Public Water System Annual Report

-2023-

Name of the Public Water System: **South Central District Water Co-op**

Name of the Legal Owner: **South Central District Water Co-operative Inc.**

Contact Person: **Don McLean, Board Chairperson**

Phone: **(204) 242-4699**

Emergency number: **(204) 245-9101**

Name of Lead Operator: **Mr. Keith Klassen**
Name of Back-up Operator: **Mr. Don Deamel**

Phone during business hours: **(204) 825-2115**

Don McLean
Board Chairperson
South Central District Water Co-op Inc.

Date Prepared: March 2024

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1. Introduction:

The 2023 South Central District Water Co-op Annual Report summarizes the water utility's ability to provide safe potable water and comply with provincial regulations.

2. Description of the Water System

The South Central District Water Co-op provides potable drinking water to a population of approximately 1800 residents. No corrective actions or emergency reporting was required. Full results have been attached in Appendix A.

The South Central District Water Co-op water system consists of two wells, raw water supply pipeline, water treatment plant (WTP), and a treated water transmission pipeline to the water storage reservoir in the town of Manitou (located in the R.M. of Pembina).

2.1. Water Supply Source

The South Central District Water Co-op receives its raw water supply from two groundwater wells, located approximately 15 km west of the WTP on SE 30-3-12W. One well can supply the system when one treatment skid is operating, and the second well supplements the supply when both treatment skids are operating.

The system provides treated water to the towns of Pilot Mound and Manitou, and some rural connections along the transmission pipeline.

2.2 Water Treatment Process

The treatment system is comprised of: two parallel RO membrane filtration skids; manganese greensand bypass filter with UV disinfection. The treatment system ensures that the water meets the *Guidelines for Canadian Drinking Water Quality* and the provincial *Drinking Water Safety Act.*

The water treatment process is designed to reduce iron and manganese concentrations, and reduce hardness to an acceptable level. Iron and manganese are metals that cause laundry and plumbing fixture staining problems, and can build up in the distribution pipes and cause reduced flow. Calcium carbonate ($CaCO_3$) causes hardness in water which diminishes the ability of the water to react with soap and form lather. Hardness also forms scale deposits in kettles and hot water tanks which can reduce the life expectancy of these appliances. Since membranes are capable of removing most of the hardness ions, a percentage of the raw water bypasses the membrane system and is filtered through a manganese greensand pressure filter. Water passing through the pressure filter continues through the UV

process and is then blended with membrane permeate to produce the desired finished water hardness.

Potassium Permanganate is injected prior to the green sand filter to oxidize iron and manganese. Iron is precipitated and filtered out, while manganese is removed mostly by adsorption within the green sand layer of the pressure filter.

Antiscalant is injected in the membrane raw water supply to minimize RO membrane fouling by sequestering dissolved metals and minerals during the treatment and concentrate phases. Since membranes remove dissolved minerals, water stabilization through pH adjustment is required to produce a non-corrosive treated water supply.

Chlorine for disinfection is added to maintain an adequate free chlorine residual concentration in the reservoir. Plant operators are required to test the water several times throughout the day at various points within the WTP to ensure break-point chlorination required for water safety is being achieved.

Treated water is stored in a 150,000 Imperial gallon, three-cell reinforced concrete reservoir. The reservoir is equipped with ultrasonic level control and monitored with a SCADA system.

2.3 Classification and Certification

The South Central District Water System is classified as a Level II Water Treatment Facility with a Level I Distribution System under the Manitoba Water and Wastewater Facility operators Regulation 77/2003. Facility classifications are used to determine certification requirements for the water system operators. The full-time operator is certified Level II Water Treatment. The relief operator is Level I Water Treatment, working towards Class II certification. Both operators are certified Level I in Water Distribution.

