



Drinking Water Annual Report

2019

Joe Law, Utilities Superintendent
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PURPOSE

The City of Quesnel annual water report describes the water system and contains all drinking water monitoring activities and sampling results for the 2019 calendar year. This report prepared and made available to the public as required by the Drinking Water Protection Act, Drinking Water Protection Regulation (section 15(b)).

WATER SYSTEM OVERVIEW

The City of Quesnel drinking water system is supplied by 6 groundwater wells that deliver water to a distribution system comprised of 7 reservoirs on 6 sites, 5 booster pump stations, 3 main PRV stations, and approximately 100 km of water main with 3640 individual service connections. Approximately 10,500 residents are served by the main water system. Currently there is no treatment or disinfection processes applied to the City's potable water system. The City of Quesnel also operates a bulk water delivery site where, for a fee, customers fill their bulk water container with potable water.

In 2019, water usage in the City system amounted to a total of 2,350,637 cubic meters, this is a 13% decrease from 2018.

WATER MANAGEMENT

In the interest of public health and environmental protection, the Environmental Operators Certification Program (EOCP) is named in legislation and is tasked with the responsibility of Classification of Facilities and Certification of Operators to enable the prudent management of water in British Columbia and the Yukon. The EOCP requires that all facilities must have an Operator with certification commensurate with the level of facility classification and that all hands-on Operators must be certified appropriate to their position. The classification level is determined by the size and complexity of the facility. In 2019 an EOCP review of facility classifications for the City of Quesnel resulted in a Level III classification of the water system. The experience and training requirements for an operator to receive a Level III certification are:

- Operator Level II Certificate *PLUS*
- 2 years related post-secondary or 90 CEUs *PLUS*
- 4 years operating experience at a Class II facility
- including 2 years Direct Responsible Charge at a Class II facility

Currently, no operators within the City of Quesnel are EOCP certified as Level III Water Distribution operators. The City of Quesnel utilities department is currently working toward acquiring Level III operator certification.

EOCP certified operators are required to achieve a minimum score of 70% on written examinations and must receive 24 hours of approved training in every two year period to maintain their certification. Operator training is critical to maintaining facility classification and ensures that current industry standards and best practices are being met. Training also provides staff an opportunity to network with other operators over common challenges faced in field operations.

The City of Quesnel maintains a Water System Emergency Response Plan, which is reviewed and updated annually to ensure that standard operating procedures remain applicable and up-to-date.

The SCADA (Supervisory Control and Data Acquisition) monitoring system enables staff to observe real-time data and information related to water system operating conditions, including water well operation and reservoir levels. System operators have the ability to remotely respond to system conditions and demands which reduces equipment failure and increases pumping efficiency.

WATER MONITORING

To ensure the delivery of safe drinking water, the City has a program to monitor water quality at the source. The City sends water samples to an approved lab for all sampling points and is notified on results and concerns.

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.

As a minimum, the number of samples to be taken from the 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 10,500 people is 13 per month. The City exceeds that number of monthly samples. The City samples 16 individual sites bi-weekly, for total coliforms, Ecoli, heterotrophic plate count and turbidity. As well, all reservoirs and wells are tested on a monthly basis for bacterial contaminants. In addition to the bacteriological parameters, additional testing is done for chemical & physical parameters.

WATER QUALITY

The Drinking Water Quality Monitoring Program outlines recommended practices for monitoring and reporting of water quality to the pertinent regulatory bodies and the public.

Water quality is routinely monitored at the source and throughout the City water system in compliance with Drinking Water Protection Act regulations and best practices employed by other municipalities in British Columbia. Samples are taken at the start, middle and end of the entire City water distribution system. If it is observed during testing that certain parameters exceed the limits specified in the GCDWQ or BCDWR guidelines, a procedure is in place for re-testing and notification of any results or conditions that render or could render the water unfit to drink.

