RAYLEIGH WATERWORKS DISTRICT

2020
Annual Water Quality Report

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1. INTRODUCTION

Under the British Columbia Drinking Water Protection Act (DWPA) all water purveyors are required to provide customers (the public) with an annual report on the quality of drinking water.

This report describes where your water comes from, how it is distributed, and how we ensure it is safe to drink.

This annual report covers the period of January 1, 2020, to December 31, 2020.

2. ANNUAL CONSUMPTION

Total consumption in 2020 was 450,105 Cubic Meters down 0.2% from 2019 and the lowest in the past ten years (Figure 1). The average per capita water usage in Rayleigh was 536.2 liters per day (Figure 2), and the average daily water production for 2020 was 1230 cubic meters (Figure 3).

Figure 1: Ten Year Consumption Comparison

Month											Year to Year Comparison		
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average	Minimum	Maximum
January	13,507	13,706	12,445	13,385	12,861	14,471	13,857	11,741	11,483	13,089	13,055	11,483	14,471
February	12,017	12,394	11,184	11,847	11,757	13,534	12,359	10,397	10,721	11,650	11,786	10,397	13,534
March	12,974	14,007	13,973	13,266	15,748	16,943	14,013	11,812	12,051	13,556	13,834	11,812	16,943
April	22,758	25,244	27,204	20,734	35,942	44,661	18,489	20,789	21,052	29,645	26,652	18,489	44,661
May	48,912	64,133	66,999	43,508	83,721	63,363	45,788	80,709	66,673	62,165	62,597	43,508	83,721
June	69,439	45,424	64,258	72,364	91,101	77,271	97,172	79,446	85,506	46,453	72,843	45,424	97,172
July	87,635	88,573	120,835	118,339	103,754	77,698	121,651	99,589	79,769	70,382	96,822	70,382	121,651
August	114,956	111,914	104,997	84,790	86,819	93,471	102,412	85,971	90,192	93,107	96,863	84,790	114,956
September	77,845	64,795	49,760	44,063	42,172	34,341	59,336	30,869	34,146	64,391	50,172	30,869	77,845
October	23,145	27,307	21,802	21,639	21,617	18,887	17,738	15,691	14,497	20,505	20,283	14,497	27,307
November	13,241	12,168	13,607	13,592	14,086	16,825	11,233	11,656	12,124	12,404	13,093	11,233	16,825
December	13,850	13,016	14,258	14,768	15,753	17,935	11,938	12,300	12,697	12,757	13,927	11,938	17,935
Total	510,280	492,681	521,322	472,295	535,330	489,399	525,987	470,970	450,911	450,105	491,928	450,105	535,330
Daily Peak	4,304	4,307	4,567	5,339	4,497	3,892	4,738	4,467	4,091	3,738	4,394	3,738	5,339
Peak Date	07-Aug	20-Aug	24-Jul	16-Jul	28-Jun	30-Jun	09-Jul	19-Jul	07-Aug	03-Aug			
Daily Low	362	305	352	299	361	302	281	319	294	257	313	257	362
Low Date	28-Feb	11-Dec	06-Mar	01-Feb	17-Feb	07-Nov	23-Mar	28-Oct	31-Jan	08-Nov			

