



2023

DISTRICT OF LOGAN LAKE

ANNUAL WATER REPORT



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1.0 Introduction

This report was prepared in compliance with the requirements under the British Columbia *Drinking Water Protection Act* (DWPA) and the District of Logan Lake Operating Permit. This report includes an overview of source water and distribution system that supplies the District, a summary of the total water consumption and water quality analysis completed, and a recap of projects and related operations. This report has been provided to Interior Health and posted on the District's website.

2.0 The District of Logan Lake Water System

The District of Logan Lake takes pride in its water source and is continually working towards improvements and operations that safely distribute that water throughout the District. For the 2023 calendar year the District had four operational wells. All four wells extract water from the Guichon Aquifer that is not under the influence of surface water. The unchlorinated groundwater is pumped up to two reservoirs which is distributed through 26.1 km of water mains throughout the community. The water utility for Logan Lake is classified by the Environmental Operators Certification Program (EOCP) as a Level II Water Distribution System.

2.1 The Wells

The District of Logan Lake's water distribution system is supplied from four deep wells located on the west side of the District. All wells draw water from the Guichon Aquifer, located within the Guichon Creek Valley immediately west of the town site. There are two main pumphouses which are situated approximately 200m apart. The first pumphouse contains Well #5 which was being developed to replace production Well #1. The second pump house contains Well's #2, #3 and #4. Well #2 and #4 are the current production wells in the second pumphouse and Well 3 currently operates as backup for Well #4.

2.1.1 Well Projects and Upgrades

Some maintenance and repairs to the back up generator for Wells 2,3,4 was made to improve the District's Well system for 2023. Sediment removal from Jasper from the Jasper Reservoir was completed by Aquavision in June and the Scada issues that resulted in a loss of data in July were also repaired.

2.1.2 Source Water Protection

The District of Logan Lake employs a series of test wells and continuously monitors water levels within the wells used for production to monitor any changes within the source water. These measures came about through a series of reports. In 2007 the District had a study done which developed a "Framework for Wellhead Protection". This study developed from a series of tests, provided the flow rate and geotechnical profiles of each well. A further study produced in 2019 which used data from 2012 to 2015 provided "Groundwater Supply Evaluation, Monitoring and a Protection Plan." The District also registered a common groundwater license for all wells that now allows for a combined extraction volume instead of individual amounts attributed to each well.

2.2 Water Storage

The district operates two reservoirs in the Districts water system, the Jasper Reservoir and the Breccia Reservoir, have full water levels at an elevation of 1166m. The Jasper Reservoir has a total volume of 1900m³ and the Breccia Reservoir has a total volume of 690m³. The Jasper Reservoir is located off of Jasper drive on the east side of town and the Breccia Reservoir is located east of Breccia Drive on the North side of town. The total water storage capacity for the Districts water distribution system is 2590m³.

2.3 Distribution System

The District’s distribution system provides potable water to over 2200 residents and multiple businesses and contains approximately 1200 service connections within the District’s boundaries. The distribution system extends for approximately 26.1 km and the composition of pipe material can be seen in Figure 1.

Figure 1: District of Logan Lake Pipe Material Breakdown

Material	Total Length (m)	Total Length as %
AC	8018.7	30.76%
CMP Casing	15.0	0.06%
DI	1634.9	6.27%
HDPE	974.7	3.74%
PVC	15349.4	58.87%
STEEL	9.00	0.03%
unknown	70.0	0.27%
Grand Total	26071.7	100.00%

The system comprises of two pressure zones. Zone 1 has pressures established by 5 pressure reducing valve stations (PRVs) throughout the system. Zone 2 has pressures established by the levels of the Jasper and Breccia Reservoirs.

2.3.1 Distribution Maintenance and Events

Normal operations for the District distribution system consists of a mix of service requests for water connections and water on/offs, annual valve and hydrant maintenance, sampling events, flushing programs and response to small repairs such as curb stops and larger events such as water main breaks. The distribution system as a whole was disinfected, and Fire Hydrant flushing was completed in September of 2023.

Figure 2 includes a couple pictures of some of the maintenance and repairs completed within the District for 2023.

