Skana Water System

2024 Annual Report

CRD | Drinking Water

Introduction

This report provides a summary of the Skana Water Service for 2024 and includes a description of the service, summary of the water supply, demand and production, drinking water quality, operations highlights, capital project updates and financial report.

Service Description

The community of Skana is a rural residential development located on the north side of Mayne Island in the Southern Gulf Islands Electoral Area, originally serviced by a private water utility. In 2003, the service converted to the Capital Regional District (CRD). The Skana Water Service (Figure 1) is made up of 73 parcels encompassing a total area of approximately 19 hectares. Of the 73 parcels, 52 were customers of the water system in 2024.

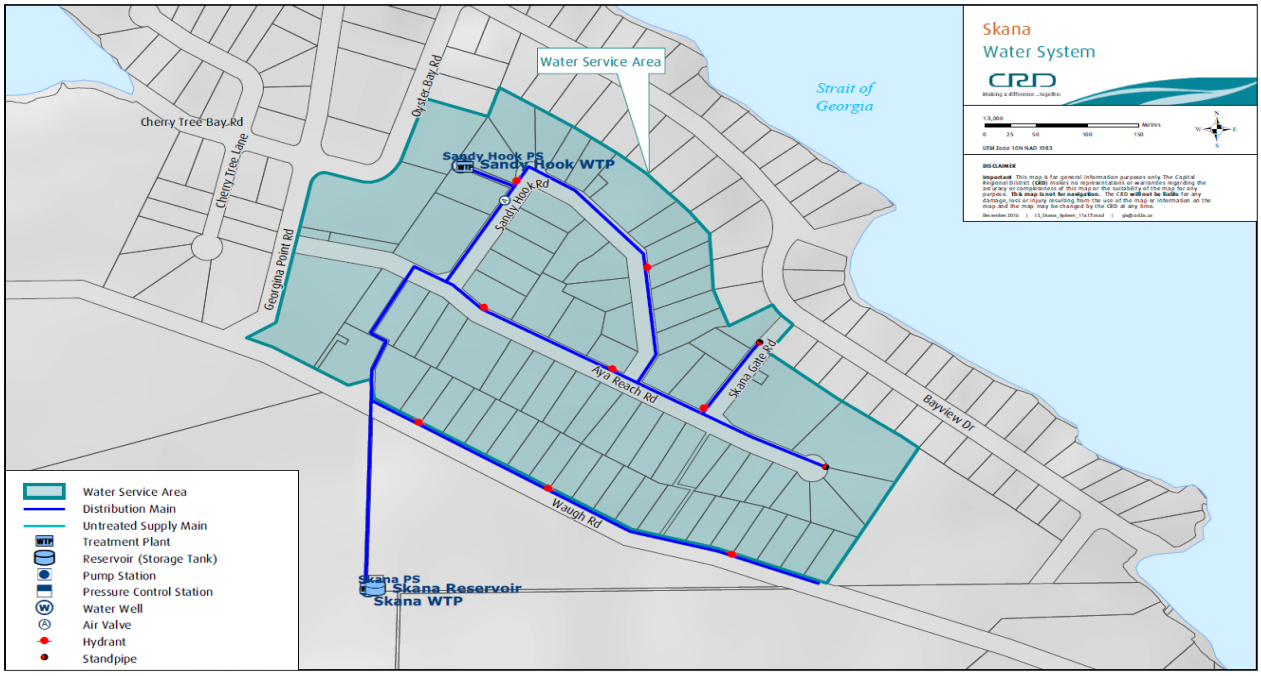

Figure 1: Map of Skana Water System

The Skana water system is primarily comprised of:

- Two groundwater wells, related pumping and control equipment and buildings (Production Wells #8 and Well #13).
- Disinfection process equipment (ultraviolet light and chlorine at each well).
- Two steel storage tanks (total volume is 91 cubic meters).
- Distribution system (approx.1,970 meters of water mains).

- Other water system assets: 52 service connections and meters, eight flushing hydrants, two flushing standpipes, 15 gate valves, one air release valve, Supervisory Control and Data Acquisition (SCADA) system and auxiliary generator.

