Assessment of the District of Chetwynd Drinking Water Supply: Source Water Characteristics

James Jacklin, March 2004[1]

Introduction

In British Columbia, drinking water quality is becoming a significant public issue. We all want to have confidence in the quality of the water we consume. Its protection is also important to local purveyors, who act as our water suppliers, and to provincial government ministries responsible for water management. Within the Omineca-Peace region of B.C., our most common potable source is ground water, although many communities do make use of rivers, streams or lakes. Our basic drinking water quality is determined by a number of factors including local geology, climate and hydrology. In addition to these, human land use activities such as urbanization, agriculture and forestry, and the pollution they may cause, are becoming increasingly important influences. Environmental managers have a responsibility to control land use development so as to minimise the effects of these activities on source water quality.

The province's Drinking Water Protection Act, enacted in October, 2002, places the responsibility for drinking water quality protection with the B.C. Ministry of Health and local water purveyors. However, through the B.C. Environmental Management Act, the British Columbia Ministry of Environment (MOE) is responsible for managing and regulating activities in watersheds that have a potential to affect water quality. Accordingly, the Ministry plans to take an active role in protecting drinking water quality at its source.

Plate 1. A view of the Chetwynd pump house where the raw water samples were collected.

MOE implemented a raw water quality and stream sediment monitoring program at selected communities in the Omineca-Peace region in 2002. Community sites were selected using a risk assessment process that considered:

- whether the source supply was surface water or ground water,
- the level of water treatment,
- the population size served,
- the potential for upstream diffuse and point-source pollution,
- the availability of current, high-quality and representative data on each raw water source,
- whether past outbreaks of waterborne illness had been reported,
- the ability/willingness of local purveyors to assist with sampling.

Through this process and with available funding, a total of 18 community water supplies in the Omineca-Peace region were selected for monitoring during 2002/03.

This brief report will summarise water quality data collected from the Chetwynd raw potable water source (ground water) (Plate 1). The data are compared to current provincial drinking water quality guidelines meant to protect finished water if no treatment other than disinfection is present. This comparison should identify parameters with concentrations that represent a risk to human health. It is intended that this program will lead to the identification of human activities responsible for unacceptable source water quality, and that it will assist water managers to develop measures to improve raw water quality where needed.

[1] A template report was prepared for the author by Todd D. French of TDF Watershed Solutions, Research & Management and Bruce Carmichael, Ministry of Environment.

