

SaskWater



Water Quality
Report 2010

SaskWater is committed to ensuring a long-term, sustainable, quality water supply to our customers.

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SaskWater’s potable customers and water sources

SaskWater owns and operates seven water treatment plants serving a number of municipalities and pipeline associations. Each treatment plant has a different source of water as described in the following table:

Our water treatment plant located in...	Draws water from this source...	And delivers potable water to these major users...
Melfort	Codette Lake on the North Saskatchewan River	Beatty Star City Farming Co. Ltd. Kinistino Melfort Star City Weldon Melfort Rural Pipeline Association
Edenwold	Local Reservoir	Edenwold
Elbow	Lake Diefenbaker	Elbow Line 19 Water Pipeline Utility (Loreburn, Strongfield)
Gravelbourg	Thomson Lake	Gravelbourg Thomson Lake Regional Park Authority
Pierceland	Local Aquifer	Pierceland
Wakaw	South Saskatchewan River	Annaheim Bruno Cudworth Domremy Hillcrest Farms Ltd. Hoey Humboldt Lake Lenore Muenster St. Isidore-de-Bellevue St. Louis Wakaw SHL Rural Pipeline Association North Central Rural Pipeline Association
White City	Zehner Aquifer	White City

SaskWater’s potable customers and water sources

SaskWater also owns and operates water transmission systems. Our transmission business buys water from the City of Saskatoon, the City of Regina and the Buffalo Pound Water Administration Board and delivers it to customers.

This transmission system...	Purchases water from this supplier...	And delivers potable water to these customers... (listed alphabetically)
Buffalo Pound East	City of Regina	The Canadian Salt Company Ltd., Eastview Water Users Co-op, Village of Grand Coulee, Yara Belle Plaine
Buffalo Pound North	Buffalo Pound Water Administration Board	Arm River Farming Co. Ltd., Village of Bethune, Buffalo Plains Cattle Co., Village of Disley, Dufferin Water Association, Qu'Appelle Valley Water Users Association
Buffalo Pound West	Buffalo Pound Water Administration Board	Eight Mile Pipeline Association, Village of Marquis, Marquis Rural Water Users Inc., Parklane Waterline Inc., Parkview Water Users Inc., Village of Tuxford, Tuxford Rural Water Users Inc.
Saskatoon East	City of Saskatoon	Allan South Rural Water Utility, Town of Allan, R.M. of Blucher (Sunset Estates), Village of Bradwell, Village of Clavet, R.M. of Corman Park (Casa Rio/Wood Meadows/Grasswood), Cory Park Mobile City, Dundurn Rural Water Utility Board, Eighth Street Waterline Group Inc., Village of Elstow, Elstow North Rural Water Utility, English River Enterprises, Southeast Corman Park Rural Water Corp., GNC Bioferm Inc., Jemini 4 Arenas, Lost River Water Co. Ltd., Potash Corporation of Sask. Inc. – Allan Division, Potash Corporation of Sask. Inc. – Patience Lake Division, Saskatoon East School Division #41, Saskatoon Stadium Sports Ltd., South Yellowhead Water Corporation, University of Saskatchewan (Goodale Farms)
Saskatoon North	City of Saskatoon	Akzo Chemicals Ltd., Can-Oat Milling (Saskatoon) Inc., Chicks'R'Us Poultry Ltd., R.M. of Corman Park (North Corman Industrial Park), Town of Dalmeny, Dalmeny West Water System Ltd., ERCO Worldwide, Town of Hague, Intervalley Water Inc., City of Martensville, Town of Osler, Sask Valley Rural Water Utility, Wanuskewin Heritage Park, Town of Warman
Saskatoon West	City of Saskatoon	Marsulex Inc., Perkins Ag Marketing Inc., Potash Corporation of Sask. Inc. – Cory Division, Prairie Pride Chick Sales Ltd.
Saskatoon Northeast	City of Saskatoon	Town of Aberdeen, Highway 41 Water Utility, University of Saskatchewan (Kernen Farm)
Saskatoon Northwest Thatcher Avenue	City of Saskatoon	Biz Hub Industrial Park, Yellowhead Industrial Park

Treatment

Water treatment processes

Water treatment removes natural and man-made contaminants from the source water so that it is safe and pleasant to drink. The treatment process from a surface water source (like a river or lake) differs from treatment for groundwater (that is, drawn from an aquifer).

Surface water

Generally, surface water treatment facilities consist of screening to remove debris, coagulation-flocculation, clarification or sedimentation, filtration and disinfection to remove physical, chemical, microbial and other contaminants from the water.

Our treatment plants in Melfort, Wakaw, Gravelbourg, Edenwold and Elbow use this type of process.

Groundwater

For groundwater, the treatment process generally consists of oxidation of iron, manganese and other minerals with aeration and/or other processes followed by detention, filtration and disinfection.

Our treatment plants in Pierceland and White City use groundwater sources with this kind of treatment process.

Monitoring requirements

SaskWater undertakes water quality testing as required by *The Water Regulations 2002* and by operating permits for our water treatment plants and distribution systems.

SaskWater monitors water quality in order to:

- assess and ensure the safety of the water for our customers;
- assess the need for any process adjustments; and,
- determine quality trends and identify potential concerns.

We employ 35 provincially certified operators who monitor and maintain the quality of water from the initial source to the final point of delivery.

Our highly trained, dedicated operators, technicians, technologists and professional engineers keep abreast of technological changes, water quality, and any upgrading needs of our waterworks systems to meet ever-changing water quality standards and monitoring requirements.