Water Supply

Groundwater supply monthly water levels are highlighted for 2024 in Figure 2. Resource water level recorded for March is lower due to high water system demands primarily due to leaks. Aquifer water levels were typical for the remainder of the year.

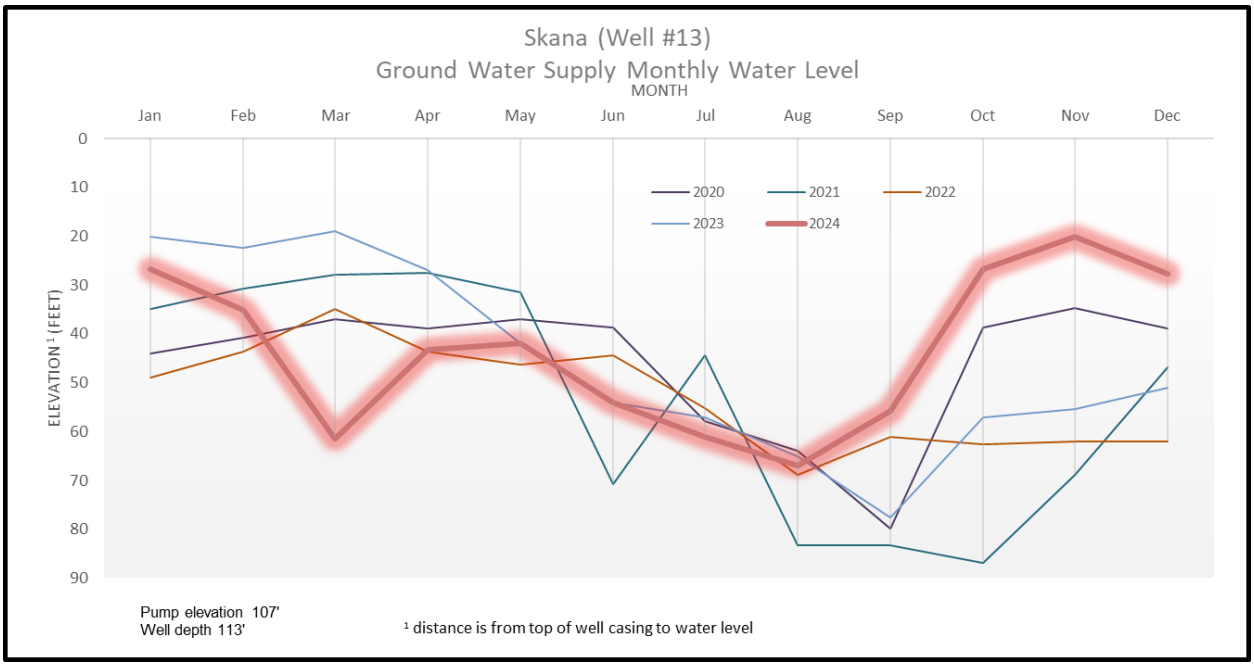

Figure 2: Skana Well #13 Groundwater Supply Monthly Water Level

Water Production and Demand

Referring to Figure 3; 3,727 cubic meters of water were extracted (water production) from the groundwater source (Well #13 and Well #8) in 2024; a 1% decrease from the previous year and a 16% decrease from the five-year average. Water demand (customer water billing) for the service totaled 2903 cubic meters of water; a 2% decrease from the previous year and a 13% decrease from the five-year average.