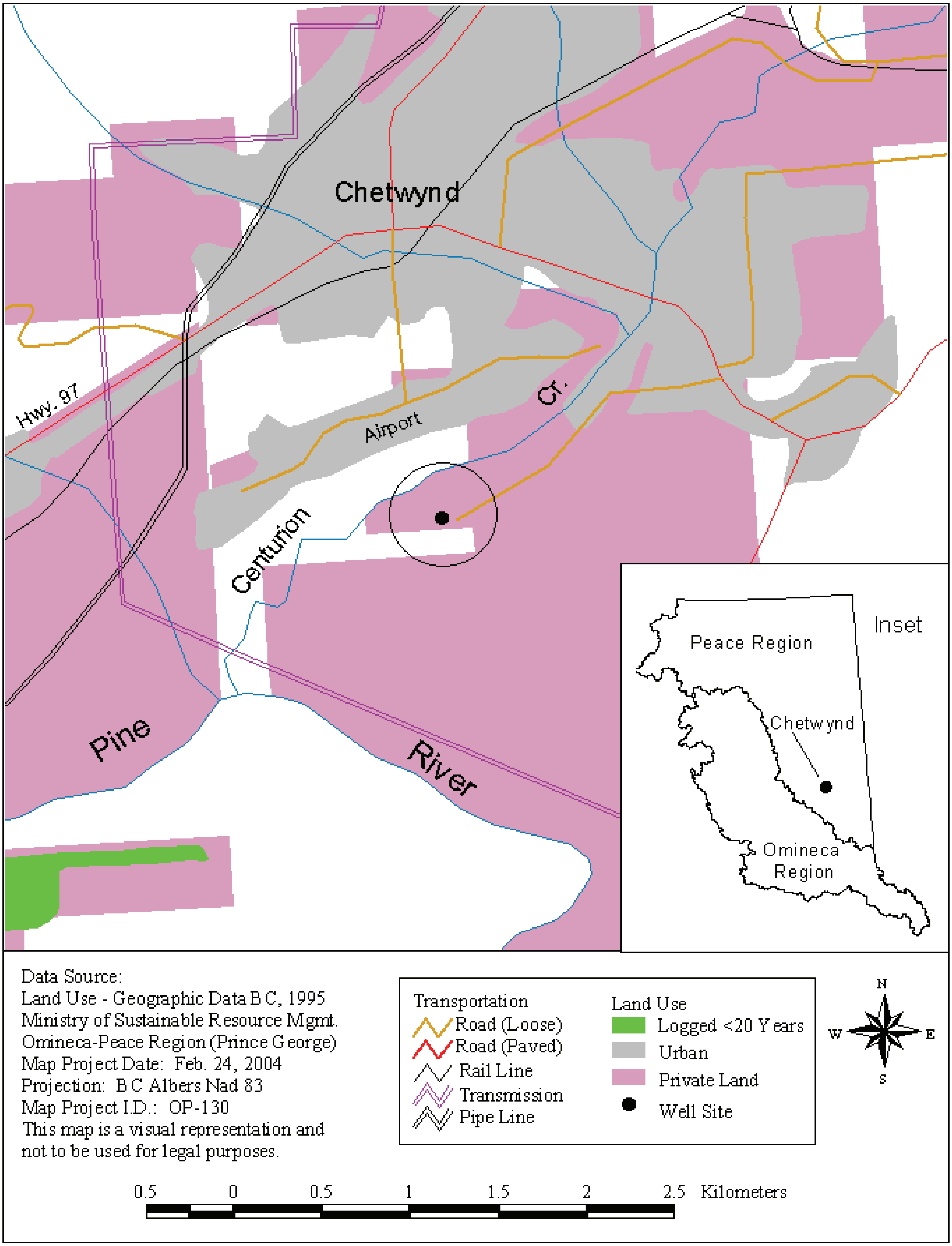

Figure 1. Chetwynd water well and nearby land use practices. A 300 m radius surrounds the well indicating the zone where contamination is most probable to occur.

Site Description

Watershed Overview

The District of Chetwynd is located approximately 150 km south of Fort St. John, B.C.. The drinking water supply consists of one well, located south of the airport. This area lies within the Boreal White and Black Spruce biogeoclimatic zone, which is characterized by rolling topography, long and cold winters and a landscape composed of black spruce bogs intermixed with stands of white spruce and trembling aspen at higher elevations (B.C. Ministry of Forests, 1998).

The predominant land use activity surrounding the community well is urban development. Agriculture, forestry, mining and oil & gas development are also present, however, are present at lower densities and located some distance from the well.

According to Gord Gosse, an engineering technician for the District, the current withdrawal rate for the well is approximately 35 litres/second. According to the Chetwynd well log TPW00-2(6), the lithology profile is clay and silts between 0 and 473 feet, and sand and gravel between 473 and 484 feet. The total well depth is 500 feet (152 m). At the time of construction, this well had a static water level of 24.16 m.

The abundance of silts and clays in the top 473 feet of the well suggests a ground with a low permeability, which should help retard the flow rate of contaminants to the ground water table. This is beneficial compared to an unconfined aquifer (dominantly sands and gravels), which allow materials to percolate at a much faster rate.

There are some waste disposal permits in the proximity of the Chetwynd well, including the communities sewage lagoon that is located approximately 450 m away. Because the well is 500 feet deep, and the lithology is dominantly silts and clays, possible impacts from this source are expected to be minimal.

Drinking Water Supply & Treatment

The District of Chetwynd draws its domestic water from a ground water supply, consisting of one well. The well is situated near the pump house, south of the airport. As measured with a GPS unit, the geographic co-ordinates of the pump house are 55.6815N/121.6276W. Sodium hypochlorite is injected into the water supply at the pump house, followed by water filtration, and chlorine gas at the water treatment plant.

There are some concerns regarding the source water supply, as indicated by Gord Gosse. The well water pressure has declined since the initial drilling tests, indicating that water volume will be a future issue.

