



Drinking Water Quality and Compliance Cities Long Form – A Template for Annual Notice to Consumers

The Water Security Agency and Ministry of Environment requires that at least once each year waterworks owners provide notification to consumers of the quality of water produced and supplied as well as information on the performance of the waterworks in submitting samples as required by a Minister's Order or Permit to Operate a Waterworks. The following is a summary of the City of Prince Albert's water quality and sample submission compliance record for the January 1, 2017 to December 31, 2017 time period. This report was completed on February 2, 2017. Readers should refer to Saskatchewan Water Security Agency's Municipal Drinking Water Quality Monitoring Guidelines, June 2015, EPB 502 for more information on minimum sample submission requirements. Permit requirements for a specific waterworks may require more sampling than outlined in the department's monitoring guidelines. If consumers need more information on the nature and significance of specific water tests, for example, "what is the significance of selenium in a water supply", more detailed information is available from: http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/index_e.html.

Water Quality Standards

Bacteriological Quality

Parameter/Location	Limit	Regular Samples Required	Regular Samples Submitted	# of Positive Regular Submitted (Percentage)
Total Coliform	0 organisms/100 mL	572	573	0 samples tested positive for total coliforms = 100 % compliance.
E. coli	0 organisms/100 ml			
Background Bacteria	Less than 200 organisms/100 mL			

The owner/operator is responsible to ensure that one hundred percent of all bacteriological samples are submitted as required. Generally analysis is performed on a single sample for all parameters mentioned above. All waterworks are required to submit samples for bacteriological water quality; the frequency of monitoring depends on the population served by the waterworks.

Water Disinfection – Chlorine Residual for Test Results Submitted with Bacteriological Samples

Parameter	Minimum Limit (mg/L)	Free Chlorine Residual Range	Total Chlorine Residual Range	# Tests Required	# Tests Submitted	# Adequate Chlorine (%)
Chlorine Residual in Distribution System	0.1 mg/L free OR 0.5 mg/L total	0.19mg/l to 1.97mg/l	0.37 mg/l to 2.17 mg/l	572	573	(100%)

*A minimum of 0.1 milligrams per litre (mg/L) free chlorine residual **OR** 0.5 mg/L total chlorine residual is required at all times throughout the distribution system unless otherwise approved. A proper chlorine submission is defined as a bacteriological sample submission form with both the free and total chlorine residual fields filled out. Adequate chlorine is a result that indicates that the chlorine level is above the regulated minimums. Adequate chlorine may be counted even if the chlorine results were submitted incorrectly. A waterworks is required to submit chlorine residual test results on every bacteriological sample they submit.*

Water Disinfection – Free Chlorine Residual for Water Entering Distribution System – From Water Treatment Plant Records

Parameter	Limit (mg/L)	Test Level Range	# Tests Performed	# Tests Not Meeting Requirements
Free Chlorine Residual	at 0.4	1.26 mg/l to 3.0 mg/l	Continuous on line monitoring and a manual grab samples every 2 hours	0

A minimum of 0.4 milligrams per litre (mg/L) free chlorine residual is required for water entering the distribution system. Water is monitored continuously for free chlorine residual and tests are normally performed on a daily basis by the waterworks operators and are recorded into the operation records. This data includes the number of free chlorine residual tests performed, the overall range of free chlorine residual (highest and lowest recorded values) and the number of tests and percentage of results not meeting the minimum requirement of 0.4 mg/L free chlorine residual.

Turbidity

Parameter	Limit (NTU)	Test Level Range	# Tests Not Meeting Requirements	Maximum Turbidity (NTU)	# Tests Required
Filter A Turbidity	1.0	0.01 - 0.30	0	0.30	Continuous Monitoring
Filter B Turbidity	1.0	0.01 - 0.30	0	0.30	Continuous Monitoring
Filter C Turbidity	1.0	0.01 - 0.30	0	0.30	Continuous Monitoring
Filter D Turbidity	1.0	0.01 - 0.30	0	0.30	Continuous Monitoring
Filter E Turbidity	1.0	0.01 - 0.30	0	0.30	Continuous Monitoring
Filter F Turbidity	1.0	0.01 - 0.30	0	0.30	Continuous Monitoring
Water entering the Distribution System	5.0	0.0 – 3.00	0	3.00	Continuous Monitoring

Turbidity is a measure of water treatment efficiency. Turbidity measures the “clarity” of the drinking water and is generally reported in Nephelometric Turbidity Units (NTU). All waterworks are required to monitor turbidity at the water treatment plant. The frequency of measurement varies from daily for small systems to continuous for larger waterworks.