3. List of Water Quality Standards and Monitoring Requirements

The Province of Manitoba has adopted a number of water quality standards from the Health Canada *Guidelines for Canadian Drinking Water Quality* (see Table 1). The health-based parameters express the maximum acceptable concentrations for drinking water. Concentration values in excess of the guidelines constitute a health-related issue and require corrective actions. All health-based parameters were within the limits in 2023 for the South Central District Water System.

Table 1: Health-Based Parameters

Parameter	Quality Standard
Total coliform	Less than one total coliform bacteria detectable per 100 mL in all treated and distributed water
E. coli	Less than one *E. coli* bacteria detectable per 100 mL in all treated and distributed water
Chlorine residual	A free chlorine residual of at least 0.5 mg/L in water entering the distribution system following a minimum contact time of 20 minutes
Turbidity	Less than or equal to 0.1 NTU in 99% of the measurements in a month of the effluent from each membrane filtration unit Not exceed 0.3 NTU for any measurement
Ultraviolet Disinfection	95% of water produced per month is disinfected within validated conditions
Arsenic	Less than or equal to 0.01 mg/L
Benzene	Less than or equal to 0.005 mg/L
Fluoride	Less than or equal to 1.5 mg/L
Lead	Less than or equal to 0.01 mg/L in the water distribution system
Nitrate	Less than or equal to 45 mg/L measured as nitrate (10 mg/L measured as nitrogen)
Trichloroethylene	Less than or equal to 0.005 mg/L
Tetrachloroethylene	Less than or equal to 0.03 mg/L
Uranium	Less than or equal to 0.02 mg/L

Public water systems are required to monitor chlorine levels and undertake regular bacterial testing. The South Central District system met all requirements 100% for water quality standards and monitoring requirements in 2023, and is fulfilling the requirements of the Operating Licence.

Table 2: Water Quality Monitoring Requirements

Parameter	Monitoring Requirement
Bacteriological (total coliform and *E. coli*)	Biweekly sampling program with each set of samples consisting of one raw, one treated, and a minimum of two distribution samples. Distribution samples are to be taken from the following locations: • Water entering the Manitou reservoir (incoming) • Water leaving the Manitou reservoir (outgoing) Consecutive sample sets to be separated by at least 12 days
Free chlorine (treated water)	Continuous sampling of water entering the distribution system following at least 20 minutes of contact time at the Pilot Mound reservoir A confirmatory sample to be taken daily at the online chlorine analyzer sampling or effluent point at the Pilot Mound reservoir One sample per day of water leaving the Manitou reservoir
Total chlorine (treated water)	One sample per day of water entering the distribution system following at least 20 minutes of contact time Pilot Mound reservoir One sample per day of water leaving the Manitou reservoir
Ultraviolet Disinfection	Continuous monitoring of UV intensity level for each operating UV unit
Turbidity	One raw water sample per day Continuous sampling of the effluent from each operating membrane filtration unit A confirmatory sample to be taken daily at the online turbidity analyzer sampling or effluent point
General chemistry (parameter list provided by Office of Drinking Water)	One raw and one treated water sample once each year
Lead	As per the instructions of the Drinking Water Officer

The Manitoba health-based standards for Trihalomethanes (THM) and Haloacetic Acids (HAA) are 100 µg/L (micrograms per liter) and 80 µg/L, respectively. Both THM and HAA are by-products of disinfection, where chlorine combines with trace amounts of organics in the water. Although the Co-op is not required to sample for THM and HAA, the Municipality of Louise is required to do so and the results are shown in Appendix A. The average THM is 5.4 µg/L and HAA levels are undetectable in their distribution system.

4. **Water System Incidents and Corrective Actions**

   There were no major water system incidents in 2023. There were no corrective actions or emergency reporting required.

5. **Drinking Water Safety Orders, Warnings, and Charges**

   There were no Drinking Water Safety Orders or warnings issued, nor were any charges laid on the system.

6. **Major Expenses Incurred**

   There were no major expenses for the South Central District Water System in 2023.

7. **Future System Expansion**

   The South Central District Water Co-op member municipalities plan to continue expansion of their distribution networks as funding opportunities arise and finances are available.