Figure 2: Consumption Per Capita Per Day

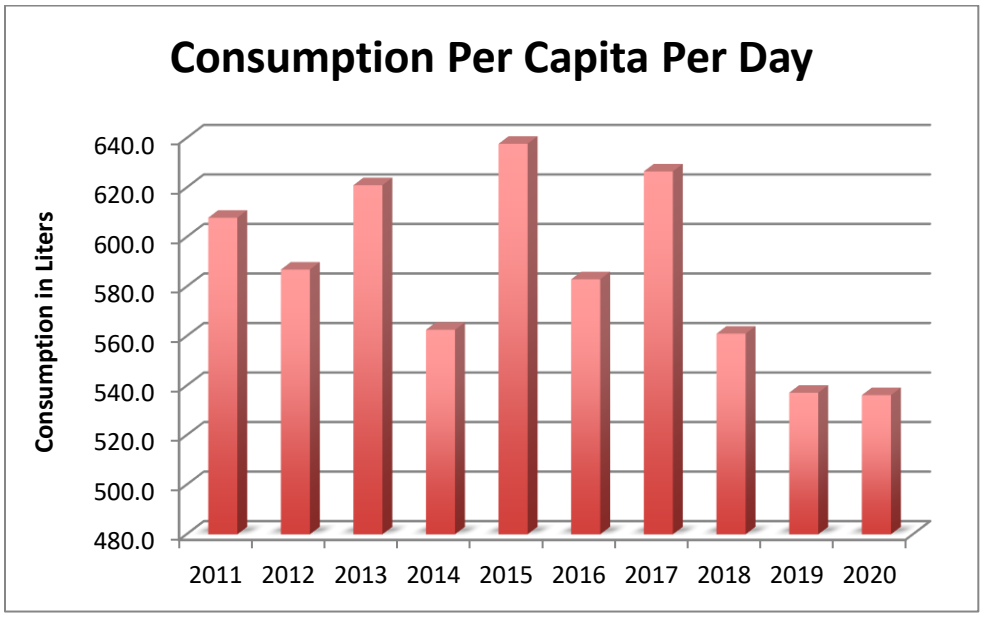
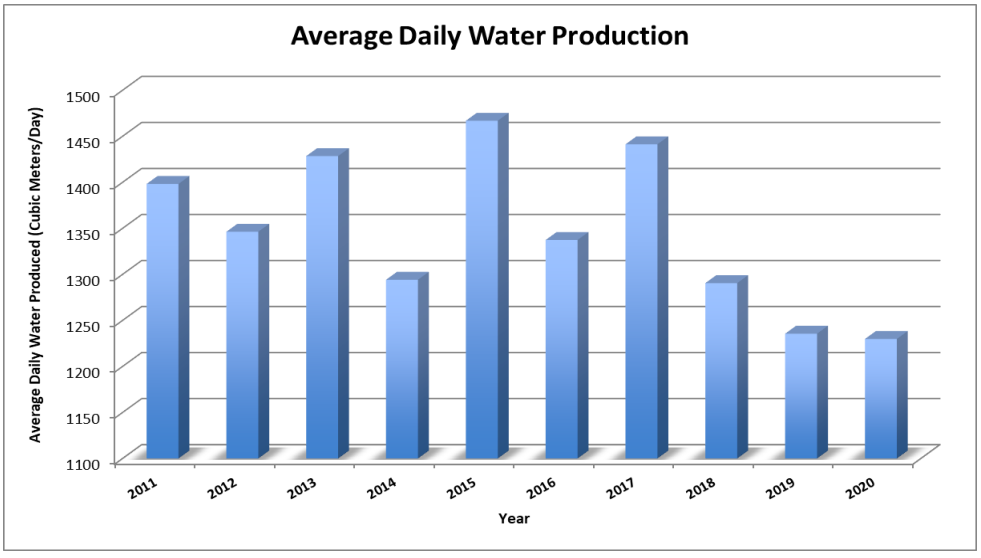


Figure 3: Average Daily Water Production



3. SYSTEM OVERVIEW

Rayleigh Waterworks District services approximately 704 connections with an estimated population of 2300 residents within its boundaries.

Source Water

The district's water supply comes from the North Thompson River. The North Thompson River originates west of the community of Valemount and joins the South Thompson in Kamloops. The Thompson River is the largest tributary of the Fraser River.

Treatment Plant

The treatment plant is a package plant from Siemens Water Technologies Corporation (now Evoqua). The plant is a conventional sand filtration, multi-barrier water treatment system.

As water is pumped from the North Thompson River it enters a Clemons Centrifugal Sand Separator, where 98 percent of 200 mesh (0.074 mm) or larger sand, grit, and other solids heavier than water are removed. The remaining particles are separated from the water in three different stages through the treatment plant.

Before entering the water treatment plant, raw water is injected with coagulant, rapidly mixed to attract and bind together solids into a settleable floc. The first portion of the treatment system (tube clarifier) removes these settleable solids. The second section of the treatment plant (adsorption clarifier) further reduces contaminants by removing non-settling solids. The final stage of the solids removal process is a mixed media filter. The mixed media consists of anthracite, silica sand and garnet. The water passes through these media particles and the remaining fine solids still left in the water are removed. The treated water then flows through ultraviolet reactors where UV light energy provides the first level of disinfection by inactivating any pathogens such as giardia and cryptosporidium that may remain. The second level of disinfection is provided by chlorination, ensuring safety of the water throughout the distribution system as it is pumped to the residents and the reservoirs.

Distribution System

Rayleigh Waterworks Distribution system consists of approximately 18 km of a mixture of Asbestos Cement, PVC, and a small amount of ductile iron pipe (100m). Figure 4 outlines the water main material, size, and length.

