Town of Swan River - Water Treatment Plant
ATTN: JORDAN ROOKS
Swan River Water Plant
Box 879
Swan River MB R0L 1Z0

Date Received: 14-MAR-18
Report Date: 20-MAR-18 13:51 (MT)
Version: FINAL

Client Phone: 204-734-0186

Certificate of Analysis

Lab Work Order #: L2067792

Project P.O. #: NOT SUBMITTED
Job Reference: SWAN RIVER - PWS 225.00
C of C Numbers:
Legal Site Desc: 17514

Hua Wo
Chemistry Laboratory Manager

ANALYTICAL REPORT

Physical Tests (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L2067792-1 Sampled Date: 13-MAR-18 Sampled Time: 13:00 Sample ID: SWAN RIVER 1 - RAW		ALS ID: L2067792-2 Sampled Date: 13-MAR-18 Sampled Time: 13:00 Sample ID: SWAN RIVER 2 - TREATED	
Colour, True	CU	15	-	<5.0		<5.0	
Conductivity	umhos/cm	-	-	780		775	
Hardness (as CaCO3)	mg/L	-	-	433	HTC	429	HTC
Langelier Index (4 C)	No Unit	-	-	0.55		0.71	
Langelier Index (60 C)	No Unit	-	-	1.3		1.5	
pH	pH units	7.00-10.5	-	7.75		7.91	
Total Dissolved Solids	mg/L	500	-	550		543	
Transmittance, UV (254 nm)	%T/cm	-	-	79.1		82.4	
Turbidity	NTU	-	-	4.82		<0.10	

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
#1: GCDWQ - Aesthetic Objective/Other Value
#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Anions and Nutrients (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L2067792-1 Sampled Date: 13-MAR-18 Sampled Time: 13:00 Sample ID: SWAN RIVER 1 - RAW		ALS ID: L2067792-2 Sampled Date: 13-MAR-18 Sampled Time: 13:00 Sample ID: SWAN RIVER 2 - TREATED	
Alkalinity, Total (as CaCO3)	mg/L	-	-	334		335	
Ammonia, Total (as N)	mg/L	-	-	0.097		<0.010	
Bicarbonate (HCO3)	mg/L	-	-	408		409	
Bromide (Br)	mg/L	-	-	0.078		<0.020	DLM
Carbonate (CO3)	mg/L	-	-	<0.60		<0.60	
Chloride (Cl)	mg/L	250	-	15.3		18.6	
Fluoride (F)	mg/L	-	1.5	0.161		0.682	
Hydroxide (OH)	mg/L	-	-	<0.34		<0.34	
Nitrate (as N)	mg/L	-	10	0.011		0.058	
Nitrite (as N)	mg/L	-	1	0.0043		<0.0020	DLM
Sulfate (SO4)	mg/L	500	-	115		116	

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
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Organic / Inorganic Carbon (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L2067792-1 Sampled Date: 13-MAR-18 Sampled Time: 13:00 Sample ID: SWAN RIVER 1 - RAW		ALS ID: L2067792-2 Sampled Date: 13-MAR-18 Sampled Time: 13:00 Sample ID: SWAN RIVER 2 - TREATED	
Dissolved Organic Carbon	mg/L	-	-	4.46		4.32	
Total Organic Carbon	mg/L	-	-	4.41		4.10	

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Detection Limit for result exceeds Guide Limit. Assessment against Guide Limit cannot be made.
Analytical result for this parameter exceeds Guide Limit listed on this report.
* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Total Metals (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	L2067792-1 13-MAR-18 13:00 SWAN RIVER 1 - RAW	L2067792-2 13-MAR-18 13:00 SWAN RIVER 2 - TREATED
			ALS ID Sampled Date Sampled Time Sample ID		
Aluminum (Al)-Total	mg/L	0.1	-	<0.0030	<0.0030
Antimony (Sb)-Total	mg/L	-	0.006	0.00010	<0.00010
Arsenic (As)-Total	mg/L	-	0.01	0.00070	0.00042
Barium (Ba)-Total	mg/L	-	1	0.0532	0.0402
Beryllium (Be)-Total	mg/L	-	-	<0.00010	<0.00010
Bismuth (Bi)-Total	mg/L	-	-	<0.000050	<0.000050
Boron (B)-Total	mg/L	-	5	0.076	0.077
Cadmium (Cd)-Total	mg/L	-	0.005	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	-	-	104	103
Cesium (Cs)-Total	mg/L	-	-	<0.000010	<0.000010
Chromium (Cr)-Total	mg/L	-	0.05	<0.00010	<0.00010
Cobalt (Co)-Total	mg/L	-	-	0.00081	<0.00010
Copper (Cu)-Total	mg/L	1	-	<0.00050	0.0557
Iron (Fe)-Total	mg/L	0.3	-	0.501	<0.010
Lead (Pb)-Total	mg/L	-	0.01	<0.000050	<0.000050
Lithium (Li)-Total	mg/L	-	-	0.0360	0.0360
Magnesium (Mg)-Total	mg/L	-	-	41.9	41.5
Manganese (Mn)-Total	mg/L	0.05	-	0.250	0.00124
Molybdenum (Mo)-Total	mg/L	-	-	0.00167	0.00158
Nickel (Ni)-Total	mg/L	-	-	0.00375	0.00211
Phosphorus (P)-Total	mg/L	-	-	<0.050	0.226
Potassium (K)-Total	mg/L	-	-	5.60	5.98
Rubidium (Rb)-Total	mg/L	-	-	0.00219	0.00221
Selenium (Se)-Total	mg/L	-	0.05	0.000137	0.000128
Silicon (Si)-Total	mg/L	-	-	7.77	8.00
Silver (Ag)-Total	mg/L	-	-	<0.000010	<0.000010
Sodium (Na)-Total	mg/L	200	-	16.4	16.9
Strontium (Sr)-Total	mg/L	-	-	0.232	0.241
Sulfur (S)-Total	mg/L	-	-	42.7	43.4
Tellurium (Te)-Total	mg/L	-	-	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	-	-	<0.000010	<0.000010
Thorium (Th)-Total	mg/L	-	-	<0.00010	<0.00010
Tin (Sn)-Total	mg/L	-	-	<0.00010	<0.00010