"<" means less than

Chemical – Health Category							
Parameter	Limit MAC (mg/L)	Limit IMAC (mg/L)	May 3 Sample Results (mg/l)	Nov 8 Sample Results (mg/l)	Samples Exceeding MAC/IMAC	# Samples Required	# Samples Submitted
Aluminum		0.10	0.027	0.0226	0	2 per year	2
Antimony	0.006		0.00018	<0.00010	0	2 per year	2
Arsenic	0.010		0.00018	0.00017	0	2 per year	2
Barium	1.0		0.0628	0.0501	0	2 per year	2
Boron		5.0	0.034	0.027	0	2 per year	2
Cadmium	0.005		0.0000122	0.0000077	0	2 per year	2
Chromium	0.05		0.00018	<0.00010	0	2 per year	2
Cobalt	no current standard		<0.0001	<0.0001	0	Supplementary Sampling	2
Copper	Aesthetic objective	1 mg/l	0.00133	0.00060	0	2 per year	2
Fluoride (avg.*)		1.5 mg/l	Max result 1.25 mg/l; Average for Year 0.64 mg/l		0	417	721
Iron	Aesthetic objective	0.3 mg/l	<0.01	<0.01	0	2 per year	2
Lead	0.01		<0.00005	<0.00005	0	2 per year	2
Manganese	Aesthetic objective	0.05 mg/l	<0.0031	<0.00094	0	2 per year	2
Molybdenum	no current standard		0.000833	0.00123	0	Supplementary Sampling	2
Nickel	no current standard		0.00165	0.0007	0	Supplementary Sampling	2
Nitrate-N	10		<0.50	<0.50	0	Supplementary Sampling	2
Nitrite	3.2		<0.05	<0.05	0	Supplementary Sampling	2
Selenium	0.01		0.000188	0.000202	0	2 per year	2
Silver	no current standard		<0.00001	<0.00001	0	2 per year	2
Uranium	0.02		0.000045	0.000306	0	2 per year	2
Zinc	Aesthetic objective	5 mg/l	<0.003	<0.003	0	2 per year	2

Substances within the chemical health category may be naturally occurring in drinking water sources or may be the result of human activities. These substances may represent a long-term health risk if the Maximum Acceptable Concentration (MAC) or Interim Maximum Acceptable Concentration (IMAC) is exceeded. All drinking water supplies are required to monitor for substances in the "Chemical-Health" category, the frequency of monitoring depends on the population served by the waterworks. Some waterworks add fluoride to drinking water as a means to aid in the prevention of dental decay.

* Results expressed as average values for communities or waterworks which fluoridate drinking water supplies or those with elevated concentrations of fluoride or nitrates.

Chemical – Cyanide and Mercury

Date of last sample: November 7, 2016

"<" means less than

Parameter	Limit MAC (mg/L)	May 3 Sample Results	November 8 Sample Results	# Samples Exceeding MAC	# Samples Required	# Samples Submitted
Cyanide	0.2	<0.002	<0.0010	0	2 per year	2
Mercury	0.001	<0.000005	0.000005	0	2 per year	2

Mercury enters water supplies naturally and as a result of human activities. Cyanide can enter source waters as a result of industrial effluent or spill events. These substances may represent a long-term health risk if the Maximum Acceptable Concentration (MAC) is exceeded. Mandatory sampling requirements depend on the population served by the waterworks.

To be sampled again in 2018

“<” means less than
July 12/2016

<u>Chemical – Pesticides</u>	Limit MAC(mg/L)	Limit IMAC (mg/L)	Sample Results (mg/l)	Samples Exceeding MAC/IMAC	# Samples Required	# Samples Submitted
Aldicarb	0.009		<0.0007	0	Supplementary Sampling	1
Alachlor	no current standard		<0.0005	0	Supplementary Sampling	1
Anzinphos-methyl	0.02		<0.00001	0	Supplementary Sampling	1
Atrazine		0.005	<0.0005	0	1 every 2 years	1
Bendiocarb	0.04		<0.002	0	Supplementary Sampling	1
Bromoxynil		0.005	<0.00044	0	1 every 2 years	1
Carbaryl	0.09		<0.0002	0	Supplementary Sampling	1
Carbofuran	0.09		<0.0018	0	1 every 2 years	1
Chlorpyrifos	0.09		<0.000002	0	1 every 2 years	1
Cyanazine	0.01		<0.0005	0	Supplementary Sampling	1
Diazinon	0.02		<0.00017	0	Supplementary Sampling	1
Dicamba	0.12		<0.000008	0	1 every 2 years	1
Dichlorprop	no current standard		<0.0005	0	Supplementary Sampling	1
Dinoseb	0.01		<0.00005	0	Supplementary Sampling	1
Diuron	0.15		<0.01	0	Supplementary Sampling	1
2,4-D*		0.1	<0.005	0	1 every 2 years	1
2,4,5-T	no current standard		<0.005	0	Supplementary Sampling	1
2,4,5-TP	no current standard		<0.005	0	Supplementary Sampling	1
Diclofop-methyl	0.009		<0.00024	0	1 every 2 years	1
Dimethoate		0.02	<0.0025	0	1 every 2 years	1
Glyphosate		0.28	<0.02	0	Supplementary Sampling	1
Malathion	0.19		<0.0001	0	1 every 2 years	1
MCPA	0.10		<0.00004	0	1 every 2 years	1
MCCP			<0.005	0	Supplementary Sampling	1
Metolachlor	0.05		<0.00011	0	Supplementary Sampling	1
Metribuzene	0.08		<0.00025	0	Supplementary Sampling	1
Parathion	0.05		<0.000013	0	Supplementary Sampling	1
Pentachlorophenol	0.06		<0.0001	0	1 every 2 years	1
Picloram		0.19	<0.0005	0	1 every 2 years	1
Phorate	0.002		<0.0005	0	Supplementary Sampling	1
Prometryne	no current standard		<0.00025	0	Supplementary Sampling	1
Simazine	0.01		<0.0005	0	Supplementary Sampling	1
Temephos	no current standard		<0.01	0	Supplementary Sampling	1
Terbufos	0.001		<0.0005	0	Supplementary Sampling	1
Triallate	no current standard		<0.00024	0	Supplementary Sampling	1
Trifluralin		0.045	<0.0002	0	1 every 2 years	1