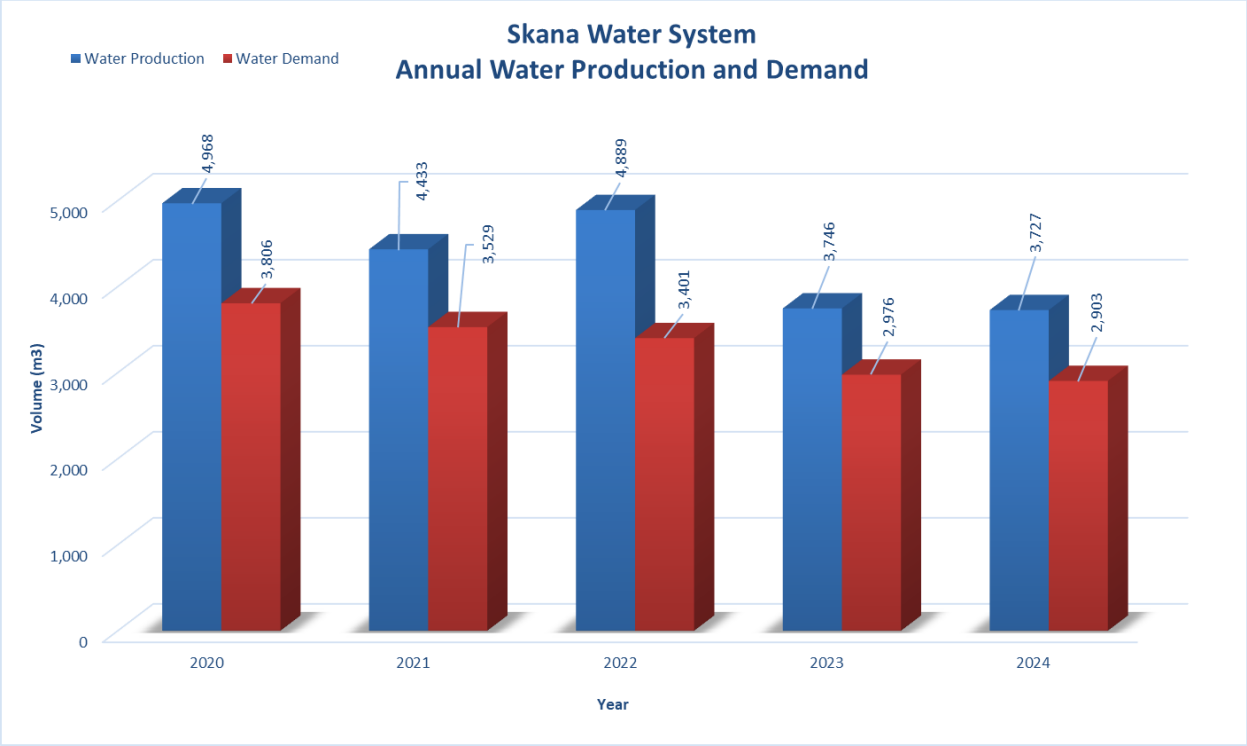

Figure 3: Skana Water Service Annual Water Production and Demand

The difference between annual water production and annual customer water demand is referred to as non-revenue water and can include water system leaks, water system maintenance and operational use (e.g. water main flushing, filter system backwashing), potential unauthorized use and fire-fighting use.

The 2024 non-revenue water (824 cubic meters) represents approximately 22% of the total water production for the service area. However, approximately 600 cubic meters is attributed to operational use resulting in a non-revenue water volume of approximately 224 cubic meters or 6.0%.

Figure 4 below illustrates the monthly water production for 2024 along with the historical water production information. The monthly water production trends are typical for small water systems such as the Skana water system. However, water production in early 2024 was abnormally higher because of water system leak that was located and repaired.