Figure 4: Length of Water Main (in meters) by Material and Size

SIZE	Asbestos Cement (m)	PVC (m)
50 mm		143
100 mm	3023	109
150 mm	8596	2787
200 mm	52	4911
250 mm	634	880
300 mm	277	1009
350 mm		4
400 mm		58
TOTAL	**12582**	**5482**

Water Storage

There are two cast in concrete reservoirs with a combined capacity of 870 cubic meters. The smaller reservoir, 113 m^3 was constructed in 1967 and the larger reservoir, 757 m^3 was constructed in 1975. The Infrastructure Condition Assessment completed in October 2018 by TRU Engineering states required storage of 1900 cubic meters based on MMCD, (Master Municipal Construction Documents) design criteria.

4. REGULATORY REQUIREMENTS

The Province through Interior Health Authority (IHA) is the regulatory agency for water suppliers. The Drinking Water Protection Act is the legislation governing safe drinking water in the province. This legislation requires that the water supplier monitor the drinking water at source and distribution system to ensure compliance with the *Drinking Water Protection Regulation* and report all results to IHA.

Interior Health Authority's 4-3-2-1-0 Drinking Water Objective provides a performance target for all water suppliers to provide consumers with microbiological safe drinking water. The drinking water objective is:

- 4 log (99.99%) inactivation of viruses
- 3 log (99.9%) removal or inactivation of Giardia Lamblia and Cryptosporidium
- 2 refers to two treatment processes for all surface drinking water systems
- 1 for less than 1 NTU of turbidity with a target of 0.1 NTU
- 0 total and fecal coliforms and E. Coli.

The following definitions apply to Rayleigh Waterworks

4 Log inactivation of viruses
Viruses are easily inactivated by using chlorine. Maintaining 0.5 mg/L of free chlorine for 20 minutes is adequate in most cases.

3 Log removal or inactivation of Giardia Lamblia and Cryptosporidium
Giardia may be inactivated by large doses of free chlorine, ultraviolet light, or removed by filtration. Systems with optimized conventional rapid sand filtration can achieve 3 log removal of Cryptosporidium. Ultraviolet disinfection is given a credit of 3.0 logs if the dose is a minimum of 40 mJ/cm^2.

2 Treatment Barriers
2 treatment barriers are a minimum for all surface water sources. The main risk to water quality is from microbiological agents. It is recognized that effective treatment for all microbial risks by a single treatment barrier is not effective. A minimum dual barrier of treatment is required for all surface water to reduce the risk of microbial or health threats to drinking water. Water filtration and disinfection meet the 2 treatment barriers.

<1 NTU of turbidity (less than)
The guidelines for the Canadian Drinking Water Quality currently specify that the filtered treated water from conventional filtration have turbidity ≤ 0.3 NTU in at least 95% of measurements either per filter cycle or per month; never to exceed 1.0 NTU. Filtration systems should be designed to reduce turbidity levels as low as reasonably achievable and strive to achieve a treated water turbidity target of less than 0.1 NTU.

0 Fecal coliform or E. coli bacteria
The Drinking Water Protection Act requires water suppliers to provide water with zero E. coli sample results. Coliform bacteria are easily controlled with chlorine, UV light and can be reduced by filtration.

5. WATER QUALITY MONITORING

Water quality samples are taken daily at source and after treatment and analyzed to confirm compliance with applicable requirements. Figure 5 summarizes the monthly averages. Weekly bacteriological samples are taken from a rotating location within the distribution system and submitted to ALS Environmental Laboratories for independent analysis. These weekly samples are also analyzed in house for free and total chlorine and turbidity. Figure 6 summarizes these results.

RWWD personnel also sample the treated water daily for bacteriological analysis using IDEXX Colilert Test. Colilert simultaneously detects total coliforms and *e. coli* in water. All daily water samples taken and analyzed using the Colilert test passed, meaning negative for total coliform and *e. coli.*

pH

The pH of water is a measurement of how acidic or basic it is. The pH scale runs from 0 (most acidic) to 14 (most basic) and 7 being neutral. Natural waters usually have a pH of between 6.5 and 8.5.

Turbidity

Turbidity is the cloudy appearance of water caused by the presence of suspended and colloidal matter. A turbidity measurement is used to indicate the clarity of water. The measurement unit is called a Nephelometric Turbidity Unit (NTU). The turbidimeter measures the intensity of light scattered at 90 degrees as a beam of light passes through a water sample.

