**Drinking Water Quality and Compliance**
**SaskWater Codette Lake Potable Water Supply System**
**2016 Notification to Consumers**

The Water Security Agency (WSA) 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 Permit to Operate a waterworks. The following is a summary of the SaskWater Codette Lake Potable Water Supply System water quality and sample submission compliance record for the January 1, 2016 to December 31, 2016 time period. This report was completed on March 20, 2017. Readers should refer to WSA's Municipal Drinking Water Quality Monitoring Guidelines, October 2012, EPB 202 for more information on minimum sample submission requirements and types of samples. Permit requirements for a specific waterworks may require more sampling than outlined in the Agency's monitoring guidelines. If consumers need to know more about drinking water, more detailed information is available from: http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/index-eng.php.

## BACTERIOLOGICAL QUALITY

| Parameter | Limit | Regular Samples Required | Required Samples Submitted | # Positive of Regular Submitted |
|---|---|---|---|---|
| Total Coliform | 0 Organisms/100 mL | 104 | 100 | 0 |
| E. Coli | 0 Organisms/100 mL | 104 | 100 | 0 |
| Background Bacteria | Less than 200/100 mL | 104 | 100 | 0 |

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.

The bacteriological samples were missed the weeks of May 30 & July 25. May 30th was because of a postal service error. July 25th was not sampled because of a Boil Water Advisory already on the system. Advisory was due to changing the source water supply due to the oil spill on the North Saskatchewan River.

## WATER DISINFECTION

**Chlorine Residual in Distribution System – From Test Results Submitted with Bacteriological Samples**

| Parameter | Minimum Limit (either/or) | Range (mg/L) | # Tests Required | # Tests Submitted | # Adequate Chlorine |
|---|---|---|---|---|---|
| Free Chlorine | 0.1 mg/L | 0.17 – 3.76 | 104 | 100 | 100 |
| Total Chlorine | 0.5 mg/L | 0.93 – 4.87 | 104 | 100 | 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. An adequate chlorine is a result that indicates that the chlorine level is above the regulated minimums. A waterworks is required to submit chlorine residual test results on every bacteriological sample they submit.

**Free Chlorine Residual for Water Leaving the Filters**

| Parameter | Limit (mg/L) | Range (mg/L) | # Tests Required | # Tests Performed | % Adequate Chlorine (%) |
|---|---|---|---|---|---|
| Free Chlorine | At least 0.35 | 0.10 – 1.84 | 366 | 735 | 98.8 |

Minimum 0.35 milligrams per litre (mg/L) free chlorine residual is required for water leaving the filters. Tests are normally performed twice daily by waterworks operators and are to be recorded in operation records.

**Free Chlorine Residual for Water Entering the Distribution System**

| Parameter | Limit (mg/L) | Range (mg/L) | # Tests Required | # Tests Performed | % Adequate Chlorine (%) |
|---|---|---|---|---|---|
| Free Chlorine | At least 1.2 | 1.27 – 4.14 | 366 | Continuous | 100 |

Minimum 1.2 milligrams per litre (mg/L) free chlorine residual is required for water entering the distribution system. Residuals are monitored continuously and multiple tests are normally performed on a daily basis by waterworks operators and are to be recorded in operation records.

## TURBIDITY

**Turbidity in the Distribution System – From Test Results Submitted with Bacteriological Samples**

| Parameter | Limit (NTU) | Range (NTU) | # Tests Required | # Tests Performed | # Exceeding Limit |
|---|---|---|---|---|---|
| Turbidity | No standard | 0.07 – 0.25 | 10 | 100 | 0 |

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). The turbidity is tested at the same frequency as the bacteriological testing with a bench testing instrument.

### Turbidity for Water Leaving the Filter

| Parameter | Limit (NTU) | Range (NTU) | 95$^{th}$ Percentile (NTU) | # Tests Required | # Tests Performed | # months Exceeding Limit |
|---|---|---|---|---|---|---|
| Turbidity | < 0.30 – 95% of time each month; cannot be > 0.3 for more than 12 consecutive hours and; never >1.0 | 0.019–0.330 | 0.154 | Continuous | Continuous | 0 |

Turbidity leaving the filters is monitored continuously and multiple tests are normally performed on a daily basis by waterworks operators and are recorded in operation records.