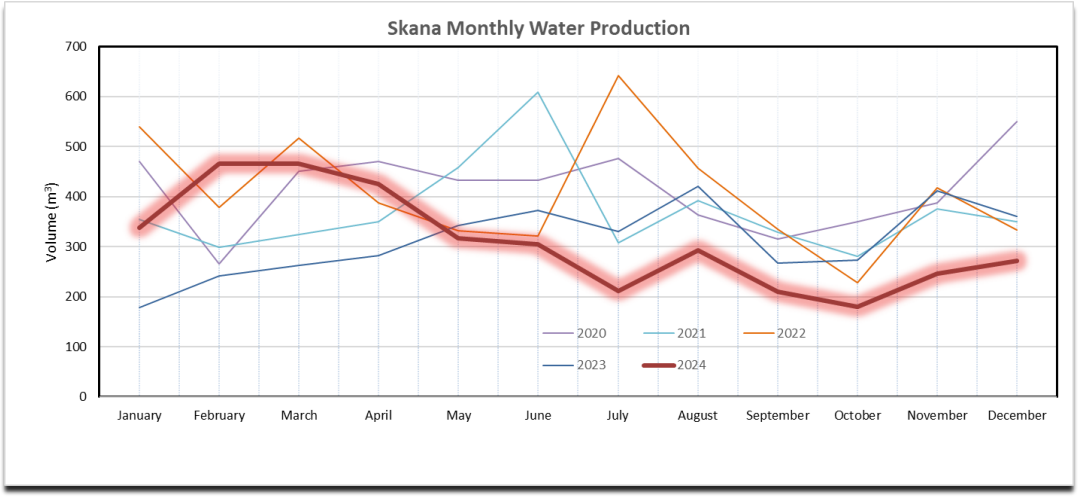

Figure 4: Skana Water Service Monthly Water Production.

Drinking Water Quality

Staff completed the water quality monitoring program at Skana based on regulatory requirements and system specific risks. Samples were collected at regular frequencies from the raw water, at the treatment plant as well as from several sampling stations in the distribution system. The samples were shipped for various analyses to the CRD's Water Quality Lab or to external laboratories for special analyses such as disinfection by-products or metals.

The water system generally supplied drinking water of good quality to the community in 2024. The main source Well #13 ran low during the peak of summer/fall and backup Well #8 had to supplement the source supply. A positive find was that the water quality supplied by Well #8 improved with higher usage. Since the decommissioning of several abandoned wells in the area, both supply wells have not recorded a bacteria positive test again. This is a notable improvement but there were still indicators of surface water influence. The raw water from Well #13 experienced again elevated iron and manganese concentrations during periods with rapid aquifer recharge.

During the wet season, disinfection by-product (DBP) concentrations in the distribution system came close but did not exceed the maximum acceptable concentration (MAC) listed in the Guidelines for Canadian Drinking Water Quality (GCDWQ). The rolling annual average concentration of DBP was below the health limit MAC.

The data below provides a summary of the water quality characteristics in 2024:

Raw Water:

- Well #13, the primary source, and Well #8, the backup and supplemental well, were both free of any indicator bacteria in 2024.
- While Well #13 supplied mostly water with turbidity levels well under 1 Nephelometric Turbidity Unit (NTU), in December and April it recorded turbidity levels of up to 1.5 NTU. This again is linked to rainfall and runoff events and therefore evidence of surface water influence.
- During the summer, source supply was supplemented with water from Well #8, the utility's backup water source. Water from Well #8 consistently supplied raw water with turbidity levels of less than 1 NTU.
- The median raw water turbidity was 0.48 NTU. This was slightly lower than in previous years.
- The raw water was hard (hardness 81.5 mg/L $CaCO_3$).
- The total organic carbon (TOC) concentration in the raw water ranged from 1.1 to 4.1 mg/L with the higher concentrations recorded in the winter during rainy periods. Episodes of high TOC have the potential for high disinfection by-product concentrations. TOC levels of 4.1 mg/L are also not typical for a true groundwater source and therefore evidence of surface water influence.

Treated Water:

- The treated water was safe to drink with no *E. coli* or total coliform bacteria positive test results.
- The median treated water turbidity was 0.50 NTU. In December, the treated water turbidity leaving the treatment plant slightly exceeded the 1 NTU threshold due to increased raw water turbidity. The sampling station on Skana Gate Road regularly registered elevated turbidity throughout the year. This was due to accumulation effects at this dead-end pipe section and should be addressed by regular spot flushes.
- The disinfection by-product total trihalomethanes (TTHM) were consistently below the MAC of 100 µg/L at the Skana Gate Road and the Waugh Road sampling location. In February, the TTHM concentrations came very close to the MAC (99 µg/L) and the HAA concentrations slightly exceeded the MAC of 80 µg/L with 89 µg/L at Skana Gate Road due to the higher

organic load in the raw water during rapid aquifer recharge periods. But the annual rolling average of the HAA concentrations of 34.6 µg/L was well below the MAC in 2024.