Materials & Methods

Sample Collection & Analyses for the 2002/03 Water Monitoring Program

Water Quality

An experienced consultant and/or MOE staff member collected water samples in laboratory certified polyethylene bottles for a variety of chemical and bacterial analyses. Representative grab samples were collected from the raw water tap (Plate 2) inside the pump house (site E249350 - Water Source ID Tag 1349). The chemical results, analytical detection levels and drinking water quality guidelines are provided in Table 1, Appendix A.

Plate 2. The raw water tap inside the Chetwynd pump house.

Bottles used for general ion analyses were rinsed three times with source water prior to sample collection. Metal and bacterial bottles were not rinsed and metal samples were lab preserved. Prior to sampling the raw water tap, the source was flushed for 5 minutes in order to minimize contamination by system piping. Water samples were shipped by overnight courier in coolers with ice packs to CanTest Ltd. (from September 2002-March 2003) and JR Laboratories Inc. (April 2003 to September 2003) for bacteria and PSC Environmental Services Ltd. for chemistry. Bacterial samples were analysed using membrane filtration. Metals analysis made use of ICPMS technology.

Quality Assessment (QA)

To ensure accuracy and precision of data, quality assurance and control (QA/QC) procedures were incorporated into the monitoring program. This included use of rigorous sampling protocols, proper training of field staff, setting of data quality objectives and the submission of QA samples to the lab. Field QA included duplicate and blind blank samples.

Blank samples detect contamination introduced in the field and/or in the lab. A comparison of duplicate results measures the effect of combined field error, laboratory error and real between-sample variability. The blind blank and duplicate program accounted for roughly 20% of the overall chemistry and bacterial sample numbers.

Results

Water Monitoring Program (2002/03)

Quality Assessment (QA)

The field blank and duplicate results indicate that minimal field or lab contamination of samples with bacteria occurred and that acceptable precision in bacterial sampling and analysis was observed.

The five water chemistry field blank samples that were prepared either the same day or within one day of the Chetwynd collections tested positive for some parameters. The concentration of most of these parameters was either very close to or less than 5-fold the minimum detectable concentration, an acceptable threshold as per the lab acceptance criteria. Seven parameters exceeded these acceptance criteria significantly and are listed below in Table 2.

Table 2. Blind blank samples that tested strongly positive (≥ 5-fold MDL) for chemical contamination.

Date	Parameter	Measured Concentration	MDL
Oct. 2/02	Lithium-Total	0.36 µg/L	0.05 µg/L
Oct. 2/03	Strontium-Dissolved	0.048 µg/L	0.005 µg/L
Mar. 20/03	Copper-Total	0.37 µg/L	0.05 µg/L
Mar. 20/03	Lead-Total	0.05 µg/L	0.01 µg/L
Mar. 20/03	Strontium-Total	0.1 µg/L	0.005 µg/L
May 1/03	Nitrate + Nitrite	0.054 mg/L	0.002 mg/L
May 1/03	Sulphate	2.7 mg/L	0.5 mg/L

Although the levels of some of these blank results are equal to or greater than the actual concentrations observed in Chetwynd on some dates, the values are usually well below provincial raw drinking water guidelines by greater than two orders of magnitude. The contamination that did occur may have resulted during the deionization process in the lab or during the transfer of the deionized water between bottles in the field. Regardless, these levels of blank contamination should not limit the comparison of data to water quality guidelines.

The five water chemistry duplicate samples that were prepared either the same day or within one day of the Chetwynd collections did have some values outside the lab acceptance criteria of 25% relative percent difference (Table 3, Appendix A). The differences that are present may be due to problems with collection and/or analytical precision. All of the parameters that did have differences greater than 25% between the duplicates occurred well below recommended drinking water guidelines.

Bacteriology

The 2002/03 bacterial data are summarised in Table 4. Drinking raw water quality guidelines for *E. coli, Enterococci* and fecal coliforms are ≤ 10/100 CFU/100mL (90th perc.), ≤ 3 CFU/100mL (90th perc.), and ≤ 10 CFU/100mL (90th perc.) respectively, in raw water supplies that undergo disinfection only.

Table 4. Results of bacterial analyses for the Chetwynd raw water supply. Units are CFU/100mL.