Appendix A

Results of Water Chemistry, Bacterial and Chlorine Residual Analysis

Chlorine Residual and Bacterial (TC/EC) Analyses

Collection Date	Sample Identification	TC	EC	CL2 Free	CL2 Total
2023-01-05	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.69	0.70
2023-01-05	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.97	0.99
2023-01-05	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-01-05	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.72	0.83
2023-01-17	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.63	0.75
2023-01-17	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	1.01	1.02
2023-01-17	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-01-17	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.71	0.79
2023-01-31	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.66	0.76
2023-01-31	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	1.01	1.04
2023-01-31	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-01-31	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.75	0.84
2023-02-14	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.66	0.73
2023-02-14	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	1.05	1.09
2023-02-14	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-02-14	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.71	0.80
2023-02-28	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.72	0.77
2023-02-28	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	1.21	1.23
2023-02-28	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-02-28	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.73	0.84
2023-03-14	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.72	0.76
2023-03-14	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	1.00	1.07
2023-03-14	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-03-14	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.74	0.84
2023-03-28	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.69	0.83
2023-03-28	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.92	1.07
2023-03-28	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-03-28	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.73	0.82
2023-04-11	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.71	0.77
2023-04-11	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.97	1.08
2023-04-11	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-04-11	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.74	0.85
2023-04-25	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.69	0.71
2023-04-25	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.93	0.97
2023-04-25	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	Na
2023-04-25	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.69	0.83

Chlorine Residual and TC/EC Analyses (continued)

Collection Date	Sample Identification	TC	EC	CL2 Free	CL2 Total
2023-05-09	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.71	0.75
2023-05-09	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.86	0.96
2023-05-09	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-05-09	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.71	0.83
2023-05-23	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.61	0.71
2023-05-23	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.86	0.96
2023-05-23	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-05-23	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.69	0.78
2023-06-06	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.64	0.84
2023-06-06	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.85	0.93
2023-06-06	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-06-06	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.70	0.79
2023-06-20	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.66	0.75
2023-06-20	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	1.10	1.21
2023-06-20	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-06-20	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.72	0.81
2023-07-04	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.69	0.74
2023-07-04	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.59	0.60
2023-07-04	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-07-04	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.70	0.78
2023-07-18	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.85	1.03
2023-07-18	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	1.05	1.08
2023-07-18	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-07-18	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.72	0.80
2023-08-01	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.68	0.77
2023-08-01	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	1.12	1.24
2023-08-01	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-08-01	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.70	0.80
2023-08-15	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.69	0.72
2023-08-15	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.99	1.00
2023-08-15	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-08-15	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.71	0.83
2023-08-29	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.64	0.70
2023-08-29	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.95	1.06
2023-08-29	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-08-29	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.71	0.80

Chlorine Residual and TC/EC Analyses (continued)

Collection Date	Sample Identification	TC	EC	CL2 Free	CL2 Total
2023-09-12	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.64	0.71
2023-09-12	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.67	0.69
2023-09-12	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-09-12	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.73	0.84
2023-09-26	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.60	0.67
2023-09-26	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.63	0.70
2023-09-26	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-09-26	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.73	0.84
2023-10-10	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.65	0.73
2023-10-10	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.59	0.73
2023-10-10	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-10-10	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.73	0.83
2023-10-24	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.68	0.69
2023-10-24	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	1.06	1.06
2023-10-24	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-10-24	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.73	0.84
2023-11-07	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.72	0.73
2023-11-07	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.53	0.73
2023-11-07	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-11-07	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.72	0.83
2023-11-21	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.67	0.69
2023-11-21	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	1.19	1.27
2023-11-21	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-11-21	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.73	0.83
2023-12-05	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.65	0.57
2023-12-05	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.88	0.88
2023-12-05	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-12-05	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.76	0.85
2023-12-19	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	0	0	0.66	0.69
2023-12-19	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	0	0	0.80	0.84
2023-12-19	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	0	0	na	na
2023-12-19	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	0	0	0.74	0.83