- In February, the iron and aluminum concentrations in the treated water leaving the treatment plant, and in the distribution system on Skana Gate Road. were above the aesthetic limit in the GCDWQ, and manganese concentrations even over the MAC. Elevated iron concentrations persisted in the distribution system into May possibly leading to water discolouration. However, no customer complaints about discolored water were received. Spot flushing in strategic locations in the distribution system during the winter/spring period would be adequate to prevent MAC exceedances through accumulation.
- In December and February, the treated water had a high colour ratings which was linked to the higher iron and manganese concentrations during this period.
- The free chlorine residual concentrations ranged from 0.04 to 1.76 mg/L with a median of 0.69 mg/L in the distribution system indicating satisfactory secondary disinfection.

Table 1 and 2 below provide a summary of the 2024 raw and treated water test results.

Water quality data collected from this drinking water system can be reviewed on the CRD website:

https://www.crd.bc.ca/about/data/drinking-water-quality-reports

Operational Highlights

The following is a summary of the major operational issues that were addressed by CRD Infrastructure and Water Services staff:

- Well #8 chlorine dosing pump corrective maintenance. Additionally, the electrical contactor, motor starter and flex conduit also required corrective maintenance.
- Emergency response to a report of dirty water by a resident. It was determined that the hydrant/standpipe annual preventative maintenance likely caused sediment within the distribution system to be disturbed causing the dirty water event. In further review of this event, it has become evident that the current water distribution system preventative maintenance program is not effective enough to remove sediment buildup. A more robust water system flushing program is being considered.
- Water service leak repair at Aya Reach Road.
- Emergency water delivery due to drought conditions on September 4, September 6 and September 9. A total of 42 cubic meters was delivered to allow Well #13 and Well #8 to recover.
- Water tanks drained, cleaned and visually inspected on November 19, 2024. The tank was last cleaned and inspected in 2021. Interior tank observations indicated a heavy number of carbuncles and corrosion in 2021 and similar findings during the most recent inspection.
- Corrective maintenance of the chlorine analyzer system. The chlorine probe required replacement primarily due to age and the requirement for greater accuracy reading.

Capital Projects Update

The Capital Projects that were in progress or completed in 2024 include:

- Storage Tank Options Assessment – CRD commenced updating the options assessment for the replacement of the Skana water storage tanks.

Financial Report

Please refer to the attached 2024 Statement of Operations and Reserve Balances.

Revenue includes parcel taxes (Transfers from Government), fixed user fees (User Charges), interest on savings (interest earnings), transfer from the Operating Reserve Fund, and miscellaneous revenue such as late payment charges (other revenue).

Expenses include all the costs of providing the service. General Government Services include budget preparation, financial management, utility billing and risk management services. CRD Labour and Operating Costs include CRD staff time as well as the costs of equipment, tools, and vehicles. Debt servicing costs are interest and principal payments on long term debt. Other Expenses include all other costs to administer and operate the water system, including insurance, supplies, water testing and electricity.

The difference between Revenue and Expenses is reported as Net revenue (expenses). Any transfers to or from capital or reserve funds for the service (Transfers to own funds) are deducted from this amount and it is then added to any surplus or deficit carry forward from the prior year, yielding an Accumulated Surplus (or deficit). In alignment with Local Government Act Section 374 (11), any deficit must be carried forward and included in next year's financial plan.