Date	Total Coliform	*E. coli*	*Enterococci*	Fecal Coliform
Provincial Guideline	No Provincial Guideline	*≤ 10 CFU/100 mL (90th perc.)*	*≤3 CFU/100 mL (90th perc.)*	*≤ 10 CFU/100 mL (90th perc.)*
Oct. 2/02	<1	<1	<1	<1
Jan. 13/03	<1; <1	<1; <1	<1; <1	-
Mar. 20/03	<1	<1	<1	<1
May 1/03	<2	<2	<2	<2
May 29/03	<1	<1	**2**	<1
Aug. 21/03	<1	<1	<1	<1

Most samples collected from this water supply contained no detectable bacteria. The May 29th sample did have a positive result for *Enterococci*, however, this detection may have resulted from long holding times or a warm arrival temperature to the lab.

Care must be taken when interpreting this data, as recommended guidelines for raw water using disinfection as treatment require five samples to be collected in a 30 day period. 90% of these samples then need to be over the stated guideline for that guideline to be exceeded. This study did not sample five times in a 30 day period, but rather six times throughout the entire year. Thus, this data must be used cautiously when referring to B.C. water quality guidelines.

Water Chemistry

In 2002/03, ground water samples were collected on six different dates. The water samples were analysed for 15 general parameters as well as for the ICPMS low level metals package that includes 27 metals in the total form.

Of the chemical parameters tested through the duration of this study, two exceeded the provincial guidelines for raw drinking water and one was of note.

Colour (TCU) - The maximum colour concentration for the year was 20 TCU, over the recommended water quality guideline of 15 TCU. The colour of water is a measure of its dissolved compounds (attributed to the presence of organic and inorganic materials). High colour levels are regarded as a pollution problem in terms of aesthetics, and can be produced by agricultural and industrial effluents (RIC, 1998). Colour can also originate naturally from organic soils and wetlands.

Barium, Total (µg/L) - The mean and maximum barium concentrations for the year were 886 and 1030 µg/L, respectively. The provincial drinking water guideline is 1000 µg/L. Barium can cause short term gastrointestinal disturbances and muscular weakness, and long term high blood pressure problems (EPA, 2002). The main anthropogenic use of barium (the mineral barite) is during the drilling of oil and gas wells. It is used as a mud to aid in the support of drill rods, and to help prevent the blow out of gas (Klein and Hurlbut, Jr., 1999). Barite is also found naturally in many locations.

Turbidity (NTU) - The mean turbidity was 4.2 NTU, approaching the provincial guideline of 5 NTU. Turbidity is a measure of the suspended particulate matter in the water which includes silt, organic material and/or microorganisms. Turbidity can increase the available surface area of solids upon which bacteria grow and can interfere with disinfection and be aesthetically unpleasant (RIC, 1998).

Water hardness, which can often be a problem in ground water supplies, had a mean concentration of 214 mg/L $CaCO_3$. This is considered very hard (>180 mg/L $CaCO_3$), above the optimum range of 60-120 mg/L $CaCO_3$ for a drinking water supply. This hardness is due to the presence of calcium and magnesium in the water. Hard water can reduce the toxicity of some metals, but can also leave scale deposits on piping (RIC, 1998). Some anthropogenic sources that contribute to water hardness are mining and industrial effluents. High hardness values also occur naturally in areas where there is an abundance of calcium and magnesium bearing rocks and minerals.

The data from 2002/03 indicates that most chemical parameters in the Chetwynd water supply are generally low for drinking water use. There do however appear to be issues regarding water hardness, colour, turbidity and barium levels.

A complete list of the results as well as their corresponding guideline is attached in Table 1, Appendix A. A complete list of the raw data from the 2002/03 program is attached in Table 5, Appendix A.

Conclusions & Recommendations

Review of the Chetwynd ground water data indicates an overall good raw drinking water quality. Most water soluble contaminants were present at concentrations well below drinking water guidelines. The main parameters of interest are hardness, colour, turbidity and barium. The hard water may cause problems with the scaling of water pipes, as well as aesthetic concerns. Colour and turbidity generally pose aesthetic concerns at low levels similar to those in this study. Barium poses more of a health risk, with the potential for gastrointestinal disturbances, muscular weakness and high blood pressure. Although concentrations of barium were either just below or exceeding the provincial raw water guideline on most dates, the District of Chetwynd has been given permission by Public Health to use the US EPA drinking water guideline of 2000 µg/L rather than the 1000 µg/L used in B.C. (Bob Watson, p.c.). The raising of the barium guideline was approved by two health authorities, Dr. Ray Copes and Dr. David Bowering. Thus, the concentrations of barium during the 2002/03 program, most of which were between 900-1000 µg/L, are well below the US EPA guideline of 2000 µg/L. There are treatment methods to deal with all of these exceedances, however those will not be discussed here.