SaskWater also monitors most of our facilities and customer facilities remotely. We have remote monitoring equipment installed in 38 locations which we either own or operate, which allows continuous facility surveillance.

We monitor key water quality parameters, equipment operation and water levels, pressures and flows.

The following table summarizes the monitoring and testing requirements SaskWater must meet at its treatment plants for bacteriological parameters, chlorine residuals, turbidity, chemicals, and health and toxicity parameters.

SaskWater Owned Water Treatment System	Annual Volume in 2010 (m³)	Water Source	BacT & Chlorine Residuals	Chlorine Residuals at the Treatment Plant	Turbidity	General Chemical	Health & Toxicity	THM*
Wakaw-Humboldt RWSS	1,056,169	South Sask. River	3 per week	1 per day	Continuous	1 every 3 months	1 every year	3 every 3 months in Jan, April, Jul, Oct
Codette RWSS	929,931	Codette Lake	2 per week	1 per day	Continuous	1 every 3 months	1 every year	2 every 3 months in Jan, April, Jul, Oct
Edenwold WTP	16,464	Local Reservoir	1 per week	1 per day	1 per day per filter	1 every 3 months every 2nd year	1 every 2 years	1 every 3 months in Jan, April, Jul, Oct
Gravelbourg WTP	170,024	Thomson Lake	1 per week	1 per day	1 per day per filter	1 every 3 months every 2nd year	1 every 2 years	1 every 3 months in Jan, April, Jul, Oct
Elbow WTP	64,195	Lake Diefenbaker	1 per week	1 per day	1 per day per filter	1 every 3 months every 2nd year	1 every 2 years	1 every 3 months in Jan, April, Jul, Oct
Pierceland WTP	53,234	Local Aquifer	2 per month	1 per day	1 per day per filter	1 every 2nd year	1 every 2 years	Not required for groundwater
White City WTP	177,539	Zehner Aquifer	1 per week	1 per day	1 per day per filter	1 every 2nd year	1 every 2 years	Not required for groundwater

*THM = Trihalomethanes

2010 Drinking Water Quality – SaskWater-owned water treatment systems

Our governing standards combine the best of Saskatchewan’s drinking water standards and the U.S. Environmental Protection Agency primary drinking water standards.

SASKWATER-OWNED WATER TREATMENT SYSTEMS

Parameters	Units	SaskWater Standards & Objectives		Wakaw-Humboldt RWSS	Codette RWSS	Edenwold WTP	Gravelbourg WTP	Elbow WTP	Pierceland WTP	White City WTP
		Regulatory	Aesthetic							
1. BACTERIOLOGICAL¹:										
Total Coliform	ct/100 mL	0		3 ⁴	0	0	0	0	0	0
E. coli	ct/100 mL	0		0	0	0	0	0	0	0
Background Bacteria	ct/100 mL	<200		<200	<200	<200	<200	<200	<200	<200
No. of Bacteriological Tests Required				156	104	0	52	52	26	0
No. of Bacteriological Tests Submitted				157	104	15 ⁵	52	53	29	16 ⁵
2. CHLORINE RESIDUALS:										
From samples submitted for bacteriological analysis										
Free Chlorine (Cl₂) Residuals:										
Average	mg/L			0.97	1.43	0.95	0.73	1.08	0.76	0.94
Maximum	mg/L			1.67	2.15	1.46	1.18	1.33	0.98	1.50
Minimum	mg/L	0.1 ²		0.18	0.70	0.61	0.20	0.71	0.42	0.73
Total Chlorine (Cl₂) Residuals:										
Average	mg/L		Or	1.16	1.64	1.72	1.56	1.26	0.98	1.10
Maximum	mg/L			1.93	2.44	2.62	2.54	1.56	1.36	1.72
Minimum	mg/L	0.5 ²		0.35	0.91	1.11	0.96	0.87	0.59	0.89
No. of Cl ₂ Residual Tests Required (with Bacti)				156	104	0	52	52	26	0
No. of Cl ₂ Residual Tests Performed (with Bacti)				157	104	15	52	53	29	16 ⁵
From water entering distribution system										
Free Chlorine (Cl₂) Residuals:										
Average	mg/L			1.35	1.78	0.91	0.74	1.06	0.81	0.85
Maximum	mg/L			2.00	2.50	5.08	1.72	1.48	1.34	1.50
Minimum	mg/L	0.1		0.92	1.15	0.16	0.17	0.59	0.40	0.42
Total Chlorine (Cl₂) Residuals:										
Average	mg/L			1.53	1.97	1.68	1.54	1.28	1.02	1.00
Maximum	mg/L			2.14	3.16	7.34	2.56	1.68	1.56	1.72
Minimum	mg/L	no standard	no standard	1.10	0.95	0.80	0.96	0.79	0.59	0.53
No. of Free Cl ₂ Residual Tests Required at WTP				365	365	365	365	365	365	365
No. of Free Cl ₂ Residual Tests Performed at WTP				Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
3. TURBIDITY:										
From samples submitted for bacteriological analysis										
Average	NTU			0.08	0.07	0.80	0.21	0.13	0.24	0.11
Maximum	NTU	no standard	no standard	0.25	0.13	2.35	0.58	0.18	0.40	0.19
Minimum	NTU			0.03	0.04	0.20	0.13	0.10	0.14	0.07
No. of Turbidity Tests Required (with Bacti)				156	104	0	52	52	26	0
No. of Turbidity Tests Performed (with Bacti)				157	104	15 ⁵	52	53	29	16 ⁵
From water leaving the filter										
Surface Water (Chem. Assisted Filtrn.):										
Average	NTU			0.051	0.045	0.101	0.037	0.092		
Maximum	NTU	1.0		0.286	0.393	0.870	0.210	0.214		
Minimum	NTU			0.017	0.018	0.002	0.012	0.055		
95th Percentile	NTU	0.3		0.087	0.071	0.223	0.099	0.133		
Groundwater:										
Average	NTU								0.15	0.06
Maximum	NTU	no standard	no standard						0.41	0.31
Minimum	NTU								0.03	0.03
95th Percentile	NTU	1.0							0.23	0.10
No. of Turbidity Tests Required at WTP				Continuous	Continuous	730	730	365	365	365
No. of Turbidity Tests Performed at WTP				Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous

Parameters	Units	SaskWater Standards & Objectives		Wakaw-Humboldt RWSS	Codette RWSS	Edenwold WTP	Gravelbourg WTP	Elbow WTP	Pierceland WTP	White City WTP
		Regulatory	Aesthetic							
4. CHEMICAL HEALTH:										
Aluminum	mg/L	0.1-0.2 OGV		0.030	0.025		0.068	0.16	0.0006	
Arsenic	mg/L	0.025		0.0002	0.0002		0.0007	0.0007	<0.0001	
Barium	mg/L	1		0.075	0.064		0.046	0.078	0.21	
Boron	mg/L	5		0.03	0.03		0.21	0.03	0.03	
Cadmium	mg/L	0.005		<0.00001	0.00002		0.00001	0.00001	<0.00001	
Chromium	mg/L	0.05		<0.0005	<0.0005		<0.005	<0.0005	<0.0005	
Copper	mg/L	1		0.0015	0.0041		0.0081	0.0007	0.037	
Iron	mg/L	0.3		0.0010	0.0011		0.1	0.0022	0.0016	
Lead	mg/L	0.01		<0.0001	<0.0001		<0.0001	0.0001	0.0003	
Manganese	mg/L	0.05		<0.0005	0.0006		0.30	<0.0005	0.0065	
Selenium	mg/L	0.01		0.0008	0.0002		0.0006	0.0002	<0.0001	
Trihalomethanes (THM)	mg/L	0.080 ³		0.042	0.036	0.111 ⁶	0.092	0.059		
Uranium	mg/L	0.02		0.0001	0.0002		0.0014	0.0009	<0.0001	
Zinc	mg/L	5		0.0018	0.0012		0.011	0.0008	<0.0083	
5. CYANIDE and MERCURY:										
Cyanide	mg/L	0.2		<0.001	<0.001			<0.001		
Mercury	mg/L	0.001		<0.00002	<0.00001			<0.000005		
6. GENERAL CHEMICAL:										
Colour	ACU	15		0	0	14	0	0	2	
Alkalinity	mg/L	500		144	141	141	193	164	406	
Bicarbonate	mg/L	no standard	no standard	175	172	172	236	200	495	
Calcium	mg/L	no standard	no standard	49	53	56	82	48	87	
Carbonate	mg/L	no standard	no standard	<1	<1	<1	0	<1	<1	
Chloride	mg/L	250		14	10	49	29	14	4	
Fluoride	mg/L	1.5		0.60	0.90	0.06	0.07	0.15	0.32	
Hardness (as CaCO ₃)	mg/L	800		200	206	266	495	193	386	
Hydroxide	mg/L	no standard	no standard	<1	<1	<1	0	<1	<1	
Magnesium	mg/L	200		19	18	31	71	18	41	
Nitrate (as NO ₃)	mg/L	45		1.3	0.82	2.0	1.9	0.53	0.13	
pH	pH units	6.5 - 9.0		7.74	7.76	7.39	6.7	7.95	8.00	
Potassium	mg/L	no standard	no standard	3.3	2.9	24	19	3.0	5.7	
Sodium	mg/L	300		29	22	25	356	28	10	
Specific Conductivity	µS/cm	no standard	no standard	513	502	686	2234	495	728	
Sulphate	mg/L	500		103	106	128	994	80	6.2	
Sum of Ions	mg/L	1500		392	384	474		391	649	
TDS	mg/L	1500		310	313	452	1788	299	422	