For questions related to this Annual Report please email IWSAdministration@crd.bc.ca

Table 1

Table 1: 2024 Summary of Raw Water Test Results, Skana Water System										
PARAMETER		**2024 ANALYTICAL RESULTS**				**CANADIAN GUIDELINES**	**2014-2023 ANALYTICAL RESULTS**			
Parameter	Units of	Annual	Samples	Range				Samples	Range	
Name	Measure	Median	Analyzed	Minimum	Maximum	≤ = Less than or equal to	Median	Analyzed	Minimum	Maximum
ND means Not Detected by analytical method used										
Physical Parameters										
Hardness as $CaCO_3$	mg/L	**81.5**	4	66.2	93.8	No Guideline Required	87.4	31	27.5	114
Colour, True	TCU	**6.5**	20	< 2	21		< 2	32	1.3	13
Turbidity	NTU	**0.475**	20	0.2	1.5		0.565	104	0.1	70
Water Temperature	deg C	**11.1**	37	9.6	13.1		7	254	5.1	21.3
pH	pH units	**7.35**	2	6.9	7.8	AO pH 7.0 -10.5	7.22	23	6.6	8.12
Total Organic Carbon	mg/L	**2.4**	4	1.1	4.1		2.35	30	1.2	6.09
Metals										
Aluminum	ug/L as Al	**16.1**	4	< 3	54.2	2900 MAC / 100 OG	11	32	< 3	110
Antimony	ug/L as Sb	**< 0.5**	4	< 0.5	< 0.5	6 MAC	< 0.5	32	< 0.5	< 0.5
Arsenic	ug/L as As	**0.17**	4	0.16	0.18	10 MAC	0.19	32	0.12	0.99
Barium	ug/L as Ba	**2.1**	4	1.7	2.2	1000 MAC	2.3	32	1.3	< 9
Beryllium	ug/L as Be	**< 0.1**	4	< 0.1	< 0.1		< 0.1	32	< 0.1	< 3
Bismuth	ug/L as Bi	**< 1**	4	< 1	< 1		< 1	28	< 1	< 1
Boron	ug/L as B	**118.5**	4	64	148	5000 MAC	123.5	32	< 50	345
Cadmium	ug/L as Cd	**< 0.01**	4	< 0.01	< 0.01	7 MAC	< 0.01	32	< 0.01	< 0.1
Calcium	mg/L as Ca	**25.8**	4	20.7	29.9	No Guideline Required	27.6	32	10.1	36
Chromium	ug/L as Cr	**< 1**	4	< 1	< 1	50 MAC	< 1	32	< 1	< 10
Cobalt	ug/L as Co	**< 0.2**	4	< 0.2	< 0.2		< 0.2	32	< 0.2	< 20
Copper	ug/L as Cu	**10.255**	4	3.51	16.7	2000 MAC / ≤ 1000 AO	< 8	32	1.48	32
Iron	ug/L as Fe	**21.25**	4	< 5	63.3	≤ 100 AO	15.8	32	< 5	464
Lead	ug/L as Pb	**1.265**	4	0.56	2.38	5 MAC	0.385	32	< 0.2	3.7
Lithium	ug/L as Li	**9.45**	4	7.3	10.6		10.35	16	7.3	15.9
Magnesium	mg/L as Mg	**4.145**	4	3.52	4.65	No Guideline Required	4.435	32	0.566	5.96
Manganese	ug/L as Mn	**12.85**	4	4.3	18.3	120 MAC / ≤ 20 AO	6	32	0.077	48.6
Molybdenum	ug/L as Mo	**< 1**	4	< 1	1		< 1	32	< 1	< 20
Nickel	ug/L as Ni	**< 1**	4	< 1	< 1		< 1	32	< 1	< 50
Potassium	mg/L as K	**0.2205**	4	0.18	0.229		0.229	32	0.093	0.348
Selenium	ug/L as Se	**< 0.1**	4	< 0.1	< 0.1	50 MAC	< 0.1	32	< 0.1	1.07
Silicon	ug/L as Si	**8650**	4	8060	8930		8395	32	6090	9210
Silver	ug/L as Ag	**< 0.02**	4	< 0.02	< 0.02	No Guideline Required	< 0.02	32	< 0.02	< 10
Sodium	mg/L as Na	**37.6**	4	27.7	50	≤ 200 AO	41.4	32	23.6	86.5
Strontium	ug/L as Sr	**69.5**	4	61.2	75.1	7000 MAC	76.15	32	53	99.7
Sulfur	mg/L as S	**7.45**	4	5.8	8.7		8.7	28	3.2	12.6
Thallium	ug/L as Tl	**0.0105**	4	< 0.01	0.011		< 0.01	28	< 0.01	< 0.05
Tin	ug/L as Sn	**< 5**	4	< 5	< 5		< 5	32	< 5	< 20
Titanium	ug/L as Ti	**< 5**	4	< 5	< 5		< 5	32	< 5	< 10
Uranium	ug/L as U	**< 0.1**	4	< 0.1	< 0.1	20 MAC	< 0.1	28	< 0.1	0.18
Vanadium	ug/L as V	**< 5**	4	< 5	< 5		< 5	32	< 5	< 10
Zinc	ug/L as Zn	**27.3**	4	14.3	40.7	≤ 5000 AO	7.5	32	< 1	198
Zirconium	ug/L as Zn	**< 0.1**	4	< 0.1	0.25		< 0.1	28	< 0.1	< 0.5
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	**< 1**	20	< 1	< 1		< 1	160	0	G 200
E. coli	CFU/100 mL	**< 1**	20	< 1	< 1		< 1	160	0	11
Heterotrophic bacteria, 7 day	CFU/mL	Not analyzed in 2024					10	1	10	10
Parasites										
Cryptosporidium, Total oocysts	oocysts/100 L	Last tested in 2015				Zero detection desirable	0	3	0	0
Giardia, Total cysts	cysts/100 L	Last tested in 2015				Zero detection desirable	0	3	0	0