Based on the lack of information regarding the well, a 300 m radius is arbitrarily assigned as the zone where contamination is most likely (Mike Wei, Senior Hydrogeologist, MOE, p.c.). Since the lithology profile of the well indicates dominantly silts and clays, the aquifer probably has a low permeability and should be more buffered against land use activities compared to a ground composed of sands and gravels. Although these clay layers would retard leachates from moving quickly into the water table, harmful land use practices in the close vicinity of the well (approximately 300 m) are discouraged. Additionally, there is one waste disposal permits just outside this 300 m radius that should be considered as possible contamination sources. Regardless, a 300 m radius site assessment may still be useful to indicate where there is potential for contamination.

Although the District of Chetwynd has indicated that they will go back to the Pine River as their primary water source, only using the well from this study as their back up supply, periodic water sampling may still be useful to indicate changing water quality parameters and to assess the potability of the water.

Acknowledgements

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Contact Information

For more information regarding either this short report, watershed protection and/or drinking water, please contact the Ministry of Environment (Contact: Bruce Carmichael (Prince George), 250-565-6455) or the Northern Health Authority (Contact: Bruce Gaunt (Prince George), 250-565-2150 or Caroline Alexander (Fort St. John), 250-787-3355).

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B.C. Ministry of Environment,
1011- 4th Avenue (3rd Floor),
PRINCE GEORGE, B.C., CANADA,
V2L 3H9
Tel: (250) 565-6135
Fax: (250) 565-6629

Appendix A

Table 1. 2002/03 sample parameters, summaries of current results and associated B.C. drinking water guidelines.

Parameter	# of Values	Min.	Max.	Mean	Std. Dev.	MDL	D.W. Guideline	Guideline Type
Physical								
pH	6	8.1	8.4	8.2	0.10	0.1	6.5-8.5	aesthetic objective
Colour (TCU)	6	5	20	13	6.4	5	≤ 15	aesthetic objective
Specific Conductance (µS/cm)	6	469	489	480	7.7	1	≤ 700	maximum acceptable concentration
Turbidity (NTU)	5	3.16	5.46	4.25	1.002	0.1	≤ 5	maximum acceptable concentration
Hardness Total (mg/L)	6	206	220	214	4.9		≤ 500 $CaCO_3$ (Diss.)	aesthetic objective
Alkalinity (mg/L)	6	265	287	271	8.3	0.5		
Residue Non-Filterable (mg/L)	6	4	12	5	3.3	4		
Total Organic Carbon (mg/L)								
TOC	5	1	1.8	1.3	0.34	0.5	≤ 4	maximum, to control THM production
Anions (mg/L)								
Chloride Dissolved	6	1.5	2.3	1.9	0.26	0.5	≤ 250	aesthetic objective
Fluoride Dissolved	6	0.47	0.59	0.53	0.051	0.01	≤ 1.5	maximum acceptable concentration
Bromide Dissolved	6	0.1	0.1	0.1	0.00	0.1		
Nutrients (mg/L)								
Nitrate+Nitrite	6	0.002	0.033	0.009	0.012	0.002	≤ 45 (Nitrate)	maximum acceptable concentration
Phosphorus Total	1	0.01	0.01	0.01		0.002		
Phosphorus Total-Diss.	1	0.006	0.006	0.006		0.002		
Sulphate (mg/L)								
Sulphate	6	4.1	57.1	13.2	21.52	0.5	≤ 500	aesthetic objective
Metals Total (ug/L)								
Aluminum-T	6	0.3	7.8	1.8	2.98	0.3	≤ 200 (Diss.)	maximum acceptable concentration
Antimony-T	6	0.006	0.035	0.020	0.010	0.005	≤ 6	interim maximum acceptable concentration
Arsenic-T	6	2.7	4.6	3.6	0.74	0.1	≤ 25	interim maximum acceptable concentration
Barium-T	6	763	1030	886	103.4	0.02	≤ 1000	maximum acceptable concentration
Beryllium-T	6	0.02	0.02	0.02	0.000	0.02		
Bismuth-T	6	0.02	0.02	0.02	0.000	0.02		
Cadmium-T	6	0.01	0.07	0.05	0.022	0.01	≤ 5	maximum acceptable concentration
Calcium-T (mg/L)	6	38.4	41.8	40.5	1.24	0.05		
Chromium-T	6	0.2	4.7	1.3	1.89	0.2	≤ 50	maximum acceptable concentration
Cobalt-T	6	0.005	0.104	0.038	0.043	0.005		
Copper-T	6	0.05	1.19	0.59	0.426	0.05	≤ 1000	aesthetic objective
Iron-T (mg/L)	5	0.544	1.28	0.71	0.318	0.005	≤ 0.3	aesthetic objective
Lead-T	6	0.07	1.77	0.62	0.598	0.01	≤ 10	maximum acceptable concentration
Lithium-T	6	16.5	19	18	1.1	0.05		
Magnesium-T (mg/L)	6	26.8	28	27	0.4	0.05	≤ 100 (Diss.)	aesthetic objective
Manganese-T	6	15.55	22.7	19.3	2.66	0.008	≤ 50	aesthetic objective
Molybdenum-T	6	20.4	22.9	22.2	0.94	0.05	≤ 250	maximum acceptable concentration
Nickel-T	6	0.05	1.12	0.46	0.391	0.05		
Selenium-T	6	0.2	0.25	0.2	0.02	0.2	≤ 10	maximum acceptable concentration
Silver-T	6	0.02	0.02	0.02	0.000	0.02		
Sodium-T (mg/L)	5	29	30.6	29	0.7	0.05	≤ 200	aesthetic objective
Strontium-T	6	518	661	591	54.8	0.005		
Thallium-T	6	0.002	0.002	0.002	0.000	0.002	≤ 2	maximum acceptable concentration
Tin-T	6	0.01	0.03	0.015	0.008	0.01		
Uranium-T	6	0.694	0.772	0.749	0.029	0.002	≤ 100	maximum acceptable concentration
Vanadium-T	6	0.1	2.155	1.219	0.819	0.06	≤ 100	maximum acceptable concentration
Zinc-T	6	1.1	6.1	3.2	2.07	0.1	≤ 5000	aesthetic objective