## FLUORIDE

### Fluoride – From Treated Water at the Water Treatment Plant (on-site testing)

| Parameter | Limit (mg/L) | Average (mg/L) | Maximum (mg/L) | # Samples Required | # Samples Submitted | # Exceeding Limit |
|---|---|---|---|---|---|---|
| Fluoride | 1.5 | 0.83 | 1.37 | 366 | 735 | 0 |

### Fluoride – From Treated Water at the Water Treatment Plant (off-site testing)

| Parameter | Limit (mg/L) | Average (mg/L) | Maximum (mg/L) | # Samples Required | # Samples Submitted | # Exceeding Limit |
|---|---|---|---|---|---|---|
| Fluoride | 1.5 | 0.68 | 1.30 | 52 | 53 | 0 |

## CHEMICAL – HEALTH

SaskWater Codette Lake Potable Water Supply is required to submit Chemical Health once per year. The last sample for Chemical Health analysis was submitted on October 13, 2016. Results indicated that provincial drinking water quality standards were not exceeded.

| Parameter | MAC (mg/L) | IMAC (mg/L) | AO* (mg/L) | Sample Results (mg/L) | # of Samples Required | # of Samples Submitted |
|---|---|---|---|---|---|---|
| Aluminum | No Objective | | | 0.016 | 1 | 5 |
| Antimony | 0.006 | | | <0.0002 | 1 | 1 |
| Arsenic | 0.010 | | | 0.0002 | 1 | 1 |
| Barium | 1.0 | | | 0.046 | 1 | 1 |
| Boron | | 5.0 | | 0.02 | 1 | 1 |
| Cadmium | 0.005 | | | 0.00003 | 1 | 1 |
| Chromium | 0.05 | | | <0.0005 | 1 | 1 |
| Copper | | | 1.0 | 0.0056 | 1 | 1 |
| Iron | | | 0.3 | 0.0022 | 1 | 1 |
| Lead | 0.01 | | | <0.0001 | 1 | 1 |
| Manganese | | | 0.05 | 0.0006 | 1 | 1 |
| Selenium | 0.01 | | | 0.0002 | 1 | 1 |
| Silver | No Objective | | | <0.00005 | 1 | 1 |
| Uranium | 0.02 | | | 0.0001 | 1 | 1 |
| Zinc | | | 5 | 0.002 | 1 | 1 |

MAC – Maximum Acceptable Concentrations AO – Aesthetic Objective
IMAC – Interim Maximum Acceptable Concentrations

## CHEMICAL – GENERAL

SaskWater Codette Lake Potable Water Supply is required to submit General Chemical once per quarter. The last sample for General Chemical analysis was submitted on November 29, 2016. Results indicated that the provincial drinking water quality standards were not exceeded.

| Parameter | MAC | AO* | Sample Results | # Of Samples Required | # Of Samples Submitted |
|---|---|---|---|---|---|
| Total Alkalinity (mg/L) | | 500 | 141 | 4 | 4 |
| Bicarbonate (mg/L) | No Objective | | 172 | 4 | 4 |
| Calcium (mg/L) | No Objective | | 57 | 4 | 4 |
| Carbonate (mg/L) | No Objective | | <1 | 4 | 4 |
| Chloride (mg/L) | | 250 | 12 | 4 | 4 |
| Fluoride (mg/L) | 1.5 | | 0.80 | 4 | 4 |
| Total Hardness (mg/L) | | 800 | 227 | 4 | 4 |
| Hydroxide (mg/L) | No Objective | | <1 | 4 | 4 |
| Magnesium (mg/L) | | 200 | 21 | 4 | 4 |
| Nitrate (mg/L) | 45 | | 0.56 | 4 | 4 |
| pH (pH units) | | 6.5 - 9.0 | 7.64 | 4 | 4 |
| Potassium (mg/L) | No Objective | | 3.3 | 4 | 4 |
| Sodium (mg/L) | | 300 | 24 | 4 | 4 |
| Specific Conductivity (µs/cm) | No Objective | | 566 | 4 | 4 |
| Sulphate (mg/L) | | 500 | 133 | 4 | 4 |
| Sum of Ions | No Objective | | 422 | 4 | 4 |
| Total Dissolved Solids (mg/L) | | 1500 | 348 | 4 | 4 |

MAC – Maximum Acceptable Concentrations AO – Aesthetic Objective

*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 $CaCO_3$, magnesium, sodium and total dissolved solids) consider regional differences in drinking water sources and quality.