If during any routine monitoring a sample comes back with an unacceptable bacteriological result for total coliforms, the standard protocol is to contact the Drinking Water Officer and re-sample immediately at the same location. The samples are then resubmitted for testing in order to rule out contamination during the collection of the sample. The provincial Drinking Water Officer will determine if any action by the City is necessary only after a second test also shows the presence of coliforms. If any other sample parameters exceed the Guidelines for Canadian Drinking Water Quality the Provincial Drinking Water Officer is contacted in order to determine an appropriate response.

The City collects samples from 16 (sixteen) individual sites throughout the distribution system on a bi-weekly basis. These samples are analyzed for total coliforms, E. coli, heterotrophic plate count, and

turbidity. The water system reservoirs (seven) and production wells (six) are sampled on a monthly basis and sampled for bacteriological contaminants. In total 27 (twenty-seven) sites are sampled and tested monthly.

In 2019, the City of Quesnel collected and tested a total of 362 water samples. 3 (three) individual samples recorded exceedances for total coliforms, 1 (one Bulk Water Site, 1 (one) Airport, 1 (one) Pinecrest Reservoir - these sites were re-sampled with all re-sampling results returned showing 0 (zero) exceedances for total coliforms. There were 0 (zero) total exceedances recorded for E. coli in 2019.

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. The production wells are also tested quarterly for the parameters: Chloride, Nitrate, and Nitrite. Identified sampling sites within the distribution system are tested on a semi-annual basis for the parameters: Copper, Lead, Iron, Vinyl Chloride, and Manganese.

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 blowoff. 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. The 2018 guideline for Canadian Drinking Water Quality aesthetic objective for manganese is 0.05 mg/L. The City of Quesnel wells vary from .014-.59 mg/L.

***In May 2019, the CGDWQ 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. Water system sampling and consultations are currently taking place to determine the next steps towards compliance with these new regulations.**

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 one 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 2019 City of Quesnel Water System Annual Report is presented to Council as required by the British Columbia Drinking Water Regulations Drinking Water Protection Act. 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 BC 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: Joe Law, Utilities Superintendent.

ATTACHMENTS

Attachment "A"

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

Attachment "B"

- Water sampling result summary reports for 2019

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.

A complete list of Water Quality Data is available online at www.healthspace.ca.nha

Attachment "A"

City of Quesnel Water Quality Monitoring Program

SITE	LOCATION	PARAMETERS
BI-WEEKLY (Distribution System)		
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	

<i>ANNUALLY (Wells)</i>		
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 Statistic Counts 2019
- Main System Coliform/Ecoli Exceedances 2019
- Main System Coliform/Ecoli Summary 2019
- May Semi-Annual Summary on Main 2019
- Manganese Wells 2019

Escherichia coli / E. coli (counts)

# samples:	362	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	362	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	362	min:	< 1 counts/100ml
# detects:	3	max:	1 counts/100ml
# non-detects:	359	Geometric Mean:	1 counts/100ml (based on 3 numerical results)
# of Exceedences:	3		

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)

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	1	max:	1 CFU/100ml
# non-detects:	12	Geometric Mean:	1 CFU/100ml (based on 1 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	14	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	14	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	13	Geometric Mean:	1 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		

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

Escherichia coli / E. coli (counts)

# samples:	12	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	12	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	12	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	12	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	12	min:	< 1 CFU/100ml
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# detects:	0	max:	< 1 CFU/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	12	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	12	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	12	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	12	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	12	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	12	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	12	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	14	min:	< 1 CFU/100ml
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# detects:	0	max:	< 1 CFU/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	14	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	13	Geometric Mean:	1 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		

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

Escherichia coli / E. coli (counts)

# samples:	11	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	11	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	11	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	11	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	12	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	12	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	14	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	14	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	13	Geometric Mean:	1 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	12	min:	< 1 CFU/100ml
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# detects:	0	max:	< 1 CFU/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	12	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	12	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	14	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	14	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	13	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	13	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	13	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	14	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	14	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	14	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	14	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	14	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	14	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