Pesticides in drinking water may occur as a result of the use of these substances by humans. These substances may represent a long-term health risk if the Maximum Acceptable Concentration (MAC) or Interim Maximum Acceptable Concentration (IMAC) is exceeded. Mandatory sampling requirements depend on the population served by the waterworks.

Chemical – Trihalomethanes & Haloacetic Acids

Parameter	Limit (mg/L)	Sample Result (average)	# Samples Required	# Samples Submitted
Trihalomethanes	0.100	0.0612	8 (two every 3 months)	8
Haloacetic Acids	0.080 (July 1, 2020)	0.0452	8 (two every 3 months)	8

Trihalomethanes and Haloacetic Acids are generated during the water disinfection process by a by-product of reactions between chlorine and organic material. Trihalomethanes are generally found only in drinking water obtained from surface water supplies. Trihalomethanes and Haloacetic Acids are to be monitored on a quarterly basis and the Interim Maximum Acceptable Concentration is expressed as an average of 4 quarterly samples. Only water supplies derived from surface water or groundwater under the influence of surface water are required to monitor Trihalomethane and Haloacetic Acids unless otherwise specified in the waterworks permit to operate.

“<” means less than
(January 16, May 3, July 5, November 8, 2017)

Parameter	Aesthetic Objectives* (mg/L)	Sample Results (average)	# Samples Required	# Samples Submitted
T – Alkalinity (as CaCO ₃)	500	144	4 per year	4
Bicarbonate	No Objective	176	4 per year	4
Dissolved Calcium	No Objective	50.5	4 per year	4
Carbonate	No Objective	<10	4 per year	4
Chloride	250	31.9	4 per year	4
Conductivity	No Objective	505 uS/cm	4 per year	4
Hardness mg CaCO ₃ /L	800	197	4 per year	4
Dissolved Magnesium	200	17.3	4 per year	4
Dissolved Potassium	No Objective	3.8	Supplementary Sampling	4
PH	No Objective	7.62	4 per year	4
Dissolved Sodium	300	23	4 per year	4
Sulphate	500	67	4 per year	4
Total dissolved solids	1500	284	4 per year	4

All waterworks serving more than 5000 persons are required to submit water samples for the General Chemical category as per their permit to operate. The General Chemical category includes analysis for alkalinity, bicarbonate, calcium, carbonate, chloride, conductivity, hardness (as CaCO₃), magnesium, sodium, sulphate and total dissolved solids.

The last sets of quarterly samples for General Chemical analysis were required to be submitted (Jan-March, April-June, July-September, October-December of 2016) the required samples were submitted on (*January 16, May 3, July 5 and November 8, 2017*). Sample results indicated that there were no exceedances of the provincial aesthetic objectives for the General Chemical category.