Table 2

Table 2: 2024 Summary of Treated Water Test Results, Skana Water System										
PARAMETER	**2024 ANALYTICAL RESULTS**					**CANADIAN GUIDELINES**	**2014-2023 ANALYTICAL RESULTS**			
Parameter	Units of	Annual	Samples	Range		≤ = Less than or equal to		Samples	Range	
Name	Measure	Median	Analyzed	Minimum	Maximum		Median	Analyzed	Minimum	Maximum
ND means Not Detected by analytical method used										
Physical Parameters										
Hardness	mg/L as CaCO3	**82.3**	8	67	93.5		84.5	56	27	107
Colour, True	TCU	**5**	30	< 2	28		< 2	48	< 2	10
pH	pH units	**6.9**	2	6.7	7.1	AO pH 7.0 -10.5	7	15	7	8.1
Turbidity	NTU	**0.5**	31	0.2	15		0.55	211	0	40
Total Organic Carbon	mg/L	**2**	2	2	2		1.75	50	0	5
Water Temperature	deg C	**11.05**	162	5.7	17.6		7.5	1665	1	23.5
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	**<1**	55	<1	<1	0 MAC	< 1	425	0	99
E. coli	CFU/100 mL	**< 1**	55	< 1	< 1	0 MAC	< 1	425	0	10
Hetero. Plate Count, 7 day	CFU/1 mL	**6255**	2	510	12000	No Guideline Required	< 10	45	< 10	15000
Disinfectants										
Disinfectants										
Chlorine, Free Residual	mg/L as Cl2	**0.69**	164	0.04	1.76		0.76	1684	0.04	4.8
Chlorine, Total Residual	mg/L as Cl2	Not analyzed in 2024					0.79	1004	0.1	5.9
Disinfection By-Products										
Disnfection Byproducts										
Bromodichloromethane	ug/L	**17.0**	8	15.0	23.0		20	8	12	29
Bromoform	ug/L	**17.0**	8	15.0	23.0		< 1	69	< 0.1	1.71
Chloroform	ug/L	**45.5**	8	26.0	82.0		61.5	8	15	120
Chlorodibromomethane	ug/L	**5.1**	8	1.4	9.8		5.1	8	1.6	7.5
Total Trihalomethanes	ug/L	**73.0**	8	52.0	99.0	100 MAC	72	69	23.1	190
Haloacetic Acids (HAAs)										
HAA5	ug/L	**21**	4	7.4	89	80 MAC	20	15	7.7	140
Metals										
Aluminum	ug/L as Al	**10.5**	8	< 3	161	2900 MAC / 100 OG	19.7	57	< 3	164
Antimony	ug/L as Sb	**< 0.5**	8	< 0.5	< 0.5	6 MAC	< 0.5	57	< 0.5	< 0.5
Arsenic	ug/L as As	**0.16**	8	0.14	0.57	10 MAC	0.18	57	< 0.1	0.97