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

Escherichia coli / E. coli (counts)

# samples:	14	min:	< 1 CFU/100ml
# detects:	0	max:	< 1 CFU/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Total Coliforms (counts)

# samples:	14	min:	< 1 counts/100ml
# detects:	0	max:	< 1 counts/100ml
# non-detects:	14	Geometric Mean:	n/a (based on 0 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,
TNTC=too numerous to count, NR=no result, NT=not tested, IG=ignore, ER=external report, SC=see comment

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Quesnel Main System Coliform Ecoli Exceedence
01/01/2019 - 12/31/2019 (mm/dd/yyyy)

City of Quesnel
City of Quesnel – Main System

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

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

Total Coliforms (counts)
*** 03/06/2019**
11:50

	Criteria
1 counts/100ml	<=0, OG, P
	User-Defined

# samples:	14	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	13	Geometric Mean:	1 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		

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)

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

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

Total Coliforms (counts) Criteria

* 03/06/2019
 14:35 1 counts/100ml <=0, OG, P User-Defined

# samples:	14	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	13	Geometric Mean:	1 counts/100ml (based on 1 numerical results)
# of Exceedences:	1		

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

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

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

* 08/13/2019
 09:45 1 counts/100ml <=0, OG, P User-Defined

# samples:	14	min:	< 1 counts/100ml
# detects:	1	max:	1 counts/100ml
# non-detects:	13	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)

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)

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,
TNTC=too numerous to count, NR=no result, NT=not tested, IG=ignore, ER=external report, SC=see comment
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» means detected & greater than number shown
* Indicates Criteria is exceeded

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

Copper (total) **Criteria**
 05/28/2019 10:35 0.00716 mg/L <=1.0 AO

samples: 1 **min:** 0.00716 mg/L
detects: 1 **max:** 0.00716 mg/L
non-detects: 0 **avg:** 0.00716 mg/L (based on 1 numerical results)
of Exceedences: 0

Iron (total) **Criteria**
 05/28/2019 10:35 < 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**
 05/28/2019 10:35 0.00033 mg/L <=0.005 MAC

samples: 1 **min:** 0.00033 mg/L
detects: 1 **max:** 0.00033 mg/L
non-detects: 0 **avg:** 0.00033 mg/L (based on 1 numerical results)
of Exceedences: 0

Manganese (total) **Criteria**
 05/28/2019 10:35 0.00520 mg/L <=0.02 AO

samples: 1 **min:** 0.00520 mg/L
detects: 1 **max:** 0.00520 mg/L
non-detects: 0 **avg:** 0.00520 mg/L (based on 1 numerical results)
of Exceedences: 0

Vinyl chloride **Criteria**
 05/28/2019 10:35 < 0.0010 mg/L <=0.002 MAC

samples: 1 **min:** < 0.0010 mg/L
detects: 0 **max:** < 0.0010 mg/L
non-detects: 1 **avg:** n/a (based on 0 numerical results)
of Exceedences: 0

Zinc (total)		Criteria	
05/28/2019 10:35	< 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	
05/28/2019 11:20	0.00495 mg/L	<=1.0	AO

# samples:	1	min:	0.00495 mg/L
# detects:	1	max:	0.00495 mg/L
# non-detects:	0	avg:	0.00495 mg/L (based on 1 numerical results)
# of Exceedences:	0		

Iron (total)		Criteria	
05/28/2019 11:20	< 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	
05/28/2019 11:20	0.00030 mg/L	<=0.005	MAC

# samples:	1	min:	0.00030 mg/L
# detects:	1	max:	0.00030 mg/L
# non-detects:	0	avg:	0.00030 mg/L (based on 1 numerical results)
# of Exceedences:	0		