Aluminum

We use an aluminum-based coagulant in the treatment process and by monitoring the amount in our treated water we can ensure that the coagulant is not being overdosed and entering our drinking water at elevated levels. For treatment plants using aluminum-based coagulants, GCDWQ has an operational guideline of 0.1 mg/L on water leaving a plant.

Iron

Iron is naturally occurring through the erosion of rocks and minerals. No evidence exists of dietary iron toxicity in the public. The aesthetic objective outlined in the GCDWQ is ≤ 0.3 mg/L.

Free & Total Chlorine

Chlorine levels are important in water treatment to ensure that water is safe all the way through the distribution system to each home. Sodium hypochlorite is the form of chlorine used in our treatment system. Free chlorine measures the amount of hypochlorite in our water, while total chlorine measures the free chlorine plus any combined chlorine disinfectants such as chloramines.

UV Transmittance (UVT)

UVT is related to the quantity of organics, colloidal solids and other material in the water which absorb and scatter the UV light as it passes through the water. In a UV disinfection system, if the UVT of the water is too low, then the UV light is not able to penetrate the water as efficiently, thereby reducing the effective UV dose delivered.

Background Bacterial Monitoring

Background bacteria monitoring is done through what is called a heterotrophic plate count (HPC). Heterotrophic bacteria are a group of bacteria that use carbon as a food source and can be found in a variety of water sources. Most bacteria found in water are actually heterotrophic. In general, these bacteria are not pathogenic, and the HPC test in itself will not tell you whether the water is safe to drink. Because of this, there is no maximum acceptable concentration (MAC), as stated in the GCDWQ. This test tells us if there are conditions within the system that bacteria can regrow or thrive in.

Coliform Bacteria Monitoring

Coliform bacteria represent a large group of bacteria found in water and soil, on vegetation, and in the feces of mammals. Most of these bacteria are not harmful to humans but, because of the ease of testing of this bacteria, it makes for a great indicator of contamination.
In water treatment systems, there is a zero-threshold allowance for coliforms within water samples. If a sample shows positive for coliforms, the site is immediately resampled and, if coliforms are found again, a boil water advisory is put in place while working closely with the local health authority.

E. Coli Bacterial Monitoring

E. coli bacteria are a subsection of coliform bacteria. These bacteria may not be harmful to human health, but specific strains can cause serious health issues and even death in some instances. These bacteria are also found almost exclusively in the feces of mammals; therefore, they are a definite sign of contamination. Any positive counts for coliforms or E. coli result in an immediate boil water advisory, resampling, and cleaning of the affected area. The results for the 2020 distribution system can be seen in Figure 6.

Figure 5: RWWD Average Monthly Raw & Treated Water Analysis

2020 AVERAGE MONTHLY RAW & TREATED WATER ANALYSIS											
	RIVER				TREATED DRINKING WATER						
Date:	Turbidity NTU	Temperature °C	pH	Iron mg/L	Turbidity NTU	Temperature °C	pH	Res. Chlorine ppm	Iron mg/L	Aluminum mg/L	UV Transmittance %
JANUARY	2.61	1.40	6.87	0.07	0.041	1.97	7.04	0.65	0.02	0.013	97
FEBRUARY	4.14	1.29	6.63	0.05	0.041	1.58	7.09	0.60	0.02	0.014	96
MARCH	5.24	3.47	6.91	0.08	0.043	3.96	7.14	0.60	0.03	0.011	97
APRIL	12.9	6.69	7.32	0.18	0.044	8.19	7.36	0.57	0.02	0.013	93
MAY	22.6	8.4	7.17	0.16	0.046	9.6	7.28	0.61	0.03	0.017	94
JUNE	19.7	11.0	7.16	0.11	0.050	11.8	7.14	0.65	0.03	0.016	96
JULY	19.8	14.2	7.29	0.10	0.049	15.2	7.28	0.55	<.02	0.020	97
AUGUST	12.5	16.4	7.51	0.12	0.049	18.8	7.41	0.53	0.03	0.023	98
SEPTEMBER	10.1	14.8	7.47	0.10	0.043	17.2	7.36	0.65	0.02	0.023	98
OCTOBER	9.18	8.84	7.04	0.11	0.043	11.5	6.93	0.58	<.02	0.012	98
NOVEMBER	2.79	4.29	6.92	0.09	0.037	5.72	7.16	0.54	0.02	0.010	97
DECEMBER	2.20	2.67	7.05	0.07	0.038	3.57	7.17	0.55	0.02	0.016	96