**Objectives apply to certain characteristics of or substances found in water for human consumptive or hygienic use. The presence of these substances will affect the acceptance of water by consumers and/or interfere with the practice of supplying good quality water. Compliance with drinking water aesthetic objectives is not mandatory as these objectives are in the range where they do not constitute a health hazards. The aesthetic objectives for several parameters (including hardness as CaCO₃, magnesium, sodium and total dissolved solids) consider regional differences in drinking water sources and quality*

"< means less than"

Hydrocarbon Monitoring

Parameter	Limit MAC (mg/L)	Limit IMAC (mg/L)	Average of Sample Results (mg/l)	# Samples Exceeding Limit	# Samples Required	# Samples Submitted
Acridine	no current standard		<0.00002	0	15	16
Ancenaphthene	no current standard		<0.00002	0	15	16
Ancenaphthylene	no current standard		<0.00002	0	15	16
Anthracene	no current standard		<0.000010	0	15	16
Benzene	0.005		<0.0005	0	15	16
Benzo(a)anthracene	no current standard		<0.000010	0	15	16
Benzo(a)pyrene	0.00001		<0.000010	0	15	16
Benzo(b)fluoranthene	no current standard		<0.000010	0	15	16
Benzo(b+j)fluoranthene	no current standard		<0.000010	0	15	16
Benzo(e)pyrene	no current standard		<0.000010	0	15	16
Benzo(g,h,i)perylene	no current standard		<0.000020	0	15	16
Benzo(k)fluoranthene	no current standard		<0.000010	0	15	16
Chrysene	no current standard		<0.000020	0	15	16
Dibenz(a,h)anthracene	no current standard		<0.000010	0	15	16
Ethyl Benzene	0.0024		<0.0005	0	15	16
Fluoranthene	no current standard		<0.000020	0	15	16
Indeno(1,2,3-c,d)pyrene	no current standard		<0.000010	0	15	16
m+p-xylene	no current standard		<0.0010	0	15	16
Naphthalene	0.090 (drinking water screening value)		<0.000050	0	15	16
0-xylene	no current standard		<0.00050	0	15	16
Perylene	no current standard		<0.000010	0	15	16
Phenanthrene	0.0004 (interim guideline)		<0.000050	0	15	16
F1 Hydrocarbons	no current standard		<0.10	0	15	16
F2 Hydrocarbons	no current standard		<0.10	0	15	16
F3 Hydrocarbons	no current standard		<0.10	0	15	16
F4 Hydrocarbons	no current standard		<0.10	0	15	16
Pyrene	0.120 (drinking water screening value)		<0.000020	0	15	16
Quinoline	0.0034 (interim guideline)		<0.000050	0	15	16
Toluene		0.024	<0.0005	0	15	16
Total Xylene	0.3 (Aesthetic Objective)		<0.0002	0	15	16

In October 2016 the Permit was amended requiring samples to be submitted every 2 weeks until such a time as the river is frozen and then once per month until spring break up. The Permit was again amended on October 1, 2017 reducing the monitoring requirements for Hydrocarbon monitoring.

Samples were submitted for analysis on January 16, February 8, March 8, April 11 & 25, May 10 & 24, June 7 & 21, July 5 & 19, August 2, 16 & 30, September 13 & 27, 2017
Contamination of drinking water by synthetic organic chemicals only results from pollution events. Contamination of drinking water in excess of Maximum Acceptable Concentration (MAC) or Interim Maximum Acceptable Concentration (IMAC) may represent a health risk. Mandatory sampling requirements depend on the population served by the waterworks.

Treated Water
Cryptosporidium & Giardia

Parameter	Limit	June 27 Sample Results/100L	# Samples Exceeding Limit	# Samples Required	# Samples Submitted
Total non-viable Cryptosporidium		0.00	0	(optional)	1
Total Viable Cryptosporidium	3 log reduction	0.00	0	(optional)	1
Total Cryptosporidium		0.00	0	(optional)	1
Total non-viable Giardia		0.00	0	(optional)	1
Total Viable Giardia	3 log reduction	0.00	0	(optional)	1
Total Giardia		0.00	0	(optional)	1

Sampling requirements depend on permit specific requirements. The Raw river water sampling outlined in the Permit to Operate a Waterworks was conducted on June 27 & October 25th, 2017.

Microcystin-LR and/or Total Microcystin Toxins

Parameter	Limit MAC (mg/l)	June 7 Sample Results	July 5 Sample Results	August 10 Sample Results	September 6 Sample Results	October 10 Sample Results	# Samples Exceeding Limit	# Samples Required	# Samples Submitted
Microcystin	0.015	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0	(variable)	5

Sampling requirements depend on permit specific requirements. In Canada, microcystin is currently under assessment and is on Health Canada's drinking water Priority List. This review should provide additional information and may lead to guidelines for its concentration in drinking water.

Radiological

Parameter	Limit Becquerels/L	October 10 Sample Results	# Samples Exceeding Limit	# Samples Required	# Samples Submitted
Gross Alpha	0.5	<0.17	0	1 per year	1
Gross Beta	1.0	0.13	0	1 per year	1

Radiological constituents in drinking water may be the result of natural conditions or as a result of human activities. Gross alpha and Gross Beta are initial water quality screening tests used to determine the overall quality of drinking water for a larger set of specific radiological parameters. Further sampling may be required if Gross Alpha or Beta exceedences are found. Sampling requirements depend on permit specific requirements.

More information on water quality and sample submission performance may be obtained from:

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