Parameters	Units	SaskWater Standards & Objectives		Wakaw-Humboldt RWSS	Codette RWSS	Edenwold WTP	Gravelbourg WTP	Elbow WTP	Pierceland WTP	White City WTP
		Regulatory	Aesthetic							
7. CHEMICAL ORGANICS and PESTICIDES:										
Atrazine	mg/L	0.003 ³		<0.001	<0.001					
Benzene	mg/L	0.001		<0.0002	<0.0002					
Benzo(a)pyrene	mg/L	0.00001		<0.00001	<0.00001					
Bromoxynil (Buctril)	mg/L	0.005		<0.0005	<0.0005					
Carbofuran	mg/L	0.04 ³		<0.002	<0.002					
Carbon tetrachloride	mg/L	0.005		<0.002	<0.002					
Chlorpyrifos	mg/L	0.09		<0.002	<0.002					
Dicamba (Banvel)	mg/L	0.12		<0.0005	<0.0005					
2,4-D	mg/L	0.07 ³		<0.0005	<0.0005					
Diclofop-methyl (HoeGrass)	mg/L	0.009		<0.003	<0.003					
Dichlorobenzene 1,2	mg/L	0.2		<0.0005	<0.0005					
Dichlorobenzene 1,4	mg/L	0.005		<0.0005	<0.0005					
Dichloroethane 1,2	mg/L	0.005		<0.0005	<0.0005					
Dichloroethylene 1,1	mg/L	0.007 ³		<0.0005	<0.0005					
Dichloromethane	mg/L	0.05		<0.0005	<0.0005					
Dichlorophenol 2,4	mg/L	0.9		<0.001	<0.001					
Dimethoate	mg/L	0.02		<0.001	<0.001					
Ethylbenzene	mg/L		0.0024	<0.0002	<0.0002					
Lindane	mg/L	0.0002		<0.00001						
Malathion	mg/L	0.19		<0.002	<0.002					
MCPA	mg/L	no standard	no standard	<0.001						
Monochlorobenzene	mg/L	0.08		<0.0005	<0.0005					
Nitrilotriacetic Acid (NTA)	mg/L	0.4			<0.1					
Pentachlorophenol (PCP)	mg/L	0.001 ³		<0.002	<0.002					
Picloram (Tordon)	mg/L	0.19		<0.001	<0.001					
Propanil	mg/L	no standard	no standard	<0.00005						
Tetrachlorophenol 2,3,4,6	mg/L	0.1		<0.0005	<0.0005					
Tolunene	mg/L		0.024	<0.0002	<0.0002					
Triallate	mg/L	no standard	no standard	<0.001						
Trichloroethylene	mg/L	0.005 ³		<0.0005	<0.0005					
Trichlorophenol 2,4,6	mg/L	0.005		<0.001	<0.001					
Trifluralin (Treflan)	mg/L	0.045		<0.001	<0.001					
Vinyl Chloride	mg/L	0.002		<0.0005	<0.0005					
Xylene	mg/L		0.3	<0.0002						

Notes

ct/100 mL : counts per 100 millilitres

MPN/100 mL: most probable number per 100 millilitres

NT: not tested

SRC: Saskatchewan Research Council

mg/L: milligrams per litre (equivalent to parts per million)

µS/cm: microsiemens per centimetre

NTU: Nephelometric turbidity units

ACU: Apparent colour units

<: Below detection limits

OGV: Operational Guideline Value

RWSS: Regional Water Supply System

WTP: Water Treatment Plant

95th Percentile: Turbidity levels from each filter must not exceed this limit in at least 95% of the discrete measurements made for each calendar month, or if continuous turbidity monitoring is employed, at least 95% of the time for each calendar month.

Not required to test (as per permit).

Due to be sampled again in 2011. For 2009 results please see SaskWater Annual Report 2009.

- Total Coliform**: Results returned from the Provincial Lab are reported as "No Detectable Organisms/100 mL". Results returned from the SRC are reported as <1/100mL. **E. coli**: Results returned from the Provincial Lab are reported as "No Detectable Organisms/100 mL". The SRC does not test for E. coli unless there is a Total Coliform result >0/100mL. **Background Bacteria**: Results are not reported unless there is data to report. Therefore, it can be assumed that all results are <200/100mL.
- Chlorine residuals in the distribution system must be either 0.1 mg/L free or 0.5 mg/L total.
- Standard shown is USEPA. Sask Environment standards for these parameters are (mg/L):

THM	0.1	Dichloroethylene 1,1	0.014
Atrazine	0.005	Pentachlorophenol (PCP)	0.06
Carbofuran	0.09	Trichloroethylene	0.05
2,4-D	0.1		
- There was one instance of a positive Total Coliform count for the Wakaw WTP. Standard protocol requires a repeat sample and the follow-up sample was negative.
- Additional testing carried out by SaskWater but not required by the permit.
- One high result in 3rd quarter 2010 due to carbon filter issue.

Transmission

In addition to owning and operating our own water treatment facilities, SaskWater also owns and operates potable water transmission systems. Our transmission business buys water from the City of Saskatoon, the City of Regina and the Buffalo Pound Water Administration Board and delivers it to customers. There are no treatment facilities on any of these transmission systems.

Monitoring requirements

Depending on the population, each potable water transmission system must be monitored according to the Saskatchewan Ministry of Environment's (SMOE) *Municipal Drinking Quality Monitor Guidelines*. Permit requirements for a specific waterworks may require more sampling than outlined in SMOE's guidelines.

The following table summarizes the water quality monitoring and testing requirements for bacteriological, chlorine residuals, turbidity, chemicals and health and toxicity parameters for each of our facilities.

SaskWater Owned Transmission System	Annual Volume for 2010 (m ³)	Water Source	BacT & Chlorine Residuals in Distribution System	Chlorine Residuals Entering the Distribution System	Turbidity	General Chemical & Health & Toxicity	THM
Saskatoon North	2,004,720	City of Saskatoon	3 per week	1 per day	3 per week	n/a	1 every 3 months in Jan, April, Jul, Oct
Saskatoon West	87,877	City of Saskatoon	2 per week	1 per day	2 per week	n/a	1 every 3 months in Jan, April, Jul, Oct
Saskatoon East	563,486	City of Saskatoon	3 per week	1 per day	3 per week	n/a	1 every 3 months in Jan, April, Jul, Oct
Saskatoon Northeast	47,615	City of Saskatoon	1 per week	1 per day	1 per week	n/a	1 every 3 months in Jan, April, Jul, Oct
Saskatoon Northwest Thatcher Ave	9,358	City of Saskatoon	1 per week	1 per day	1 per week	n/a	1 every 3 months in Jan, April, Jul, Oct
Buffalo Pound North	135,624	Buffalo Pound WTP	1 per month	1 per day	n/a	n/a	1 every 3 months in Jan, April, Jul, Oct
Buffalo Pound West	49,780	Buffalo Pound WTP	1 per month	1 per day	n/a	n/a	1 every 3 months in Jan, April, Jul, Oct
Buffalo Pound East	71,698	City of Regina	1 per month	1 per day	n/a	n/a	1 every 3 months in Jan, April, Jul, Oct