Manganese (total)		Criteria	
* 05/28/2019 11:20	0.0424 mg/L	<=0.02	AO

# samples:	1	min:	0.0424 mg/L
# detects:	1	max:	0.0424 mg/L
# non-detects:	0	avg:	0.0424 mg/L (based on 1 numerical results)

of Exceedences: 1

Vinyl chloride
 05/28/2019 11:20 < 0.0010 mg/L **Criteria** <=0.002 MAC

samples: 1 **min:** < 0.0010 mg/L
detects: 0 **max:** < 0.0010 mg/L
non-detects: 1 **avg:** n/a (based on 0 numerical results)
of Exceedences: 0

Zinc (total)
 05/28/2019 11:20 0.0056 mg/L **Criteria** <=5 AO

samples: 1 **min:** 0.0056 mg/L
detects: 1 **max:** 0.0056 mg/L
non-detects: 0 **avg:** 0.0056 mg/L (based on 1 numerical results)
of Exceedences: 0

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

Copper (total)
 05/28/2019 13:45 0.00078 mg/L **Criteria** <=1.0 AO

samples: 1 **min:** 0.00078 mg/L
detects: 1 **max:** 0.00078 mg/L
non-detects: 0 **avg:** 0.00078 mg/L (based on 1 numerical results)
of Exceedences: 0

Iron (total)
 05/28/2019 13:45 < 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)
 05/28/2019 13:45 0.00020 mg/L **Criteria** <=0.005 MAC

samples: 1 **min:** 0.00020 mg/L

# detects:	1	max:	0.00020 mg/L
# non-detects:	0	avg:	0.00020 mg/L (based on 1 numerical results)
# of Exceedences:	0		

Manganese (total)		Criteria	
* 05/28/2019 13:45	0.0622 mg/L	<=0.02	AO

# samples:	1	min:	0.0622 mg/L
# detects:	1	max:	0.0622 mg/L
# non-detects:	0	avg:	0.0622 mg/L (based on 1 numerical results)
# of Exceedences:	1		

Vinyl chloride		Criteria	
05/28/2019 13:45	< 0.0010 mg/L	<=0.002	MAC

# samples:	1	min:	< 0.0010 mg/L
# detects:	0	max:	< 0.0010 mg/L
# non-detects:	1	avg:	n/a (based on 0 numerical results)
# of Exceedences:	0		

Zinc (total)		Criteria	
05/28/2019 13:45	0.0139 mg/L	<=5	AO

# samples:	1	min:	0.0139 mg/L
# detects:	1	max:	0.0139 mg/L
# non-detects:	0	avg:	0.0139 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, 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: Well 10 Hilborn Rd.; Well No 10
Sampling Point: Well No 10 Hilborn Rd. (9-1-EP, 28000)

Manganese (total)		Criteria	
* 05/15/2019 10:50	0.568 mg/L	<=0.02	AO
* 06/04/2019 13:30	0.149 mg/L	<=0.02	AO
* 07/03/2019 15:20	0.565 mg/L	<=0.02	AO
* 07/30/2019 11:40	0.589 mg/L	<=0.02	AO
* 08/27/2019 13:15	0.623 mg/L	<=0.02	AO
* 10/22/2019 13:00	0.608 mg/L	<=0.02	AO
* 11/19/2019 13:45	0.581 mg/L	<=0.02	AO
* 12/17/2019 14:50	0.594 mg/L	<=0.02	AO

# samples:	8	min:	0.149 mg/L
# detects:	8	max:	0.623 mg/L
# non-detects:	0	avg:	0.535 mg/L (based on 8 numerical results)
# of Exceedences:	8		

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

Manganese (total)		Criteria	
* 05/15/2019 11:30	0.688 mg/L	<=0.02	AO
* 06/04/2019 11:40	0.604 mg/L	<=0.02	AO
* 07/03/2019 13:15	0.766 mg/L	<=0.02	AO
* 07/30/2019 09:20	0.678 mg/L	<=0.02	AO
* 08/27/2019 09:45	0.708 mg/L	<=0.02	AO
* 10/22/2019 11:15	0.669 mg/L	<=0.02	AO