## CHEMICAL – TRIHALOMETHANES (THM)

Trihalomethanes are formed when chlorine reacts with organic matter in water. The four THM compounds are: chloroform, dibromochloromethane, bromodichloromethane (BCDM) and bromoform. The sum of the concentrations of these four components is referred to as Total Trihalomethanes. The limit for THM is a long term objective based on an annual average of seasonal samples.

| Parameter | Limit (mg/L) | Average (mg/L) | # Samples Required | # Samples Submitted |
|---|---|---|---|---|
| Total Trihalomethanes | 0.100 | 0.113 | 8 | 8 |

High third quarter results caused by high chlorine dosage needed for alternate source water following the oil spill in the North Saskatchewan River.

## CHEMICAL – HALOACETIC ACIDS (HAAs)

Haloacetic acids are formed when chlorine reacts with organic matter in water. The five regulated haloacetic acids are: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. The sum of the concentrations of these five components is referred to as HAA5.

| Parameter | Limit (mg/L) | Average (mg/L) | # Samples Required | # Samples Submitted |
|---|---|---|---|---|
| Haloacetic Acids 5 | 0.080 | Not tested | 1 | 0 |

## CHEMICAL –CYANIDE AND MERCURY

SaskWater Codette Lake Potable Water Supply System is required to submit water samples for the WSA's Cyanide and Mercury category once every second year. 2016 is a required sampling year. The last sample was submitted on October 13, 2016.

| Parameter | Limit (mg/L) | Sample Results (mg/L) | # Samples Required | # Samples Submitted |
|---|---|---|---|---|
| Cyanide | 0.2 | <0.001 | 1 | 1 |
| Mercury | 0.001 | 0.000007 | 1 | 1 |

## CHEMICAL – SYNTHETIC ORGANICS

SaskWater Codette Lake Potable Water Supply System is required to submit water samples for the WSA's Synthetic Organic category once every second year. 2016 is a required sampling year. The last sample for analysis was submitted on October 13, 2016. Sample results indicated that the provincial drinking water quality standards were not exceeded.

| Parameter | MAC (mg/L) | IMAC (mg/L) | AO (mg/L) | Sample Results (mg/L) | # of Samples Required | # of Samples Submitted |
|---|---|---|---|---|---|---|
| Benzene | 0.005 | | | <0.0002 | 1 | 1 |
| Benzo(a)pyrene | 0.00001 | | | <0.00001 | 1 | 1 |
| Carbon tetrachloride | 0.005 | | | <0.002 | 1 | 1 |
| Dichlorobenzene 1,2 | 10.2 | | | <0.0005 | 1 | 1 |
| Dichlorobenzene 1,4 | 0.005 | | | <0.0005 | 1 | 1 |
| Dichloroethane 1,2 | | 0.005 | | <0.0005 | 1 | 1 |
| Dichloroethylene 1,1 | 0.014 | | | <0.0005 | 1 | 1 |
| Dichloromethane | 0.05 | | | <0.0005 | 1 | 1 |
| Dichlorophenol 2,4 | 0.9 | | | <0.002 | 1 | 1 |
| Ethylbenzene | | | 0.0024 | <0.0002 | 1 | 1 |
| Monochlorobenzene | 0.080 | | | <0.0005 | 1 | 1 |
| Nitrilotriacetic Acid (NTA) | 0.4 | | | <0.1 | 1 | 1 |
| Tetrachlorophenol 2,3,4,6 | 0.10 | | | <0.002 | 1 | 1 |
| Toluene | 0.05 | | | <0.0002 | 1 | 1 |
| Trichloroethylene | | | 0.024 | <0.0005 | 1 | 1 |
| Trichlorophenol 2,4,6 | 0.005 | | | <0.002 | 1 | 1 |
| Vinyl Chloride | 0.002 | | | <0.0005 | 1 | 1 |

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IMAC – Interim Maximum Acceptable Concentrations

## CHEMICAL – PESTICIDES

SaskWater Codette Lake Potable Water Supply System is required to submit water samples for the WSA's Pesticide category once every second year. 2016 is a required sampling year. The last sample for analysis was submitted on October 13, 2016. Sample results indicated that the provincial drinking water quality standards were not exceeded.