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ANALYTICAL REPORT

Total Metals (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L2067792-1 Sampled Date: 13-MAR-18 Sampled Time: 13:00 Sample ID: SWAN RIVER 1 - RAW	ALS ID: L2067792-2 Sampled Date: 13-MAR-18 Sampled Time: 13:00 Sample ID: SWAN RIVER 2 - TREATED
Titanium (Ti)-Total	mg/L	-	-	<0.00030	<0.00030
Tungsten (W)-Total	mg/L	-	-	<0.00010	<0.00010
Uranium (U)-Total	mg/L	-	0.02	0.00586	0.00570
Vanadium (V)-Total	mg/L	-	-	0.00052	<0.00050
Zinc (Zn)-Total	mg/L	5	-	<0.0030	0.0041
Zirconium (Zr)-Total	mg/L	-	-	0.000236	0.000097

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
#1: GCDWQ - Aesthetic Objective/Other Value
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Volatile Organic Compounds (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L2067792-1 Sampled Date: 13-MAR-18 Sampled Time: 13:00 Sample ID: SWAN RIVER 1 - RAW
Benzene	mg/L	-	0.005	<0.00050
1,1-dichloroethene	mg/L	-	0.014	<0.00050
Dichloromethane	mg/L	-	0.05	<0.00050
Ethylbenzene	mg/L	0.0016	0.14	<0.00050
MTBE	mg/L	0.015	-	<0.00050
Tetrachloroethene	mg/L	-	0.01	<0.00050
Toluene	mg/L	0.024	0.06	<0.00050
Trichloroethene	mg/L	-	0.005	<0.00050
o-Xylene	mg/L	-	-	<0.00050
M+P-Xylenes	mg/L	-	-	<0.00040
Xylenes (Total)	mg/L	0.02	0.09	<0.00064
Surrogate: 4-Bromofluorobenzene (SS)	%	-	-	98.3
Surrogate: 1,4-Difluorobenzene (SS)	%	-	-	101.5

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Detection Limit for result exceeds Guide Limit. Assessment against Guide Limit cannot be made.
Analytical result for this parameter exceeds Guide Limit listed on this report.
* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.

ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L

ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.

ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B

The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.

BR-L-IC-N-WP	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)-LR

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DOC-HTC-WP	Water	Dissolved Organic Carbon by Combustion	APHA 5310 B-WP

Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

CL-L-IC-N-WP	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COLOUR-TRUE-WP	Water	Colour, True	APHA 2120C

True Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method (450 - 465 nm) after filtration of sample through a 0.45 um filter. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-WP	Water	Conductivity	APHA 2510B

Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.

ETL-LANGELIER-4-WP	Water	Langelier Index 4C	Calculated
ETL-LANGELIER-60-WP	Water	Langelier Index 60C	Calculated
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

IONBALANCE-CALC-WP	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance (as % difference) cannot be calculated accurately for waters with very low electrical conductivity (EC), and is reported as "Low EC" where EC < 100 uS/cm (umhos/cm). Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-T-CCMS-WP Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod.)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-COL-WP Water Ammonia by colour APHA 4500 NH3 F

Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.

NO2-L-IC-N-WP Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-WP Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

PH-WP Water pH APHA 4500H

The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.

SO4-IC-N-WP Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-WP Water Total Dissolved Solids (TDS) APHA 2540 SOLIDS C,E

A well-mixed sample is filtered through a glass fiber filter paper. The filtrate is then evaportaed to dryness in a pre-weighed vial and dried at 180 – 2C. The increase in vial weight represents the total dissolved solids.

TURBIDITY-WP Water Turbidity APHA 2130B (modified)

Turbidity in aqueous matrices is determined by the nephelometric method.

UV-%TRANS-WP Water UV Transmittance (Calculated) APHA 5910B

Test method is adapted from APHA Method 5910B. A sample is filtered through a 0.45 um polyethersulfone (PES) filter and its UV Absorbance is measured in a quartz cell at 254 nm. UV Transmittance is calculated from the UV Absorbance result and reported as UV Transmittance per cm. The analysis is carried out without pH adjustment.

VOC+F1-HSMS-WP Water VOC plus F1 by GCMS EPA 8260C / EPA 5021A

In this method samples are analyzed using a headspace autosampler interfaced to a dual column gas chromatograph with MS and Flame Ionization detectors.

XYLENES-SUM-CALC-WP Water Sum of Xylene Isomer Concentrations CALCULATED RESULT

Total xylenes represents the sum of o-xylene and m&p-xylene.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.