2010 Drinking Water Quality – SaskWater-owned water transmission systems

SASKWATER-OWNED WATER TRANSMISSION SYSTEMS

Parameters	Units	SaskWater Standards & Objectives		Saskatoon North	Saskatoon West	Saskatoon East	Saskatoon Northeast	Saskatoon Northwest Thatcher Ave	Buffalo Pound North	Buffalo Pound West	Buffalo Pound East
		Regulatory	Aesthetic								
1. BACTERIOLOGICAL:											
Total Coliform	ct/100 mL	0		0	0	0	0	0	0	0	0
E. coli	ct/100 mL	0		0	0	0	0	0	0	0	0
Background Bacteria	ct/100 mL	<200		<200	<200	<200	<200	<200	<200	<200	<200
No. of Bacteriological Tests Required				156	104	156	39	43	12	12	12
No. of Bacteriological Tests Submitted				159	106	159	40	44	20	12	12
2. CHLORINE RESIDUALS:											
From samples submitted for bacteriological analysis											
Free Chlorine (Cl₂) Residuals:											
Average	mg/L								0.45	0.56	0.62
Maximum	mg/L								0.91	1.10	1.04
Minimum	mg/L	0.1 ¹							0.12	0.20	0.20
Total Chlorine (Cl₂) Residuals:											
Average	mg/L	Or		1.63	1.47	1.48	1.52	1.62	0.66	0.78	0.83
Maximum	mg/L			1.94	1.89	1.82	1.72	1.85	1.00	1.30	1.20
Minimum	mg/L	0.5 ¹		1.21	0.65	1.18	1.21	1.43	0.40	0.45	0.47
No. of Cl ₂ Residual Tests Required (with Bacti)				156	104	156	39	43	12	12	12
No. of Cl ₂ Residual Tests Performed (with Bacti)				159	106	159	40	44	20	12	12
3. TURBIDITY:											
From samples submitted for bacteriological analysis											
Average	NTU			0.16	0.29	0.32	0.17	0.17	0.25	0.17	0.19
Maximum	NTU	no standard	no standard	0.36	0.93	0.77	0.48	0.39	1.10	0.35	0.28
Minimum	NTU			0.06	0.09	0.15	0.08	0.08	0.11	0.12	0.02
No. of Turbidity Tests Required (with Bacti)				156	104	156	39	43	0	0	0
No. of Turbidity Tests Performed (with Bacti)				159	106	159	40	44	20 ³	12 ³	12 ³
4. CHEMICAL HEALTH:											
Trihalomethanes (THM)	mg/L	0.080 ²		0.032	0.035	0.040	0.035	0.036	0.071	0.078	0.066
Sampling for parameters below this point is not required under permit.											
Aluminum	mg/L	0.1-0.2 OGV			0.045	0.041	0.052	0.047			
Arsenic	mg/L	0.01			0.0002	0.0008	0.0002	0.0010			
Barium	mg/L	1			0.025	0.036	0.026	0.034			
Boron	mg/L	5			0.05	0.03	0.03	0.03			
Cadmium	mg/L	0.005			0.00002	<0.00001	0.00001	0.00002			
Chromium	mg/L	0.05			0.0007	<0.0005	<0.0005	<0.0005			
Copper	mg/L		1		0.0026	0.0008	0.0013	0.0022			
Iron	mg/L		0.3		0.0059	0.024	0.0042	0.0064			
Lead	mg/L	0.01			0.0005	<0.0001	0.0002	0.0004			
Manganese	mg/L		0.05		0.0011	0.0025	0.001	0.0005			
Selenium	mg/L	0.01			0.0004	0.0004	0.0004	0.0004			
Uranium	mg/L	0.02			0.0008	0.0009	0.001	0.0008			
Zinc	mg/L		5		0.0067	0.0053	0.0034	0.0018			

Parameters	Units	SaskWater Standards & Objectives		Saskatoon North	Saskatoon West	Saskatoon East	Saskatoon Northeast	Saskatoon Northwest Thatcher Ave	Buffalo Pound North	Buffalo Pound West	Buffalo Pound East	
		Regulatory	Aesthetic									
5. GENERAL CHEMICAL:												
Alkalinity	mg/L		500	79			81	91				
Bicarbonate	mg/L	no standard	no standard	96			94	101				
Calcium	mg/L	no standard	no standard	23			24	26				
Carbonate	mg/L	no standard	no standard	<1			2.5	5				
Chloride	mg/L		250	12			13	12				
Fluoride	mg/L	1.5		0.62			0.54	0.41				
Hardness (as CaCO ₃)	mg/L		800	130			131	135				
Hydroxide	mg/L	no standard	no standard	<1			<1	<1				
Magnesium	mg/L		200	18			18	17				
Nitrate (as NO ₃)	mg/L	45		0.89			0.76	0.89				
pH	pH units		6.5 - 9.0	8.15			8.23	8.43				
Potassium	mg/L	no standard	no standard	3.2			3.2	3.2				
Sodium	mg/L		300	27			26	25				
Specific Conductivity	µS/cm	no standard	no standard	394			383	390				
Sulphate	mg/L		500	99			92	91				
Sum of Ions	mg/L		1500	277			271	281				
TDS	mg/L		1500	232			227	230				

Notes

ct/100 mL: counts per 100 millilitre

MPN/100 mL: most probable number per 100 millilitre

NT: not tested (SRC does not test for E. coli if Total Coliforms are negative)

SRC: Saskatchewan Research Council

mg/L: milligrams per litre (equivalent to parts per million)

µS/cm: microsiemens per centimetre

NTU: Nephelometric turbidity units

<: Below detection limits

OGV: Operational Guideline Value

Free chlorine residuals don't apply due to Saskatoon using chloramination.