Figure 6: Weekly Distribution Samples

RAYLEIGH WATERWORKS DISTRICT DISTRIBUTION SAMPLES 2020								
		CHLORINE RESIDUAL mg/L			ALS ENVIRONMENTAL			
DATE	SAMPLE LOCATION	FREE	TOTAL	TURBIDITY NTU	E-COLI	*CFU/100 mL **MPN/100mL COLIFORM BACTERIA TOTAL	BACKGROUND COLONIES	CERTIFICATE OF ANALYSIS
07-Jan	*Yellowhead South	0.29	0.37	0.29	<1	<1	<1	L2403021
15-Jan	*Yellowhead North	0.35	0.44	1.27	<1	<1	<1	L2406058
20-Jan	*Hyas Place	0.52	0.58	0.61	<1	<1	<1	L2407290
28-Jan	*Reighmount Place	0.55	0.61	0.32	<1	<1	<1	L2410743
04-Feb	*Rayleigh Elementary	0.56	0.59	0.28	<1	<1	<1	L2413455
11-Feb	*Strawberry Lane	0.42	0.48	0.27	<1	<1	<1	L2415906
18-Feb	*Reighmount Drive	0.56	0.63	0.20	<1	<1	<1	L2417936
25-Feb	*Pinantan Place	0.46	0.55	0.47	<1	<1	<1	L2420833
06-Mar	*Yellowhead South	0.42	0.47	0.18	<1	<1	<1	L2424695
10-Mar	*Yellowhead North	0.36	0.43	0.22	<1	<1	<1	L2426376
17-Mar	*Hyas Place	0.60	0.66	0.19	<1	<1	<1	L2428733
25-Mar	*Reighmount Place	0.54	0.57	0.26	<1	<1	<1	L2431601
01-Apr	*Reighmount Dr.	0.45	0.51	0.08	<1	<1	<1	KS2000152
07-Apr	*3990 Davie Road	0.35	0.38	0.34	<1	<1	<1	KS2000170
15-Apr	*Strawberry Lane	0.51	0.58	0.08	<1	<1	<1	KS2000205
20-Apr	*Pinantan Place	0.35	0.45	0.36	<1	<1	<1	KS2000218
27-Apr	*Yellowhead North	0.09	0.16	0.15	<1	<1	<1	KS2000253
04-May	*Yellowhead South	0.04	0.14	0.15	<1	<1	<1	KS2000333
11-May	*Hyas Place	0.44	0.54	0.20	<1	<1	<1	KS2000374
19-May	*Reighmount Place	0.48	0.52	0.10	<1	<1	<1	KS2000444
26-May	*Reighmount Drive	0.41	0.47	0.17	<1	<1	<1	KS2000511
03-Jun	*4011 Davie Road	0.07	0.14	0.21	<1	<1	<1	KS2000584
09-Jun	*Strawberry Lane	0.45	0.48	0.16	<1	<1	<1	KS2000636
16-Jun	*Pinantan Place	0.47	0.53	0.17	<1	<1	<1	KS2000709
23-Jun	*Yellowhead South	0.07	0.12	0.21	<1	<1	<1	KS2000800
02-Jul	*Yellowhead North	0.38	0.47	0.19	<1	<1	<1	KS2000900
07-Jul	*Hyas Place	0.48	0.52	0.29	<1	<1	<1	KS2000949
14-Jul	*Reighmount Place	0.51	0.55	0.25	<1	<1	<1	KS2001028
21-Jul	*Reighmount Drive	0.43	0.47	0.20	<1	<1	<1	KS2001128
28-Jul	*Davie Road	0.32	0.39	0.15	<1	<1	<1	KS2001199
04-Aug	*Strawberry Lane	0.53	0.60	0.14	<1	<1	<1	KS2001258
11-Aug	*Pinanatan Place	0.46	0.49	0.67	<1	<1	<1	KS2001337
18-Aug	*Yellowhead South	0.20	0.25	0.23	<1	<1	<1	KS2001429
25-Aug	*Yellowhead North	0.58	0.59	1.43	<1	<1	<1	KS2001518
02-Sep	*Hyas Place	0.41	0.44	0.16	<1	<1	<1	KS2001626
08-Sep	**Reighmount Place	0.59	0.66	0.12	<1	<1		KS2001665
18-Sep	**Reighmount Drive	0.56	0.58	0.12	<1	<1		KS2001795
23-Sep	**3990 Davie Road	0.50	0.58	0.29	<1	<1		KS2001899
29-Sep	**Strawberry Lane	0.38	0.43	0.17	<1	<1		KS2001963
06-Oct	**Pinantan Place	0.47	0.53	0.09	<1	<1		KS2002058
13-Oct	**Yellowhead Sout	0.2	0.23	0.38	<1	<1		KS2002153
19-Oct	**Yellowhead North	0.21	0.27	0.23	<1	<1		KS2002228
27-Oct	**Hyas Place	0.34	0.40	0.24	<1	<1		KS2002324
03-Nov	**Reighmount Place	0.53	0.55	0.15	<1	<1		KS2002431
09-Nov	**Reighmount Drive	0.21	0.28	0.31	<1	<1		KS2002493
17-Nov	**Strawberry Lane	0.39	0.42	0.13	<1	<1		KS2002568
24-Nov	**Pinantan Place	0.48	0.51	0.16	<1	<1		KS2002651
01-Dec	**Yellowhead South	0.13	0.18	0.1	<1	<1		KS2002732
09-Dec	**Yellowhead North	0.28	0.35	0.1	<1	<1		KS2002832
15-Dec	**Hyas Place	0.34	0.38	0.09	<1	<1		KS2002888
21-Dec	**Reighmount Place	0.48	0.55	0.13	<1	<1		KS2002961
28-Dec	**Reighmount Drive	0.45	0.49	0.16	<1	<1		KS2003017