Barium	ug/L as Ba	**2**	8	1.6	4.6	1000 MAC	2.3	57	1.1	< 9
Beryllium	ug/L as Be	**< 0.1**	8	< 0.1	< 0.1		< 0.1	57	< 0.1	< 3
Bismuth	ug/L as Bi	**< 1**	8	< 1	< 1		< 1	55	< 1	< 1
Boron	ug/L as B	**140**	8	67	167	5000 MAC	124	57	53	507
Cadmium	ug/L as Cd	**< 0.01**	8	< 0.01	0.01	7 MAC	< 0.01	57	< 0.01	< 0.1
Calcium	mg/L as Ca	**26.1**	8	20.9	30	No Guideline Required	26.7	57	9.8	34.3
Chromium	ug/L as Cr	**< 1**	8	< 1	< 1	50 MAC	< 1	57	< 1	< 10
Cobalt	ug/L as Co	**< 0.2**	8	< 0.2	0.3		< 0.2	57	< 0.2	< 20
Copper	ug/L as Cu	**13**	8	5.76	66.6	2000 MAC / ≤ 1000 AO	7.58	57	3.48	118
Iron	ug/L as Fe	**32.5**	8	9	1190	≤ 100 AO	54.4	57	14.3	607
Lead	ug/L as Pb	**1.09**	8	0.2	4.44	5 MAC	0.37	57	< 0.2	29
Lithium	ug/L as Li	**9.6**	8	7.4	11.2		9.95	32	7.4	15.9
Magnesium	mg/L as Mg	**4.11**	8	3.61	4.5	No Guideline Required	4.24	57	0.55	5.15
Manganese	ug/L as Mn	**6**	8	1.7	344	120 MAC / ≤ 20 AO	3.4	57	< 0.004	42.9
Molybdenum	ug/L as Mo	**<1**	8	<1	1.1		< 1	57	< 1	< 20
Nickel	ug/L as Ni	**< 1**	8	< 1	2.3		< 1	57	< 1	< 50
Potassium	mg/L as K	**0.2125**	8	0.193	0.253		0.235	57	0.162	0.409
Selenium	ug/L as Se	**<0.1**	8	<0.1	<0.1	50 MAC	< 0.1	57	< 0.1	0.564
Silicon	ug/L as Si	**8480**	8	7610	9170		8460	57	6550	11800
Silver	ug/L as Ag	**< 0.02**	8	< 0.02	< 0.02	No Guideline Required	< 0.02	57	< 0.02	< 10
Sodium	mg/L as Na	**40.3**	8	30.5	56.5	≤ 200 AO	42.7	57	28.2	87.4
Strontium	ug/L as Sr	**72.1**	8	63.5	81.4	7000 MAC	72.7	57	53.5	89.7
Sulphur	mg/L as S	**7.5**	8	5.6	8.6		8.5	55	3.1	12.8
Thallium	ug/L as Tl	**<0.01**	8	<0.01	0.043		< 0.01	55	< 0.01	< 0.05
Tin	ug/L as Sn	**<5**	8	<5	<5		< 5	57	< 5	< 20
Titanium	ug/L as Ti	**<5**	8	<5	6.2		< 5	57	< 5	31
Uranium	ug/L as U	**< 0.1**	8	< 0.1	0.12	20 MAC	< 0.1	55	< 0.1	0.18
Vanadium	ug/L as V	**< 5**	8	< 5	< 5		< 5	57	< 5	< 10
Zinc	ug/L as Zn	**24.45**	8	7.7	208	≤ 5000 AO	11.5	57	< 5	521
Zirconium	ug/L	**< 0.1**	8	< 0.1	0.63		< 0.1	55	< 0.1	< 0.5