Not required to test (as per permit).

- Chlorine residuals in the distribution system must be either 0.1 mg/L free or 0.5 mg/L total.
- Standard shown is USEPA, Sask Environment standards for this parameter is 0.1 mg/L.
- Additional testing carried out by SaskWater but not required by the permit.

Information

Further water quality information on potable water that we purchase is available from our suppliers:

Buffalo Pound Water Treatment Plant

moosejaw.ca/cityhall/engineers/municipal/pdf/BPAnnualReport2009.pdf

City of Saskatoon

saskatoon.ca/DEPARTMENTS and select > Utilities Services > Water and Wastewater Treatment > Water Treatment Plant > Reports

Key drinking water parameters and effects

In addition to meeting the water quality parameters set by the province of Saskatchewan, SaskWater's governing standards for new and upgraded treatment plants meet the most stringent guidelines for health-related parameters in North America.

Alkalinity

Alkalinity is water's acid-neutralizing capacity and is primarily a function of carbonate, bicarbonate and hydroxide content. Excessive alkalinity levels may cause scale formation. Low alkalinity waters tend to dissolve minerals and metals, while high alkalinity waters tend to precipitate minerals and metals. The Aesthetic Objective (AO) is set at a maximum of 500 mg/L.

Aluminum (Al)

Aluminum is the most abundant metal in the crust of the earth. Research has linked aluminum to Alzheimer's disease, but most mainstream health professionals believe, based on current knowledge, that exposure to aluminum is not a significant risk factor. No Saskatchewan or national guidelines have been established for the permissible level of aluminum in drinking water. Current operation guideline values of 0.1 to 0.2 mg/L are suggested.

Arsenic (As)

Arsenic occurs naturally in water and soil. It has been classified as carcinogenic to humans. High arsenic has been linked to many health problems including lung, bladder and skin cancer, heart disease, diabetes, and others. The Maximum Acceptable Concentration (MAC) of arsenic in drinking water is currently published as 0.025 mg/L; however the Federal-Provincial-Territorial Committee on Drinking Water has recently adopted a revised standard at 0.01 mg/L (i.e., 10 µg/L) which is expected to be published in the near future. The US standard has been at this more stringent level for some time and this is the standard that SaskWater adopted for our internal governing standard.

Background Bacteria

Background bacteria levels are measured on a total coliform or fecal coliform membrane filtration plate. This is used to determine the variety of bacteria that are commonly found in water. Background bacteria levels must be less than 200 colonies/100 mL or no overgrowth.

Barium (Ba)

Ingestion of barium may result in serious effects to the heart, blood vessels, and nerves. In humans, a single dose of 125 mg/L of soluble barium can elicit an acute toxic response, but at very low levels the toxicological effects of barium are still uncertain. The MAC of barium in drinking water is 1.0 mg/L (US EPA 2.0 mg/L).

Bromodichloromethane (BDCM)

Bromodichloromethane is one of the four major chemical compounds contained in trihalomethanes (THMs). Preliminary studies indicate that BDCM and other trihalomethanes that contain bromine may be more toxic than chlorinated THMs such as chloroform. BDCM is considered to be a probable carcinogen in humans, with sufficient evidence in animal studies. The MAC for bromodichloromethane in drinking water is 0.016 mg/L (i.e. 16 µg/L).

Cadmium (Cd)

Cadmium is a metal found naturally in the earth's crust. Pure cadmium is a soft, silver-white metal. It is commonly found in combination with other elements such as oxygen (cadmium oxide) or sulphur (cadmium sulphate). Short-term exposure above recommended levels can cause nausea, vomiting, diarrhea, muscle cramps, salivation, sensory disturbances, liver injury, convulsions, shock and renal failure. In long-term exposures above guidelines, cadmium has the potential to cause effects such as emphysema, kidney or liver damage and softening of the bones. The MAC for cadmium in drinking water is 0.005 mg/L.

Calcium (Ca)

Calcium is an abundant natural element, entering the freshwater system through the weathering of rocks, and from the soil through seepage, leaching, and runoff. High levels of calcium salts can precipitate when heated to form scale in boilers, pipes and cooking utensils. Calcium contributes to the total hardness of water. There is no AO or MAC set for calcium.

Chloride (Cl)

Chloride is widely distributed in nature and is generally found in sodium and potassium salts. Underground salt deposits have been found in all Canadian provinces except British Columbia. At concentrations above the aesthetic objective, chloride imparts undesirable taste to water and may cause corrosion in distribution systems. Concentrations of chloride in excess of 250 mg/L may impart a salty taste to water. Therefore, the AO is set at a maximum of 250 mg/L.

Colour

Colour is aesthetically undesirable in water used for domestic supplies and is detrimental for various industrial processes. Colour in drinking water may be due to the presence of coloured organic matter or metals such as iron and manganese. The AO is 15 Apparent Colour Units (ACU). Levels above 15 ACU can be detected in a glass of water by most people.

Escherichia Coli (E. coli)

E. coli is a type of fecal coliform bacteria commonly found in the intestines of animals and humans. The presence of E. coli in water is a strong indication of recent sewage or animal waste contamination. Most strains of E. coli do not cause illness in healthy humans and are beneficial to the synthesis of vitamins. Some strains, however, cause cramps and diarrhea in humans. One particular strain named O157:H7 produces a powerful toxin that can cause severe illness. The standard for E. coli is no organisms detectable per 100 mL of water sample. A typical water treatment process with appropriate disinfection system would inactivate E. coli.