*CFU/100mL Colony Forming Units/100mL
**MPN/100mL Most Probable Number/100mL

Potable Water Disinfection By-Products

Interior Health Authority requested that we sample our distribution system quarterly for THM's, HAA's and Total Organic Carbon. These analyses are performed by ALS Environmental. The results are presented in figure 7.

Trihalomethanes (THM's) are formed as a by-product predominantly when chlorine is used to disinfect water for drinking. They represent one group of chemicals generally referred to as disinfection by-products. They result from the reaction of chlorine and/or bromine with organic matter present in the water being treated.

Haloacetic acids are a type of chlorination disinfection by-product that are formed when the chlorine used to disinfect drinking water reacts with naturally occurring organic matter (NOM) in water. Haloacetic Acids five (HAA5) refer to the five haloacetic acids most commonly found in drinking water. HAA5 consists of monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. HAA5 are more likely to be found at higher levels in water supplies with surface water sources such as rivers since soil and rock act as filters to reduce organic matter found in groundwater.

Trihalomethane and Haloacetic Acid results are below GCDWQ Maximum Allowable Concentration.

Figure 7: Quarterly Potable Water - Total Organic Carbon & Disinfection By Products

Test Description	2020 - Results				Units of Measure	GCDWQ MAC
	05-Mar	04-May	04-Aug	03-Nov		
Organic / Inorganic Carbon						
Total Organic Carbon	1.23	3.32	1.22	0.88	mg/L	
Trihalomethanes						
Bromodichloromethane	0.0011	0.0011	<0.0010	<0.0010	mg/L	
Bromoform	<0.0010	<0.0010	<0.0010	<0.0010	mg/L	
Dibromochloromethane	<0.0010	<0.0010	<0.0010	<0.0010	mg/L	
Chloroform	0.0257	0.0338	0.0182	0.0326	mg/L	
Total Trihalomethanes	0.0268	0.0349	0.0182	0.0326	mg/L	0.1
Haloacetic Acids						
Bromochloroacetic acid	<0.0010	<0.00100	<0.00100	<0.00100	mg/L	
Monochloroacetic Acid	<0.0050	0.00116	<0.00100	<0.00100	mg/L	
Dichloroacetic Acid	0.0066	0.00779	0.0029	<0.00100	mg/L	
Trichloroacetic Acid	0.0082	0.00914	0.00581	0.00598	mg/L	
Monobromoacetic Acid	<0.0010	<0.00100	<0.00100	<0.00100	mg/L	
Dibromoacetic Acid	<0.0010	<0.00100	<0.00100	<0.00100	mg/L	
Total Haloecetic Acids 5	0.0148	0.0181	0.00871	0.00598	mg/L	0.080
ALS Certificate of Analysis	**L2424737**	**KS2000332**	**KS2001266**	**KS2002429**		

GCDWQ = Guidelines for Canadian Drinking Water Quality updated June 2019
MAC - Maximum Allowable Concentration

Raw Water Analysis

Figure 8 shows the results of an extensive water quality analysis on the source water. These analyses were performed by ALS Environmental Laboratories, a Provincially accredited lab.