Figure 2: Water Main Repairs, Hydrant Maintenance and Flushing Program



3.0 Cross Connection Control Program (CCCP)

The District of Logan Lake has a CCCP that targets industrial, commercial, and multi-family residential buildings. The District uses a contractor to manage the program which includes processing test reports and follow up with non-compliant businesses. The District maintains 39 backflow prevention assemblies (BFA) and has two staff certified in cross connection control testing. Figure 3 provides a summary of the District CCCP at the end of 2023 calendar year.

Figure 3: Summary of District CCCP Status for 2023 Year End

Cross-Connection Control Program District of Logan Lake Summary Report - Jan 02, 2024

Facilities	72
Past Due BFP Test Reports	12
Total BFPs Tracked	85
Mandatory Test Required	84
Test Not Required	1

Facilities (H, M, L Classifications)

Hazards	Quantity	Not Surveyed	Surveyed	Vacant	Compliant
High	13	0	13	0	12
Medium	38	1	37	0	27
Low	20	0	20	0	12
None***	1	1	0	1	0
Totals	72	2	70	1	51

*** Facilities without H, M, or L hazard classifications are grouped in the **None** category.

Classifications

Below is a full breakdown of all facility classifications:

Classification	Totals
HS <i>Severe / High Hazard Surveyed</i>	1
HSC <i>Severe / High Hazard Compliant</i>	12
LS <i>Low Hazard Surveyed</i>	7
LSC <i>Low Hazard Compliant</i>	12
M <i>Moderate Hazard</i>	1
MS <i>Moderate Hazard Surveyed</i>	10
MSC <i>Moderate Hazard Compliant</i>	27
V <i>Vacant Facility / Property</i>	1
Not set	1

4.0 Operator Training and Certification

The District of Logan Lake water utility is classified as a Level II system by the EOCP. As the system is classified as Level II the District must employ at least one Level II certified Operator. Currently the District has two Level II Operators and one level I Operator. Training of operators is a top priority for the District which is reflected by employees the hold a variety of EOCP certifications including a Level IV in Water Treatment and a Level III and Level II in Wastewater Treatment.