Hardness

Water hardness is mainly caused by the presence of calcium and magnesium, and is expressed as the equivalent quantity of calcium carbonate. Hardness consumes soap, forms scum, curds and scale, and is harmful to many industrial processes. Water with more than 200 mg/L (i.e. over 11.7 grains/gallon) of hardness is generally considered “hard”, though the AO is 800 mg/L for municipal drinking water purposes. Because water softening may introduce undesirably high quantities of sodium into drinking water, it is recommended that a separate un-softened supply be used for drinking and cooking.

Iron (Fe)

At levels above 0.3 mg/L, iron stains laundry and plumbing fixtures, imparts taste and interferes with iron exchange units. The precipitation of excessive iron causes a reddish brown colour in the water. It may also promote the growth of iron bacteria, leaving a slimy coating in the piping. The AO is 0.3 mg/L.

Magnesium (Mg)

Magnesium is present in all natural waters and high levels in groundwater are probably the result of contact with magnesium-containing rock formations. Magnesium is a major contributor to water hardness and may also contribute an undesirable taste to drinking water. The AO is set at a maximum of 200 mg/L.

Manganese (Mn)

At levels exceeding 0.15 mg/L, manganese stains laundry and plumbing fixtures and is undesirable in many industrial processes even in low concentrations. Also, it may lead to the accumulation of bacterial growth in pipelines. Elevated concentrations of manganese will form coatings on piping that may fall off as black flakes. The AO is set at a maximum of 0.05 mg/L.

Nitrate (NO₃)

The MAC of nitrate in drinking water is 45 mg/L as NO₃. In excessive amounts, it interferes with the oxygen-carrying capacity of the blood and contributes to an illness known as methemoglobinemia in infants, or “blue baby syndrome.” Sources of nitrate in water include decaying plant or animal material, agricultural fertilizers, manure, domestic sewage or geological formations containing soluble nitrogen compounds. Since they are very soluble and do not bind to soils, nitrates have a high potential to migrate to groundwater.

Pesticides

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 MAC or Interim Maximum Acceptable Concentration (IMAC) is exceeded. Mandatory sampling requirements depend on the population served by the waterworks. For details, please refer to *Saskatchewan's Drinking Water Quality Standards and Objectives*.

pH

Natural waters usually have pH values in the range of 4 to 9 and most are slightly basic (i.e. greater than 7) because of the presence of bicarbonates and carbonates. Corrosion effects may become significant at a pH below 6.5 and scaling may become a problem at a pH above 8.5. For this reason the AO is a range from 6.5 to 9.0.

Sodium (Na)

High sodium concentration is undesirable for people on salt free diets; causes foaming in boilers; has a laxative effect when combined with sulphate; and is detrimental to irrigation. The AO is 300 mg/L, but people with high blood pressure, hypertension or heart conditions should not exceed a level of 20 mg/L in drinking water or as directed by a physician.

Sum of Ions

Sum of ions indicates the concentration of ions in the water (i.e. dissolved solids). The AO for total dissolved solids is a maximum of 1500 mg/L. See Total Dissolved Solids.

Sulphate (SO₄)

Sulphate occurs naturally in water and may be present in natural waters in concentrations ranging from a few to several thousand mg/L. Concentrations in excess of 500 mg/L, especially if the magnesium content is also high, may have a laxative effect or cause gastrointestinal irritation, and may also have a noticeable taste at this concentration. The AO is set at a maximum of 500 mg/L.

Total Coliforms

The presence of coliform organisms is an indication of pollution. The MAC for total coliforms is no organisms detectable per 100 mL of water sample. If any coliform organisms are detected, the site should be resampled, and if the presence of coliforms is confirmed, the appropriate corrective action should be taken. A typical water treatment process with an appropriate disinfection system would inactivate coliforms.

Total Dissolved Solids (TDS)

TDS is a measure of the sum of individual dissolved minerals in water. Highly mineralized water is detrimental to agriculture (irrigation) and industry and may have negative health effects, although research is inconclusive and contradictory on this point. Waters with high dissolved solids are less palatable and also may leave a white film on dishes, etc. A water softener will not reduce TDS. The AO is 1,500 mg/L.

Trihalomethanes (THM)

Trihalomethanes have been linked to asthma, cancer of the bladder and colon, skin disorders and other health problems. THMs are compounds formed when chlorine reacts with organic matter found in water. The four THM compounds are: chloroform, dibromochloromethane, bromodichloromethane (BDCM) and bromoform. The long-term objective for trihalomethanes is 0.1 mg/L (i.e. 100 µg/L) based on an annual average of seasonal samples.

Turbidity

Turbidity is a measure of the cloudiness of the water. High levels of turbidity can mask the presence of bacteria in the water and decrease the effectiveness of treatment processes such as filtration and chlorination. Higher turbidity levels are also often associated with higher levels of disease-causing microorganisms such as viruses, parasites and some bacteria. These organisms can cause symptoms such as nausea, cramps, diarrhea, and headaches. Saskatchewan Environment has created different regulatory standards for turbidity depending on the source of the raw water and the filtration process used during treatment.

Typically, for surface water with a chemically assisted filtration plant, the turbidity level must be less than 0.30 NTU 95% of the time and for a groundwater filtration plant the turbidity level must be less than 1.0 NTU 95% of the time. For details, please refer to *Saskatchewan's Drinking Water Quality Standards and Objectives*.