Figure 8: Raw Water - Physical and Chemical Properties

Test Description	2020 - Results		Unit of Measure	GCDWQ MAC	Aesthetic Objective/ Operational Guideline
	27-Apr	16-Sep			
Physical Tests					
Colour	25.9	<5.0	CU		15
Conductivity	103	96.9	µS/cm		
Hardness (as CaCO3), dissolved	44.7	42.3	mg/L		80-100
pH	7.85	7.69	pH		7-10.5
Total Suspended Solids	24.6	3.0	mg/L		
Total Dissolved Solids	75	62	mg/L		500
Turbidity	9.40	3.88	NTU		
Hardness (as CaCO3), from total Ca/Mg	47.9	43.2	mg/L		
Anions and Nutrients					
Alkalinity, Total (as CaCO3)	50.2	36.5	mg/L		
Chloride (Cl)	0.55	0.57	mg/L		≤250
Flouride (F)	0.061	0.052	mg/L	1.5	
Nitrate (as N)	0.127	0.0613	mg/L	10	
Nitrite (as N)	<0.0010	<0.0010	mg/L	1	
Sulfate (SO4)	6.14	8.95	mg/L		≤500
Organic / Inorganic Carbon					
Carbon, Total Organic (TOC)	5.71	1.52	mg/L		
Total Metals					
Aluminum (Al) - Total	0.469	0.314	mg/L		0.1
Antimony (Sb) - Total	<0.00050	<0.00050	mg/L	0.006	
Arsenic (As) - Total	0.00028	0.00013	mg/L	0.01	
Barium (Ba) - Total	<0.0200	<0.0200	mg/L	1	
Boron (B) - Total	<0.100	<0.100	mg/L	5	
Cadmium (Cd) - Total	<0.000200	<0.000200	mg/L	0.005	
Calcium (Ca) - Total	14.4	13.4	mg/L		
Chromium (Cr) - Total	<0.00200	<0.00200	mg/L	0.05	
Copper (Cu) - Total	0.0437	0.00339	mg/L	2.0	1.0
Iron (Fe) - Total	0.702	0.444	mg/L		0.3
Lead (Pb) - Total	0.00144	<0.000500	mg/L	0.005	
Magnesium (Mg) - Total	2.92	2.36	mg/L		
Manganese (Mn) - Total	0.0182	0.00923	mg/L	0.12	0.02
Mercury (Hg) - Total	<0.0000050	<0.0000050	mg/L	0.001	
Potassium (K) - Total	1.05	1.04	mg/L		
Selenium (Se) - Total	<0.00100	<0.00100	mg/L	0.05	
Sodium (Na) - Total	<2.00	<2.00	mg/L		200
Uranium (U) - Total	0.000480	0.000308	mg/L	0.02	
Zinc (Zn) - Total	<0.0500	<0.0500	mg/L		5.0