Notes:

CL2: Reported in units of mg/L

TC/EC: Reported in units of MPN/100 mL

NDSF: No Data - Sample Received Frozen

Trihalomethane (THM) 2023 Results

WATER SYSTEM NAME	CODE	FEB	MAY	AUG	NOV	AVG THM (µg/L)
Municipality of Louise	120.00	5.9	4.3	4.3	7.0	**5.4**
(Source– South Central District Co-Op - 203.75)						

Notes:

- All results reported in µg/l
- THM Annual Average Maximum Allowable Concentration = 100 µg/l

Haloacetic Acids (HAA) 2023 Results

WATER SYSTEM NAME	CODE	FEB	MAY	AUG	NOV	AVG HAA (µg/L)
Municipality of Louise	120.00	<1.8 (DL)	<1.8 (DL)	<5.0 (DL)	<5.0 (DL)	**<3.4 (DL)**
(Source– South Central District Co-Op – 203.75)						

Notes:

- All results reported in µg/l
- HAA Annual Average Maximum Allowable Concentration = 80 µg/l
- DL = Detection Limit (ie. No detectable HAA in the water)

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: SOUTH CENTRAL REGIONAL 1 - RAW	SOUTH CENTRAL REGIONAL 2 - TREATED	SOUTH CENTRAL REGIONAL 3 - DISTRIBUTION (MID)	---	---
Client sampling date / time					05-Dec-2023 10:00	05-Dec-2023 10:30	05-Dec-2023 11:00	---	---
					WP2331892-001	WP2331892-002	WP2331892-003	-----	-----
					Result	Result	Result	---	---
Physical Tests									
Absorbance, UV (@ 254nm)	---	E404/WP	0.0050	AU/cm	0.0220	0.0060	---	---	---
Alkalinity, bicarbonate (as CaCO3)	---	E290/WP	1.0	mg/L	235	86.9	---	---	---
Alkalinity, carbonate (as CaCO3)	---	E290/WP	1.0	mg/L	Not Detected	Not Detected	---	---	---
Alkalinity, hydroxide (as CaCO3)	---	E290/WP	1.0	mg/L	Not Detected	Not Detected	---	---	---
Alkalinity, total (as CaCO3)	---	E290/WP	1.0	mg/L	235	86.9	---	---	---
Colour, true	---	E329/WP	5.0	CU	Not Detected	Not Detected	---	---	---
Conductivity	---	E100/WP	2.0	µS/cm	534	208	---	---	---
Hardness (as CaCO3), from total Ca/Mg	---	EC100A/WP	0.50	mg/L	265	78.9	---	---	---
Langelier index (@ 4°C)	---	EC105A/WP	0.010	-	0.314	-0.356	---	---	---
Langelier index (@ 60°C)	---	EC105A/WP	0.010	-	1.08	0.417	---	---	---
pH	---	E108/WP	0.10	pH units	7.78	7.99	---	---	---
Solids, total dissolved [TDS]	---	E162-L/WP	3.0	mg/L	322	108	---	---	---
Turbidity	---	E121/WP	0.10	NTU	1.35	0.12	---	---	---
pH, saturation (@ 4°C)	---	EC105A/WP	0.010	pH units	7.47	8.35	---	---	---
Transmittance, UV (@ 254nm)	---	E404/WP	1.0	% T/cm	95.1	98.6	---	---	---
pH, saturation (@ 60°C)	---	EC105A/WP	0.010	pH units	6.70	7.57	---	---	---
Anions and Nutrients									
Bromide	24959-67-9	E235.Br-L/WP	0.050	mg/L	Not Detected	Not Detected	---	---	---
Chloride	16887-00-6	E235.Cl-L/WP	0.10	mg/L	3.76	2.39	---	---	---
Fluoride	16984-48-8	E235.F/WP	0.020	mg/L	0.095	0.029	---	---	---
Nitrate (as N)	14797-55-8	E235.NO3-L/WP	0.0050	mg/L	Not Detected	0.0026	---	---	---
Nitrite (as N)	14797-65-0	E235.NO2-L/WP	0.0010	mg/L	Not Detected	Not Detected	---	---	---
Sulfate (as SO4)	14808-79-8	E235.SO4/WP	0.30	mg/L	57.6	16.9	---	---	---
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	---	E358-L/WP	0.50	mg/L	1.73	0.96	---	---	---