Table 3. Duplicate samples that exceeded precision acceptability criteria (≤25% difference when >5-fold MDL). All concentrations in µg/L unless otherwise indicated.

Parameter	MDL (µg/L)	October/02			January/03			March/03			April/03			May/03		
		Conc. 1	Conc. 2	RPD %	Conc. 1	Conc. 2	RPD %	Conc. 1	Conc. 2	RPD %	Conc. 1	Conc. 2	RPD %	Conc. 1	Conc. 2	RPD %
Aluminum-D	0.3	31.2	13.5	**79**												
Chromium-T	0.2	2.1	4.3	**69**												
Colour-True (TCU)	5										240	160	**40**			
Copper-T	0.05				0.55	0.78	**35**	1.69	2.32	**31**						
Iron-T (mg/L)	0.005													13.8	10.7	**25**
Phosphorus-T (mg/L)	0.002										0.084	0.012	**150**			
Phosphorus-T-D (mg/L)	0.002										0.013	0.002	**147**			
Thallium-D	0.002										0.012	0.009	**29**			
Turbidity (NTU)	0.1				3.9	2.86	**31**									
Vanadium-T	0.06	1.94	3.35	**53**												
Zinc-T	0.1	2.8	1.1	**87**	4.4	6.4	**37**									

RPD %=Relative Percent Difference
**Data are presented for the purpose of batch specific QA assessment. Most QA samples were not collected at Chetwynd.*

Table 5. 2002/03 raw drinking water data collected from the Chetwynd well.