| Parameter | MAC (mg/L) | IMAC (mg/L) | Sample Results (mg/L) | # of Samples Required | # of Samples Submitted |
|---|---|---|---|---|---|
| Atrazine | | 0.005 | <0.0002 | 1 | 1 |
| Bromoxynil | | 0.005 | <0.0005 | 1 | 1 |
| Carbofuran | 0.09 | | <0.0002 | 1 | 1 |
| Chlorpyrifos | 0.09 | | <0.0002 | 1 | 1 |
| Dicamba | 0.12 | | <0.0005 | 1 | 1 |
| 2,4-D | | 0.10 | <0.0005 | 1 | 1 |
| Diclofop-methyl | 0.009 | | <0.003 | 1 | 1 |
| Dimethoate | | 0.02 | <0.002 | 1 | 1 |
| Malathion | 0.19 | | <0.0002 | 1 | 1 |
| Pentachlorophenol | 0.06 | | <0.002 | 1 | 1 |
| Picloram | | 0.19 | <0.001 | 1 | 1 |
| Trifluralin | | 0.045 | <0.0002 | 1 | 1 |

MAC – Maximum Acceptable Concentrations IMAC – Interim Maximum Acceptable Concentrations

## HYDROCARBONS

SaskWater Codette Lake Potable Water Supply System is required to submit water samples for Hydrocarbon monitoring following the oil spill in the North Saskatchewan River. WSA has set up a monitoring schedule until the spring of 2017. At that time, WSA will inform SaskWater of the required monitoring schedule. The last sample for analysis was submitted on December 19, 2016. Sample results indicated that the provincial drinking water quality standards were not exceeded.

| Parameter | MAC (mg/L) | AO (mg/L) | Sample Results (mg/L) (max) | # of Samples Required | # of Samples Submitted |
|---|---|---|---|---|---|
| Benzene | 0.005 | | <0.0002 | 6 | 6 |
| Ethylbenzene | 0.140 | 0.0016 | <0.0002 | 6 | 6 |
| m + p-Xylene | No Limit | | <0.0002 | 6 | 6 |
| o-Xylene | No Limit | | <0.0002 | 6 | 6 |
| Total Xylene | 0.090 | 0.020 | <0.0002 | 6 | 6 |
| Toluene | 0.060 | 0.024 | <0.0002 | 6 | 6 |
| 2-Methylnaphthalene | 0.020 | | <0.00005 | 6 | 6 |
| Acenaphthene | No Limit | | <0.00005 | 6 | 6 |
| Acenaphthylene | No Limit | | <0.00005 | 6 | 6 |
| Acridine | No Limit | | Not tested | 6 | 0 |
| Anthracene | No Limit | | <0.00005 | 6 | 6 |
| Benzo(a)anthracene | No Limit | | <0.00002 | 6 | 6 |
| Benzo(a)pyrene | 0.00001 | | <0.00001 | 6 | 6 |
| Benzo(b)fluoranthene | No Limit | | <0.0005 | 6 | 6 |
| Benzo(b+j)fluoranthene | No Limit | | Not tested | 6 | 0 |
| Benzo(e)pyrene | No Limit | | <0.0005 | 6 | 6 |
| Benzo(g,h,i)perylene | No Limit | | <0.0005 | 6 | 6 |
| Benzo(k)fluoranthene | No Limit | | <0.0005 | 6 | 6 |
| Chrysene | No Limit | | <0.0001 | 6 | 6 |
| Dibenzo(a,h)anthracene | No Limit | | <0.0005 | 6 | 6 |
| Fluoranthene | No Limit | | <0.00005 | 6 | 6 |
| Fluorene | No Limit | | <0.00005 | 6 | 6 |
| Indeno(1,2,3,-c,d)pyrene | No Limit | | <0.0005 | 6 | 6 |
| Naphthalene | 0.090 | | <0.00005 | 6 | 6 |
| Perylene | No Limit | | <0.0005 | 6 | 6 |
| Phenanthrene | No Limit | | <0.00005 | 6 | 6 |
| Pyrene | 0.120 | | <0.00002 | 6 | 6 |
| Quinoline | No Limit | | <0.00005 | 6 | 6 |
| Hydrocarbons, F1 | No Limit | | <0.050 | 6 | 6 |
| Hydrocarbons, F2 | No Limit | | <0.050 | 6 | 6 |
| Hydrocarbons, F3 | 0.120 | | 0.100 | 6 | 6 |
| Hydrocarbons, F4 | No Limit | | <0.050 | 6 | 6 |

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

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