Water Chemistry (continued):

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: SOUTH CENTRAL REGIONAL 1 - RAW	SOUTH CENTRAL REGIONAL 2 - TREATED	SOUTH CENTRAL REGIONAL 3 - DISTRIBUTION (MID)	---	---
Client sampling date / time					05-Dec-2023 10:00	05-Dec-2023 10:30	05-Dec-2023 11:00	---	---
					WP2331892-001	WP2331892-002	WP2331892-003	-------	-------
					Result	Result	Result	---	---
Organic / Inorganic Carbon									
Carbon, total organic [TOC]	---	E355-L/WP	0.50	mg/L	2.02	0.77	---	---	---
Ion Balance									
Anion sum	---	EC101A/WP	0.10	meq/L	6.01	2.16	---	---	---
Cation sum (total)	---	EC101A/WP	0.10	meq/L	5.90	2.17	---	---	---
Ion balance (cations/anions)	---	EC101A/WP	0.01	%	98.2	100	---	---	---
Ion balance (APHA)	---	EC101A/WP	0.010	%	-0.924	0.231	---	---	---
Total Metals									
Aluminum, total	7429-90-5	E420/WP	3.0	µg/L	<3.0	<3.0	5.6	---	---
Antimony, total	7440-36-0	E420/WP	0.10	µg/L	<0.10	<0.10	<0.10	---	---
Arsenic, total	7440-38-2	E420/WP	0.10	µg/L	1.57	0.33	0.31	---	---
Barium, total	7440-39-3	E420/WP	0.10	µg/L	97.0	24.1	23.4	---	---
Beryllium, total	7440-41-7	E420/WP	0.020	µg/L	<0.020	<0.020	<0.020	---	---
Bismuth, total	7440-69-9	E420/WP	0.050	µg/L	<0.050	<0.050	<0.050	---	---
Boron, total	7440-42-8	E420/WP	10	µg/L	66	45	35	---	---
Cadmium, total	7440-43-9	E420/WP	0.0050	µg/L	<0.0050	<0.0050	<0.0050	---	---
Calcium, total	7440-70-2	E420/WP	50	µg/L	69200	20800	20000	---	---
Cesium, total	7440-46-2	E420/WP	0.010	µg/L	<0.010	<0.010	<0.010	---	---
Chromium, total	7440-47-3	E420/WP	0.50	µg/L	<0.50	<0.50	<0.50	---	---
Cobalt, total	7440-48-4	E420/WP	0.10	µg/L	0.16	<0.10	<0.10	---	---
Copper, total	7440-50-8	E420/WP	0.50	µg/L	<0.50	3.31	6.00	---	---
Iron, total	7439-89-6	E420/WP	10	µg/L	209	<10	<10	---	---
Lead, total	7439-92-1	E420/WP	0.050	µg/L	<0.050	<0.050	0.084	---	---
Lithium, total	7439-93-2	E420/WP	1.0	µg/L	19.2	5.9	5.4	---	---
Magnesium, total	7439-95-4	E420/WP	5.0	µg/L	22300	6540	5990	---	---
Manganese, total	7439-96-5	E420/WP	0.10	µg/L	447	1.49	1.46	---	---
Molybdenum, total	7439-98-7	E420/WP	0.050	µg/L	1.07	0.269	0.249	---	---
Nickel, total	7440-02-0	E420/WP	0.50	µg/L	<0.50	<0.50	<0.50	---	---