5.0 Water Consumption

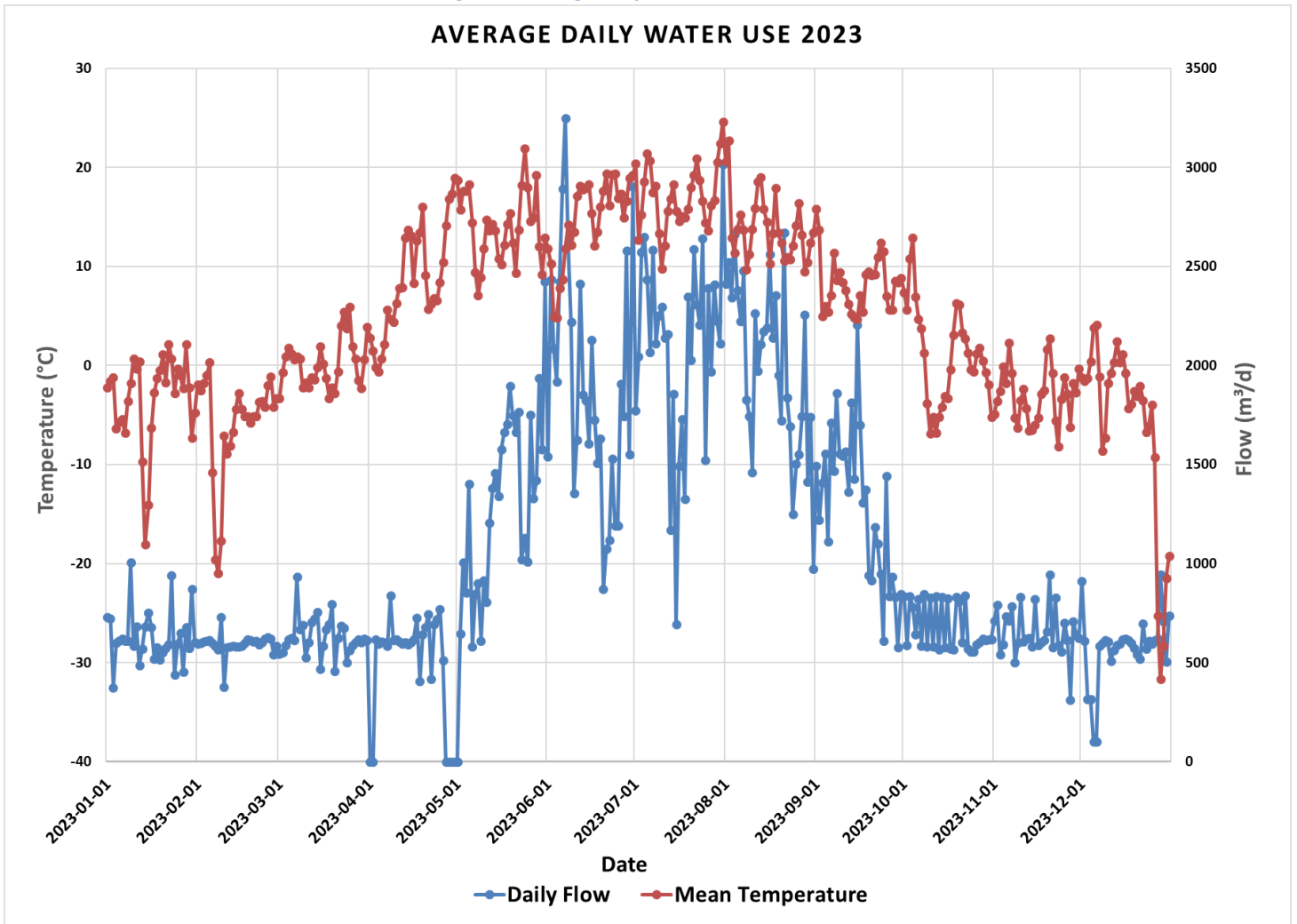
The Districts water consumption is monitored and recorded through SCADA systems for each of the supply wells. The following Figure 4 presents the total volume of water pumped in cubic meters monthly for the 2014 to 2023 calendar year.

Figure 4: District of Logan Lake Water Monthly Water Use for the Past 10 Years

Month	Year										Year to year Average		
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	10 Year Average	10 Year Max	10 Year Min
January	22,253	21,262	22,206	24,058	25,673	22,657	21,210	22,969	20,788	19,448	22,252	25,673	19,448
February	19,874	19,999	20,343	18,910	23,225	22,057	18,574	21,136	24,130	16,600	20,485	24,130	16,600
March	22,766	20,321	20,986	22,319	25,644	24,167	21,711	23,130	38,021	19,482	23,855	38,021	19,482
April	21,382	24,171	30,969	20,700	26,214	24,562	21,122	25,588	20,632	21,062	23,640	30,969	20,632
May	30,900	45,813	42,991	29,846	60,686	39,343	34,832	38,362	28,698	40,517	39,199	60,686	28,698
June	39,861	52,752	50,682	62,299	55,350	47,460	29,152	82,856	32,746	56,685	50,984	82,856	29,152
July	82,699	56,370	46,754	95,181	71,442	43,625	46,710	84,544	65,225	65,094	65,764	95,181	43,625
August	58,375	69,975	51,920	82,229	56,664	60,430	62,427	50,012	73,985	62,118	62,814	82,229	50,012
September	34,687	48,691	29,530	42,931	30,112	26,822	47,674	30,346	45,335	38,835	37,496	48,691	26,822
October	22,730	24,161	22,176	24,222	23,022	19,767	26,588	21,396	21,131	21,107	22,630	26,588	19,767
November	19,670	20,176	22,070	23,053	22,496	19,680	25,250	20,132	17,703	20,203	21,043	25,250	17,703
December	22,069	22,720	22,984	24,975	22,342	20,661	26,876	21,871	18,700	17,686	22,089	26,876	17,686
Total Volume	397,266	426,412	383,612	470,722	442,869	371,230	382,128	442,343	407,096	398,837	412,252	470,722	371,230
Peak Day	4,353	4,218	2,431	3,739	4,368	2,497	2,764	4,178	3,574	3,248	3,537	4,368	2,431
Date	Jul-16	Jul-25	Jun-05	Jul-07	May-26	Aug-07	Aug-17	28-Jun	27-Jul	07-Jun	42,950	46,143	38,504
Average Daily Use	1,088	1,168	1,051	1,290	1,213	1,017	1,047	1,212	1,115	1,093	1,129	1,290	1,017
Average Indoor Use	711	721	763	746	795	724	761	737	760	640	736	795	640

The 2023 Calendar year seen production levels return to similar numbers experienced in 2019 after the 2021 increase in production due to the heat dome event. The Daily Water production can be seen in Figure 5.

Figure 5: Average Daily Water Use for 2023



6.0 Water Quality Sampling and Analysis

The water quality from the source wells through to the distribution system is analyzed regularly as part of the measures to ensure safe drinking water. Samples are taken weekly from within the distribution system and the wells are sampled annually for a multitude of parameters and sent off to an accredited lab.

6.1 Distribution Water Quality

The District is committed to providing safe drinking water throughout the Distribution System. To ensure this happens two sites are sampled for bacteriological analysis weekly. The sample locations are rotated between summer and winter locations at spots on the furthest points within the distribution system. These bacteriological analyses include background bacterial counts, total coliforms, and E. coli.

6.1.1 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 bad 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.

The District uses this test to monitor for growth within the distribution system which may indicate need for flushing.

6.1.2 Coliform Bacterial Monitoring

Coliform bacteria are a group of bacteria that is a little more of a narrow focus from the HPC test. These bacteria again 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 these 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 up positive for coliforms, the site is immediately resampled and, if coliforms are found again further steps are introduced which include system flushing and may lead to boil water advisories.

6.1.3 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 2023 distribution system can be seen in Figure 6 and 7.

Figure 6: Distribution Bacteriological Testing

Date	Lab	Total Coliform (cfu/100mL)	E Coli (cfu/100mL)	Background Bacteria Counts (cfu/100mL)	Location	Notes
03-Jan	ALS	<1	<1	<1	Office	
03-Jan	ALS	<1	<1	<1	Shop	
09-Jan	ALS	<1	<1	<1	Office	
09-Jan	ALS	<1	<1	<1	Shop	
16-Jan	ALS	<1	<1	<1	Office	
16-Jan	ALS	<1	<1	<1	Shop	
23-Jan	ALS	<1	<1	<1	Office	
23-Jan	ALS	<1	<1	<1	Shop	
30-Jan	ALS	<1	<1	<1	Office	
30-Jan	ALS	<1	<1	<1	Shop	
06-Feb	ALS	<1	<1	<1	Office	
06-Feb	ALS	<1	<1	<1	Shop	
13-Feb	ALS	<1	<1	<1	Office	
13-Feb	ALS	<1	<1	<1	Shop	
21-Feb	ALS	<1	<1	<1	Office	
21-Feb	ALS	<1	<1	<1	Shop	
27-Feb	ALS	<1	<1	<1	Office	
27-Feb	ALS	<1	<1	<1	Shop	
06-Mar	ALS	<1	<1	<1	Office	
06-Mar	ALS	<1	<1	<1	Shop	
13-Mar	ALS	<1	<1	<1	Office	
13-Mar	ALS	<1	<1	<1	Shop	
21-Mar	ALS	<1	<1	<1	Office	
21-Mar	ALS	<1	<1	<1	Shop	
28-Mar	ALS	<1	<1	<1	Office	
28-Mar	ALS	<1	<1	<1	Shop	
03-Apr	ALS	<1	<1	<1	Office	
03-Apr	ALS	<1	<1	<1	Shop	
11-Apr	ALS	<1	<1	<1	Office	
11-Apr	ALS	<1	<1	<1	Shop	
17-Apr	ALS	<1	<1	<1	Office	
17-Apr	ALS	<1	<1	<1	Shop	
25-Apr	ALS	<1	<1	<1	Office	
25-Apr	ALS	<1	<1	<1	Shop	
01-May	ALS	<1	<1	<1	Office	
01-May	ALS	<1	<1	<1	Shop	
08-May	ALS	<1	<1	<1	Office	
08-May	ALS	<1	<1	<1	Shop	
15-May	ALS	<1	<1	<1	Office	
15-May	ALS	<1	<1	<1	Shop	
23-May	ALS	<1	<1	<1	Office	
23-May	ALS	<1	<1	<1	Shop	
29-May	ALS	<1	<1	<1	Office	
29-May	ALS	<1	<1	<1	Shop	
06-Jun	ALS	<1	<1	<1	Calcite	
06-Jun	ALS	<1	<1	<1	Lea Rig	
12-Jun	ALS	<1	<1	<1	Calcite	
12-Jun	ALS	<1	<1	<1	Lea Rig	
19-Jun	ALS	<1	<1	<1	Calcite	
19-Jun	ALS	<1	<1	<1	Lea Rig	
26-Jun	ALS	<1	<1	<1	Calcite	
26-Jun	ALS	<1	<1	<1	Lea Rig	
04-Jul	ALS	<1	<1	<1	Calcite	
04-Jul	ALS	<1	<1	<1	Lea Rig	
10-Jul	ALS	<1	<1	<1	Calcite	
10-Jul	ALS	<1	<1	<1	Lea Rig	
17-Jul	ALS	<1	<1	<1	Calcite	
17-Jul	ALS	<1	<1	<1	Lea Rig	
24-Jul	ALS	<1	<1	<1	Calcite	
24-Jul	ALS	<1	<1	<1	Lea Rig	
31-Jul	ALS	<1	<1	<1	Calcite	
31-Jul	ALS	<1	<1	<1	Lea Rig	

Figure 7: Distribution Bacteriological Testing Continued

Date	Lab	Total Coliform (cfu/100mL)	E Coli (cfu/100mL)	Background Bacteria Counts (cfu/100mL)	Location	Notes
09-Aug	ALS	<1	<1	<1	Calcite	
09-Aug	ALS	<1	<1	<1	Lea Rig	
14-Aug	ALS	<1	<1	<1	Calcite	
14-Aug	ALS	<1	<1	<1	Lea Rig	
21-Aug	ALS	<1	<1	<1	Calcite	
21-Aug	ALS	<1	<1	<1	Lea Rig	
29-Aug	ALS	1	<1	<1	Calcite	
29-Aug	ALS	1	<1	<1	Lea Rig	
31-Aug	ALS	2	<1	<1	Calcite	Resample from Aug 29
31-Aug	ALS	<1	<1	<1	Lea Rig	Resample from Aug 29
05-Sep	ALS	<1	<1	<1	Calcite	Distribution System Disinfected
05-Sep	ALS	<1	<1	<1	Lea Rig	Hydrant Flushing
11-Sep	ALS	<1	<1	<1	Calcite	
11-Sep	ALS	<1	<1	<1	Lea Rig	
18-Sep	ALS	<1	<1	<1	Calcite	
18-Sep	ALS	<1	<1	<1	Office	
25-Sep	ALS	<1	<1	<1	Calcite	
25-Sep	ALS	<1	<1	<1	Lea Rig	
03-Oct	ALS	<1	<1	<1	Shop	
03-Oct	ALS	<1	<1	<1	Office	
10-Oct	ALS	<1	<1	<1	Shop	
10-Oct	ALS	<1	<1	<1	Office	
16-Oct	ALS	<1	<1	<1	Shop	
16-Oct	ALS	<1	<1	<1	Office	
23-Oct	ALS	<1	<1	<1	Shop	
23-Oct	ALS	<1	<1	<1	Office	
30-Oct	ALS	<1	<1	<1	Shop	
30-Oct	ALS	<1	<1	<1	Office	
06-Nov	ALS	<1	<1	<1	Shop	
06-Nov	ALS	<1	<1	<1	Office	
14-Nov	ALS	<1	<1	<1	Shop	
14-Nov	ALS	<1	<1	<1	Office	
20-Nov	ALS	<1	<1	<1	Shop	
20-Nov	ALS	<1	<1	<1	Office	
27-Nov	ALS	<1	<1	<1	Shop	
27-Nov	ALS	<1	<1	<1	Office	
04-Dec	ALS	<1	<1	<1	Shop	
04-Dec	ALS	<1	<1	<1	Office	
11-Dec	ALS	<1	<1	<1	Shop	
11-Dec	ALS	<1	<1	<1	Office	
18-Dec	ALS	<1	<1	<1	Shop	
18-Dec	ALS	<1	<1	<1	Office	
27-Dec	ALS	<1	<1	<1	Shop	
27-Dec	ALS	<1	<1	<1	Office	

6.2 Source Water Quality

Water quality monitoring for the wells consists of routine turbidity analysis and a yearly in depth of analysis of the wells which are in production. The results of the routine turbidity analysis can be seen in Figure 8 and 9, while the results from the annual in-depth analysis can be found in Figure 10, 11,12.

Figure 8: Turbidity Analysis For 2023

Date	Location	NTU		Date	Location	NTU
03-Jan	Office	0.11		01-May	Office	0.1
03-Jan	Shop	0.08		01-May	Shop	0.11
09-Jan	Office	0.09		08-May	Office	0.15
09-Jan	Shop	0.1		08-May	Shop	0.1
16-Jan	Office	0.22		15-May	Office	0.1
16-Jan	Shop	0.09		15-May	Shop	0.12
23-Jan	Office	0.17		23-May	Office	0.11
23-Jan	Shop	0.12		23-May	Shop	0.09
30-Jan	Office	0.18		29-May	Office	0.11
30-Jan	Shop	0.09		29-May	Shop	0.08
06-Feb	Office	0.13		06-Jun	Calcite	0.11
06-Feb	Shop	0.11		06-Jun	Lea Rig	0.11
13-Feb	Office	0.16		12-Jun	Calcite	0.12
13-Feb	Shop	0.08		12-Jun	Lea Rig	0.11
21-Feb	Office	0.23		19-Jun	Calcite	0.14
21-Feb	Shop	0.09		19-Jun	Lea Rig	0.1
27-Feb	Office	0.1		26-Jun	Calcite	0.17
27-Feb	Shop	0.08		26-Jun	Lea Rig	0.09
06-Mar	Office	0.13		04-Jul	Calcite	0.31
06-Mar	Shop	0.09		04-Jul	Lea Rig	0.19
13-Mar	Office	0.11		10-Jul	Calcite	0.08
13-Mar	Shop	0.09		10-Jul	Lea Rig	0.1
21-Mar	Office	0.1		17-Jul	Calcite	0.19
21-Mar	Shop	0.06		17-Jul	Lea Rig	0.11
28-Mar	Office	0.14		24-Jul	Calcite	0.11
28-Mar	Shop	0.08		24-Jul	Lea Rig	0.09
03-Apr	Office	0.13		31-Jul	Calcite	0.12
03-Apr	Shop	0.11		31-Jul	Lea Rig	0.08
11-Apr	Office	0.07		09-Aug	Calcite	0.1
11-Apr	Shop	0.08		09-Aug	Lea Rig	0.11
17-Apr	Office	0.09		14-Aug	Calcite	0.12
17-Apr	Shop	0.08		14-Aug	Lea Rig	0.08
25-Apr	Office	0.08		21-Aug	Calcite	0.12
25-Apr	Shop	0.09		21-Aug	Lea Rig	0.09

Figure 9: Turbidity Analysis for 2023 Continued

Date	Location	NTU		Date	Location	NTU
29-Aug	Calcite	0.12		23-Oct	Office	0.09
29-Aug	Lea Rig	0.08		30-Oct	Shop	0.1
31-Aug	Calcite	0.12		30-Oct	Office	0.12
31-Aug	Lea Rig	0.12		06-Nov	Shop	0.14
05-Sep	Calcite	0.14		06-Nov	Office	0.09
05-Sep	Lea Rig	0.1		14-Nov	Shop	0.1
11-Sep	Calcite	0.13		14-Nov	Office	0.08
11-Sep	Lea Rig	0.1		20-Nov	Shop	0.12
18-Sep	Calcite	0.17		20-Nov	Office	0.12
18-Sep	Office	0.09		27-Nov	Shop	0.13
25-Sep	Calcite	0.17		27-Nov	Office	0.09
25-Sep	Lea Rig	0.15		04-Dec	Shop	0.12
03-Oct	Shop	0.12		04-Dec	Office	0.12
03-Oct	Office	0.1		11-Dec	Shop	0.1
10-Oct	Shop	0.12		11-Dec	Office	0.11
10-Oct	Office	0.14		18-Dec	Shop	0.12
16-Oct	Shop	0.09		18-Dec	Office	0.1
16-Oct	Office	0.11		27-Dec	Shop	0.09
23-Oct	Shop	0.1		27-Dec	Office	0.13

Figure 10: Physical Tests

Physical Tests (Matrix: Water) November 28, 2023					
Parameters	Lowest Detection Limit	Units	Well #2	Well #4	Well #5
Conductivity	2	µS/cm	428	527	394
Absorbance, UV (@ 254nm), unfiltered	0.005	AU/cm	0.025	0.017	0.058
Alkalinity, bicarbonate (as CaCO3)	1	mg/L	223	251	193
Alkalinity, carbonate (as CaCO3)	1	mg/L	<1.0	<1.0	<1.0
Alkalinity, hydroxide (as CaCO3)	1	mg/L	<1.0	<1.0	<1.0
Alkalinity, phenolphthalein (as CaCO3)	1	mg/L	<1.0	<1.0	<1.0
Alkalinity, total (as CaCO3)	1	mg/L	223	251	193
Colour, true	5	CU	<5.0	<5.0	<5.0
Hardness (as CaCO3), from total Ca/Mg	0.6	mg/L	199	242	179
Langelier index (@ 4°C)	0.01		0.58	0.756	0.372
Solids, total dissolved [TDS]	10	mg/L	304	335	266
Turbidity	0.1	NTU	<0.10	<0.10	<0.10
pH	0.1	pH units	8.23	8.27	8.12
Langelier index (@ 15°C)	0.01		0.754	0.929	0.546
Transmittance, UV (@ 254nm), unfiltered	1	% T/cm	94.4	96.2	87.5
Langelier index (@ 20°C)	0.01		0.827	1	0.62
Langelier index (@ 25°C)	0.01		0.898	1.07	0.69
Langelier index (@ 60°C)	0.01		1.34	1.51	1.14
Langelier index (@ 77°C)	0.01		1.54	1.71	1.33
pH, saturation (@ 4°C)	0.01	pH units	7.65	7.51	7.75
pH, saturation (@ 15°C)	0.01	pH units	7.48	7.34	7.57
pH, saturation (@ 20°C)	0.01	pH units	7.4	7.27	7.5
pH, saturation (@ 25°C)	0.01	pH units	7.33	7.2	7.43
pH, saturation (@ 60°C)	0.01	pH units	6.89	6.76	6.98
pH, saturation (@ 77°C)	0.01	pH units	6.69	6.56	6.78

Figure 11: Anions and Nutrients

Anions and Nutrients (Matrix: Water) November 28, 2023					
Parameters	Lowest Detection Limit	Units	Well #2	Well #4	Well #5
Anions and Nutrients (Matrix: Water)					
Ammonia, total (as N)	0.005	mg/L	<0.0050	<0.0050	<0.0050
Bromide	0.05	mg/L	<0.050	<0.050	<0.050
Chloride	0.5	mg/L	5.97	17.5	9.34
Fluoride	0.02	mg/L	0.12	0.12	0.119
Kjeldahl nitrogen, total [TKN]	0.05	mg/L	0.059	0.094	0.102
Nitrate (as N)	0.005	mg/L	0.159	0.872	0.161
Nitrite (as N)	0.001	mg/L	<0.0010	<0.0010	<0.0010
Nitrogen, total organic	0.05	mg/L	0.059	0.094	0.102
Sulfate (as SO4)	0.3	mg/L	9.59	15.3	12
Cyanides (Matrix: Water)					
Cyanide, strong acid dissociable (Total)	0.005	mg/L	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon (Matrix: Water)					
Carbon, total organic [TOC]	0.5	mg/L	1.97	1.4	4.19
Microbiological Tests (Matrix: Water)					
Coliforms, total	1	MPN/100mL	<1	<1	<1
Coliforms, Escherichia coli [E. coli]	1	MPN/100mL	<1	<1	<1
Ion Balance (Matrix: Water)					
Anion sum	0.1	meq/L	4.84	5.9	4.39
Cation sum (total)	0.1	meq/L	4.62	5.66	4.22
Ion balance (APHA)	0.01	%	-2.32	-2.08	-1.97

Figure 12: Metals

Total Metals (Matrix: Water) November 28, 2023					
Parameters	Lowest Detection Limit	Units	Well #2	Well #4	Well #5
Aluminum, total	0.003	mg/L	0.0032	<0.0030	<0.0030
Antimony, total	0.0001	mg/L	<0.00010	<0.00010	<0.00010
Arsenic, total	0.0001	mg/L	0.00082	0.00077	0.00082
Barium, total	0.0001	mg/L	0.023	0.0296	0.0206
Beryllium, total	0.0001	mg/L	<0.000100	<0.000100	<0.000100
Bismuth, total	0.00005	mg/L	<0.000050	<0.000050	<0.000050
Boron, total	0.01	mg/L	0.012	0.017	<0.010
Cadmium, total	0.000005	mg/L	<0.0000050	<0.0000050	<0.0000050
Calcium, total	0.05	mg/L	47.7	59.1	42.7
Cesium, total	0.00001	mg/L	<0.000010	<0.000010	<0.000010
Chromium, total	0.0005	mg/L	0.00062	0.00155	<0.00050
Cobalt, total	0.0001	mg/L	<0.00010	<0.00010	<0.00010
Copper, total	0.0005	mg/L	0.00556	0.00548	0.00422
Iron, total	0.01	mg/L	<0.010	<0.010	<0.010
Lead, total	0.00005	mg/L	0.000169	<0.000050	<0.000050
Lithium, total	0.001	mg/L	<0.0010	<0.0010	<0.0010
Magnesium, total	0.005	mg/L	19.4	22.9	17.5
Manganese, total	0.0001	mg/L	<0.00010	<0.00010	0.00026
Mercury, total	0.000005	mg/L	<0.0000050	<0.0000050	<0.0000050
Molybdenum, total	0.00005	mg/L	0.00311	0.00301	0.00513
Nickel, total	0.0005	mg/L	<0.00050	<0.00050	<0.00050
Phosphorus, total	0.05	mg/L	0.052	0.057	0.06
Potassium, total	0.05	mg/L	2.39	2.41	2.64
Rubidium, total	0.0002	mg/L	0.00108	0.00119	0.00106
Selenium, total	0.00005	mg/L	0.000195	0.00052	0.00005
Silicon, total	0.1	mg/L	11.1	10.1	12.9
Silver, total	0.00001	mg/L	<0.000010	<0.000010	<0.000010
Sodium, total	0.05	mg/L	13.3	17.7	13.4
Strontium, total	0.0002	mg/L	0.218	0.27	0.195
Sulfur, total	0.5	mg/L	3.43	5.49	4.2
Tellurium, total	0.0002	mg/L	<0.00020	<0.00020	<0.00020
Thallium, total	0.00001	mg/L	<0.000010	<0.000010	<0.000010
Thorium, total	0.0001	mg/L	<0.00010	<0.00010	<0.00010
Tin, total	0.0001	mg/L	0.00019	<0.00010	<0.00010
Titanium, total	0.0003	mg/L	<0.00030	<0.00030	<0.00030
Tungsten, total	0.0001	mg/L	<0.00010	<0.00010	<0.00010
Uranium, total	0.00001	mg/L	0.00147	0.00213	0.00116
Vanadium, total	0.0005	mg/L	0.00374	0.00347	0.00388
Zinc, total	0.003	mg/L	<0.0030	0.0073	0.0073
Zirconium, total	0.0002	mg/L	<0.00020	<0.00020	<0.00020



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