Date	Total Coliform (CFU./100mL)	Fecal Coliform (CFU./100mL)	Enterococci (CFU./100mL)	E. Coli (CFU./100mL)	pH (pH Units)
02-Oct-02	<1	<1	<1	<1	8.2
13-Jan-03	<1	<1	<1		8.2
13-Jan-03	<1	<1	<1		8.3
20-Mar-03	<1	<1	<1	<1	8.1
01-May-03	<2	<2	<2	<2	8.2
29-May-03	<1	<1	2	<1	8.4
21-Aug-03	<1	<1	<1	<1	8.3

True Colour (Col. Unit)	Specific Conductance (µS/cm)	Residues - NonFilt. (mg/L)	Turbidity (NTU)	Hardness - Total (mg/L)	Alkalinity - Tas $CaCO_3$ (mg/L)
5	469	<4		216	267
5	481	<4	3.9	216	270
10	483	<4	2.86	215	271
20	473	12	3.16	220	270
15	489	<4	5.03	216	265
20	485	<4	5.46	211	287
10	484	<4	4.22	206	265

Bromide - Diss. (mg/L)	Chloride - Diss. (mg/L)	Fluoride - Diss. (mg/L)	Carbon - Tot. Org. (mg/L)	NO2 + NO3 (mg/L)	Phosphorus - Tot. Diss. (mg/L)
<0.1	1.9	0.57	1.4	0.003	
<0.1	2.4	0.61		<0.002	
<0.1	1.3	0.58		<0.002	
<0.1	2	0.49	1.2	0.011	
<0.1	2.3	0.47	1	0.033	
<0.1	1.8	0.5	1	<0.002	0.006
<0.1	1.5	0.56	1.8	0.005	

Phosphorus - Tot. (mg/L)	Sulfate (mg/L)	Aluminum - Tot. (µg/L)	Antimony - Tot. (µg/L)	Arsenic - Tot. (µg/L)	Barium - Tot. (µg/L)
	4.9	<0.3	0.006	2.7	763
	3.9	<0.3	0.036	3.2	755
	4.4	<0.3	0.034	3.2	796
	4.3	0.7	0.026	3.3	958
	57.1	7.8	0.012	4.6	1030
0.01	4.5	<0.3	0.02	3.5	899
	4.1	1.2	0.023	4.4	891

Beryllium - Tot. (µg/L)	Bismuth - Tot. (µg/L)	Cadmium - Tot. (µg/L)	Calcium - Tot. (mg/L)	Chromium - Tot. (µg/L)	Cobalt - Tot. (µg/L)
<0.02	<0.02	0.05	41.1	2.5	<0.005
<0.02	<0.02	<0.01	40.8	<0.2	<0.005
<0.02	<0.02	<0.01	40.6	<0.2	<0.005
<0.02	<0.02	0.05	41.8	<0.2	<0.005
<0.02	<0.02	0.07	41.3	<0.2	0.079
<0.02	<0.02	0.05	39.8	<0.2	0.031
<0.02	<0.02	0.07	38.4	4.7	0.104

Copper - Tot. (µg/L)	Iron - Tot. (mg/L)	Lead - Tot. (µg/L)	Lithium - Tot. (µg/L)	Magnesium - Tot. (mg/L)	Manganese - Tot. (µg/L)
<0.05		0.07	18.2	27.5	17
0.55	0.581	1.81	16.2	27.8	15.3
0.78	0.585	1.73	17	27.7	15.8
1.19	0.582	0.48	16.5	28	21.3
0.95	1.28	0.66	18.8	27.5	22.7
0.43	0.569	0.51	18	27.2	19.9
0.28	0.544	0.26	19	26.8	19.3

Molybdenum - Tot. (µg/L)	Nickel - Tot. (µg/L)	Selenium - Tot. (µg/L)	Silver - Tot. (µg/L)	Sodium - Tot. (mg/L)	Strontium - Tot. (µg/L)
21.9	0.56	<0.2	<0.02		541
19.4	<0.05	<0.2	<0.02	29	505
21.4	<0.05	0.3	<0.02	29	531
22.9	0.11	<0.2	<0.02	29.4	661
22.5	0.57	<0.2	<0.02	29	635
22.8	1.12	<0.2	<0.02	30.6	585
22.6	0.33	<0.2	<0.02	29.5	609

Thallium - Tot. (µg/L)	Tin - Tot. (µg/L)	Uranium - Tot. (µg/L)	Vanadium - Tot. (µg/L)	Zinc - Tot. (µg/L)
<0.002	<0.01	0.74	1.85	1.1
<0.002	0.02	0.745	2.17	4.4
<0.002	0.02	0.776	2.14	6.4
0.002	<0.01	0.766	1.47	2.1
<0.002	0.03	0.759	0.1	6.1
0.002	<0.01	0.772	0.36	2.4
<0.002	<0.01	0.694	1.38	1.8