Water Chemistry (continued)

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	SOUTH CENTRAL REGIONAL 1 - RAW	SOUTH CENTRAL REGIONAL 2 - TREATED	SOUTH CENTRAL REGIONAL 3 - DISTRIBUTION (MID)	---	---
					Client sampling date / time	05-Dec-2023 10:00	05-Dec-2023 10:30	05-Dec-2023 11:00	---	---
						WP2331892-001	WP2331892-002	WP2331892-003	------	------
						Result	Result	Result	---	---
Total Metals										
Phosphorus, total	7723-14-0	E420/WP	50	µg/L		<50	<50	662	---	---
Potassium, total	7440-09-7	E420/WP	50	µg/L		2810	1050	1000	---	---
Rubidium, total	7440-17-7	E420/WP	0.20	µg/L		1.48	0.56	0.52	---	---
Selenium, total	7782-49-2	E420/WP	0.050	µg/L		<0.050	<0.050	<0.050	---	---
Silicon, total	7440-21-3	E420/WP	100	µg/L		13300	4040	3630	---	---
Silver, total	7440-22-4	E420/WP	0.010	µg/L		<0.010	<0.010	<0.010	---	---
Sodium, total	7440-23-5	E420/WP	50	µg/L		12000	13100	12300	---	---
Strontium, total	7440-24-6	E420/WP	0.20	µg/L		208	62.0	59.6	---	---
Sulfur, total	7704-34-9	E420/WP	500	µg/L		21200	6180	5540	---	---
Tellurium, total	13494-80-9	E420/WP	0.20	µg/L		<0.20	<0.20	<0.20	---	---
Thallium, total	7440-28-0	E420/WP	0.010	µg/L		<0.010	<0.010	<0.010	---	---
Thorium, total	7440-29-1	E420/WP	0.10	µg/L		<0.10	<0.10	<0.10	---	---
Tin, total	7440-31-5	E420/WP	0.10	µg/L		<0.10	<0.10	<0.10	---	---
Titanium, total	7440-32-6	E420/WP	0.30	µg/L		<0.30	<0.30	<0.30	---	---
Tungsten, total	7440-33-7	E420/WP	0.10	µg/L		<0.10	<0.10	<0.10	---	---
Uranium, total	7440-61-1	E420/WP	0.010	µg/L		1.44	0.442	0.449	---	---
Vanadium, total	7440-62-2	E420/WP	0.50	µg/L		<0.50	<0.50	<0.50	---	---
Zinc, total	7440-66-6	E420/WP	3.0	µg/L		<3.0	<3.0	<3.0	---	---
Zirconium, total	7440-67-7	E420/WP	0.20	µg/L		<0.20	<0.20	<0.20	---	---
Volatile Organic Compounds										
Benzene	71-43-2	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Bromodichloromethane	75-27-4	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Bromoform	75-25-2	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Chloroform	67-66-3	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Dibromochloromethane	124-48-1	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Dichloromethane	75-09-2	E611D/WP	0.0010	mg/L		<0.0010	---	---	---	---
Ethylbenzene	100-41-4	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---

Water Chemistry (continued)

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

					Client sample ID	SOUTH CENTRAL REGIONAL 1 - RAW	SOUTH CENTRAL REGIONAL 2 - TREATED	SOUTH CENTRAL REGIONAL 3 - DISTRIBUTION (MID)	----	----
					Client sampling date / time	05-Dec-2023 10:00	05-Dec-2023 10:30	05-Dec-2023 11:00	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		WP2331892-001	WP2331892-002	WP2331892-003	-------	-------
						Result	Result	Result	---	---
Volatile Organic Compounds										
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Tetrachloroethylene	127-18-4	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Toluene	108-88-3	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Trichloroethane, 1,1,1-	71-55-6	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Trichloroethane, 1,1,2-	79-00-5	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Trichloroethylene	79-01-6	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Xylene, m+p-	179601-23-1	E611D/WP	0.00040	mg/L		<0.00040	---	---	---	---
Xylene, o-	95-47-6	E611D/WP	0.00030	mg/L		<0.00030	---	---	---	---
Xylenes, total	1330-20-7	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
BTEX, total	----	E611D/WP	0.0010	mg/L		<0.0010	---	---	---	---
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611D/WP	0.0010	%		91.6	---	---	---	---
Difluorobenzene, 1,4-	540-36-3	E611D/WP	0.0010	%		103	---	---	---	---