Manganese (total)		Criteria	
* 11/19/2019 11:40	0.679 mg/L	<=0.02	AO
* 12/17/2019 10:30	0.725 mg/L	<=0.02	AO

# samples:	8	min:	0.604 mg/L
# detects:	8	max:	0.766 mg/L
# non-detects:	0	avg:	0.690 mg/L (based on 8 numerical results)
# of Exceedences:	8		

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

Manganese (total)		Criteria	
* 05/15/2019 14:00	0.183 mg/L	<=0.02	AO
* 06/04/2019 11:00	0.162 mg/L	<=0.02	AO
* 07/03/2019 09:15	0.183 mg/L	<=0.02	AO
* 07/30/2019 09:45	0.188 mg/L	<=0.02	AO
* 08/27/2019 10:15	0.198 mg/L	<=0.02	AO
* 10/22/2019 09:45	0.217 mg/L	<=0.02	AO
* 11/19/2019 11:00	0.217 mg/L	<=0.02	AO
* 12/17/2019 11:30	0.233 mg/L	<=0.02	AO

# samples:	8	min:	0.162 mg/L
# detects:	8	max:	0.233 mg/L
# non-detects:	0	avg:	0.198 mg/L (based on 8 numerical results)
# of Exceedences:	8		

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

Manganese (total)		Criteria	
05/15/2019 13:25	0.0114 mg/L	<=0.02	AO

Manganese (total)		Criteria	
06/04/2019 10:30	0.0113 mg/L	<=0.02	AO
07/03/2019 14:05	0.0127 mg/L	<=0.02	AO
07/30/2019 10:45	0.0129 mg/L	<=0.02	AO
08/27/2019 10:35	0.0156 mg/L	<=0.02	AO
10/22/2019 09:15	0.0145 mg/L	<=0.02	AO
11/19/2019 10:40	0.0141 mg/L	<=0.02	AO
12/17/2019 09:50	0.0141 mg/L	<=0.02	AO

# samples:	8	min:	0.0113 mg/L
# detects:	8	max:	0.0156 mg/L
# non-detects:	0	avg:	0.0133 mg/L (based on 8 numerical results)
# of Exceedences:	0		

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

Manganese (total)		Criteria	
* 05/15/2019 14:45	0.219 mg/L	<=0.02	AO
* 06/04/2019 14:00	0.225 mg/L	<=0.02	AO
* 07/03/2019 11:15	0.248 mg/L	<=0.02	AO
* 07/30/2019 11:10	0.211 mg/L	<=0.02	AO
* 08/27/2019 13:45	0.226 mg/L	<=0.02	AO
* 10/22/2019 13:30	0.225 mg/L	<=0.02	AO
* 11/19/2019 13:00	0.250 mg/L	<=0.02	AO
* 12/17/2019 13:50	0.211 mg/L	<=0.02	AO

# samples:	8	min:	0.211 mg/L
# detects:	8	max:	0.250 mg/L
# non-detects:	0	avg:	0.227 mg/L (based on 8 numerical results)
# of Exceedences:	8		

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

Manganese (total)		Criteria	
* 05/15/2019 09:50	0.153 mg/L	<=0.02	AO
* 06/04/2019 09:30	0.564 mg/L	<=0.02	AO
* 07/03/2019 11:55	0.159 mg/L	<=0.02	AO
* 07/30/2019 13:10	0.147 mg/L	<=0.02	AO
* 08/27/2019 11:15	0.159 mg/L	<=0.02	AO
* 10/22/2019 10:45	0.148 mg/L	<=0.02	AO
* 11/19/2019 09:30	0.139 mg/L	<=0.02	AO
* 12/17/2019 13:00	0.138 mg/L	<=0.02	AO
# samples:	8	min:	0.138 mg/L
# detects:	8	max:	0.564 mg/L
# non-detects:	0	avg:	0.201 mg/L (based on 8 numerical results)
# of Exceedences:	8		

Result Legend:

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