Figure 8 continued: Raw Water - Physical and Chemical Properties continued

Test Description	2020 - Results		Unit of Measure	GCDWQ MAC	Aesthetic Objective/ Operational Guideline
	27-Apr	16-Sep			
Dissolved Metals					
Aluminum (Al) - Dissolved	0.0750	0.0274	mg/L		0.1
Antimony (Sb) - Total	<0.00010	<0.00010	mg/L	0.006	
Arsenic (As) - Dissolved	0.00018	<0.00010	mg/L	0.01	
Barium (Ba) - Dissolved	0.00888	0.00758	mg/L	1	
Beryllium (Be) - Dissolved	<0.000100	<0.000100	mg/L		
Bismuth (Bi) - Dissolved	<0.000050	<0.000050	mg/L		
Boron (B) - Dissolved	<0.010	<0.010	mg/L	5	
Cadmium (Cd) - Dissolved	0.0000063	0.0000075	mg/L	0.005	
Calcium (Ca) - Dissolved	13.6	13.2	mg/L		
Cesium (Cs) - Dissolved	0.000015	0.000022	mg/L		
Chromium (Cr) - Dissolved	0.00023	<0.00010	mg/L	0.05	
Cobalt (Co) - Dissolved	<0.00010	<0.00010	mg/L		
Copper (Cu) - Dissolved	0.00372	0.00203	mg/L	2.0	1.0
Iron (Fe) - Dissolved	0.106	0.030	mg/L		0.3
Lead (Pb) - Dissolved	0.000172	0.000056	mg/L	0.005	
Lithium (Li) - Dissolved	0.0011	0.0011	mg/L		
Magnesium (Mg) - Dissolved	2.64	2.25	mg/L		
Manganese (Mn) - Dissolved	0.00458	0.00244	mg/L	0.12	0.02
Mercury (Hg) - Dissolved	<0.0000050	<0.0000050	mg/L	0.001	
Molybdenum (Mo) - Dissolved	0.000931	0.000658	mg/L		
Nickel (Ni) - Dissolved	0.00106	0.00103	mg/L		
Phosphorus (P) - Dissolved	<0.050	<0.050	mg/L		
Potassium (K) - Dissolved	0.884	0.890	mg/L		
Rubidium (Rb) - Dissolved	0.00114	0.00196	mg/L		
Selenium (Se) - Dissolved	0.000148	0.000056	mg/L	0.05	
Silicon (Si) - Dissolved	4.29	2.08	mg/L		
Silver (Ag) - Dissolved	<0.000010	<0.000010	mg/L		
Sodium (Na) - Dissolved	1.67	1.30	mg/L		200
Strontium (Sr) - Dissolved	0.0779	0.0858	mg/L		
Sulfur (S) - Dissolved	<2.50DLB	2.80	mg/L		
Tellurium (Te) - Dissolved	<0.00020	<0.00020	mg/L		
Thallium (Tl) - Dissolved	<0.000010	<0.000010	mg/L		
Thorium (Th) - Thorium	<0.00010	<0.00010	mg/L		
Tin (Sn) - Dissolved	<0.00010	<0.00010	mg/L		
Titanium (Ti) - Dissolved	0.00304	0.00114	mg/L		
Tungsten (W) - Dissolved	<0.00010	<0.00010	mg/L		
Uranium (U) - Dissolved	0.000400	0.000282	mg/L	0.02	
Vanadium (V) - Dissolved	<0.00050	<0.00050	mg/L		
Zinc (Zn) - Dissolved	0.0038	0.0033	mg/L		5.0
Zirconium (Zr) - Dissolved	<0.00020	<0.00020	mg/L		
Certificate of Analysis	**KS2000255**	**KS2001796**			

GCDWQ = Guidelines for Canadian Drinking Water Quality limits updated June 2019

MAC - Maximum Allowable Concentration

*GCDWQ for Nitrate + Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10 mg/L

< or N.D. = less than detection limit

- A blank entry designates no known limit

DLB detection Limit Raised. Analyte detected at comparable level in Method Blank

6. WATER QUALITY CONCERNS

Rayleigh Waterworks received five water related enquiries in 2020. One was pressure related and four were aesthetic related. The aesthetic complaints were investigated, samples were taken and tested for pH, turbidity, free chlorine and a colilert test was performed, the water was determined to meet drinking water standards.

7. CROSS CONNECTION CONTROL PROGRAM

A back flow prevention device is used to protect the potable water supply from contamination or pollution due to backflow. RWWD has bylaws in place requiring commercial/institutional premises to have back flow preventers (BFP) installed and to maintain a yearly inspection by certified testers. A yearly verification of inspection is to be provided to the District to have on file. Back flow preventers are required on all irrigation systems for commercial, institutional, and residential connections.

8. EMERGENCY RESPONSE PLAN

The District has an Emergency Response Plan pertaining to the water system. The emergency response plan identifies a number of potential emergencies that can occur and provides a systematic approach on how the District will deal with the emergency.

9. 2020 PROJECTS

A Clemons Sand Centrifugal Separator was installed at the river intake in the spring of 2020.

Operators are continuing to locate residential service valves, mapping and identifying any problems for future repairs.

10. STAFF CERTIFICATION

In accordance with Interior Health Authority's Condition of Permit and the Environmental Operators Certification Program (E.O.C.P), all operators employed by the Rayleigh Waterworks District must be certified and complete a specific schedule of training to retain certification. The following certifications have been achieved to date:

Water Treatment Operator Level I
Water Treatment Operator Level MUII
Water Treatment Operator Level III

Water Distribution Operator Level I
Water Distribution Operator Level MUI

Municipal Wastewater Treatment Operator Level MUII