Explanation of terms

Potable water

Treated water that is suitable for human consumption in accordance with applicable regulations.

Non-potable water

Water that is *not* suitable for human consumption in accordance with applicable regulations.

Precautionary drinking water advisory (PDWA)

An advisory issued under the authority of Subsection 32(1) of *The Environmental Management and Protection Act, 2002* by Saskatchewan Ministry of Environment Field Offices (SMOEF) when the SMOEF and the Health Region determined that drinking water quality concerns exist but immediate public health threats have not been identified. As an example, it is standard protocol to issue a PDWA when a water main is depressurized to undertake repairs.

ACU

Apparent colour unit

AO

Aesthetic objective

Bq/L

Becquerels per litre

<

Below lab detection levels

ct/100 mL

Counts per 100 millilitres

IMAC

Interim maximum acceptable concentration

MAC

Maximum acceptable concentration

mg/L

Milligrams per litre (equivalent to parts per million)

NTU

Nephelometric turbidity unit

n/a

Not required by Minister's permit/not applicable

OGV

Operational guideline value

RWSS

Regional water supply system

SMOE

Saskatchewan Ministry of Environment

µg/L

Micrograms per litre

µS/cm

Microsiemens per centimetre

WTP

Water treatment plant

Water quality issues

Emergency boil water orders

There were no emergency boil water orders issued on any SaskWater owned or operated facilities in 2010.

Precautionary drinking water advisories

A Precautionary Drinking Water Advisory (PDWA) is issued when drinking water quality concerns exist but immediate public health threats have not been identified. They are commonly issued as a result of power outages or maintenance that may result in depressurization of the distribution system.

There were eleven (11) PDWAs issued on SaskWater owned potable water systems in 2010:

- The Saskatoon Northeast Potable Water Supply System had one PDWA, due to startup of the new pipeline system.
- The Buffalo Pound North Potable Water Supply System had two PDWAs, both due to leak repairs that resulted in depressurization of the pipeline system.
- The Buffalo Pound North and West Potable Water Supply System had two PDWAs due to pipeline depressurization as a result of interruptions to the potable water supplied from the Buffalo Pound Water Treatment Plant. The first was due to planned maintenance at the plant and the second due to an electrical failure that left the plant without power for an extended period. Several SaskWater customers also had PDWAs issued as a result of these incidents.
- The Saskatoon East Potable Water Supply System had two PDWAs due to pipeline depressurization resulting from planned system upgrades. Several SaskWater customers also had PDWAs issued as a result of both these instances.
- The Saskatoon West Potable Water Supply System had three PDWAs, all due to pipeline depressurization resulting from planned system upgrades.
- The Saskatoon Northwest Potable Water Supply System had one PDWA, due to startup of a new pipeline system.

Where SaskWater provides operation and maintenance services to community or rural pipeline association-owned systems, there were fifteen (15) PDWAs issued in 2010 and the following provides details of each:

- The Town of White City was issued a PDWA due to depressurization of the waterworks distribution system.
- The Town of Star City was issued a PDWA due to flooding of the water treatment plant.

- The RM of Sherwood was issued two PDWAs, both during planned system maintenance and both due to depressurization of the distribution system.
- Interlake Regional Water Board was issued two PDWAs – one to Cochin/Hunt's Cove due to startup of a seasonal system and one to Trevesa Beach due to leak repair that resulted in depressurization in the distribution system.
- The Village of Halbrite was issued three PDWAs, the first due to distribution system depressurization resulting from planned distribution system maintenance, the second due to equipment failure which resulted in low chlorine residuals and the third due to distribution system depressurization during the repair of a sewer main.
- The Village of Edenwold was issued a PDWA due to a power outage causing a depressurization of the distribution system.
- Jackfish Lake West Water Utility was issued a PDWA due to a power outage causing a depressurization of the distribution system.
- The Village of Vanscoy was issued four PDWAs, all due to depressurization of the distribution system during planned system maintenance.

There were some instances of SaskWater customers (potable water customers) who had a PDWA issued on their own distribution systems in 2010. Other than the instances noted above, all these advisories were due to issues with the customers' facilities and not due to the water supplied by SaskWater.

There were some instances of SaskWater non-potable water customers who had a PDWA issued and one instance of an EBWO on a customer-owned treatment and distribution system in 2010. In these instances, customers are aware that the water SaskWater supplies is non-potable and if they wish to use non-potable water for domestic purposes, the customers are responsible for providing their own water treatment.

There is an ongoing PDWA, issued by the Ministry of Environment in 2008, on SaskWater's Saskatoon Non-Potable Water Supply System – East and West. This is a situation where the Ministry of Environment has decided that these systems need to be permitted under *The Environmental Management and Protection Act, 2002* and *The Water Regulations, 2002*. This is a non-potable water supply system developed to supply industrial customers. However, household users are also supplied and the water is unsuitable for drinking unless treated.

Water quality issues

As reported in the 2009 Water Quality Report, SaskWater's Gravelbourg Water Treatment Plant does not meet the water quality standard for trihalomethanes (THMs). Samples regularly exceed the regulatory limit. On an interim basis, SaskWater is using chlorine dioxide to reduce the THM levels; however, major upgrades to the plant are required to fully address this and other issues. Work has started on these water treatment plant upgrades, with completion scheduled for early 2012.

As noted in the water quality results for the Edenwold Water Treatment Plant, the trihalomethanes did not meet the water quality standard in 2010. This was because of an unusually high reading in the 3rd quarter which occurred due to depletion of the carbon filtration material. This was corrected by replacing the carbon in the filter.



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