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

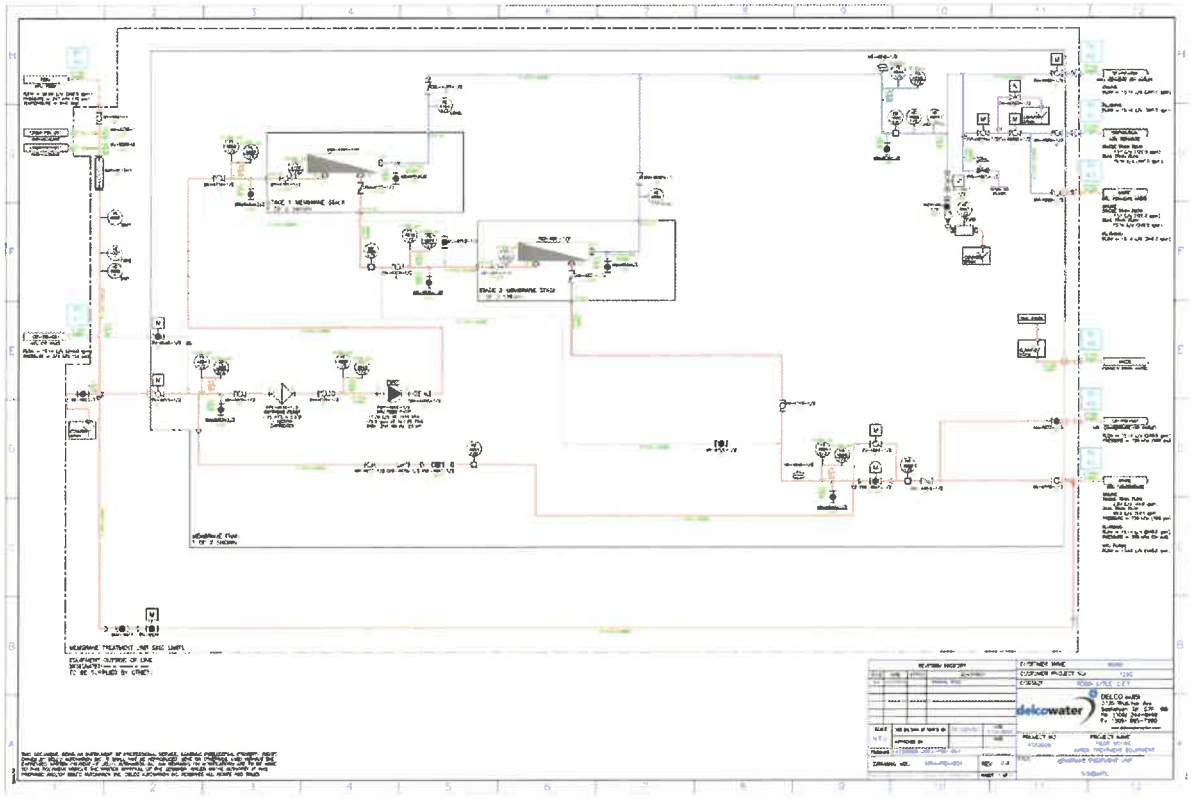
Appendix B

Water Treatment Plant Process Diagram

Process Schematics:

- Membrane Filtration
- Greensand Filtration

MEMBRANE FILTRATION:



GREEN SAND FILTRATION: