

TOWN OF OKOTOKS

WATERWORKS SYSTEM

2021 ANNUAL REPORT



Approval # 1029-03-00

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1. Waterworks Introduction

The Town of Okotoks Water Services has prepared the Waterworks Annual report. EPCOR Water Services Inc. operated and maintained the waterworks system on behalf of the Town of Okotoks from Jun 1st, 2005 until Nov 25th, 2019. Effective Nov 25th, 2019 the Town of Okotoks resumed responsibility to operate and maintain the waterworks system.

The Quality Assurance Program described was in effect until from Jun 1st, 2005 to Nov 25th, 2019.

The Town of Okotoks Water Services Department will be developing its QA Program, description below.

2. Quality Assurance Program

The Water Services Quality Assurance Program is a Quality Management System which ensures that the utility:

- can demonstrate that it can consistently meet regulatory requirements
- can demonstrate that it can meet internal operational requirements
- can enhance customer protection through effective application of a quality system
- continuously improves the overall quality system.

The QA program is in place to ensure that water and wastewater quality data is reliable and technically (and legally) defensible, data is reported correctly, violations are reported in a timely manner, approval requirements are met, and water or wastewater quality problems are responded to effectively. For internal and external audit purposes is also be able to demonstrate that:

- it is doing what it says it is doing in all its operations and it has the documentation to back this claim up,
- data, and procedures for generating data, are verified by a qualified group that is independent of operations, and
- it is exercising due diligence by requiring that a reasonable level of quality assurance is in place at its site.
- has identified risks to the utility and has prepared remedial action plans for improvements.

Components of the QA Program

To satisfy these general requirements, the Water Services Quality Assurance program will audit operational management. The goal is to ensure that data is produced, recorded, and reported in manners that are consistent with legislative requirements.

The components of the quality assurance program will include:

1. Monthly Reports
2. Analysis of the Water Services internal annual Proficiency Testing (PT) samples.
3. Review of monthly and annual utility performance reports.
4. Tracking and review of site incident reports.
5. Development and review of site cross-connection control program (CCC).
6. Development and review of site watershed protection programs.

The plan and procedures will be reviewed on an annual basis, and amended as necessary.

3. Annual Summary - Raw & Distribution Volumes

Approval # 1029-03-00; Schedule 3A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Parameter - Raw & Distribution Volume													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
Raw Water Volume	m ³	Once Per Day	Continuous	Raw Water Entering the WTP	N/A	MIN	6016	6411	3640	6489	6576	7348	6503
						MAX	7135	7517	8702	7359	9757	11980	11611
						AVG	6598	6910	6785	6799	7568	9780	9912
						Total	204527	193472	210336	203957	234612	293394	307268
Distribution Volume Zone 1 South	m ³	Once Per Day	Continuous	Distribution Water Entering Zone 1 South	N/A	MIN	2796	2782	2841	2808	2821	3240	3169
						MAX	3168	3178	3201	3168	4704	6340	6180
						AVG	2943	2938	2977	2956	3313	4346	4394
						Total	91229	82277	92288	88690	102690	130384	136207
Distribution Volume Zone 2 North	m ³	Once Per Day	Continuous	Distribution Water Entering Zone 2 North	N/A	MIN	2499	2570	2575	2603	2683	3073	1552
						MAX	2734	3075	2744	2962	4036	5057	5113
						AVG	2593	2805	2646	2788	2987	3821	3625
						Total	80377	78553	82019	83641	92611	114639	112374
Distribution Volume Zone 3 North	m ³	Once Per Day	Continuous	Distribution Water Entering Zone 3 North	N/A	MIN	1585	1595	1582	1610	1684	1633	1799
						MAX	1776	1805	1779	1855	2856	3727	3416
						AVG	1655	1665	1655	1717	1967	2454	2556
						Total	51305	46625	51320	51511	60989	73612	79226
Total Distribution Volume	m ³	Once Per Day	Continuous	Sum of Three Zones Distribution Volume	N/A	MIN	6898	7067	7066	7146	7257	7958	7634
						MAX	7678	7904	7702	7946	11596	15067	14691
						AVG	7191	7409	7278	7461	8267	10621	10574
						Total	222911	207455	225627	223842	256290	318635	327807

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Approval # 1029-03-00; Schedule 3A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System												
Water Quality Parameter - Raw & Distribution Volume												
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Aug	Sep	Oct	Nov	Dec	Annual
Raw Water Volume	m ³	Once Per Day	Continuous	Raw Water Entering the WTP	N/A	MIN	6734	6748	5552	6185	3891	3640
						MAX	11019	9563	8418	7869	10014	11980
						AVG	9247	8042	6866	7149	7397	7754
						Total	286647	241247	212851	214464	229306	2832081
Distribution Volume Zone 1 South	m ³	Once Per Day	Continuous	Distribution Water Entering Zone 1 South	N/A	MIN	2868	3131	2868	2896	2892	2782
						MAX	5892	4200	3731	3324	3312	6340
						AVG	4079	3684	3131	3041	3105	3409
						Total	126445	110531	97065	91228	96252	1245286
Distribution Volume Zone 2 North	m ³	Once Per Day	Continuous	Distribution Water Entering Zone 2 North	N/A	MIN	2671	2781	2460	2625	3370	1552
						MAX	4825	3462	3174	3840	3730	5113
						AVG	3465	3052	2713	3457	3501	3121
						Total	107425	91556	84115	103713	108518	1139541
Distribution Volume Zone 3 North	m ³	Once Per Day	Continuous	Distribution Water Entering Zone 3 North	N/A	MIN	1456	1569	1458	1396	1506	1396
						MAX	3395	2325	2086	1769	1814	3727
						AVG	2197	1912	1628	1534	1663	1884
						Total	68118	57349	50476	46020	51544	688095
Total Distribution Volume	m ³	Once Per Day	Continuous	Sum of Three Zones Distribution Volume	N/A	MIN	7049	7527	6904	7352	7806	6898
						MAX	13708	9742	8991	8694	8712	15067
						AVG	9742	8648	7473	8032	8268	8414
						Total	301988	259436	231656	240961	256314	3072922

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Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
Transfer to Zone 2	m ³	Once Per Day	Continuous	Transfer to Zone 2	N/A	Total	113228	109274	115830	117705	135278	168681	176233
Transfer to Zone 3	m ³	Once Per Day	Continuous	Transfer to Zone 3	N/A	Total	47787	45418	50667	47320	56971	68472	74615
Zone 2 (-)Zone 3	m ³	Once Per Day	Continuous	Zone 2 (-)Zone 3	N/A	Total	65441	63856	65163	70385	78307	100209	101618
Distribution #2 Transfer to Zone 2 (+) South Reservoir	m ³	Once Per Day	Continuous	Distribution #2 Transfer to Zone 2 (+) South Reservoir	N/A	Total	204457	191551	208118	206395	237968	299065	312440
Distribution#1 less (-) Distribution #2	m ³		Calculated	Distribution#1 less (-) Distribution #2	N/A	Total	18454	15904	17509	17447	18322	19570	15367
Diiference between the Z2 & Trans to Z3 flow meter	m ³		Calculated	Diiference between the Z2 & Trans to Z3 flow meter	N/A	Total	14936	14697	16856	13256	14304	14430	10756
ACTIFLO Totals	m ³	Once Per Day	Continuous	ACTIFLO Totals	N/A	Total	208959	197261	213717	206395	239982	300258	314667

NOTE: It has been determined the Zone 2 flow meter is not measuring correctly. Troubleshooting is being done to correct the problem.

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Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Aug	Sep	Oct	Nov	Dec	Annual
Transfer to Zone 2	m ³	Per	Continuous	Transfer to Zone 2	N/A	Total	160756	132127	117623	123939	133537	1604211
Transfer to Zone 3	m ³	Once Per Day	Continuous	Transfer to Zone 3	N/A	Total	65410	53840	49326	41903	47370	649099
Zone 2(-)Zone 3	m ³	Once Per Day	Continuous	Zone 2(-)Zone 3	N/A	Total	95346	78287	68297	82036	86167	955112
Distribution Total #2 Zone 2 (+) South Reservoir	m ³	Once Per Day	Continuous	Distribution Total #2 Zone 2 (+) South Reservoir	N/A	Total	287201	242658	214688	215167	229789	2849497
Distribution #2 Transfer to Zone 2 (+) South Reservoir	m ³		Calculated	Distribution #2 Transfer to Zone 2 (+) South Reservoir	N/A	Total	14787	16778	16968	25794	26525	223425
Diifference between the Z2 & Trans to Z3 flow meter	m ³		Calculated	Diifference between the Z2 & Trans to Z3 flow meter	N/A	Total	12079	13269	15818	21677	22351	184429
ACTIFLO Totals	m ³	Once Per Day	Continuous	ACTIFLO Totals	N/A	Total	292424	247188	218413	220568	236240	2896072

NOTE: It has been determined the Zone 2 flow meter is not measuring correctly. Troubleshooting is being done to correct the problem.

4. Annual Summary – Turbidity

Approval # 1029-03-00; Schedule 3A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Quality Parameter - Turbidity													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
Turbidity Raw Water	NTU	Once Per Day	Grab	Raw Water Entering the WTP	N/A	MIN	0.02	0.04	0.03	0.06	0.05	0.04	0.04
						MAX	0.08	0.17	0.10	0.13	0.11	0.09	0.09
						AVG	0.04	0.07	0.06	0.08	0.08	0.06	0.07
Turbidity Treated Water	NTU	Daily Maximum	Continuous	Filter Train #1	≤ 1.0 NTU, 100% of the time	MIN	0.02	0.02	0.03	0.03	0.03	0.03	0.03
					≤ 0.3 NTU, at least 99% of the samples on a daily basis	MAX	0.04	0.03	0.05	0.05	0.04	0.08	0.05
					Minutes between 0.3 - 1.0 NTU	AVG	0.03	0.03	0.03	0.03	0.03	0.04	0.04
					Total	0	0	0	0	0	0	0	
Turbidity Treated Water	NTU	Daily Maximum	Continuous	Filter Train #2	≤ 1.0 NTU, 100% of the time	MIN	0.02	0.02	0.02	0.02	0.02	0.02	0.02
					≤ 0.3 NTU, at least 99% of the samples on a daily basis	MAX	0.03	0.02	0.02	0.02	0.02	0.02	0.03
					Minutes between 0.3 - 1.0 NTU	AVG	0.02	0.02	0.02	0.02	0.02	0.02	0.02
					Total	0	0	0	0	0	0	0	
Turbidity Treated Water	NTU	Daily Maximum	Continuous	Filter Train #3	≤ 1.0 NTU, 100% of the time	MIN	0.03	0.02	0.03	0.04	0.03	0.03	0.02
					≤ 0.3 NTU, at least 99% of the samples on a daily basis	MAX	0.06	0.07	0.06	0.05	0.05	0.03	0.03
					Minutes between 0.3 - 1.0 NTU	AVG	0.03	0.04	0.04	0.04	0.04	0.03	0.03
					Total	0	0	0	0	0	0	0	
Turbidity Distribution Centre	NTU	Weekly	Grab	Water Distribution Bacteriological Random Locations	N/A	MIN	0.03	0.04	0.05	0.04	0.04	0.05	0.02
						MAX	0.23	0.18	0.16	0.18	0.89	0.19	0.52
						AVG	0.08	0.07	0.09	0.10	0.16	0.08	0.08

NTU - Nephelometric Turbidity Units

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Approval # 1029-03-00; Schedule 3A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System
Water Quality Parameter - Turbidity

Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit	Aug	Sep	Oct	Nov	Dec	Annual	
Turbidity Raw Water	NTU	Once Per Day	Grab	Raw Water Entering the WTP	N/A	MIN	0.03	0.05	0.04	0.03	0.03	0.02
						MAX	0.12	0.09	0.11	0.13	0.09	0.17
						AVG	0.07	0.06	0.07	0.06	0.06	0.06
Turbidity Treated Water	NTU	Daily Maximum	Continuous	Filter Train #1	≤ 1.0 NTU, 100% of the time	MIN	0.03	0.02	0.03	0.02	0.03	0.02
					≤ 0.3 NTU, at least 99% of the samples on a daily basis	MAX	0.04	0.07	0.04	0.03	0.05	0.08
					AVG	0.03	0.03	0.03	0.02	0.04	0.03	
					Minutes between 0.3 - 1.0 NTU	Total	0	0	0	0	0	0
Turbidity Treated Water	NTU	Daily Maximum	Continuous	Filter Train #2	≤ 1.0 NTU, 100% of the time	MIN	0.02	0.03	0.02	0.02	0.02	0.02
					≤ 0.3 NTU, at least 99% of the samples on a daily basis	MAX	0.12	0.04	0.05	0.02	0.06	0.12
					AVG	0.03	0.04	0.04	0.02	0.03	0.03	
					Minutes between 0.3 - 1.0 NTU	Total	0	0	0	0	0	0
Turbidity Treated Water	NTU	Daily Maximum	Continuous	Filter Train #3	≤ 1.0 NTU, 100% of the time	MIN	0.03	0.03	0.02	0.02	0.02	0.02
					≤ 0.3 NTU, at least 99% of the samples on a daily basis	MAX	0.05	0.04	0.06	0.03	0.08	0.08
					AVG	0.04	0.04	0.04	0.02	0.03	0.04	
					Minutes between 0.3 - 1.0 NTU	Total	0	0	0	0	0	0
Turbidity Distribution Centre	NTU	Weekly	Grab	Water Distribution Bacteriological Random Locations	N/A	MIN	0.03	0.03	0.03	0.03	0.02	0.02
						MAX	0.93	0.12	0.15	0.15	0.11	0.93
						AVG	0.11	0.06	0.07	0.06	0.06	0.09

NTU - Nephelometric Turbidity Units

5. Annual Summary - UV Disinfection – Log Reduction of Giardia & Cryptosporidium

Approval # 1029-03-00; Schedule 2A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Quality Parameter - UV Flow & Transmittance													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
UV Flow	m ³ /hr	Daily Maximum	Continuous	UV Reactor # 1	≥ 47.3 m ³ /hr and ≤ 772 m ³ /hr	MIN	41.7	47.5	47.0	47.5	48.1	54.6	56.1
						MAX	149.9	161.3	160.2	153.5	173.1	173.0	168.7
						AVG MIN	50.7	50.0	54.2	49.5	55.5	106.3	112.0
						AVG MAX	125.9	142.6	125.9	134.7	137.5	161.8	157.6
UV Flow	m ³ /hr	Daily Maximum	Continuous	UV Reactor # 2	≥ 47.3 m ³ /hr and ≤ 772 m ³ /hr	MIN	41.7	47.5	47.0	47.5	48.1	54.6	56.1
						MAX	149.9	161.3	228.4	153.5	173.1	173.0	168.7
						AVG MIN	50.7	50.0	64.7	49.5	55.5	106.3	112.0
						AVG MAX	125.9	142.6	147.4	134.7	137.5	161.8	157.6
UV Flow	m ³ /hr	Daily Maximum	Continuous	UV Reactor # 3	≥ 47.3 m ³ /hr and ≤ 772 m ³ /hr	MIN	41.5	47.5	47.6	46.9	48.1	54.6	56.1
						MAX	149.9	161.3	228.4	153.5	173.1	173.0	170.1
						AVG MIN	50.6	50.0	62.0	49.3	55.7	106.3	111.7
						AVG MAX	125.8	142.7	147.3	134.8	137.5	162.0	157.4
UV Transmittance	% per cm	Daily	Grab	Entering UV Reactors 1,2 & 3	≥ 70 % per cm	MIN	96.3	96.3	95.4	93.6	89.1	91.4	94.8
						MAX	97.7	101.3	101.3	97.5	96.1	96.4	98.3
						AVG	97.1	97.7	97.5	95.7	94.3	94.0	95.8

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Approval # 1029-03-00; Schedule 2A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System												
Water Quality Parameter - UV Flow & Transmittance												
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Aug	Sep	Oct	Nov	Dec	Annual
UV Flow	m ³ /hr	Daily Maximum	Continuous	UV Reactor # 1	≥ 47.3 m ³ /hr and ≤ 772 m ³ /hr	MIN	53.6	50.5	48.8	46.4	46.5	41.7
						MAX	158.7	152.7	152.4	152.4	158.6	173.1
						AVG MIN	114.9	84.6	55.6	59.7	72.4	72.1
						AVG MAX	150.1	145.0	143.8	146.1	153.2	143.7
UV Flow	m ³ /hr	Daily Maximum	Continuous	UV Reactor # 2	≥ 47.3 m ³ /hr and ≤ 772 m ³ /hr	MIN	53.6	50.5	48.8	46.6	46.5	41.7
						MAX	158.7	216.0	152.4	226.2	158.1	228.4
						AVG MIN	114.8	84.6	55.6	58.9	72.4	72.9
						AVG MAX	150.0	147.3	143.8	150.9	152.9	146.0
UV Flow	m ³ /hr	Daily Maximum	Continuous	UV Reactor # 3	≥ 47.3 m ³ /hr and ≤ 772 m ³ /hr	MIN	54.0	50.5	49.0	45.9	46.3	41.5
						MAX	158.7	216.4	152.2	226.5	158.9	228.4
						AVG MIN	115.1	84.5	55.4	58.7	72.5	72.7
						AVG MAX	150.4	147.4	143.5	150.6	153.2	146.0
UV Transmittance	% per cm	Daily	Grab	Entering UV Reactors 1,2 & 3	≥ 70 % per cm	MIN	95.8	96.4	96.6	96.8	95.0	89.1
						MAX	97.5	98.2	98.2	98.4	98.5	101.3
						AVG	96.6	97.1	97.3	97.5	97.4	96.5

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Approval # 1029-03-00; Schedule 2A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Quality Parameter - UV Dose													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
UV Dose	mJ/cm ²	Daily Min	Continuous	UV	≥ 18 mJ/cm ²	MIN	24.9	22.4	20.8	20.8	20.1	20.0	20.1
				Reactor # 1		MAX	31.7	31.2	68.3	25.9	23.1	25.4	27.0
						AVG	26.5	24.8	27.2	22.6	21.3	21.8	22.8
UV Dose	mJ/cm ²	Daily Avg	Continuous	UV	≥ 18 mJ/cm ²	MIN	28.5	25.0	26.8	24.3	21.7	21.2	23.1
				Reactor # 1		MAX	37.3	42.7	68.3	35.6	28.9	27.3	33.1
						AVG	30.7	31.6	32.6	26.8	24.4	24.2	25.8
UV Dose	mJ/cm ²	Daily Min	Continuous	UV	≥ 18 mJ/cm ²	MIN	24.8	22.1	21.2	21.2	19.7	20.3	20.3
				Reactor # 2		MAX	28.3	27.1	34.0	25.4	22.9	25.2	26.2
						AVG	26.2	24.6	23.7	23.4	20.8	21.6	22.8
UV Dose	mJ/cm ²	Daily Avg	Continuous	UV	≥ 18 mJ/cm ²	MIN	27.6	25.2	22.3	24.1	21.1	20.4	22.2
				Reactor # 2		MAX	42.0	38.4	38.2	30.8	25.9	27.1	29.5
						AVG	29.8	29.6	27.2	25.9	23.4	23.8	25.2
UV Dose	mJ/cm ²	Daily Min	Continuous	UV	≥ 18 mJ/cm ²	MIN	25.2	22.5	20.7	21.2	20.0	20.3	20.2
				Reactor # 3		MAX	28.3	26.6	26.9	25.6	22.9	25.8	27.4
						AVG	26.2	24.3	22.9	23.4	21.1	21.7	22.0
UV Dose	mJ/cm ²	Daily Avg	Continuous	UV	≥ 18 mJ/cm ²	MIN	27.4	26.0	21.9	24.6	21.6	21.1	21.4
				Reactor # 3		MAX	34.1	36.2	39.4	32.1	25.8	26.1	28.7
						AVG	29.5	28.8	26.7	26.2	23.9	23.7	25.0

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Water Quality Parameter - UV Dose												
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Aug	Sep	Oct	Nov	Dec	Annual
UV Dose	mJ/cm ²	Daily Min	Continuous	UV	≥ 18 mJ/cm ²	MIN	20.4	27.3	28.5	30.7	30.9	20.0
				Reactor # 1		MAX	35.6	40.1	42.8	36.8	42.1	68.3
						AVG	29.4	33.4	33.4	33.0	36.5	27.7
UV Dose	mJ/cm ²	Daily Avg	Continuous	UV	≥ 18 mJ/cm ²	MIN	25.2	32.1	39.7	40.0	34.4	21.2
				Reactor # 1		MAX	52.4	48.9	62.5	54.4	55.9	68.3
						AVG	36.0	40.6	50.2	47.1	51.6	35.1
UV Dose	mJ/cm ²	Daily Min	Continuous	UV	≥ 18 mJ/cm ²	MIN	20.4	20.3	19.8	21.3	23.1	19.7
				Reactor # 1		MAX	30.9	22.4	24.9	24.1	31.2	34.0
						AVG	25.4	21.4	22.2	22.5	27.4	23.5
UV Dose	mJ/cm ²	Daily Avg	Continuous	UV	≥ 18 mJ/cm ²	MIN	23.3	22.0	24.8	25.2	27.4	20.4
				Reactor # 1		MAX	31.3	25.9	31.9	35.5	33.3	42.0
						AVG	27.6	24.1	26.2	27.3	30.4	26.7
UV Dose	mJ/cm ²	Daily Min	Continuous	UV	≥ 18 mJ/cm ²	MIN	20.1	19.9	19.8	20.9	22.7	19.8
				Reactor # 1		MAX	27.4	22.7	27.2	24.2	29.4	29.4
						AVG	24.1	20.9	22.2	22.5	23.6	22.9
UV Dose	mJ/cm ²	Daily Avg	Continuous	UV	≥ 18 mJ/cm ²	MIN	20.5	22.7	20.8	24.5	25.2	20.5
				Reactor # 1		MAX	28.5	27.3	35.0	39.0	34.0	39.4
						AVG	25.8	25.2	27.3	28.2	29.1	26.6

6. Annual Summary – Primary Disinfection: CT & Log Removal

CT – NORTH DISTRIBUTION

Approval # 1029-03-00; Schedule 3A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Quality Parameter - Primary Disinfection - Log Reduction of Viruses - CT North Distribution													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
CT required NORTH Distribution	N/A	Once Per Day	Calculated	Entering North Distribution System	N/A	MIN	6	6	6	6	6	4	4
						MAX	6	6	9	9	6	6	4
						AVG	6	6	7	7	6	5	4
CT lowest actual NORTH Distribution	N/A	Once Per Day	Calculated	Entering North Distribution System	N/A	MIN	1524	1523	1447	1373	1082	1350	1170
						MAX	1689	1677	1740	1679	1428	1707	1875
						AVG	1601	1628	1564	1468	1337	1544	1465
CT performance ratio NORTH Distribution	N/A	Once Per Day	Calculated	Entering North Distribution System	≥ 1 except for one day per month, which must be > 0.9	MIN	254.0	253.8	164.2	152.6	180.3	225.1	292.6
						MAX	281.5	279.5	289.9	249.9	238.0	419.6	468.8
						AVG	267.2	271.4	235.1	193.2	222.8	300.8	367.8

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Approval # 1029-03-00; Schedule 3A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Quality Parameter -Primary Disinfection - Log Reduction of Viruses - CT North Distribution													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Aug	Sep	Oct	Nov	Dec		Annual
CT required NORTH Distribution	N/A	Once Per Day	Calculated	Entering South Distribution System	N/A	MIN	3	3	4	4	4		3
						MAX	3	3	4	4	6		9
						AVG	3	3	4	4	5		5
CT lowest actual NORTH Distribution	N/A	Once Per Day	Calculated	Entering South Distribution System	N/A	MIN	1324	1385	1424	1460	1282		1082
						MAX	1615	1676	1703	1537	1691		1875
						AVG	1474	1520	1509	1501	1479		1507
CT performance ratio NORTH Distribution	N/A	Once Per Day	Calculated	Entering South Distribution System	≥ 1 except for one day per month, which must be > 0.9	MIN	392.0	368.2	355.9	364.9	213.7		152.6
						MAX	538.4	558.6	425.6	384.2	422.7		558.6
						AVG	481.9	438.7	377.9	375.3	319.1		320.9

CT – SOUTH DISTRIBUTION

Approval # 1029-03-00; Schedule 3A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Quality Parameter -Primary Disinfection - Log Reduction of Viruses - CT South Distribuion													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
CT required SOUTH Distribution	N/A	Once Per Day	Calculated	Entering South Distribution System	N/A	MIN	6	6	6	6	6	4	2
						MAX	6	6	6	6	6	6	4
						AVG	6	6	6	6	6	5	4
CT lowest actual SOUTH Distribution	N/A	Once Per Day	Calculated	Entering South Distribution System	N/A	MIN	1204	1255	1112	1142	928	1224	979
						MAX	1346	1346	1387	1438	1234	1438	1387
						AVG	1284	1293	1238	1245	1155	1314	1237
CT performance ratio SOUTH Distribution	N/A	Once Per Day	Calculated	Entering South Distribution System	≥ 1 except for one day per month, which must be > 0.9	MIN	200.6	209.1	185.3	190.4	154.7	204.0	244.8
						MAX	224.4	224.4	231.2	239.7	205.7	354.5	544.0
						AVG	213.9	215.4	206.4	207.6	192.4	284.8	350.0

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Approval # 1029-03-00; Schedule 3A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System												
Water Quality Parameter - Primary Disinfection - Log Reduction of Viruses - CT South Distribuion												
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Aug	Sep	Oct	Nov	Dec	Annual
CT required SOUTH Distribution		Once per day	Calculated	Entering South Distribution System	N/A	MIN	3	3	3	4	4	2
						MAX	3	3	4	4	4	6
						AVG	3	3	4	4	4	5
CT lowest actual SOUTH Distribution		Once per day	Calculated	Entering South Distribution System	N/A	MIN	1132	1122	1173	1173	1000	928
						MAX	1425	1336	1530	1285	1428	1530
						AVG	1264	1225	1242	1216	1188	1242
CT performance ratio SOUTH Distribution		Once per day	Calculated	Entering South Distribution System	≥ 1 except for one day per month, w hich must be > 0.9	MIN	377.4	374.0	293.3	293.3	249.9	154.7
						MAX	475.0	445.4	411.4	321.3	357.0	544.0
						AVG	421.1	408.2	330.5	304.0	297.0	285.9

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Approval # 1029-03-00; Schedule 2A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Quality Parameter - Primary Disinfection - Log Reduction of Viruses													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
VOLUME	m ³	Daily Minimum	Continuous	Clearwell	N/A	MIN	733.3	799.6	620.3	856.6	787.5	736.0	734.6
						MAX	946.3	884.0	885.4	882.8	879.8	886.5	883.8
						AVG	851.2	862.8	820.4	865.2	860.3	825.1	796.0
FLOW	MAXIMUM L/min	Once Per Day	Continuous	Entering Distribution System	N/A	MIN	8237	7739	6760	10972	9963	10823	10982
						MAX	12054	12072	13630	12118	12789	15758	15702
						AVG	10727	11183	11368	11397	11486	12825	13288
pH	N/A	Once Per Day	Grab	Entering Distribution System	6.5 - 8.5 pH	MIN	7.6	7.5	7.6	7.7	7.6	7.6	7.5
						MAX	7.8	7.8	7.9	7.9	7.8	7.8	7.7
						AVG	7.7	7.7	7.8	7.7	7.8	7.7	7.7
Temperature	Degrees Celcius	Once Per Day	Grab	Entering Distribution System	N/A	MIN	5.7	5.4	3.8	3.7	5.6	7.2	9.9
						MAX	7.2	6.2	5.7	5.7	7.4	10.1	13.0
						AVG	6.6	5.8	5.0	4.6	6.6	8.6	11.9

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Approval # 1029-03-00; Schedule 2A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Quality Parameter - Primary Disinfection - Log Reduction of Viruses													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Aug	Sep	Oct	Nov	Dec		Annual
VOLUME	m ³	Daily Minimum	Continuous	Clearwell	N/A	MIN	330.3	744.8	858.0	368.7	669.4		330.3
						MAX	868.1	885.6	873.0	870.0	867.1		946.3
						AVG	724.1	856.1	866.9	847.6	804.9		831.7
FLOW	MAXIMUM L/min	Once Per Day	Continuous	Entering Distribution System	N/A	MIN	9291	11112	6787	10447	9127		6760
						MAX	14562	14859	12124	12553	12216		15758
						AVG	12069	11744	11150	11296	11462		11666
pH	N/A	Once Per Day	Grab	Entering Distribution System	6.5 - 8.5 pH	MIN	7.5	7.5	7.6	7.5	7.5		7.5
						MAX	7.7	7.7	7.7	7.7	7.7		7.9
						AVG	7.6	7.6	7.6	7.6	7.6		7.7
Temperature	Degrees Celcius	Once Per Day	Grab	Entering Distribution System	N/A	MIN	12.9	13.3	11.3	9.0	7.2		7.9
						MAX	15.0	14.2	13.5	11.2	12.0		10.1
						AVG	13.8	13.8	12.5	10.1	8.4		9.0

7. Annual Summary – Distribution Chlorine Residual

Approval # 1029-03-00; Schedule 3A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Quality Parameter - Primary Disinfection: Chlorine Residual - Free													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
Free Chlorine Residual	mg/L	Daily Min	Continuous	South Reservoir	≥ 0.2 mg/L	MIN	1.14	1.22	1.06	1.13	0.86	1.10	0.93
						MAX	1.31	1.29	1.35	1.39	1.20	1.38	1.37
						AVG	1.24	1.25	1.19	1.20	1.11	1.26	1.18
Free Chlorine Residual	mg/L	Daily Min	Continuous	Zone 2N Reservoir	≥ 0.2 mg/L	MIN	1.17	1.19	1.08	1.03	0.82	0.99	0.89
						MAX	1.31	1.29	1.32	1.26	1.09	1.27	1.32
						AVG	1.23	1.25	1.19	1.10	1.01	1.16	1.10
Water Quality Parameter - Secondary Disinfection: Chlorine Residual - Free													
Free Chlorine Residual	mg/L	Once per day	Grab	Water Distribution Random Locations	≥ 0.1 mg/L, based on 75% of the samples taken on a particular day	MIN	0.93	0.87	0.83	0.73	0.69	0.65	0.66
						MAX	1.66	1.40	1.30	1.20	1.17	1.29	1.27
						AVG	1.12	1.18	1.10	1.00	0.92	1.01	1.01
Free Chlorine Residual	mg/L	One sample taken with Bacteriological	Grab	Water Distribution Bacteriological Random Locations	≥ 0.1 mg/L, based on 75% of the samples taken on a particular day	MIN	0.74	0.87	0.74	0.70	0.51	0.51	0.64
						MAX	1.32	1.34	1.32	1.10	1.12	1.29	1.21
						AVG	1.08	1.14	1.05	0.94	0.88	1.02	1.00

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Approval # 1029-03-00; Schedule 3A - Raw Water & Schedule 3A Treated Water Quality: Monitoring - Town of Okotoks Waterworks System													
Water Quality Parameter - Primary Disinfection: Chlorine Residual - Free													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Aug	Sep	Oct	Nov	Dec	Annual	
Free Chlorine Residual	mg/L	Daily Min	Continuous	South Reservoir	≥ 0.2 mg/L	MIN	1.10	1.08	1.12	1.14	0.98	0.86	
						MAX	1.32	1.30	1.28	1.24	1.37	1.39	
						AVG	1.21	1.19	1.19	1.18	1.15	1.19	
Free Chlorine Residual	mg/L	Daily Min	Continuous	Zone 2N Reservoir	≥ 0.2 mg/L	MIN	0.99	1.07	1.11	0.99	0.95	0.82	
						MAX	1.22	1.27	1.27	1.19	1.29	1.32	
						AVG	1.13	1.16	1.16	1.15	1.12	1.15	
Water Quality Parameter - Secondary Disinfection: Chlorine Residual - Free													
Free Chlorine Residual	mg/L	Once per day	Grab	Water Distribution Random Locations	≥ 0.1 mg/L, based on 75% of the samples taken on a particular day	MIN	0.53	0.76	0.70	0.67	0.78	0.53	
						MAX	1.22	1.22	1.22	1.28	1.32	1.66	
						AVG	0.94	1.04	1.04	1.03	1.06	1.04	
Free Chlorine Residual	mg/L	One sample taken with Bacteriological	Grab	Water Distribution Bacteriological Random Locations	≥ 0.1 mg/L, based on 75% of the samples taken on a particular day	MIN	0.02	0.58	0.56	0.74	0.74	0.02	
						MAX	1.30	1.48	1.21	1.21	1.29	1.48	
						AVG	0.92	0.98	0.99	0.99	1.04	1.00	

8. Annual Summary – Waste Stream Monitoring

A. FILTER WASTE TANK

The filter to waste water was pumped to the sanitary sewer.

Approval # 1029-03-00; Section 4.5.3: Waste Streams Monitoring Program - Town of Okotoks Waterworks System													
Filter Waste Monitoring (Samples taken directly from the Filter Backwash Holding Tank)													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
pH	N/A	Once per week	Grab	Filter Waste Holding Tank	N/A	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
						MAX	0.0	0.0	0.0	0.0	0.0	0.0	0.0
						AVG	0.0	# 0.0	0.0	0.0	0.0	0.0	0.0
Turbidity	NTU	Once per week	Grab	Filter Waste Holding Tank	N/A	MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
						MAX	0.00	0.00	0.00	0.00	0.00	0.00	0.00
						AVG	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Free Chlorine	mg/L	Once per week	Grab	Filter Waste Holding Tank	N/A	MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
						MAX	0.00	0.00	0.00	0.00	0.00	0.00	0.00
						AVG	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TSS	mg/L	Once per week	Grab	Filter Waste Holding Tank	N/A	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
						MAX	0.0	0.0	0.0	0.0	0.0	0.0	0.0
						AVG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOLUME	m ³	Daily	Calculated	FW Tank	N/A	TOTAL	7016	5812	5206	4953	4652	5106	5344

NOTE: All filter to waste water was pumped to the sanitary sewer.

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Approval # 1029-03-00; Section 4.5.3: Waste Streams Monitoring Program - Town of Okotoks Waterworks System
Filter Waste Monitoring (Samples taken directly from the Filter Waste Tank)

Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Aug	Sep	Oct	Nov	Dec	Annual
pH	N/A	Once per week	Grab	Filter Waste Holding Tank	N/A	MIN	0.0	0.0	0.0	0.0	0.0	0.0
						MAX	0.0	0.0	0.0	0.0	0.0	0.0
						AVG	0.0	0.0	0.0	0.0	0.0	0.0
Turbidity	NTU	Once per week	Grab	Filter Waste Holding Tank	N/A	MIN	0.00	0.00	0.00	0.00	0.00	0.00
						MAX	0.00	0.00	0.00	0.00	0.00	0.00
						AVG	0.00	0.00	0.00	0.00	0.00	0.00
Free Chlorine	mg/L	Once per week	Grab	Filter Waste Holding Tank	N/A	MIN	0.00	0.00	0.00	0.00	0.00	0.00
						MAX	0.00	0.00	0.00	0.00	0.00	0.00
						AVG	0.00	0.00	0.00	0.00	0.00	0.00
TSS	mg/L	Once per week	Grab	Filter Waste Holding Tank	N/A	MIN	0.0	0.0	0.0	0.0	0.0	0.0
						MAX	0.0	0.0	0.0	0.0	0.0	0.0
						AVG	0.0	0.0	0.0	0.0	0.0	0.0
VOLUME	m ³	Daily	Calculated	FW Tank	N/A	TOTAL	5097	6371	5976	5274	6520	67327

NOTE: All filter to waste water was pumped to the sanitary sewer.

B. CLARIFIER WASTE TANK

- No clarifier waste for 2021.

Approval # 1029-03-00; Section 4.5.3: Waste Streams Monitoring Program - Town of Okotoks Waterworks System													
Clarifier Waste Monitoring (Samples taken directly from the Clarifier Waste Tank)													
Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Jan	Feb	Mar	Apr	May	Jun	Jul
pH	N/A	Once per day	Grab	Clarifier Waste Tank	N/A	MIN							
						MAX							
						AVG							
Turbidity	NTU	Once per day	Grab	Clarifier Waste Tank	N/A	MIN							
						MAX							
						AVG							
TSS	mg/L	Once per week	Grab	Clarifier Waste Tank	N/A	MIN							
						MAX							
						AVG							
VOLUME	m ³	Daily	Calculated	FW Tank	N/A	TOTAL							
NOTE: There was no clarifier waste in 2021.													

**Approval # 1029-03-00; Section 4.5.3: Waste Streams Monitoring Program - Town of Okotoks Waterworks System
Clarifier Waste Monitoring (Samples taken directly from the Clarifier Waste Tank)**

Parameter	Units of Measure	Frequency	Sample Type	Sampling Location	Approval Limit		Aug	Sep	Oct	Nov	Dec	Annual
pH	N/A	Once per day	Grab	Clarifier Waste Tank	N/A	MIN						
						MAX						
						AVG						
Turbidity	NTU	Once per day	Grab	Clarifier Waste Tank	N/A	MIN						
						MAX						
						AVG						
TSS	mg/L	Once per week	Grab	Clarifier Waste Tank	N/A	MIN						
						MAX						
						AVG						
VOLUME	m ³	Daily	Calculated	FW Tank	N/A	TOTAL						

NOTE: There was no clarifier waste in 2021.

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9. Annual Summary – Bacteriological Analysis: Water Distribution System

JANUARY 2021											
DATE	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E-Coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)	
							Present	Absent/100 mL			
4-Jan-21	7:35am	ma	ma		Southbank Lift Station	1680614	Absent	Absent	0.14	0.81	
4-Jan-21	8:00am	ma	ma		Westmount Booster	1680618	Absent	Absent	0.23	1.18	
4-Jan-21	8:10am	ma	ma		280 Southridge Drive	1680616	Absent	Absent	0.07	1.11	
4-Jan-21	8:35am	ma	ma		12 Sheep River Drive	1680615	Absent	Absent	0.10	1.21	
4-Jan-21	8:15am	bs	bs	200-1118 North Railway Street		1680620	Absent	Absent	0.14	0.87	
4-Jan-21	7:32am	bs	bs	261 Don Seaman Way		1680613	Absent	Absent	0.12	1.00	
4-Jan-21	7:55am	bs	bs	51 Drake Landing Loop		1680617	Absent	Absent	0.08	0.99	
4-Jan-21	8:30am	bs	bs	14 Ranchers View		1680618	Absent	Absent	0.10	0.74	
11-Jan-21	7:55am	ma	ma		Southbank Lift station	1680611	Absent	Absent	0.06	0.95	
11-Jan-21	8:15am	ma	ma		Westmount Booster	1680609	Absent	Absent	0.08	1.21	
11-Jan-21	8:30am	ma	ma		280 Southridge Drive	1680610	Absent	Absent	0.05	1.11	
11-Jan-21	8:50am	ma	ma		12 Sheep River Drive	1680608	Absent	Absent	0.04	1.22	
11-Jan-21	8:00am	pk	pk	200-1118 North Railway Street		1680606	Absent	Absent	0.09	1.29	
11-Jan-21	8:20am	pk	pk	261 Don Seaman Way		1680605	Absent	Absent	0.08	0.99	
11-Jan-21	8:40am	pk	pk	51 Drake Landing Loop		1680607	Absent	Absent	0.05	1.07	
11-Jan-21	9:00am	pk	pk	40 Crystal Shores HTS		1680612	Absent	Absent	0.05	0.93	
18-Jan-21	7:27am	pw	pw	200 - 1118 North Railway Street		1680602	Absent	Absent	0.12	0.96	
18-Jan-21	7:50am	pw	pw	257 Don Seaman Way		1694147	Absent	Absent	0.04	1.10	
18-Jan-21	8:25am	pw	pw	111 Waldron Avenue		1680601	Absent	Absent	0.04	1.11	
18-Jan-21	8:40am	pw	pw	69 Okotoks Drive		1694149	Absent	Absent	0.05	1.31	
18-Jan-21	7:45am	ma	ma		Southbank Lift Station	1680603	Absent	Absent	0.04	0.93	
18-Jan-21	8:05am	ma	ma		Westmount Booster Station	1680604	Absent	Absent	0.06	1.32	
18-Jan-21	8:20am	ma	ma		280 Southridge Drive	1694148	Absent	Absent	0.05	1.19	
18-Jan-21	8:50am	ma	ma		12 Sheep River Drive	1694150	Absent	Absent	0.09	1.30	
25-Jan-21	7:15am	bs	bs	200-1118 North Railway street		1694145	Absent	Absent	0.08	0.99	
25-Jan-21	7:54am	bs	bs	261 Don Seaman Way		1694144	Absent	Absent	0.03	0.97	
25-Jan-21	8:18am	bs	bs	51 Drake Landing Loop		1694146	Absent	Absent	0.10	1.06	
25-Jan-21	8:40am	bs	bs	4 Ranchers View		1694143	Absent	Absent	0.03	0.86	
25-Jan-21	8:20am	pk	pk		12 Sheep River Drive	1694138	Absent	Absent	0.04	1.23	
25-Jan-21	8:30am	pk	pk		22 South ridge Drive	1694140	Absent	Absent	0.05	1.15	
25-Jan-21	8:38am	pk	pk		280 South ridge Drive	1694142	Absent	Absent	0.04	1.24	
25-Jan-21	8:57am	pk	pk		109-201 Southridge Drive	1694141	Absent	Absent	0.10	1.26	
									MINIMUM	0.03	0.74
									MAXIMUM	0.23	1.32
									AVERAGE	0.08	1.08
TOTAL # OF SAMPLES							32				
Approval	Frequency			Weekly	Weekly	30 Samples per Month		Weekly	Daily		
Requirements	Limit			Random	Random	Random		≤ 5 NTU	≥ 0.1 mg/L		

FEBRUARY 2021											
DATE	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E-Coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)	
							Present	Absent/100 mL			
1-Feb-21	7:20am	bs	bs	200-1118 North Railway Street		1694136	Absent	Absent	0.10	1.14	
1-Feb-21	7:44am	bs	bs	261 Don Seaman Way		1694137	Absent	Absent	0.05	1.00	
1-Feb-21	8:13am	bs	bs	51 Drake Landing Loop		1394134	Absent	Absent	0.08	1.23	
1-Feb-21	8:30am	bs	bs	4 Ranchers View		1394135	Absent	Absent	0.08	0.99	
1-Feb-21	7:48am	dp	dp		Southbank Lift Station	1694130	Absent	Absent	0.08	1.11	
1-Feb-21	8:15am	dp	dp		Westmount Booster Station	1394131	Absent	Absent	0.05	1.27	
1-Feb-21	8:39am	dp	dp		280 Southridge Drive	1694132	Absent	Absent	0.09	1.24	
1-Feb-21	8:58am	dp	dp		12 Sheep River Drive	1694133	Absent	Absent	0.06	1.28	
8-Feb-21	7:40am	pk	pk	200-1118 North Railway Street		1694125	Absent	Absent	0.08	1.05	
8-Feb-21	7:50am	pk	pk	261 Don Seaman Way		1694128	Absent	Absent	0.06	1.21	
8-Feb-21	8:05am	pk	pk	51 Drake Landing Loop		1694123	Absent	Absent	0.06	1.25	
8-Feb-21	8:30am	pk	pk	40 Crystal Shores Heights		1694124	Absent	Absent	0.05	1.06	
8-Feb-21	8:05am	ma	ma		Southbank Lift Station	1694122	Absent	Absent	0.08	1.13	
8-Feb-21	8:30am	ma	ma		Westmount Booster Station	1694129	Absent	Absent	0.05	1.25	
8-Feb-21	8:45am	ma	ma		281 Southridge Drive	1694126	Absent	Absent	0.06	1.17	
8-Feb-21	9:15am	ma	ma		12 Sheep River Drive	1694127	Absent	Absent	0.06	1.25	
16-Feb-21	7:40am	pk	pk	200 - 1118 North Railway Street		1694120	Absent	Absent	0.18	0.95	
16-Feb-21	8:00am	pk	pk	261 Don Seaman Way		1694117	Absent	Absent	0.09	1.26	
16-Feb-21	8:30am	pk	pk	51 Drake Landing Loop		1694118	Absent	Absent	0.07	1.34	
16-Feb-21	8:50am	pk	pk	40 Crystal Shores Heights		1694121	Absent	Absent	0.07	1.34	
16-Feb-21	7:40am	ma	ma		Southbank Lift Station	1694119	Absent	Absent	0.06	1.07	
16-Feb-21	8:20am	ma	ma		Westmount Booster Station	1694114	Absent	Absent	0.07	1.14	
16-Feb-21	8:30am	ma	ma		280 Southridge Drive	1694115	Absent	Absent	0.07	1.10	
16-Feb-21	8:45am	ma	ma		22 Sheep River Drive	1694116	Absent	Absent	0.17	1.21	
22-Feb-21	7:09am	bs	bs	200-1118 North Railway Street		1694111	Absent	Absent	0.12	1.04	
22-Feb-21	7:34am	bs	bs	261 Don Seaman Way		1694113	Absent	Absent	0.06	1.12	
22-Feb-21	7:54am	bs	bs	51 Drake Landing Loop		1694110	Absent	Absent	0.04	1.05	
22-Feb-21	8:12am	bs	bs	4 Ranchers View		1694109	Absent	Absent	0.05	0.87	
22-Feb-21	7:25am	ma	ma		Southbank Lift Station	1694105	Absent	Absent	0.06	1.01	
22-Feb-21	7:45am	ma	ma		Westmount Booster Station	1694108	Absent	Absent	0.04	1.10	
22-Feb-21	8:00am	ma	ma		280 Southridge Drive	1694106	Absent	Absent	0.05	1.09	
22-Feb-21	8:25am	ma	ma		12 Sheep River Drive	1694107	Absent	Absent	0.05	1.21	
									MINIMUM	0.04	0.87
									MAXIMUM	0.18	1.34
									AVERAGE	0.07	1.14
TOTAL # OF SAMPLES							32				
Approval	Frequency			Weekly	Weekly	30 Samples per Month		Weekly	Daily		
Requirements	Limit			Random	Random	Random		≤ 5 NTU	≥ 0.1 mg/L		

Okotoks Waterworks System Annual Report 2021

MARCH 2021										
DAY	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E-Coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)
							Present or Absent/100 mL	Total Coliform		
1-Mar-21	7:20am	bs	bs	200-1118 North Railway Street		1694199	Absent	Absent	0.15	0.98
1-Mar-21	7:38am	bs	bs	261 Don Seaman Way		1694197	Absent	Absent	0.08	1.13
1-Mar-21	8:00am	bs	bs	51 Drake Landing Loop		1694200	Absent	Absent	0.12	1.03
1-Mar-21	8:15am	bs	bs	4 Ranchers View		1694198	Absent	Absent	0.07	0.99
1-Mar-21	7:26am	dp	dp		Southbank Lift Station	1694195	Absent	Absent	0.09	0.99
1-Mar-21	7:50am	dp	dp		Westmount Booster Station	1694196	Absent	Absent	0.08	1.27
1-Mar-21	8:12am	dp	dp		280 Southridge Drive	1694194	Absent	Absent	0.12	1.11
1-Mar-21	8:50am	dp	dp		12 Sheep River Drive	1694193	Absent	Absent	0.10	1.32
8-Mar-21	8:10am	pk	pk		12 Sheep River Drive	1694189	Absent	Absent	0.07	1.12
8-Mar-21	8:20am	pk	pk		22 Southridge Drive	1694185	Absent	Absent	0.07	1.11
8-Mar-21	8:30am	pk	pk		Westmount Booster Station	1694181	Absent	Absent	0.14	1.13
8-Mar-21	8:50am	pk	pk		280 Southridge Drive	1694188	Absent	Absent	0.06	1.09
8-Mar-21	7:13am	bs	bs	200 - 1118 North Railway Street		1694191	Absent	Absent	0.11	1.09
8-Mar-21	7:50am	bs	bs	261 Don Seaman Way		1694190	Absent	Absent	0.09	0.91
8-Mar-21	8:13am	bs	bs	51 Drake Landing Loop		1694186	Absent	Absent	0.08	0.95
8-Mar-21	8:25am	bs	bs	4 Ranchers View		1694192	Absent	Absent	0.07	0.91
15-Mar-21	7:45am	dp	dp		Southbank Lift station	1694177	Absent	Absent	0.06	0.99
15-Mar-21	8:05am	dp	dp		Westmount Booster Station	1694180	Absent	Absent	0.05	1.17
15-Mar-21	8:30am	dp	dp		280 Southridge Drive	1694178	Absent	Absent	0.05	1.18
15-Mar-21	9:02am	dp	dp		12 Sheep River Drive	1694179	Absent	Absent	0.13	1.22
15-Mar-21	7:36am	pk	pk	200-1118 North Railway Street		1694181	Absent	Absent	0.16	0.98
15-Mar-21	8:00am	pk	pk	261 Don Seaman Way		1694184	Absent	Absent	0.06	1.17
15-Mar-21	8:15am	pk	pk	51 Drake Landing Loop		1694183	Absent	Absent	0.05	1.23
15-Mar-21	8:35am	pk	pk	40 Crystal Shores Heights		1694182	Absent	Absent	0.08	1.15
22-Mar-21	7:45am	ma	ma		Southbank Lift station	1394170	Absent	Absent	0.07	0.80
22-Mar-21	8:05am	ma	ma		Westmount Booster Station	1694171	Absent	Absent	0.06	1.10
22-Mar-21	8:25am	ma	ma		280 Southridge Drive	1694172	Absent	Absent	0.14	1.09
22-Mar-21	8:45am	ma	ma		12 Sheep River Drive	1694169	Absent	Absent	0.10	1.12
22-Mar-21	7:22am	bs	bs	200-1118 North Railway Street		1694175	Absent	Absent	0.08	1.22
22-Mar-21	7:35am	bs	bs	261 Don Seaman Way		1694176	Absent	Absent	0.14	0.74
22-Mar-21	7:57am	bs	bs	51 Drake Landing Loop		1694174	Absent	Absent	0.12	0.92
22-Mar-21	8:15am	bs	bs	4 Ranchers View		1694173	Absent	Absent	0.05	0.77
30-Mar-21	8:00am	ma	ma		Southbank Lift station	1694167	Absent	Absent	0.15	0.86
30-Mar-21	8:20am	ma	ma		Westmount Booster Station	1694165	Absent	Absent	0.12	1.13
30-Mar-21	8:40am	ma	ma		280 Southridge Drive	1694166	Absent	Absent	0.14	1.05
30-Mar-21	9:00am	ma	ma		22 Sheep River Drive	1694168	Absent	Absent	0.11	1.15
30-Mar-21	7:25am	bs	bs	200-1118 North Railway Street		1694163	Absent	Absent	0.12	1.03
30-Mar-21	7:44am	bs	bs	261 Don Seaman Way		1694162	Absent	Absent	0.06	1.00
30-Mar-21	8:11am	bs	bs	51 Drake Landing Loop		1694164	Absent	Absent	0.07	1.00
30-Mar-21	8:25am	bs	bs	4 Ranchers View		1694161	Absent	Absent	0.07	0.83
								MINIMUM	0.05	0.74
								MAXIMUM	0.16	1.32
								AVERAGE	0.09	1.05
							TOTAL # OF SAMPLES	40		
Approval	Frequency			Weekly	Weekly	30 Samples per Month		Weekly	Daily	
Requirements	Limit			Random	Random	Random		≤ 5 NTU	≥ 0.1 mg/L	

APRIL 2021										
DAY	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E-Coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)
							Present or Absent/100 mL	Total Coliform		
05-Apr-21	7:15am	bs	bs	200-1118 North Railway Street		1694159	Absent	Absent	0.18	0.81
05-Apr-21	7:36am	bs	bs	261 Don Seaman Way		1694155	Absent	Absent	0.09	0.97
05-Apr-21	7:56am	bs	bs	51 Drake Landing Loop		1694156	Absent	Absent	0.05	0.92
05-Apr-21	8:15am	bs	bs	4 Ranchers View		1694153	Absent	Absent	0.05	0.80
05-Apr-21	7:40am	pk	pk		12 Sheep River Drive	1694154	Absent	Absent	0.04	0.75
05-Apr-21	8:10am	pk	pk		22 Southridge Drive	1694158	Absent	Absent	0.10	0.73
05-Apr-21	8:20am	pk	pk		Westmount Booster	1694157	Absent	Absent	0.05	0.77
05-Apr-21	7:25am	pk	pk		280 Southridge Drive	1694160	Absent	Absent	0.16	0.70
12-Apr-21	8:15am	ts	ts	261 Don Seaman Way		1954299	Absent	Absent	0.17	0.98
12-Apr-21	8:30am	ts	ts	51 Drake Landing Loop		1954296	Absent	Absent	0.08	0.84
12-Apr-21	8:45am	ts	ts	99 Okotoks Drive		1954297	Absent	Absent	0.10	0.96
12-Apr-21	9:00am	ts	ts	200 Sandstone Drive		1954298	Absent	Absent	0.09	1.06
12-Apr-21	9:30am	ts	ts		12 Sheep River Drive	1954300	Absent	Absent	0.09	1.08
12-Apr-21	9:40am	ts	ts		Westmount Booster	1954301	Absent	Absent	0.13	1.05
12-Apr-21	9:50am	ts	ts		280 Southridge Drive	1694151	Absent	Absent	0.08	0.99
12-Apr-21	10:05am	ts	ts		30 Cimarron Crescent	1694152	Absent	Absent	0.12	1.00
19-Apr-21	9:00am	ts	ts		12 Sheep River Drive	1954292	Absent	Absent	0.09	1.09
19-Apr-21	9:10am	ts	ts		Westmount Booster	1954294	Absent	Absent	0.13	0.99
19-Apr-21	9:15am	ts	ts		280 Southridge Drive	1954295	Absent	Absent	0.11	1.06
19-Apr-21	9:30am	ts	ts		30 Cimarron Crescent	1954288	Absent	Absent	0.09	1.01
19-Apr-21	7:30am	ts	ts	200-1118 North Railway Street		1954293	Absent	Absent	0.14	0.91
19-Apr-21	7:55am	ts	ts	261 Don Seaman Way		1954291	Absent	Absent	0.10	1.10
19-Apr-21	8:05am	ts	ts	51 Drake Landing Loop		1954289	Absent	Absent	0.08	0.89
19-Apr-21	8:40am	ts	ts	200 Sandstone Drive		1954290	Absent	Absent	0.14	1.10
26-Apr-21	7:15am	ts	ts	200-1118 North Railway Street		1954280	Absent	Absent	0.13	0.89
26-Apr-21	8:00am	ts	ts	261 Don Seaman Way		1954281	Absent	Absent	0.07	0.80
26-Apr-21	8:20am	ts	ts	51 Drake Landing Loop		1954283	Absent	Absent	0.08	0.84
26-Apr-21	8:35am	ts	ts	200 Sand Stone Drive		1954282	Absent	Absent	0.06	0.99
26-Apr-21	8:55am	ts	ts		12 Sheep River Drive	1954284	Absent	Absent	0.08	1.01
26-Apr-21	9:10am	ts	ts		Westmount Booster Statio	1954285	Absent	Absent	0.07	1.10
26-Apr-21	10:15am	ts	ts		30 Cimarron Crescent	1954287	Absent	Absent	0.06	1.06
26-Apr-21	10:30am	ts	ts		280 Southridge Drive	1954286	Absent	Absent	0.07	0.87
								MINIMUM	0.04	0.70
								MAXIMUM	0.18	1.10
								AVERAGE	0.10	0.94
							TOTAL # OF SAMPLES	32		
Approval	Frequency			Weekly	Weekly	30 Samples per Month		Weekly	Daily	
Requirements	Limit			Random	Random	Random		≤ 5 NTU	≥ 0.1 mg/L	

Okotoks Waterworks System Annual Report 2021

MAY 2021										
DAY	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E. coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)
							Present or Absent/100 mL	Total Coliform		
3-May-21	7:30am	ts	ts	200-1118 North Railway Street		1954278	Absent	Absent	0.12	0.99
3-May-21	8:15am	ts	ts	261 Don Seaman Way		1954279	Absent	Absent	0.09	1.02
3-May-21	8:35am	ts	ts	51 Drake Landing Loop		1954276	Absent	Absent	0.08	0.98
3-May-21	8:50am	ts	ts	200 Sandstone Drive		1954277	Absent	Absent	0.08	1.03
3-May-21	9:20am	ts	ts		12 Sheep River Drive	1954275	Absent	Absent	0.08	1.07
3-May-21	10:30am	ts	ts		Westmount Booster Station	1954272	Absent	Absent	0.26	1.02
3-May-21	10:50am	ts	ts		280 Southridge Drive	1954274	Absent	Absent	0.22	0.99
3-May-21	11:05am	ts	ts		30 Cimarron Crescent	1954273	Absent	Absent	0.07	1.10
10-May-21	7:35am	ts	ts	200-1118 North Railway Street		1954266	Absent	Absent	0.08	0.87
10-May-21	8:10am	ts	ts	261 Don Seaman Way		1954269	Absent	Absent	0.05	0.90
10-May-21	8:30am	ts	ts	51 Drake Landing Loop		1954265	Absent	Absent	0.06	0.96
10-May-21	8:45am	ts	ts	200 Sandstone Drive		1954267	Absent	Absent	0.07	0.99
10-May-21	9:10am	ts	ts		12 Sheep River Drive	1954270	Absent	Absent	0.08	1.09
10-May-21	10:35am	ts	ts		Westmount Booster Station	1954268	Absent	Absent	0.10	1.02
10-May-21	10:50am	ts	ts		280 Southridge Drive	1954271	Absent	Absent	0.09	0.98
10-May-21	11:00am	ts	ts		109-201 Southridge Drive	1954269	Absent	Absent	0.09	1.00
10-May-21	9:46am	pw	pw		129 Westridge Close	1954263	Absent	Absent	0.06	0.88
17-May-21	7:30am	ts	ts	200-1118 North Railway Street		1954257	Absent	Absent	0.08	0.81
17-May-21	8:05am	ts	ts	261 Don Seaman Way		1954255	Absent	Absent	0.07	0.84
17-May-21	8:25am	ts	ts	51 Drake Landing Loop		1954256	Absent	Absent	0.14	0.78
17-May-21	8:45am	ts	ts	200 Sandstone Drive		1954258	Absent	Absent	0.06	0.90
17-May-21	9:10am	ts	ts		12 Sheep River Drive	1954260	Absent	Absent	0.08	0.81
17-May-21	9:20am	ts	ts		Westmount Booster Station	1954261	Absent	Absent	0.07	0.85
17-May-21	10:25am	ts	ts		280 Southridge Drive	1954259	Absent	Absent	0.07	0.77
17-May-21	10:40am	ts	ts		30 Cimarron Crescent	1954262	Absent	Absent	0.05	0.86
18-May-21	8:50pm	pk	pk	90 North Railway Street		1954243	Absent	Absent	0.12	0.80
18-May-21	10:14pm	pk	pk	84 North Railway Street		1954244	Absent	Absent	0.79	0.73
25-May-21	7:30am	ts	ts	200-1118 North Railway Street		1954250	Absent	Absent	0.08	0.71
25-May-21	8:15am	ts	ts	261 Don Seaman Way		1954249	Absent	Absent	0.18	0.97
25-May-21	8:30am	ts	ts	51 Drake Landing Loop		1954247	Absent	Absent	0.10	0.86
25-May-21	8:45am	ts	ts	200 Sandstone Drive		1954253	Absent	Absent	0.07	1.05
25-May-21	9:15am	ts	ts		280 Southridge Drive	1954251	Absent	Absent	0.09	1.12
25-May-21	10:20am	ts	ts		Westmont Booster Station	1954248	Absent	Absent	0.05	1.05
25-May-21	10:30am	ts	ts		280 Southridge Drive	1954254	Absent	Absent	0.09	0.98
25-May-21	10:45am	ts	ts		30 Cimarron Crescent	1954252	Absent	Absent	0.04	1.09
31-May-21	7:40am	pw	pw	261 Don Seaman Way		1954309	Absent	Absent	0.05	0.68
31-May-21	8:13am	pw	pw	51 Drake Landing Loop		1954307	Absent	Absent	0.09	0.51
31-May-21	8:30am	pw	pw	111 Waldron Ave		1954308	Absent	Absent	0.05	0.75
31-May-21	8:55am	pw	pw	69 Okotoks Drive		1954306	Absent	Absent	0.06	1.06
31-May-21	7:30am	pw	pw		12 Sheep River Drive	1954303	Absent	Absent	0.07	0.98
31-May-21	8:20am	pw	pw		22 Southridge Drive	1954306	Absent	Absent	0.10	0.62
31-May-21	8:30am	pw	pw		Westmount Booster Station	1954302	Absent	Absent	0.07	0.91
31-May-21	8:42am	pw	pw		280 Southridge Drive	1954304	Absent	Absent	0.07	0.69
31-May-21	7:45pm	ma	ma	111 Waldren Avenue		1954238	Absent	Absent	0.89	0.61
31-May-21	7:50pm	ma	ma	111 Waldren Avenue		1954239	Absent	Absent	0.89	0.61
31-May-21	7:59pm	ma	ma	111 Waldren Avenue		1954240	Absent	Absent	0.89	0.61
								MINIMUM	0.04	0.51
								MAXIMUM	0.89	1.12
								AVERAGE	0.16	0.88
						TOTAL # OF SAMPLES	46			
Approval	Frequency			Weekly	Weekly	30 Samples per Month		Weekly	Daily	
Requirements	Limit			Random	Random	Random		≤ 5 NTU	≥ 0.1 mg/L	

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JUNE 2021										
DAY	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E. coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)
							Present or Absent/100 mL			
7-Jun-21	7:41am	pw	pw	261 Don Seaman Way		1954235	Absent	Absent	0.06	0.93
7-Jun-21	8:04am	pw	pw	51 Drake Landing Loop		1954236	Absent	Absent	0.09	0.51
7-Jun-21	8:25am	pw	pw	111 Waldron Avenue		1954237	Absent	Absent	0.06	0.84
7-Jun-21	8:41am	pw	pw	69 Okotoks Drive		1954234	Absent	Absent	0.05	1.25
7-Jun-21	8:15am	pk	pk		12 Sheep River Drive	1954232	Absent	Absent	0.07	1.25
7-Jun-21	8:40am	pk	pk		Westmount Booster	1954233	Absent	Absent	0.19	1.16
7-Jun-21	9:00am	pk	pk		280 Southridge Drive	1954231	Absent	Absent	0.18	0.75
7-Jun-21	9:15am	pk	pk		109-201 Southridge Drive	1954230	Absent	Absent	0.18	1.08
14-Jun-21	7:57am	bs	bs		12 Sheep River Drive	1954229	Absent	Absent	0.14	1.22
14-Jun-21	8:10am	bs	bs		22 Southridge Drive	1954225	Absent	Absent	0.09	1.08
14-Jun-21	8:20am	bs	bs		Westmount Booster	1954222	Absent	Absent	0.09	1.11
14-Jun-21	8:35am	bs	bs		280 Southridge Drive	1954227	Absent	Absent	0.11	0.79
14-Jun-21	7:47am	pw	pw	261 Don Seaman Way		1954228	Absent	Absent	0.06	1.07
14-Jun-21	8:10am	pw	pw	51 Drake Landing Loop		1954223	Absent	Absent	0.08	0.52
14-Jun-21	8:20am	pw	pw	111 Waldron Avenue		1954224	Absent	Absent	0.05	0.98
14-Jun-21	8:45am	pw	pw	69 Okotoks Drive		1954226	Absent	Absent	0.06	1.29
21-Jun-21	7:35am	pw	pw	200-1118 North Railway Street		1954214	Absent	Absent	0.05	0.87
21-Jun-21	8:04am	pw	pw	261 Don Seaman Way		1954215	Absent	Absent	0.05	1.01
21-Jun-21	8:27am	pw	pw	51 Drake Landing Loop		1954216	Absent	Absent	0.09	1.05
21-Jun-21	8:45am	pw	pw	111 Waldron Avenue		1954217	Absent	Absent	0.09	0.98
21-Jun-21	7:56am	bs	bs		12 Sheep River Drive	1954219	Absent	Absent	0.09	1.22
21-Jun-21	8:07am	bs	bs		22 Southridge Drive	1954220	Absent	Absent	0.06	1.12
21-Jun-21	8:20am	bs	bs		Westmount Booster	1954218	Absent	Absent	0.07	1.20
21-Jun-21	8:28am	bs	bs		280 Southridge Drive	1954221	Absent	Absent	0.09	0.68
28-Jun-21	8:10am	pk	pk		12 Sheep River Drive	1954211	Absent	Absent	0.06	1.27
28-Jun-21	8:25am	pk	pk		22 Southridge Drive	1954212	Absent	Absent	0.07	1.22
28-Jun-21	8:35am	pk	pk		Westmount Booster	1954208	Absent	Absent	0.08	1.13
28-Jun-21	8:45am	pk	pk		280 Southridge Drive	1954210	Absent	Absent	0.06	0.85
28-Jun-21	7:36am	pw	pw	261 Don Seaman Way		1954209	Absent	Absent	0.07	1.15
28-Jun-21	7:56am	pw	pw	51 Drake Landing Loop		1984207	Absent	Absent	0.08	0.73
28-Jun-21	8:12am	pw	pw	111 Waldron Ave		1954213	Absent	Absent	0.08	1.06
28-Jun-21	8:25am	pw	pw	69 Okotoks Drive		1954206	Absent	Absent	0.06	1.25
							MINIMUM		0.05	0.51
							MAXIMUM		0.19	1.29
							AVERAGE		0.08	1.02
							TOTAL # OF SAMPLES	32		
Approval Requirements	Frequency Limit			Weekly Random	Weekly Random	30 Samples per Month Random		Weekly	Daily	
								≤ 5 NTU	≥ 0.1 mg/L	
JULY 2021										
DAY	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E. coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)
							Present or Absent/100 mL			
07-Jul-21	8:14am	bs	bs		12 Sheep River Drive	1980745	Absent	Absent	0.07	1.21
07-Jul-21	8:25am	bs	bs		22 Southridge Drive	1980746	Absent	Absent	0.06	1.03
07-Jul-21	8:34am	bs	bs		Westmount Booster Station	1980744	Absent	Absent	0.08	0.92
07-Jul-21	8:50am	bs	bs		280 Southridge Drive	1980747	Absent	Absent	0.07	1.13
07-Jul-21	7:42am	pw	pw	261 Don Seaman Way		1980740	Absent	Absent	0.13	1.00
07-Jul-21	7:59am	pw	pw	51 Drake Landing Loop		1980741	Absent	Absent	0.07	0.64
07-Jul-21	8:16am	pw	pw	111 Waldron Avenue		1980743	Absent	Absent	0.07	1.01
07-Jul-21	8:38am	pw	pw	69 Okotoks Drive		1980742	Absent	Absent	0.07	1.10
12-Jul-21	7:57am	bs	bs		12 Sheep River Drive	1980738	Absent	Absent	0.04	1.10
12-Jul-21	8:10am	bs	bs		22 Southridge Drive	1980734	Absent	Absent	0.04	1.03
12-Jul-21	8:18am	bs	bs		Westmount Booster Station	1980733	Absent	Absent	0.05	1.02
12-Jul-21	8:27am	bs	bs		280 Southridge Drive	1980735	Absent	Absent	0.04	0.84
12-Jul-21	7:35am	pw	pw	261 Don Seaman Way		1980737	Absent	Absent	0.09	0.91
12-Jul-21	7:56am	pw	pw	51 Drake Landing Loop		1980732	Absent	Absent	0.07	0.78
12-Jul-21	8:14am	pw	pw	111 Waldron Avenue		1980736	Absent	Absent	0.04	0.92
12-Jul-21	8:30am	pw	pw	69 Okotoks Drive		1980739	Absent	Absent	0.02	1.04
19-Jul-21	7:27am	tn	tn	Business Park Lift Station		1980726	Absent	Absent	0.04	0.91
19-Jul-21	7:43am	tn	tn	Drake Landing Lift Station		1980727	Absent	Absent	0.04	0.69
19-Jul-21	8:20am	tn	tn	69 Okotoks Drive		1980724	Absent	Absent	0.04	1.12
19-Jul-21	11:12am	tn	tn	111 Waldron Avenue		1980725	Absent	Absent	0.04	0.90
19-Jul-21	8:00am	jb	jb		Southbank Lift Station	1980728	Absent	Absent	0.09	0.90
19-Jul-21	8:30m	jb	jb		280 Southridge Drive	1980731	Absent	Absent	0.05	1.12
19-Jul-21	8:50am	jb	jb		Westmount Booster Station	1980729	Absent	Absent	0.07	1.08
19-Jul-21	9:10am	jb	jb		12 Sheep River Drive	1980730	Absent	Absent	0.52	1.12
26-Jul-21	7:45am	pk	pk		12 Sheep River Drive	1980716	Absent	Absent	0.07	1.15
26-Jul-21	8:02am	pk	pk		Westmount Booster Station	1980717	Absent	Absent	0.06	1.10
26-Jul-21	8:28am	pk	pk		280 Southridge Drive	1980718	Absent	Absent	0.09	0.99
26-Jul-21	8:41am	pk	pk		109-102 Southridge Drive	1980719	Absent	Absent	0.11	1.09
26-Jul-21	7:42am	pw	pw	261 Don Seaman Way		1980723	Absent	Absent	0.05	1.09
26-Jul-21	7:59am	pw	pw	51 Drake Landing Loop		1980722	Absent	Absent	0.09	0.95
26-Jul-21	8:20am	pw	pw	111 Waldron Avenue		1980720	Absent	Absent	0.05	1.04
26-Jul-21	8:35am	pw	pw	69 Okotoks Drive		1980721	Absent	Absent	0.06	1.18
							MINIMUM		0.02	0.64
							MAXIMUM		0.52	1.21
							AVERAGE		0.08	1.00
							TOTAL # OF SAMPLES	32		
Approval Requirements	Frequency Limit			Weekly Random	Weekly Random	30 Samples per Month Random		Weekly	Daily	
								≤ 5 NTU	≥ 0.1 mg/L	

Okotoks Waterworks System Annual Report 2021

AUGUST 2021										
DAY	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E. coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)
							Present or Absent/100 mL			
03-Aug-21	7:50am	pk	pk	200-1118 North Railway Street		1954149	Absent	Absent	0.09	0.99
03-Aug-21	8:10am	pk	pk	261 Don Seaman Way		1954150	Absent	Absent	0.08	1.13
03-Aug-21	8:35am	pk	pk	51 Drake Landing Loop		1954147	Absent	Absent	0.06	0.80
03-Aug-21	8:50am	pk	pk	40 Crystal Shores Heights		1954148	Absent	Absent	0.06	1.10
03-Aug-21	7:55am	tn	tn		Southbank Lift Station	1954144	Absent	Absent	0.05	0.99
03-Aug-21	8:01am	tn	tn		12 Sheep River Drive	1954146	Absent	Absent	0.17	1.20
03-Aug-21	9:06am	tn	tn		Westmount Booster Station	1954145	Absent	Absent	0.06	1.10
03-Aug-21	9:30am	tn	tn		280 Southridge Drive	1954143	Absent	Absent	0.03	0.91
09-Aug-21	8:06am	tn	tn		47 Sheep River Drive	1954141	Absent	Absent	0.08	1.15
09-Aug-21	9:00am	tn	tn		12 Sheep River Drive	1954142	Absent	Absent	0.05	1.14
09-Aug-21	9:44am	tn	tn		Westmount Booster Station	1954139	Absent	Absent	0.15	1.08
09-Aug-21	9:59am	tn	tn		280 Southridge Drive	1954140	Absent	Absent	0.04	0.88
09-Aug-21	7:32am	bs	bs	200-1118 North Railway Street		1954136	Absent	Absent	0.06	1.01
09-Aug-21	7:50am	bs	bs	261 Don Seaman Way		1954138	Absent	Absent	0.09	0.74
09-Aug-21	8:10am	bs	bs	51 Drake Landing Loop		1954135	Absent	Absent	0.04	0.90
09-Aug-21	8:50am	bs	bs	4 Ranchers View		1954137	Absent	Absent	0.04	0.81
10-Aug-21	9:15am	tn	tn		201 Southridge Drive	1954131	Absent	Absent	0.08	1.02
10-Aug-21	9:25am	tn	tn		Sobeys - Deli Sink	1954133	Absent	Absent	0.07	1.06
10-Aug-21	9:47am	tn	tn		110 Southbank Street	1954132	Absent	Absent	0.10	0.74
10-Aug-21	10:04am	tn	tn		Southbank Lift Station	1954134	Absent	Absent	0.08	0.98
15-Aug-21	7:06pm	bm	bm	58 Crystal Green Way		1954115	Absent	Absent	not done	0.34
15-Aug-21	7:26pm	bm	bm	5 Ranchers View		1954119	Absent	Absent	not done	0.92
15-Aug-21	7:41pm	bm	bm	132 Milligan Drive		1954117	Absent	Present	not done	1.14
15-Aug-21	7:54pm	bm	bm	3/4N Waldron		1954113	Absent	Absent	not done	0.02
15-Aug-21	8:27pm	bm	bm	25 Crystal Shores Heights		1954114	Absent	Absent	not done	0.28
16-Aug-21	7:02am	pk	pk	200-1118 North Railway Street		1954127	Absent	Absent	0.08	1.04
16-Aug-21	7:20am	pk	pk	261 Don Seaman Way		1954129	Absent	Absent	0.09	1.09
16-Aug-21	7:40am	pk	pk	51 Drake Landing Loop		1954130	Absent	Absent	0.09	0.82
16-Aug-21	7:56am	pk	pk	40 Crystal Shores Heights		1954123	Absent	Absent	0.11	1.21
16-Aug-21	7:24am	tn	tn		12 Sheep River Drive	1954128	Absent	Absent	0.10	1.14
16-Aug-21	7:42am	tn	tn		280 Southridge Drive	1954124	Absent	Absent	0.06	0.65
16-Aug-21	7:53am	tn	tn		Westmount Booster Station	1954126	Absent	Absent	0.06	1.30
16-Aug-21	8:16am	tn	tn		Southbank Lift Station	1954125	Absent	Absent	0.04	0.75
16-Aug-21	11:07am	bs	bs	4 Ranchers View		1954109	Absent	Absent	0.14	0.93
16-Aug-21	11:40am	bs	bs	11 Crystal Shores Mews		1954121	Absent	Absent	0.11	0.50
16-Aug-21	11:59am	bs	bs	124 Three Point Cove		1954116	Absent	Absent	0.16	1.09
16-Aug-21	12:08pm	bs	bs	27 Highwood Drive		1954122	Absent	Absent	0.18	1.16
16-Aug-21	11:44am	pk	pk	19 Crystal Shores Point		1954120	Absent	Absent	0.25	1.04
16-Aug-21	11:55am	pk	pk	217 Darcy Ranch Drive		1954118	Absent	Absent	0.27	0.64
17-Aug-21	2:10pm	bs	bs	403 Milligan Drive (upstream sample)		1954112	Absent	Absent	not done	1.04
17-Aug-21	2:12pm	pk	pk	132 Milligan Drive (downstream sample)		1954110	Absent	Absent	not done	1.05
17-Aug-21	2:24pm	pk	pk	132 Milligan Drive (Resample)		1954111	Absent	Absent	not done	1.02
18-Aug-21	7:25am	bs	bs	Wedderburn Pond West		1980713	Absent	Absent	0.63	1.13
18-Aug-21	9:08am	bs	bs	Wedderburn South East		1980714	Absent	Absent	0.93	0.97
18-Aug-21	11:42am	bs	bs	59 Crystal Shores Heights		1980712	Absent	Absent	not done	not recorded
18-Aug-21	1:55pm	bs	bs	HTA Church		1980715	Absent	Absent	not done	not recorded
23-Aug-21	7:35am	ma	ma	200-1118 North Railway Street		1954105	Absent	Absent	0.12	0.83
23-Aug-21	8:00am	ma	ma	261 Don Seaman Way		1954103	Absent	Absent	0.09	0.87
23-Aug-21	8:15am	ma	ma	51 Drake Landing Loop		1954104	Absent	Absent	0.06	0.81
23-Aug-21	8:30am	ma	ma	111 Waldron Avenue		1954102	Absent	Absent	0.08	0.94
23-Aug-21	9:00am	pk	pk		12 Sheep River Drive	1954101	Absent	Absent	0.11	0.93
23-Aug-21	9:20am	pk	pk		22 Southridge Drive	1954107	Absent	Absent	0.12	0.87
23-Aug-21	9:30pm	pk	pk		Westmount Booster Station	1954106	Absent	Absent	0.07	1.02
23-Aug-21	9:45am	pk	pk		280 Southridge Drive	1954108	Absent	Absent	0.05	0.79
30-Aug-21	7:35am	pk	pk	200-1118 North Railway Street		1980707	Absent	Absent	0.12	0.83
30-Aug-21	8:20am	pk	pk	261 Don Seaman Way		1980705	Absent	Absent	0.03	0.85
30-Aug-21	8:35am	pk	pk	51 Drake Landing Loop		1980704	Absent	Absent	0.03	0.76
30-Aug-21	8:50am	pk	pk	40 Crystal Shores Heights		1980706	Absent	Absent	0.05	0.82
30-Aug-21	8:02am	tn	tn		12 Sheep River Drive	1980710	Absent	Absent	0.06	1.21
30-Aug-21	8:16am	tn	tn		Westmount Booster Station	1980709	Absent	Absent	0.03	1.01
30-Aug-21	8:50am	tn	tn		280 Southridge Drive	1980711	Absent	Absent	0.04	1.01
30-Aug-21	9:05am	tn	tn		Southbank Lift Station	1980708	Absent	Absent	0.03	0.83
							MINIMUM		0.03	0.02
							MAXIMUM		0.93	1.30
							AVERAGE		0.11	0.92
						TOTAL # OF SAMPLES	62			
Approval	Frequency			Weekly	Weekly	30 Samples per Month		Weekly	Daily	
Requirements	Limit			Random	Random	Random		≤ 5 NTU	≥ 0.1 mg/L	

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SEPTEMBER 2021											
DAY	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E. coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)	
							Present	Absent/100 mL			
07-Sep-21	7:20am	pk	pk	200-1118 North Railway Street		1980703	Absent	Absent	0.07	0.83	
07-Sep-21	7:35am	pk	pk	261 Don Seaman Way		1980702	Absent	Absent	0.09	0.92	
07-Sep-21	8:00am	pk	pk	51 Drake Landing Loop		2136250	Absent	Absent	0.06	0.70	
07-Sep-21	8:20am	pk	pk	40 Crystal Shores Heights		1446834	Absent	Absent	0.12	0.92	
07-Sep-21	8:00am	jb	jb		Southbank Lift Station	2136249	Absent	Absent	0.04	0.90	
07-Sep-21	8:30am	jb	jb		280 Southridge Drive	1980701	Absent	Absent	0.05	0.88	
07-Sep-21	8:50am	jb	jb		Westmount Booster Station	2136246	Absent	Absent	0.04	1.06	
07-Sep-21	9:20am	jb	jb		12 Sheep River Drive	2136247	Absent	Absent	0.09	1.11	
13-Sep-21	7:20am	bs	bs	200-1118 North Railway Street		2136243	Absent	Absent	0.04	1.08	
13-Sep-21	7:37am	bs	bs	261 Don Seaman Way		2136242	Absent	Absent	0.03	1.01	
13-Sep-21	7:58am	bs	bs	51 Drake Landing Loop		2136244	Absent	Absent	0.06	1.04	
13-Sep-21	8:15am	bs	bs	4 Ranchers View		2136245	Absent	Absent	0.07	0.91	
13-Sep-21	8:01am	jab	jab		201 Southridge Drive	2136239	Absent	Absent	0.05	1.48	
13-Sep-21	8:17am	jab	jab		208 Southridge Drive	2136238	Absent	Absent	0.06	0.76	
13-Sep-21	8:30am	jab	jab		Westmount Booster Station	2136240	Absent	Absent	0.05	1.22	
13-Sep-21	8:50am	jab	jab		12 Sheep River Drive	2136241	Absent	Absent	0.08	1.23	
15-Sep-21	7:07pm	pk	pk	315 Bannister Drive		1711642	Absent	Absent	0.76	1.38	
15-Sep-21	7:20pm	pk	pk	310 Bannister Drive		1711643	Absent	Absent	0.47	1.45	
15-Sep-21	7:30pm	pk	pk	305 Bannister Drive		1711641	Absent	Absent	0.75	1.13	
20-Sep-21	7:40am	ts	ts	200-1118 North Railway Street		2136230	Absent	Absent	0.05	1.06	
20-Sep-21	7:50am	ts	ts	261 Don Seaman Way		2136235	Absent	Absent	0.07	1.04	
20-Sep-21	8:20am	ts	ts	51 Drake Landing Loop		2136232	Absent	Absent	0.05	0.91	
20-Sep-21	8:40am	ts	ts	200 Sandstone Drive		2136231	Absent	Absent	0.09	1.15	
20-Sep-21	7:55am	tn	tn		12 Sheep River Drive	2136233	Absent	Absent	0.08	0.83	
20-Sep-21	8:11am	tn	tn		Westmount Booster Station	2136237	Absent	Absent	0.05	0.87	
20-Sep-21	8:26am	tn	tn		208 Southridge Drive	2136234	Absent	Absent	0.05	0.58	
20-Sep-21	8:53am	tn	tn		Southbank Lift Station	2136236	Absent	Absent	0.08	0.74	
27-Sep-21	7:45am	pk	pk	200-1118 North Railway Street		2136224	Absent	Absent	0.09	0.89	
27-Sep-21	8:40am	pk	pk	261 Don Seaman Way		2136227	Absent	Absent	0.07	1.04	
27-Sep-21	8:55am	pk	pk	51 Drake Landing Loop		2136223	Absent	Absent	0.05	0.84	
27-Sep-21	9:15am	pk	pk	40 Crystal Shores Heights		2136222	Absent	Absent	0.10	0.98	
27-Sep-21	7:55am	ma	ma		Southbank Lift Station	2136229	Absent	Absent	0.05	0.99	
27-Sep-21	8:15am	ma	ma		280 Southridge Drive	2136228	Absent	Absent	0.05	1.11	
27-Sep-21	8:35am	ma	ma		Westmount Booster Station	2136226	Absent	Absent	0.04	1.16	
27-Sep-21	9:55am	ma	ma		12 Sheep River Drive	2136225	Absent	Absent	0.07	1.19	
							MINIMUM		0.03	0.58	
							MAXIMUM		0.12	1.48	
							AVERAGE		0.06	0.98	
							TOTAL # OF SAMPLES	35			
Approval Requirements	Frequency Limit			Weekly Random	Weekly Random	30 Samples per Month Random			Weekly ≤ 5 NTU	Daily ≥0.1 mg/L	

OCTOBER 2021											
DAY	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E. coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)	
							Present	Absent/100 mL			
4-Oct-21	7:30am	tn	tn	261 Don Seaman Way		2136218	Absent	Absent	0.15	1.01	
4-Oct-21	8:18am	tn	tn	51 Drake Landing Loop		2136219	Absent	Absent	0.06	0.89	
4-Oct-21	8:45am	tn	tn	111 Waldren Avenue		2136220	Absent	Absent	0.05	1.01	
4-Oct-21	9:03am	tn	tn	200-1118 North Railway Street		2136221	Absent	Absent	0.04	0.56	
4-Oct-21	8:30am	ts	ts		12 Sheep River Drive	2136214	Absent	Absent	0.05	1.19	
4-Oct-21	8:45am	ts	ts		Westmount Booster Station	2136215	Absent	Absent	0.10	1.06	
4-Oct-21	9:00am	ts	ts		280 Southridge Drive	2136216	Absent	Absent	0.08	1.14	
4-Oct-21	10:45am	ts	ts		30 Cimarron Crescent	2136217	Absent	Absent	0.07	1.08	
12-Oct-21	8:00am	pw	pw	261 Don Seaman Way		1954350	Absent	Absent	0.04	1.02	
12-Oct-21	8:20am	pw	pw	51 Drake Landing Loop		1954348	Absent	Absent	0.03	0.87	
12-Oct-21	8:57am	pw	pw	111 Waldron Avenue		2136205	Absent	Absent	0.05	1.08	
12-Oct-21	9:25am	pw	pw	69 Okotoks Drive		1954349	Absent	Absent	0.06	1.21	
12-Oct-21	8:20am	jm	jm		Southbank Liftstation	2136204	Absent	Absent	0.04	1.03	
12-Oct-21	8:40am	jm	jm		280 Southridge Drive	2136202	Absent	Absent	0.04	0.96	
12-Oct-21	9:02am	jm	jm		40 Cimarron Meadows Way	2136201	Absent	Absent	0.03	1.20	
12-Oct-21	9:17am	jm	jm		27 SheepRiver Drive	2136203	Absent	Absent	0.03	1.14	
18-Oct-21	7:40am	pk	pk	200-1118 North Railway Street		1954339	Absent	Absent	0.05	0.93	
18-Oct-21	8:30am	pk	pk	261 Don Seaman Way		1954345	Absent	Absent	0.05	0.99	
18-Oct-21	8:53am	pk	pk	51 Drake Landing Loop		1954346	Absent	Absent	0.07	0.83	
18-Oct-21	9:07am	pk	pk	40 Crystal Shores Heights		1954342	Absent	Absent	0.08	0.93	
18-Oct-21	8:10am	ts	ts		12 Sheep River Drive	1954343	Absent	Absent	0.03	1.09	
18-Oct-21	8:30am	ts	ts		30 Cimarron Crescent	1954341	Absent	Absent	0.04	1.07	
18-Oct-21	8:40am	ts	ts		Westmount Booster Station	1954340	Absent	Absent	0.06	1.11	
18-Oct-21	9:00am	ts	ts		280 Southridge Drive	1954344	Absent	Absent	0.04	0.99	
25-Oct-21	7:35am	bs	bs	200-1118 North Railway Street		2136207	Absent	Absent	0.15	0.74	
25-Oct-21	7:50am	bs	bs	261 Don Seaman Way		2136208	Absent	Absent	0.09	1.01	
25-Oct-21	8:20am	bs	bs	51 Drake Landing Loop		2136213	Absent	Absent	0.10	0.87	
25-Oct-21	8:40am	bs	bs	4 Ranchers View		2136206	Absent	Absent	0.13	0.86	
25-Oct-21	8:00am	jab	jab		Southbank Lift Station	2136209	Absent	Absent	0.05	0.60	
25-Oct-21	8:20am	jab	jab		Westmount Booster Station	2136210	Absent	Absent	0.07	1.19	
25-Oct-21	8:30am	jab	jab		280 Southridge Drive	2136212	Absent	Absent	0.07	0.87	
25-Oct-21	8:50am	jab	jab		12 Sheep River Drive	2136211	Absent	Absent	0.14	1.16	
							MINIMUM		0.03	0.56	
							MAXIMUM		0.15	1.21	
							AVERAGE		0.07	0.99	
							TOTAL # OF SAMPLES	32			
Approval Requirements	Frequency Limit			Weekly Random	Weekly Random	30 Samples per Month Random			Weekly ≤ 5 NTU	Daily ≥0.1 mg/L	

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NOVEMBER 2021											
DAY	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E. coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)	
							Total Coliform				
							Present or Absent/100 mL				
01-Nov-21	7:50am	pk	pk	200-1118 North Railway Street		1954333	Absent	Absent	0.04	0.97	
01-Nov-21	8:30am	pk	pk	261 Don Seamans Way		1954332	Absent	Absent	0.06	1.02	
01-Nov-21	9:00am	pk	pk	51 Drake Landing Loop		1954336	Absent	Absent	0.04	0.96	
01-Nov-21	9:15am	pk	pk	40 Crystal Shores Heights		1954334	Absent	Absent	0.08	1.03	
01-Nov-21	8:45am	tn	tn		12 Sheep River Drive	1954338	Absent	Absent	0.05	1.16	
01-Nov-21	9:15am	tn	tn		Westmount Booster Station	1954337	Absent	Absent	0.06	1.17	
01-Nov-21	9:45am	tn	tn		280 Southridge Drive	1954335	Absent	Absent	0.03	0.96	
01-Nov-21	10:30am	tn	tn		Southbank Lift Station	1954347	Absent	Absent	0.03	0.93	
08-Nov-21	7:15am	bs	bs	200-1118 North Railway Street		1954328	Absent	Absent	0.15	1.05	
08-Nov-21	7:43am	bs	bs	261 Don Seamans Way		1954324	Absent	Absent	0.04	1.04	
08-Nov-21	8:16am	bs	bs	51 Drake Landing Loop		1954329	Absent	Absent	0.04	0.89	
08-Nov-21	8:35am	bs	bs	4 Ranchers View		1954326	Absent	Absent	0.08	0.78	
08-Nov-21	9:00am	jb	jb		Southbank Lift Station	1954331	Absent	Absent	0.03	0.88	
08-Nov-21	9:20am	jb	jb		280 Southridge Drive	1954325	Absent	Absent	0.04	1.01	
08-Nov-21	9:35am	jb	jb		Westmount Booster Station	1954330	Absent	Absent	0.03	1.06	
08-Nov-21	10:05am	jb	jb		12 Sheep River Drive	1954327	Absent	Absent	0.05	1.13	
15-Nov-21	8:40am	ma	ma	261 Don Seamans Way		1954322	Absent	Absent	0.07	0.74	
15-Nov-21	9:34am	ma	ma	51 Drake Landing Loop		1954323	Absent	Absent	0.13	1.06	
15-Nov-21	7:50am	ma	ma	200-1118 North Railway Street		1954321	Absent	Absent	0.11	0.79	
15-Nov-21	9:20am	ma	ma	61 Downey Road		1954320	Absent	Absent	0.06	1.09	
15-Nov-21	9:17am	tn	tn		Westmount Booster Station	1954319	Absent	Absent	0.09	1.07	
15-Nov-21	9:30am	tn	tn		280 Southridge Drive	1954318	Absent	Absent	0.08	0.91	
15-Nov-21	tn	tn	tn		Southbank Lift Station	1954317	Absent	Absent	0.10	0.92	
15-Nov-21	8:55am	tn	tn		12 Sheep River Drive	1954316	Absent	Absent	0.03	1.14	
22-Nov-21	7:50am	pk	pk	200-1118 North Railway Street		1954313	Absent	Absent	0.06	0.99	
22-Nov-21	8:20am	pk	pk	261 Don Seaman Way		1954311	Absent	Absent	0.04	0.94	
22-Nov-21	8:35am	pk	pk	51 Drake Landing Loop		1954314	Absent	Absent	0.04	0.90	
22-Nov-21	8:55am	pk	pk	40 Crystal Shores Heights		1954312	Absent	Absent	0.03	1.05	
22-Nov-21	7:55am	ma	ma		Southbank Lift Station	1954399	Absent	Absent	0.13	0.88	
22-Nov-21	7:10am	ma	ma		280 Southridge Drive	1954400	Absent	Absent	0.03	0.94	
22-Nov-21	8:55am	ma	ma		83 Sheep River Cove	1954315	Absent	Absent	0.03	1.21	
22-Nov-21	9:30am	ma	ma		12 Sheep River Drive	1954310	Absent	Absent	0.07	1.18	
29-Nov-21	7:18am	bs	bs	200-1118 North Railway Street		1954397	****	****	0.10	1.03	
29-Nov-21	7:40am	bs	bs	261 Don Seamans Way		1954392	****	****	0.04	1.02	
29-Nov-21	8:05am	bs	bs	51 Drake Landing Loop		1954395	****	****	0.07	0.82	
29-Nov-21	8:20am	bs	bs	4 Ranchers View		1954398	****	****	0.08	0.80	
29-Nov-21	8:20am	tn	tn		12 Sheep River Drive	1954393	****	****	0.04	1.18	
29-Nov-21	8:40am	tn	tn		Westmount Booster Station	1954396	****	****	0.03	1.17	
29-Nov-21	9:00am	tn	tn		280 Southridge Drive	1954394	****	****	0.08	0.95	
29-Nov-21	9:25am	tn	tn		Southbank Lift Station	1954391	****	****	0.08	0.86	
NOTE: **** Samples collected on Nov 29, 2021 could not be tested at the Provincial Lab in Calgary due to a lab error.									MINIMUM	0.03	0.74
									MAXIMUM	0.15	1.21
									AVERAGE	0.06	0.99
						TOTAL # OF SAMPLES	32				
Approval	Frequency			Weekly	Weekly	30 Samples per Month		Weekly	Daily		
Requirements	Limit			Random	Random			≤ 5 NTU	≥ 0.1 mg/L		

DECEMBER 2021											
DAY	TIME	Sampled By	Tested By	North Location	South Location	Bacti Sample Collected	E. coli		TURBIDITY (NTU)	FREE CHLORINE RESIDUAL (mg/L)	
							Total Coliform				
							Present or Absent/100 mL				
1-Dec-21	7:50am	bs	bs	200-1118 North Railway Street		1711647	Absent	Absent	0.06	0.74	
1-Dec-21	8:00am	bs	bs	261 Don Seaman Way		1446833	Absent	Absent	0.06	0.96	
1-Dec-21	8:25am	bs	bs	51 Drake Landing Loop		1446832	Absent	Absent	0.04	0.92	
1-Dec-21	8:40am	bs	bs	4 Ranchers View		1446838	Absent	Absent	0.04	0.78	
1-Dec-21	8:20am	pk	pk		12 Sheep River Drive	1446830	Absent	Absent	0.09	1.17	
1-Dec-21	8:45am	pk	pk		Westmount Booster Station	1446825	Absent	Absent	0.07	1.04	
1-Dec-21	9:04am	pk	pk		280 Southridge Drive	1446831	Absent	Absent	0.07	0.94	
1-Dec-21	9:30am	pk	pk		Southbank Lift Station	1446850	Absent	Absent	0.11	0.81	
6-Dec-21	8:45am	jb	jb	261 Don Seaman Way		1954387	Absent	Absent	0.07	1.19	
6-Dec-21	9:10am	jb	jb	51 Drake Landing Loop		1954385	Absent	Absent	0.10	0.99	
6-Dec-21	9:30am	jb	jb	111 Waldren Avenue		1954386	Absent	Absent	0.07	1.09	
6-Dec-21	9:55am	jb	jb	200-1118 North Railway Street		1954384	Absent	Absent	0.09	1.24	
6-Dec-21	8:20am	tn	tn		Southbank Lift Station	1954390	Absent	Absent	0.07	0.98	
6-Dec-21	8:55am	tn	tn		Westmount Booster Station	1954383	Absent	Absent	0.06	1.19	
6-Dec-21	9:15am	tn	tn		Westmount Booster Station	1954388	Absent	Absent	0.05	1.29	
6-Dec-21	9:30am	tn	tn		12 Sheep River Drive	1954389	Absent	Absent	0.04	1.26	
13-Dec-21	8:20am	pw	pw	261 Don Seaman Way		1954381	Absent	Absent	0.06	1.11	
13-Dec-21	8:48am	pw	pw	51 Drake Landing Loop		1954379	Absent	Absent	0.06	1.10	
13-Dec-21	9:05am	pw	pw	111 Waldron Avenue		1954380	Absent	Absent	0.08	1.08	
13-Dec-21	9:25am	pw	pw	69 Okotoks Drive		1954382	Absent	Absent	0.07	1.17	
13-Dec-21	8:12am	bs	bs		12 Sheep River Drive	1954375	Absent	Absent	0.07	1.13	
13-Dec-21	8:27am	bs	bs		Westmount Booster Station	1954378	Absent	Absent	0.04	1.11	
13-Dec-21	8:40am	bs	bs		280 Southridge Drive	1954377	Absent	Absent	0.05	0.87	
13-Dec-21	9:10am	bs	bs		22 South Ridge Drive	1954376	Absent	Absent	0.08	0.79	
20-Dec-21	8:23am	pw	pw	261 Don Seaman Way		1954274	Absent	Absent	0.04	1.04	
20-Dec-21	8:40am	pw	pw	51 Drake Landing Loop		1954373	Absent	Absent	0.04	0.97	
20-Dec-21	8:55am	pw	pw	111 Waldron Avenue		1954372	Absent	Absent	0.03	1.07	
20-Dec-21	9:15am	pw	pw	69 Okotoks Drive		1954371	Absent	Absent	0.06	1.05	
20-Dec-21	9:10am	tn	tn		12 Sheep River Drive	1954370	Absent	Absent	0.05	1.07	
20-Dec-21	8:15am	tn	tn		Southbank Lift Station	1954369	Absent	Absent	0.05	0.99	
20-Dec-21	8:55am	tn	tn		Westmount Booster Station	1954368	Absent	Absent	0.04	1.03	
20-Dec-21	8:40am	tn	tn		Westmount Booster Station	1954367	Absent	Absent	0.02	1.04	
									MINIMUM	0.02	0.74
									MAXIMUM	0.11	1.29
									AVERAGE	0.06	1.04
						TOTAL # OF SAMPLES	32				
Approval	Frequency			Weekly	Weekly	30 Samples per Month		Weekly	Daily		
Requirements	Limit			Random	Random			≤ 5 NTU	≥ 0.1 mg/L		

10. Annual Results – Total Trihalomethanes (THM's) and (HAA's)

REPORTED TO PROJECT	Okotoks, Town of THM/HAA	WORK ORDER REPORTED	21A0912 2021-01-21 17:53		
Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
101 Woodhaven Drive (21A0912-01) Matrix: Water Sampled: 2021-01-12 08:00					
Calculated Parameters					
Total Trihalomethanes	0.00859	MAC = 0.1	0.00400 mg/L		N/A
Haloacetic Acids					
Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-01-16
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-01-16
Dichloroacetic Acid	0.0023	N/A	0.0020 mg/L		2021-01-16
Trichloroacetic Acid	0.0020	N/A	0.0020 mg/L		2021-01-16
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-01-16
Total Haloacetic Acids (HAA5)	0.00440	MAC = 0.08	0.00200 mg/L		N/A
Surrogate: 2-Bromopropionic Acid	109		70-130 %		2021-01-16
Volatile Organic Compounds (VOC)					
Bromodichloromethane	0.0014	N/A	0.0010 mg/L		2021-01-16
Bromoform	< 0.0010	N/A	0.0010 mg/L		2021-01-16
Chloroform	0.0072	N/A	0.0010 mg/L		2021-01-16
Dibromochloromethane	< 0.0010	N/A	0.0010 mg/L		2021-01-16
Surrogate: Toluene-d8	84		70-130 %		2021-01-16
Surrogate: 4-Bromofluorobenzene	83		70-130 %		2021-01-16
51 Drake Landing Loop (21A0912-02) Matrix: Water Sampled: 2021-01-12 07:20					
Calculated Parameters					
Total Trihalomethanes	0.00854	MAC = 0.1	0.00400 mg/L		N/A
Haloacetic Acids					
Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-01-16
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-01-16
Dichloroacetic Acid	0.0023	N/A	0.0020 mg/L		2021-01-16
Trichloroacetic Acid	0.0025	N/A	0.0020 mg/L		2021-01-16
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-01-16
Total Haloacetic Acids (HAA5)	0.00476	MAC = 0.08	0.00200 mg/L		N/A
Surrogate: 2-Bromopropionic Acid	110		70-130 %		2021-01-16
Volatile Organic Compounds (VOC)					
Bromodichloromethane	0.0014	N/A	0.0010 mg/L		2021-01-16
Bromoform	< 0.0010	N/A	0.0010 mg/L		2021-01-16
Chloroform	0.0071	N/A	0.0010 mg/L		2021-01-16
Dibromochloromethane	< 0.0010	N/A	0.0010 mg/L		2021-01-16
Surrogate: Toluene-d8	85		70-130 %		2021-01-16
Surrogate: 4-Bromofluorobenzene	83		70-130 %		2021-01-16

Okotoks Waterworks System Annual Report 2021

69 Okotoks Drive (21A0912-03) | Matrix: Water | Sampled: 2021-01-12 00:00 To 2021-01-12 07:40, Continued

Calculated Parameters, Continued

Total Trihalomethanes	0.00785	MAC = 0.1	0.00400 mg/L	N/A
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-01-16
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-01-16
Dichloroacetic Acid	0.0022	N/A	0.0020 mg/L	2021-01-16
Trichloroacetic Acid	0.0021	N/A	0.0020 mg/L	2021-01-16
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-01-16
Total Haloacetic Acids (HAA5)	0.00437	MAC = 0.08	0.00200 mg/L	N/A
Surrogate: 2-Bromopropionic Acid	112		70-130 %	2021-01-16

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0013	N/A	0.0010 mg/L	2021-01-16
Bromoform	< 0.0010	N/A	0.0010 mg/L	2021-01-16
Chloroform	0.0065	N/A	0.0010 mg/L	2021-01-16
Dibromochloromethane	< 0.0010	N/A	0.0010 mg/L	2021-01-16
Surrogate: Toluene-d8	85		70-130 %	2021-01-16
Surrogate: 4-Bromofluorobenzene	82		70-130 %	2021-01-16

18 Sheep River Cove (21A0912-04) | Matrix: Water | Sampled: 2021-01-12 07:00

Calculated Parameters

Total Trihalomethanes	0.00908	MAC = 0.1	0.00400 mg/L	N/A
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-01-16
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-01-16
Dichloroacetic Acid	0.0025	N/A	0.0020 mg/L	2021-01-16
Trichloroacetic Acid	0.0028	N/A	0.0020 mg/L	2021-01-16
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-01-16
Total Haloacetic Acids (HAA5)	0.00529	MAC = 0.08	0.00200 mg/L	N/A
Surrogate: 2-Bromopropionic Acid	118		70-130 %	2021-01-16

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0014	N/A	0.0010 mg/L	2021-01-16
Bromoform	< 0.0010	N/A	0.0010 mg/L	2021-01-16
Chloroform	0.0076	N/A	0.0010 mg/L	2021-01-16
Dibromochloromethane	< 0.0010	N/A	0.0010 mg/L	2021-01-16
Surrogate: Toluene-d8	85		70-130 %	2021-01-16
Surrogate: 4-Bromofluorobenzene	83		70-130 %	2021-01-16

Okotoks Waterworks System Annual Report 2021

REPORTED TO PROJECT Okotoks, Town of THM/HAA **WORK ORDER REPORTED** 21A0912 2021-01-21 17:53

Analysis Description	Method Ref.	Technique	Accredited	Location
Haloacetic Acids in Water	EPA 552.3*	Liquid-Liquid Microextraction, Derivatization and GC-ECD	✓	Richmond
Trihalomethanes in Water	EPA 5030B / EPA 8260D	Purge&Trap / GC-MSD (SIM)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
EPA	United States Environmental Protection Agency Test Methods

Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, June 2019\)](#)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: acrump@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

Okotoks Waterworks System Annual Report 2021

REPORTED TO Okotoks, Town of
PROJECT THM/HAA

WORK ORDER 21D0386
REPORTED 2021-04-14 20:17

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
Entering Distribution System 101 Woodhaven Drive (21D0386-01) Matrix: Water Sampled: 2021-04-05 08:00					
Calculated Parameters					
Total Trihalomethanes	0.0166	MAC = 0.1	0.00400 mg/L		N/A
Haloacetic Acids					
Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-04-13
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-04-13
Dichloroacetic Acid	0.0052	N/A	0.0020 mg/L		2021-04-13
Trichloroacetic Acid	0.0060	N/A	0.0020 mg/L		2021-04-13
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-04-13
Total Haloacetic Acids (HAA5)	0.0113	MAC = 0.08	0.00200 mg/L		N/A
Surrogate: 2-Bromopropionic Acid	118		70-130 %		2021-04-13
Volatile Organic Compounds (VOC)					
Bromodichloromethane	0.0018	N/A	0.0010 mg/L		2021-04-13
Bromoform	< 0.0010	N/A	0.0010 mg/L		2021-04-13
Chloroform	0.0130	N/A	0.0010 mg/L		2021-04-13
Dibromochloromethane	0.0018	N/A	0.0010 mg/L		2021-04-13
Surrogate: Toluene-d8	98		70-130 %		2021-04-13
Surrogate: 4-Bromofluorobenzene	81		70-130 %		2021-04-13

Extreme End 280 Southridge Drive (21D0386-02) | Matrix: Water | Sampled: 2021-04-05 07:25

Calculated Parameters					
Total Trihalomethanes	0.0198	MAC = 0.1	0.00400 mg/L		N/A
Haloacetic Acids					
Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-04-13
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-04-13
Dichloroacetic Acid	0.0063	N/A	0.0020 mg/L		2021-04-13
Trichloroacetic Acid	0.0065	N/A	0.0020 mg/L		2021-04-13
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L		2021-04-13
Total Haloacetic Acids (HAA5)	0.0128	MAC = 0.08	0.00200 mg/L		N/A
Surrogate: 2-Bromopropionic Acid	112		70-130 %		2021-04-13
Volatile Organic Compounds (VOC)					
Bromodichloromethane	0.0022	N/A	0.0010 mg/L		2021-04-13
Bromoform	< 0.0010	N/A	0.0010 mg/L		2021-04-13
Chloroform	0.0152	N/A	0.0010 mg/L		2021-04-13
Dibromochloromethane	0.0024	N/A	0.0010 mg/L		2021-04-13
Surrogate: Toluene-d8	100		70-130 %		2021-04-13
Surrogate: 4-Bromofluorobenzene	86		70-130 %		2021-04-13

Okotoks Waterworks System Annual Report 2021

Random North 111 Waldren Ave (21D0386-03) | Matrix: Water | Sampled: 2021-04-05 07:30, Continued

Calculated Parameters

Total Trihalomethanes	0.0171	MAC = 0.1	0.00400 mg/L	N/A
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-04-13
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-04-13
Dichloroacetic Acid	0.0062	N/A	0.0020 mg/L	2021-04-13
Trichloroacetic Acid	0.0069	N/A	0.0020 mg/L	2021-04-13
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-04-13
Total Haloacetic Acids (HAA5)	0.0132	MAC = 0.08	0.00200 mg/L	N/A
Surrogate: 2-Bromopropionic Acid	109		70-130 %	2021-04-13

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0019	N/A	0.0010 mg/L	2021-04-14
Bromoform	< 0.0010	N/A	0.0010 mg/L	2021-04-14
Chloroform	0.0133	N/A	0.0010 mg/L	2021-04-14
Dibromochloromethane	0.0018	N/A	0.0010 mg/L	2021-04-14
Surrogate: Toluene-d8	96		70-130 %	2021-04-14
Surrogate: 4-Bromofluorobenzene	81		70-130 %	2021-04-14

Random South Southbank Lift Station (21D0386-04) | Matrix: Water | Sampled: 2021-04-05 07:45

Calculated Parameters

Total Trihalomethanes	0.0195	MAC = 0.1	0.00400 mg/L	N/A
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-04-13
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-04-13
Dichloroacetic Acid	0.0065	N/A	0.0020 mg/L	2021-04-13
Trichloroacetic Acid	0.0071	N/A	0.0020 mg/L	2021-04-13
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-04-13
Total Haloacetic Acids (HAA5)	0.0136	MAC = 0.08	0.00200 mg/L	N/A
Surrogate: 2-Bromopropionic Acid	100		70-130 %	2021-04-13

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0021	N/A	0.0010 mg/L	2021-04-14
Bromoform	< 0.0010	N/A	0.0010 mg/L	2021-04-14
Chloroform	0.0151	N/A	0.0010 mg/L	2021-04-14
Dibromochloromethane	0.0024	N/A	0.0010 mg/L	2021-04-14
Surrogate: Toluene-d8	97		70-130 %	2021-04-14
Surrogate: 4-Bromofluorobenzene	81		70-130 %	2021-04-14

Okotoks Waterworks System Annual Report 2021

REPORTED TO PROJECT Okotoks, Town of THM/HAA

WORK ORDER REPORTED 21D0386
2021-04-14 20:17

Analysis Description	Method Ref.	Technique	Accredited	Location
Haloacetic Acids in Water	EPA 552.3*	Liquid-Liquid Microextraction, Derivatization and GC-ECD	✓	Richmond
Trihalomethanes in Water	EPA 5030B / EPA 8260D	Purge&Trap / GC-MSD (SIM)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
EPA	United States Environmental Protection Agency Test Methods

Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, June 2019\)](#)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

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Okotoks Waterworks System Annual Report 2021

REPORTED TO Okotoks, Town of
PROJECT THM/HAA

WORK ORDER 21G0533
REPORTED 2021-07-16 15:22

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
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Entering Distribution System 101 Woodhaven Drive (21G0533-01) | Matrix: Water | Sampled: 2021-07-05 08:00

Calculated Parameters

Total Trihalomethanes	0.0180	MAC = 0.1	0.00400 mg/L	N/A	
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16	
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16	
Dichloroacetic Acid	0.0068	N/A	0.0020 mg/L	2021-07-16	
Trichloroacetic Acid	0.0060	N/A	0.0020 mg/L	2021-07-16	
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16	
Total Haloacetic Acids (HAA5)	0.0128	MAC = 0.08	0.00200 mg/L	N/A	
Surrogate: 2-Bromopropionic Acid	115		70-130 %	2021-07-16	

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0019	N/A	0.0010 mg/L	2021-07-10	
Bromoform	< 0.0010	N/A	0.0010 mg/L	2021-07-10	
Chloroform	0.0143	N/A	0.0010 mg/L	2021-07-10	
Dibromochloromethane	0.0018	N/A	0.0010 mg/L	2021-07-10	
Surrogate: Toluene-d8	83		70-130 %	2021-07-10	
Surrogate: 4-Bromofluorobenzene	74		70-130 %	2021-07-10	

Extreme End 280 Southridge Drive (21G0533-02) | Matrix: Water | Sampled: 2021-07-05 07:30

Calculated Parameters

Total Trihalomethanes	0.0312	MAC = 0.1	0.00400 mg/L	N/A	
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16	
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16	
Dichloroacetic Acid	0.0094	N/A	0.0020 mg/L	2021-07-16	
Trichloroacetic Acid	0.0085	N/A	0.0020 mg/L	2021-07-16	
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16	
Total Haloacetic Acids (HAA5)	0.0179	MAC = 0.08	0.00200 mg/L	N/A	
Surrogate: 2-Bromopropionic Acid	110		70-130 %	2021-07-16	

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0033	N/A	0.0010 mg/L	2021-07-10	
Bromoform	< 0.0010	N/A	0.0010 mg/L	2021-07-10	
Chloroform	0.0248	N/A	0.0010 mg/L	2021-07-10	
Dibromochloromethane	0.0031	N/A	0.0010 mg/L	2021-07-10	
Surrogate: Toluene-d8	80		70-130 %	2021-07-10	
Surrogate: 4-Bromofluorobenzene	69		70-130 %	2021-07-10	S02

Okotoks Waterworks System Annual Report 2021

Random North 40 Crystal Shores Heights (21G0533-03) | Matrix: Water | Sampled: 2021-07-05 07:15, Continued

Calculated Parameters

Total Trihalomethanes	0.0229	MAC = 0.1	0.00400 mg/L	N/A
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16
Dichloroacetic Acid	0.0078	N/A	0.0020 mg/L	2021-07-16
Trichloroacetic Acid	0.0082	N/A	0.0020 mg/L	2021-07-16
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16
Total Haloacetic Acids (HAA5)	0.0160	MAC = 0.08	0.00200 mg/L	N/A
Surrogate: 2-Bromopropionic Acid	115		70-130 %	2021-07-16

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0023	N/A	0.0010 mg/L	2021-07-10
Bromoform	< 0.0010	N/A	0.0010 mg/L	2021-07-10
Chloroform	0.0183	N/A	0.0010 mg/L	2021-07-10
Dibromochloromethane	0.0023	N/A	0.0010 mg/L	2021-07-10
Surrogate: Toluene-d8	80		70-130 %	2021-07-10
Surrogate: 4-Bromofluorobenzene	67		70-130 %	2021-07-10 S02

Random South 12 Sheep River Drive (21G0533-04) | Matrix: Water | Sampled: 2021-07-05 07:45

Calculated Parameters

Total Trihalomethanes	0.0182	MAC = 0.1	0.00400 mg/L	N/A
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16
Dichloroacetic Acid	0.0073	N/A	0.0020 mg/L	2021-07-16
Trichloroacetic Acid	0.0058	N/A	0.0020 mg/L	2021-07-16
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-07-16
Total Haloacetic Acids (HAA5)	0.0131	MAC = 0.08	0.00200 mg/L	N/A
Surrogate: 2-Bromopropionic Acid	121		70-130 %	2021-07-16

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0019	N/A	0.0010 mg/L	2021-07-10
Bromoform	< 0.0010	N/A	0.0010 mg/L	2021-07-10
Chloroform	0.0142	N/A	0.0010 mg/L	2021-07-10
Dibromochloromethane	0.0021	N/A	0.0010 mg/L	2021-07-10
Surrogate: Toluene-d8	80		70-130 %	2021-07-10
Surrogate: 4-Bromofluorobenzene	68		70-130 %	2021-07-10 S02

Sample Qualifiers:

S02 Surrogate recovery outside of control limits. Data accepted based on acceptable recovery of other surrogates.

Okotoks Waterworks System Annual Report 2021

REPORTED TO PROJECT Okotoks, Town of THM/HAA

WORK ORDER REPORTED 21G0533
2021-07-16 15:22

Analysis Description	Method Ref.	Technique	Accredited	Location
Haloacetic Acids in Water	EPA 552.3*	Liquid-Liquid Microextraction, Derivatization and GC-ECD	✓	Richmond
Trihalomethanes in Water	EPA 5030B / EPA 8260D	Purge&Trap / GC-MSD (SIM)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
EPA	United States Environmental Protection Agency Test Methods

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, June 2019)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: rpschyk@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

Okotoks Waterworks System Annual Report 2021

REPORTED TO Okotoks, Town of
PROJECT THM/HAA

WORK ORDER 21J0390
REPORTED 2021-10-18 10:34

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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Entering Distribution System 101 Woodhaven Drive (21J0390-01) | Matrix: Water | Sampled: 2021-10-04 08:00

Calculated Parameters

Total Trihalomethanes	0.0165	MAC = 0.1	0.00400	mg/L		N/A
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020	mg/L		2021-10-16
Monobromoacetic Acid	< 0.0020	N/A	0.0020	mg/L		2021-10-16
Dichloroacetic Acid	0.0045	N/A	0.0020	mg/L		2021-10-16
Trichloroacetic Acid	0.0029	N/A	0.0020	mg/L		2021-10-16
Dibromoacetic Acid	< 0.0020	N/A	0.0020	mg/L		2021-10-16
Total Haloacetic Acids (HAA5)	0.00739	MAC = 0.08	0.00200	mg/L		N/A
Surrogate: 2-Bromopropionic Acid	88		70-130	%		2021-10-16

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0021	N/A	0.0010	mg/L		2021-10-09
Bromoform	< 0.0010	N/A	0.0010	mg/L		2021-10-09
Chloroform	0.0121	N/A	0.0010	mg/L		2021-10-09
Dibromochloromethane	0.0022	N/A	0.0010	mg/L		2021-10-09
Surrogate: Toluene-d8	80		70-130	%		2021-10-09
Surrogate: 4-Bromofluorobenzene	86		70-130	%		2021-10-09

Extreme End 280 Southridge Drive (21J0390-02) | Matrix: Water | Sampled: 2021-10-04 08:30

Calculated Parameters

Total Trihalomethanes	0.0282	MAC = 0.1	0.00400	mg/L		N/A
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020	mg/L		2021-10-16
Monobromoacetic Acid	< 0.0020	N/A	0.0020	mg/L		2021-10-16
Dichloroacetic Acid	0.0090	N/A	0.0020	mg/L		2021-10-16
Trichloroacetic Acid	0.0066	N/A	0.0020	mg/L		2021-10-16
Dibromoacetic Acid	< 0.0020	N/A	0.0020	mg/L		2021-10-16
Total Haloacetic Acids (HAA5)	0.0155	MAC = 0.08	0.00200	mg/L		N/A
Surrogate: 2-Bromopropionic Acid	91		70-130	%		2021-10-16

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0031	N/A	0.0010	mg/L		2021-10-09
Bromoform	< 0.0010	N/A	0.0010	mg/L		2021-10-09
Chloroform	0.0219	N/A	0.0010	mg/L		2021-10-09
Dibromochloromethane	0.0031	N/A	0.0010	mg/L		2021-10-09
Surrogate: Toluene-d8	83		70-130	%		2021-10-09
Surrogate: 4-Bromofluorobenzene	83		70-130	%		2021-10-09

Okotoks Waterworks System Annual Report 2021

Random North DonSeaman Way (21J0390-03) | Matrix: Water | Sampled: 2021-10-04 07:45, Continued

Calculated Parameters				
Total Trihalomethanes	0.0201	MAC = 0.1	0.00400 mg/L	N/A
Haloacetic Acids				
Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-10-16
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-10-16
Dichloroacetic Acid	0.0058	N/A	0.0020 mg/L	2021-10-16
Trichloroacetic Acid	0.0043	N/A	0.0020 mg/L	2021-10-16
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-10-16
Total Haloacetic Acids (HAA5)	0.0101	MAC = 0.08	0.00200 mg/L	N/A
Surrogate: 2-Bromopropionic Acid	97		70-130 %	2021-10-16
Volatile Organic Compounds (VOC)				
CT8				
Bromodichloromethane	0.0025	N/A	0.0010 mg/L	2021-10-09
Bromoform	< 0.0010	N/A	0.0010 mg/L	2021-10-09
Chloroform	0.0153	N/A	0.0010 mg/L	2021-10-09
Dibromochloromethane	0.0024	N/A	0.0010 mg/L	2021-10-09
Surrogate: Toluene-d8	81		70-130 %	2021-10-09
Surrogate: 4-Bromofluorobenzene	77		70-130 %	2021-10-09

Random South 12 Sheep River Drive (21J0390-04) | Matrix: Water | Sampled: 2021-10-04 07:30

Calculated Parameters				
Total Trihalomethanes	0.0163	MAC = 0.1	0.00400 mg/L	N/A
Haloacetic Acids				
Monochloroacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-10-16
Monobromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-10-16
Dichloroacetic Acid	0.0049	N/A	0.0020 mg/L	2021-10-16
Trichloroacetic Acid	0.0031	N/A	0.0020 mg/L	2021-10-16
Dibromoacetic Acid	< 0.0020	N/A	0.0020 mg/L	2021-10-16
Total Haloacetic Acids (HAA5)	0.00802	MAC = 0.08	0.00200 mg/L	N/A
Surrogate: 2-Bromopropionic Acid	96		70-130 %	2021-10-16
Volatile Organic Compounds (VOC)				
CT8				
Bromodichloromethane	0.0022	N/A	0.0010 mg/L	2021-10-09
Bromoform	< 0.0010	N/A	0.0010 mg/L	2021-10-09
Chloroform	0.0121	N/A	0.0010 mg/L	2021-10-09
Dibromochloromethane	0.0021	N/A	0.0010 mg/L	2021-10-09
Surrogate: Toluene-d8	88		70-130 %	2021-10-09
Surrogate: 4-Bromofluorobenzene	84		70-130 %	2021-10-09

Sample Qualifiers:

CT8 Headspace in sample container is greater than 5% volume - VOC results may be compromised

Okotoks Waterworks System Annual Report 2021

REPORTED TO PROJECT Okotoks, Town of THM/HAA

WORK ORDER REPORTED 21J0390
2021-10-18 10:34

Analysis Description	Method Ref.	Technique	Accredited	Location
Haloacetic Acids in Water	EPA 552.3*	Liquid-Liquid Microextraction, Derivatization and GC-ECD	✓	Richmond
Trihalomethanes in Water	EPA 5030B / EPA 8260D	Purge&Trap / GC-MSD (SIM)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
EPA	United States Environmental Protection Agency Test Methods

Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, June 2019\)](#)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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11. Annual Summary – Chemicals – Sodium Hypochlorite

Approval # 1029-03-00; Annual Summary of Chemicals Used - Town of Okotoks Waterworks System															
Chemical Name - Sodium Hypochlorite (16%)															
Parameter		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
Sodium Hypochlorite Used Liters	MIN	67	68	52	72	72	84	103	81	89	47	48	75	47	
	MAX	83	85	99	102	204	194	204	191	196	228	109	139	103	
	AVG	73	75	79	83	106	153	146	147	118	127	82	100	107	
	TOTAL	2278	2100	2378	2502	3298	4581	4540	4557	3526	3922	2455	3087	39224	
Sodium Hypochlorite Used Kilograms	MIN	12.86	13.06	0.19	13.82	14.98	16.13	19.78	15.55	17.09	9.02	9.22	14.40	0.19	
	MAX	15.94	16.32	19.01	19.58	39.17	37.25	39.17	36.67	37.63	43.78	20.93	26.69	43.78	
	AVG	14.11	14.40	14.73	16.01	20.43	29.32	28.12	28.22	22.57	24.29	15.71	19.12	20.59	
	TOTAL	437.38	403.20	456.77	480.38	633.22	879.55	871.68	874.94	676.99	753.02	471.36	592.70	7531.20	
Chlorine Dosage mg/L	MIN	1.85	1.81	0.05	1.96	2.02	1.96	1.87	1.85	1.97	1.39	1.50	1.92	0.05	
	MAX	2.35	2.26	2.49	2.87	4.06	4.30	4.04	4.02	4.47	6.24	2.79	4.99	6.24	
	AVG	2.10	2.05	2.11	2.31	2.62	2.96	2.80	3.05	2.75	3.42	2.14	2.55	2.57	

12. Annual Summary – Chemicals – Coagulant

Approval # 1029-03-00; Annual Summary of Chemicals Used - Coagulant - Town of Okotoks Waterworks System															
Chemical Name - ClearPAC 180 (Poly Aluminum Chloride)															
Chemical		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
ClearPAC 180 Used Litres	MIN	1.49	0.42	2.34	3.40	2.55	5.10	5.10	5.31	3.61	2.55	4.67	2.51	0.42	
	MAX	35.28	13.60	15.73	13.60	14.87	14.02	12.54	11.26	12.96	13.39	14.45	23.38	35.28	
	AVG	15.51	5.59	9.21	8.60	8.78	9.13	9.05	8.79	8.76	8.05	8.62	8.42	9.04	
	TOTAL	480.68	156.40	285.60	257.98	272.21	273.91	280.50	272.64	262.65	249.69	258.61	261.16	3312.03	
ClearPAC 180 Used Kilograms	MIN	2.04	0.58	3.20	4.66	3.49	6.99	6.99	7.28	4.95	3.49	6.40	3.44	0.58	
	MAX	48.33	18.63	21.54	18.63	20.38	19.21	17.18	15.43	17.76	18.34	19.80	32.02	48.33	
	AVG	21.24	7.65	12.62	11.78	12.03	12.51	12.40	12.05	11.99	11.03	11.81	11.54	12.39	
	TOTAL	658.52	214.27	391.27	353.43	372.93	-375.26	384.29	373.51	359.83	342.07	354.30	357.79	3786.95	
ClearPAC 180 Dosage mg/L	MIN	0.29	0.08	0.46	0.70	0.45	0.71	0.80	0.66	0.63	0.54	0.92	0.55	0.08	
	MAX	6.63	2.46	3.65	2.70	2.48	1.78	2.10	2.02	2.32	2.53	2.55	3.99	6.63	
	AVG	3.14	1.09	1.87	1.69	1.58	1.27	1.24	1.31	1.47	1.58	1.61	1.51	1.61	
Aluminum (Al ³⁺) Dosage mg/L	MIN	0.03	0.01	0.04	0.06	0.04	0.06	0.07	0.06	0.06	0.05	0.08	0.05	0.01	
	MAX	0.60	0.22	0.33	0.24	0.22	0.16	0.19	0.18	0.21	0.23	0.23	0.36	0.60	
	AVG	0.28	0.10	0.17	0.15	0.14	0.11	0.11	0.12	0.13	0.14	0.14	0.14	0.15	

13. Annual Summary – Chemicals – Polymer

Approval # 1029-03-00; Annual Summary of Chemicals Used - Polymer - Town of Okotoks Waterworks System														
Chemical Name - Hydrex 3613 (Dry Polymer)														
Parameter		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Polymer Used Litres	MIN	3.69	3.42	2.03	3.66	3.70	4.05	3.71	3.77	3.78	3.04	3.38	2.22	2.03
	MAX	4.38	4.21	4.83	4.14	5.47	6.77	6.53	6.13	5.40	4.72	4.53	5.63	6.77
	AVG	4.04	3.87	3.79	3.82	4.26	5.50	5.58	5.19	4.53	3.88	4.04	3.78	4.36
	TOTAL	125.38	108.49	117.54	114.60	131.99	165.14	173.07	160.83	149.66	137.41	133.27	128.73	1646.12
Polymer Used Kilograms	MIN	0.74	0.68	0.41	0.73	0.74	0.81	0.74	0.75	0.76	0.61	0.68	0.44	0.41
	MAX	0.88	0.84	0.97	0.83	1.09	1.35	1.31	1.23	1.08	0.94	0.91	1.13	1.35
	AVG	0.81	0.77	0.76	0.76	0.85	1.10	1.12	1.04	0.91	0.78	0.81	0.76	0.87
	TOTAL	25.08	21.70	23.51	22.92	26.40	33.03	34.61	32.17	29.93	26.37	26.65	25.75	328.11
Polymer Dosage mg/L	MIN	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.08	0.08
	MAX	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12
	AVG	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.10	0.11

14. Treated Water - Physical, Inorganic and Organic Chemical & Pesticide Parameters

SEMI-ANNUAL SAMPLE # 1 – January 13, 2021



TEST RESULTS

REPORTED TO PROJECT Okotoks, Town of
Schedule 4

WORK ORDER REPORTED 21A0914
2021-01-27 10:08

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
51 Drake Landing Loop (21A0914-01) Matrix: Water Sampled: 2021-01-12 07:15					
Acid Herbicides					
2,4-D	< 0.10	MAC = 100	0.10 µg/L	2021-01-19	
MCPA	< 0.02	MAC = 100	0.02 µg/L	2021-01-19	
2,4,5-T	< 0.10	N/A	0.10 µg/L	2021-01-19	
Dicamba	< 0.10	MAC = 120	0.10 µg/L	2021-01-19	
Picloram	< 0.10	MAC = 190	0.10 µg/L	2021-01-19	
Dinoseb	< 0.10	N/A	0.10 µg/L	2021-01-19	
Anions					
Bromate	< 0.010	MAC = 0.01	0.010 mg/L	2021-01-20	
Chloride	7.96	AO ≤ 250	0.50 mg/L	2021-01-14	
Fluoride	0.15	MAC = 1.5	0.10 mg/L	2021-01-14	
Nitrate (as N)	0.134	MAC = 10	0.050 mg/L	2021-01-14	
Nitrite (as N)	< 0.050	MAC = 1	0.050 mg/L	2021-01-14	
Sulfate	62.4	AO ≤ 500	1.0 mg/L	2021-01-14	
Calculated Parameters					
Chloramines	0.0800	MAC = 3	0.0400 mg/L	N/A	
Total Trihalomethanes	0.0126	MAC = 0.1	0.00400 mg/L	N/A	
Hardness, Total (as CaCO3)	272	None Required	0.541 mg/L	N/A	
Solids, Total Dissolved	312	AO ≤ 500	3.35 mg/L	N/A	
Chlorinated Phenols					
2-Chlorophenol	< 0.10	N/A	0.10 µg/L	2021-01-18	
3 & 4-Chlorophenol	< 0.10	N/A	0.10 µg/L	2021-01-18	
4-Chloro-3-Methylphenol	< 0.50	N/A	0.50 µg/L	2021-01-18	
2,3-Dichlorophenol	< 0.20	N/A	0.20 µg/L	2021-01-18	
2,4 & 2,5-Dichlorophenol	< 0.20	AO ≤ 0.3	0.20 µg/L	2021-01-18	
2,6-Dichlorophenol	< 0.20	N/A	0.20 µg/L	2021-01-18	
3,4-Dichlorophenol	< 0.20	N/A	0.20 µg/L	2021-01-18	
3,5-Dichlorophenol	< 0.20	N/A	0.20 µg/L	2021-01-18	
2,3,4-Trichlorophenol	< 0.50	N/A	0.50 µg/L	2021-01-18	
2,3,5-Trichlorophenol	< 0.50	N/A	0.50 µg/L	2021-01-18	
2,3,6-Trichlorophenol	< 0.50	N/A	0.50 µg/L	2021-01-18	
2,4,5-Trichlorophenol	< 0.50	N/A	0.50 µg/L	2021-01-18	
2,4,6-Trichlorophenol	< 0.50	AO ≤ 2	0.50 µg/L	2021-01-18	
3,4,5-Trichlorophenol	< 0.50	N/A	0.50 µg/L	2021-01-18	
2,3,4,5 & 2,3,5,6-Tetrachlorophenol	< 0.50	N/A	0.50 µg/L	2021-01-18	
2,3,4,6-Tetrachlorophenol	< 0.50	AO ≤ 1	0.50 µg/L	2021-01-18	
Pentachlorophenol	< 0.50	AO ≤ 30	0.50 µg/L	2021-01-18	
Surrogate: 2,4-Dibromophenol	81		60-130 %	2021-01-18	
Surrogate: 2,4,6-Tribromophenol	109		60-130 %	2021-01-18	
General Parameters					
Alkalinity, Total (as CaCO3)	213	N/A	2.0 mg/L	2021-01-14	

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General Parameters, Continued

Bicarbonate (HCO ₃)	260	N/A	2.0 mg/L	2021-01-14
Carbonate (CO ₃)	< 2.0	N/A	2.0 mg/L	2021-01-14
Hydroxide (OH)	< 2.0	N/A	2.0 mg/L	2021-01-14
Ammonia, Total (as N)	< 0.050	None Required	0.050 mg/L	2021-01-15
Carbon, Total Organic	0.79	N/A	0.50 mg/L	2021-01-15
Chlorine, Total	1.05	None Required	0.02 mg/L	2021-01-14 HT2
Chlorine, Free	0.97	N/A	0.02 mg/L	2021-01-14 HT2
Colour, True	< 5.0	AO ≤ 15	5.0 CU	2021-01-15
Conductivity (EC)	523	N/A	2.0 µS/cm	2021-01-15
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020 mg/L	2021-01-25
Nitrioltriacetic Acid	< 0.20	MAC = 0.4	0.20 mg/L	2021-01-22 HT1
pH	7.20	7.0-10.5	0.10 pH units	2021-01-14 HT2
Sulfide, Total	< 0.020	AO ≤ 0.05	0.020 mg/L	2021-01-14
Turbidity	< 0.10	OG < 1	0.10 NTU	2021-01-13

Miscellaneous Herbicides

Glyphosate	< 0.050	MAC = 0.28	0.050 mg/L	2021-01-26
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Pesticides, Herbicides, and Fungicides

Alachlor	< 0.100	N/A	0.100 µg/L	2021-01-21
Aldrin	< 0.006	N/A	0.006 µg/L	2021-01-21
Atrazine and metabolites	< 0.100	MAC = 5	0.100 µg/L	2021-01-21
Azinphos-methyl	< 0.200	MAC = 20	0.200 µg/L	2021-01-21
alpha-BHC	< 0.010	N/A	0.010 µg/L	2021-01-21
beta-BHC	< 0.050	N/A	0.050 µg/L	2021-01-21
delta-BHC	< 0.050	N/A	0.050 µg/L	2021-01-21
gamma-BHC (Lindane)	< 0.050	N/A	0.050 µg/L	2021-01-21
Bromacil	< 0.100	N/A	0.100 µg/L	2021-01-21
Bromoxynil	< 0.200	MAC = 5	0.200 µg/L	2021-01-21
Butachlor	< 0.020	N/A	0.020 µg/L	2021-01-21
Captan	< 0.100	N/A	0.100 µg/L	2021-01-21
Chlordane (cis + trans)	< 0.050	N/A	0.050 µg/L	2021-01-21
Chlorothalonil	< 0.050	N/A	0.050 µg/L	2021-01-21
Chlorpyrifos	< 0.010	MAC = 90	0.010 µg/L	2021-01-21
Cyanazine	< 0.100	N/A	0.100 µg/L	2021-01-21
DDT, Total	< 0.010	N/A	0.010 µg/L	2021-01-21
Deltamethrin	< 0.100	N/A	0.100 µg/L	2021-01-21
Diazinon	< 0.020	MAC = 20	0.020 µg/L	2021-01-21
Dichlorvos	< 0.100	N/A	0.100 µg/L	2021-01-21
Diclofop-methyl	< 0.100	MAC = 9	0.100 µg/L	2021-01-21
Dieldrin	< 0.010	N/A	0.010 µg/L	2021-01-21
Dimethoate	< 0.200	MAC = 20	0.200 µg/L	2021-01-21
Disulfoton	< 0.100	N/A	0.100 µg/L	2021-01-21
Diuron	< 0.200	MAC = 150	0.200 µg/L	2021-01-21

Okotoks Waterworks System Annual Report 2021

Pesticides, Herbicides, and Fungicides, Continued

Endosulfan I + II	< 0.010	N/A	0.010 µg/L	2021-01-21
Endosulfan sulfate	< 0.050	N/A	0.050 µg/L	2021-01-21
Endrin	< 0.020	N/A	0.020 µg/L	2021-01-21
Endrin aldehyde	< 0.020	N/A	0.020 µg/L	2021-01-21
Endrin ketone	< 0.020	N/A	0.020 µg/L	2021-01-21
Fenchlorphos (Ronnell)	< 0.100	N/A	0.100 µg/L	2021-01-21
Heptachlor	< 0.010	N/A	0.010 µg/L	2021-01-21
Heptachlor epoxide	< 0.010	N/A	0.010 µg/L	2021-01-21
Linuron	< 0.050	N/A	0.050 µg/L	2021-01-21
Malathion	< 0.100	MAC = 190	0.100 µg/L	2021-01-21
Methoxychlor	< 0.050	N/A	0.050 µg/L	2021-01-21
Methyl parathion	< 0.100	N/A	0.100 µg/L	2021-01-21
Metolachlor	< 0.100	MAC = 50	0.100 µg/L	2021-01-21
Metribuzin	< 0.200	MAC = 80	0.200 µg/L	2021-01-21
Parathion	< 0.100	N/A	0.100 µg/L	2021-01-21
Pentachloronitrobenzene	< 0.100	N/A	0.100 µg/L	2021-01-21
Permethrin	< 0.010	N/A	0.010 µg/L	2021-01-21
Phorate	< 0.100	MAC = 2	0.100 µg/L	2021-01-21
Prometon	< 0.300	N/A	0.300 µg/L	2021-01-21
Prometryne	< 0.100	N/A	0.100 µg/L	2021-01-21
Simazine	< 0.200	MAC = 10	0.200 µg/L	2021-01-21
Sulfotep	< 0.100	N/A	0.100 µg/L	2021-01-21
Tebuthiuron	< 0.200	N/A	0.200 µg/L	2021-01-21
Temephos (Abate)	< 0.500	N/A	0.500 µg/L	2021-01-21
Terbufos	< 0.100	MAC = 1	0.100 µg/L	2021-01-21
Triallate	< 0.100	N/A	0.100 µg/L	2021-01-21
Trifluralin	< 0.200	MAC = 45	0.200 µg/L	2021-01-21
Surrogate: Tributyl Phosphate	82		50-140 %	2021-01-21
Surrogate: 4-chloro-3-nitrobenzotrifluoride	66		50-140 %	2021-01-21

Polycyclic Aromatic Hydrocarbons (PAH)

Acenaphthene	< 0.050	N/A	0.050 µg/L	2021-01-20
Acenaphthylene	< 0.200	N/A	0.200 µg/L	2021-01-20
Acridine	< 0.050	N/A	0.050 µg/L	2021-01-20
Anthracene	< 0.010	N/A	0.010 µg/L	2021-01-20
Benz(a)anthracene	< 0.010	N/A	0.010 µg/L	2021-01-20
Benzo(a)pyrene	< 0.010	MAC = 0.04	0.010 µg/L	2021-01-20
Benzo(b+j)fluoranthene	< 0.050	N/A	0.050 µg/L	2021-01-20
Benzo(g,h,i)perylene	< 0.050	N/A	0.050 µg/L	2021-01-20
Benzo(k)fluoranthene	< 0.050	N/A	0.050 µg/L	2021-01-20
2-Chloronaphthalene	< 0.100	N/A	0.100 µg/L	2021-01-20
Chrysene	< 0.050	N/A	0.050 µg/L	2021-01-20
Dibenz(a,h)anthracene	< 0.010	N/A	0.010 µg/L	2021-01-20

Okotoks Waterworks System Annual Report 2021

Polycyclic Aromatic Hydrocarbons (PAH), Continued

Fluoranthene	< 0.030	N/A	0.030 µg/L	2021-01-20
Fluorene	< 0.050	N/A	0.050 µg/L	2021-01-20
Indeno(1,2,3-cd)pyrene	< 0.050	N/A	0.050 µg/L	2021-01-20
1-Methylnaphthalene	< 0.100	N/A	0.100 µg/L	2021-01-20
2-Methylnaphthalene	< 0.100	N/A	0.100 µg/L	2021-01-20
Naphthalene	< 0.200	N/A	0.200 µg/L	2021-01-20
Phenanthrene	< 0.100	N/A	0.100 µg/L	2021-01-20
Pyrene	< 0.020	N/A	0.020 µg/L	2021-01-20
Quinoline	< 0.050	N/A	0.050 µg/L	2021-01-20
Surrogate: Acridine-d9	70		50-140 %	2021-01-20
Surrogate: Naphthalene-d8	91		50-140 %	2021-01-20
Surrogate: Perylene-d12	99		50-140 %	2021-01-20

Total Metals

Aluminum, total	0.0386	OG < 0.1	0.0050 mg/L	2021-01-15
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2021-01-15
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L	2021-01-15
Barium, total	0.105	MAC = 2	0.0050 mg/L	2021-01-15
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2021-01-15
Cadmium, total	0.000012	MAC = 0.005	0.000010 mg/L	2021-01-15
Calcium, total	73.3	None Required	0.20 mg/L	2021-01-15
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2021-01-15
Copper, total	0.0137	MAC = 2	0.00040 mg/L	2021-01-15
Iron, total	< 0.010	AO ≤ 0.3	0.010 mg/L	2021-01-15
Lead, total	0.00024	MAC = 0.005	0.00020 mg/L	2021-01-15
Magnesium, total	21.6	None Required	0.010 mg/L	2021-01-15
Manganese, total	0.00023	MAC = 0.12	0.00020 mg/L	2021-01-15
Mercury, total	< 0.000010	MAC = 0.001	0.000010 mg/L	2021-01-16
Potassium, total	1.68	N/A	0.10 mg/L	2021-01-15
Selenium, total	0.00082	MAC = 0.05	0.00050 mg/L	2021-01-15
Silver, total	< 0.000050	None Required	0.000050 mg/L	2021-01-15
Sodium, total	14.3	AO ≤ 200	0.10 mg/L	2021-01-15
Strontium, total	0.360	7	0.0010 mg/L	2021-01-15
Uranium, total	0.000876	MAC = 0.02	0.000020 mg/L	2021-01-15
Zinc, total	0.0045	AO ≤ 5	0.0040 mg/L	2021-01-15

Volatile Organic Compounds (VOC) S03

Benzene	< 0.5	MAC = 5	0.5 µg/L	2021-01-16
Bromodichloromethane	2.2	N/A	1.0 µg/L	2021-01-16
Bromoform	3.1	N/A	1.0 µg/L	2021-01-16
Carbon tetrachloride	< 0.5	MAC = 2	0.5 µg/L	2021-01-16
Chlorobenzene	< 1.0	AO ≤ 30	1.0 µg/L	2021-01-16
Chloroethane	< 2.0	N/A	2.0 µg/L	2021-01-16
Chloroform	5.8	N/A	1.0 µg/L	2021-01-16

Okotoks Waterworks System Annual Report 2021

<i>Volatile Organic Compounds (VOC), Continued</i>					S03
Dibromochloromethane	1.5	N/A	1.0 µg/L	2021-01-16	
1,2-Dibromoethane	< 0.3	N/A	0.3 µg/L	2021-01-16	
Dibromomethane	< 1.0	N/A	1.0 µg/L	2021-01-16	
1,2-Dichlorobenzene	< 0.5	AO ≤ 3	0.5 µg/L	2021-01-16	
1,3-Dichlorobenzene	< 1.0	N/A	1.0 µg/L	2021-01-16	
1,4-Dichlorobenzene	< 1.0	AO ≤ 1	1.0 µg/L	2021-01-16	
1,1-Dichloroethane	< 1.0	N/A	1.0 µg/L	2021-01-16	
1,2-Dichloroethane	< 1.0	MAC = 5	1.0 µg/L	2021-01-16	
1,1-Dichloroethylene	< 1.0	MAC = 14	1.0 µg/L	2021-01-16	
cis-1,2-Dichloroethylene	< 1.0	N/A	1.0 µg/L	2021-01-16	
trans-1,2-Dichloroethylene	< 1.0	N/A	1.0 µg/L	2021-01-16	
Dichloromethane	< 3.0	MAC = 50	3.0 µg/L	2021-01-16	
1,2-Dichloropropane	< 1.0	N/A	1.0 µg/L	2021-01-16	
1,3-Dichloropropene (cis + trans)	< 1.0	N/A	1.0 µg/L	2021-01-16	
Ethylbenzene	< 50.0	AO ≤ 1.6	1.0 µg/L	2021-01-16	CST2
Methyl tert-butyl ether	< 1.0	AO ≤ 15	1.0 µg/L	2021-01-16	
Styrene	< 50.0	N/A	1.0 µg/L	2021-01-16	CST2
1,1,2,2-Tetrachloroethane	< 0.5	N/A	0.5 µg/L	2021-01-16	
Tetrachloroethylene	< 1.0	MAC = 10	1.0 µg/L	2021-01-16	
Toluene	< 50.0	AO ≤ 24	1.0 µg/L	2021-01-16	CST2
1,1,1-Trichloroethane	< 1.0	N/A	1.0 µg/L	2021-01-16	
1,1,2-Trichloroethane	< 1.0	N/A	1.0 µg/L	2021-01-16	
Trichloroethylene	< 1.0	MAC = 5	1.0 µg/L	2021-01-16	
Trichlorofluoromethane	< 1.0	N/A	1.0 µg/L	2021-01-16	
Vinyl chloride	< 1.0	MAC = 2	1.0 µg/L	2021-01-16	
Xylenes (total)	< 100	AO ≤ 20	2.0 µg/L	2021-01-16	CST2
Surrogate: Toluene-d8	0.8		70-130 %	2021-01-16	
Surrogate: 4-Bromofluorobenzene	86		70-130 %	2021-01-16	
Surrogate: 1,4-Dichlorobenzene-d4	74		70-130 %	2021-01-16	

Sample Qualifiers:

CST2	The reporting limit is raised due to signal suppression from matrix interference
HT1	The sample was prepared and/or analyzed past the recommended holding time.
HT2	The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.
S03	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Okotoks, Town of
Schedule 4

WORK ORDER REPORTED 21A0914
2021-01-27 10:08

Analysis Description	Method Ref.	Technique	Accredited	Location
Acid Herbicides in Water in Water	In-House	N/A		Richmond
Alkalinity in Water	SM 2320 B* (2017)	Titration with H2SO4	✓	Edmonton
Ammonia, Total in Water	SM 4500-NH3 D* (2017)	Ion Selective Electrode	✓	Edmonton
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Edmonton
Bromate in Water	SM 4110 B (2017)	Ion Chromatography		Sublet
Carbon, Total Organic in Water	SM 5310 B (2017)	Combustion, Infrared CO2 Detection	✓	Kelowna
Chlorine, Free in Water	SM 4500-Cl G (2017)	Colorimetry (DPD)		Edmonton
Chlorine, Total in Water	SM 4500-Cl G (2017)	Colorimetry (DPD)		Edmonton
Colour, True in Water	SM 2120 C (2017)	Spectrophotometry (456 nm)		Edmonton
Conductivity in Water	SM 2510 B (2017)	Conductivity Meter	✓	Edmonton
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection with In-Line UV Digestion and Amperometry	✓	Kelowna
Glyphosate in Water	EPA 547*	Direct Aqueous Injection HPLC with Post-Column Derivatization and Fluorescence Detection	✓	Richmond
Hardness in Water	SM 2340 B (2017)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	✓	N/A
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Nitritotriacetic Acid in Water	EPA 430.1	Manual Colorimetry (Zinc-Zincon)		Kelowna
Pesticides in Water	EPA 3510C* / EPA 8270D*	Liquid-Liquid DCM Extraction (B/N) / GC-MSD (SIM)	✓	Richmond
pH in Water	SM 4500-H+ B (2017)	Electrometry	✓	Edmonton
Phenols, Chlorinated in Water	EPA 3510C* / EPA 8270D	Liquid-Liquid DCM Extraction (Acidic) / GC-MSD (SIM)	✓	Richmond
Polycyclic Aromatic Hydrocarbons in Water	EPA 3511* / EPA 8270D	Hexane MicroExtraction (Base/Neutral) / GC-MSD (SIM)	✓	Richmond
Solids, Total Dissolved in Water	SM 1030 E (2017)	SM 1030 E (2011)		N/A
Sulfide, Total in Water	SM 4500-S2 D* (2017)	Colorimetry (Methylene Blue)	✓	Edmonton
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
Turbidity in Water	SM 2130 B (2017)	Nephelometry	✓	Edmonton
Volatile Organic Compounds in Water	EPA 5030B / EPA 8260D	Purge&Trap / GC-MSD (SIM)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
CU	Colour Units (referenced against a platinum cobalt standard)
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
OG	Operational Guideline (treated water)
pH units	pH < 7 = acidic, pH > 7 = basic
µg/L	Micrograms per litre
µS/cm	Microsiemens per centimetre

Okotoks Waterworks System Annual Report 2021

REPORTED TO PROJECT	Okotoks, Town of Schedule 4	WORK ORDER REPORTED	21A0914 2021-01-27 10:08
ASTM	ASTM International Test Methods		
EPA	United States Environmental Protection Agency Test Methods		
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association		

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: acrump@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

SEMI-ANNUAL SAMPLE # 2 – July 6, 2021



TEST RESULTS

REPORTED TO PROJECT Okotoks, Town of Schedule 4

WORK ORDER REPORTED 21G0783
2021-07-21 16:04

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
12 Sheep River Drive (21G0783-01) Matrix: Water Sampled: 2021-07-06 08:00					
<i>Acid Herbicides</i>					
2,4-D	< 0.10	MAC = 100	0.10 µg/L	2021-07-14	
MCPA	< 0.02	MAC = 100	0.02 µg/L	2021-07-14	
2,4,5-T	< 0.10	N/A	0.10 µg/L	2021-07-14	
Dicamba	< 0.10	MAC = 120	0.10 µg/L	2021-07-14	
Picloram	< 0.10	MAC = 190	0.10 µg/L	2021-07-14	
Dinoseb	< 0.10	N/A	0.10 µg/L	2021-07-14	
<i>Anions</i>					
Bromate	< 0.010	MAC = 0.01	0.010 mg/L	2021-07-21	
Chloride	6.95	AO ≤ 250	0.50 mg/L	2021-07-08	
Fluoride	0.19	MAC = 1.5	0.10 mg/L	2021-07-08	
Nitrate (as N)	0.106	MAC = 10	0.050 mg/L	2021-07-08	
Nitrite (as N)	< 0.050	MAC = 1	0.050 mg/L	2021-07-08	
Sulfate	44.6	AO ≤ 500	1.0 mg/L	2021-07-08	
<i>Calculated Parameters</i>					
Chloramines	0.0800	MAC = 3	0.0400 mg/L		N/A
Total Trihalomethanes	0.0151	MAC = 0.1	0.00400 mg/L		N/A
Hardness, Total (as CaCO3)	220	None Required	0.541 mg/L		N/A
Solids, Total Dissolved	257	AO ≤ 500	3.35 mg/L		N/A
<i>Chlorinated Phenols</i>					
2-Chlorophenol	< 0.10	N/A	0.10 µg/L	2021-07-15	
3 & 4-Chlorophenol	< 0.10	N/A	0.10 µg/L	2021-07-15	
4-Chloro-3-Methylphenol	< 0.50	N/A	0.50 µg/L	2021-07-15	
2,3-Dichlorophenol	< 0.20	N/A	0.20 µg/L	2021-07-15	
2,4 & 2,5-Dichlorophenol	< 0.20	AO ≤ 0.3	0.20 µg/L	2021-07-15	
2,6-Dichlorophenol	< 0.20	N/A	0.20 µg/L	2021-07-15	
3,4-Dichlorophenol	< 0.20	N/A	0.20 µg/L	2021-07-15	
3,5-Dichlorophenol	< 0.20	N/A	0.20 µg/L	2021-07-15	
2,3,4-Trichlorophenol	< 0.50	N/A	0.50 µg/L	2021-07-15	
2,3,5-Trichlorophenol	< 0.50	N/A	0.50 µg/L	2021-07-15	
2,3,6-Trichlorophenol	< 0.50	N/A	0.50 µg/L	2021-07-15	
2,4,5-Trichlorophenol	< 0.50	N/A	0.50 µg/L	2021-07-15	
2,4,6-Trichlorophenol	< 0.50	AO ≤ 2	0.50 µg/L	2021-07-15	
3,4,5-Trichlorophenol	< 0.50	N/A	0.50 µg/L	2021-07-15	
2,3,4,5 & 2,3,5,6-Tetrachlorophenol	< 0.50	N/A	0.50 µg/L	2021-07-15	
2,3,4,6-Tetrachlorophenol	< 0.50	AO ≤ 1	0.50 µg/L	2021-07-15	
Pentachlorophenol	< 0.50	AO ≤ 30	0.50 µg/L	2021-07-15	
Surrogate: 2,4-Dibromophenol	73		60-130 %	2021-07-15	
Surrogate: 2,4,6-Tribromophenol	89		60-130 %	2021-07-15	
<i>General Parameters</i>					
Alkalinity, Total (as CaCO3)	187	N/A	2.0 mg/L	2021-07-13	

Okotoks Waterworks System Annual Report 2021

General Parameters, Continued				
Bicarbonate (HCO ₃)	228	N/A	2.0 mg/L	2021-07-13
Carbonate (CO ₃)	< 2.0	N/A	2.0 mg/L	2021-07-13
Hydroxide (OH)	< 2.0	N/A	2.0 mg/L	2021-07-13
Ammonia, Total (as N)	0.055	None Required	0.050 mg/L	2021-07-12
Carbon, Total Organic	1.51	N/A	0.50 mg/L	2021-07-13
Chlorine, Total	0.79	None Required	0.02 mg/L	2021-07-09 HT2
Chlorine, Free	0.71	N/A	0.02 mg/L	2021-07-09 HT2
Colour, True	< 5.0	AO ≤ 15	5.0 CU	2021-07-09
Conductivity (EC)	445	N/A	2.0 µS/cm	2021-07-13
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020 mg/L	2021-07-09
Nitritotriacetic Acid	< 0.20	MAC = 0.4	0.20 mg/L	2021-07-13
pH	7.27	7.0-10.5	0.10 pH units	2021-07-13 HT2
Sulfide, Total	< 0.020	AO ≤ 0.05	0.020 mg/L	2021-07-09
Turbidity	3.53	OG < 1	0.10 NTU	2021-07-09 HT1
Miscellaneous Herbicides				
Glyphosate	< 0.050	MAC = 0.28	0.050 mg/L	2021-07-19
Pesticides, Herbicides, and Fungicides				
Alachlor	< 0.100	N/A	0.100 µg/L	2021-07-17
Aldrin	< 0.006	N/A	0.006 µg/L	2021-07-17
Atrazine and metabolites	< 0.100	MAC = 5	0.100 µg/L	2021-07-17
Azinphos-methyl	< 0.200	MAC = 20	0.200 µg/L	2021-07-17
alpha-BHC	< 0.010	N/A	0.010 µg/L	2021-07-17
beta-BHC	< 0.050	N/A	0.050 µg/L	2021-07-17
delta-BHC	< 0.050	N/A	0.050 µg/L	2021-07-17
gamma-BHC (Lindane)	< 0.050	N/A	0.050 µg/L	2021-07-17
Bromacil	< 0.100	N/A	0.100 µg/L	2021-07-17
Bromoxynil	< 0.200	MAC = 5	0.200 µg/L	2021-07-17
Butachlor	< 0.020	N/A	0.020 µg/L	2021-07-17
Captan	< 0.100	N/A	0.100 µg/L	2021-07-17
Chlordane (cis + trans)	< 0.050	N/A	0.050 µg/L	2021-07-17
Chlorothalonil	< 0.050	N/A	0.050 µg/L	2021-07-17
Chlorpyrifos	< 0.010	MAC = 90	0.010 µg/L	2021-07-17
Cyanazine	< 0.100	N/A	0.100 µg/L	2021-07-17
DDT, Total	< 0.010	N/A	0.010 µg/L	2021-07-17
Deltamethrin	< 0.100	N/A	0.100 µg/L	2021-07-17
Diazinon	< 0.020	MAC = 20	0.020 µg/L	2021-07-17
Dichlorvos	< 0.100	N/A	0.100 µg/L	2021-07-17
Diclofop-methyl	< 0.100	MAC = 9	0.100 µg/L	2021-07-17
Dieldrin	< 0.010	N/A	0.010 µg/L	2021-07-17
Dimethoate	< 0.200	MAC = 20	0.200 µg/L	2021-07-17
Disulfoton	< 0.100	N/A	0.100 µg/L	2021-07-17
Diuron	< 0.200	MAC = 150	0.200 µg/L	2021-07-17

Okotoks Waterworks System Annual Report 2021

12 Sheep River Drive (21G0783-01) | Matrix: Water | Sampled: 2021-07-06 08:00, Continued

Pesticides, Herbicides, and Fungicides, Continued

Endosulfan I + II	< 0.010	N/A	0.010 µg/L	2021-07-17
Endosulfan sulfate	< 0.050	N/A	0.050 µg/L	2021-07-17
Endrin	< 0.020	N/A	0.020 µg/L	2021-07-17
Endrin aldehyde	< 0.020	N/A	0.020 µg/L	2021-07-17
Endrin ketone	< 0.020	N/A	0.020 µg/L	2021-07-17
Fenchlorphos (Ronnel)	< 0.100	N/A	0.100 µg/L	2021-07-17
Heptachlor	< 0.010	N/A	0.010 µg/L	2021-07-17
Heptachlor epoxide	< 0.010	N/A	0.010 µg/L	2021-07-17
Linuron	< 0.050	N/A	0.050 µg/L	2021-07-17
Malathion	< 0.100	MAC = 190	0.100 µg/L	2021-07-17
Methoxychlor	< 0.050	N/A	0.050 µg/L	2021-07-17
Methyl parathion	< 0.100	N/A	0.100 µg/L	2021-07-17
Metolachlor	< 0.100	MAC = 50	0.100 µg/L	2021-07-17
Metribuzin	< 0.200	MAC = 80	0.200 µg/L	2021-07-17
Parathion	< 0.100	N/A	0.100 µg/L	2021-07-17
Pentachloronitrobenzene	< 0.100	N/A	0.100 µg/L	2021-07-17
Permethrin	< 0.010	N/A	0.010 µg/L	2021-07-17
Phorate	< 0.100	MAC = 2	0.100 µg/L	2021-07-17
Prometon	< 0.300	N/A	0.300 µg/L	2021-07-17
Prometryne	< 0.100	N/A	0.100 µg/L	2021-07-17
Simazine	< 0.200	MAC = 10	0.200 µg/L	2021-07-17
Sulfotep	< 0.100	N/A	0.100 µg/L	2021-07-17
Tebuthiuron	< 0.200	N/A	0.200 µg/L	2021-07-17
Temphos (Abate)	< 0.500	N/A	0.500 µg/L	2021-07-17
Terbufos	< 0.100	MAC = 1	0.100 µg/L	2021-07-17
Triallate	< 0.100	N/A	0.100 µg/L	2021-07-17
Trifluralin	< 0.200	MAC = 45	0.200 µg/L	2021-07-17
Surrogate: Tributyl Phosphate	83		50-140 %	2021-07-17
Surrogate: 4-chloro-3-nitrobenzotrifluoride	51		50-140 %	2021-07-17

Polycyclic Aromatic Hydrocarbons (PAH)

Acenaphthene	< 0.050	N/A	0.050 µg/L	2021-07-15
Acenaphthylene	< 0.200	N/A	0.200 µg/L	2021-07-15
Acridine	< 0.050	N/A	0.050 µg/L	2021-07-15
Anthracene	0.013	N/A	0.010 µg/L	2021-07-15
Benz(a)anthracene	< 0.010	N/A	0.010 µg/L	2021-07-15
Benzo(a)pyrene	< 0.010	MAC = 0.04	0.010 µg/L	2021-07-15
Benzo(b+j)fluoranthene	< 0.050	N/A	0.050 µg/L	2021-07-15
Benzo(g,h,i)perylene	< 0.050	N/A	0.050 µg/L	2021-07-15
Benzo(k)fluoranthene	< 0.050	N/A	0.050 µg/L	2021-07-15
2-Chloronaphthalene	< 0.100	N/A	0.100 µg/L	2021-07-15
Chrysene	< 0.050	N/A	0.050 µg/L	2021-07-15
Dibenz(a,h)anthracene	< 0.010	N/A	0.010 µg/L	2021-07-15

Okotoks Waterworks System Annual Report 2021

12 Sheep River Drive (21G0783-01) | Matrix: Water | Sampled: 2021-07-06 08:00, Continued

Polycyclic Aromatic Hydrocarbons (PAH), Continued

Fluoranthene	< 0.030	N/A	0.030 µg/L	2021-07-15
Fluorene	< 0.050	N/A	0.050 µg/L	2021-07-15
Indeno(1,2,3-cd)pyrene	< 0.050	N/A	0.050 µg/L	2021-07-15
1-Methylnaphthalene	< 0.100	N/A	0.100 µg/L	2021-07-15
2-Methylnaphthalene	< 0.100	N/A	0.100 µg/L	2021-07-15
Naphthalene	< 0.200	N/A	0.200 µg/L	2021-07-15
Phenanthrene	< 0.100	N/A	0.100 µg/L	2021-07-15
Pyrene	< 0.020	N/A	0.020 µg/L	2021-07-15
Quinoline	< 0.050	N/A	0.050 µg/L	2021-07-15
Surrogate: Acridine-d9	59		50-140 %	2021-07-15
Surrogate: Naphthalene-d8	57		50-140 %	2021-07-15
Surrogate: Perylene-d12	59		50-140 %	2021-07-15

Total Metals

Aluminum, total	0.0705	OG < 0.1	0.0050 mg/L	2021-07-14
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2021-07-14
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L	2021-07-14
Barium, total	0.0906	MAC = 2	0.0050 mg/L	2021-07-14
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2021-07-14
Cadmium, total	< 0.000010	MAC = 0.005	0.000010 mg/L	2021-07-14
Calcium, total	59.3	None Required	0.20 mg/L	2021-07-14
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2021-07-14
Copper, total	0.00831	MAC = 2	0.00040 mg/L	2021-07-14
Iron, total	< 0.010	AO ≤ 0.3	0.010 mg/L	2021-07-14
Lead, total	0.00024	MAC = 0.005	0.00020 mg/L	2021-07-14
Magnesium, total	17.4	None Required	0.010 mg/L	2021-07-14
Manganese, total	0.00028	MAC = 0.12	0.00020 mg/L	2021-07-14
Mercury, total	< 0.000010	MAC = 0.001	0.000010 mg/L	2021-07-13
Potassium, total	1.78	N/A	0.10 mg/L	2021-07-14
Selenium, total	0.00092	MAC = 0.05	0.00050 mg/L	2021-07-14
Silver, total	< 0.000050	None Required	0.000050 mg/L	2021-07-14
Sodium, total	12.5	AO ≤ 200	0.10 mg/L	2021-07-14
Strontium, total	0.284	7	0.0010 mg/L	2021-07-14
Uranium, total	0.000627	MAC = 0.02	0.000020 mg/L	2021-07-14
Zinc, total	0.0061	AO ≤ 5	0.0040 mg/L	2021-07-14

Volatile Organic Compounds (VOC)

Benzene	< 0.5	MAC = 5	0.5 µg/L	2021-07-13
Bromodichloromethane	2.0	N/A	1.0 µg/L	2021-07-13
Bromoform	< 1.0	N/A	1.0 µg/L	2021-07-13
Carbon tetrachloride	< 0.5	MAC = 2	0.5 µg/L	2021-07-13
Chlorobenzene	< 1.0	AO ≤ 30	1.0 µg/L	2021-07-13
Chloroethane	< 2.0	N/A	2.0 µg/L	2021-07-13
Chloroform	13.1	N/A	1.0 µg/L	2021-07-13

Okotoks Waterworks System Annual Report 2021

Volatile Organic Compounds (VOC), Continued

Dibromochloromethane	< 1.0	N/A	1.0 µg/L	2021-07-13
1,2-Dibromoethane	< 0.3	N/A	0.3 µg/L	2021-07-13
Dibromomethane	< 1.0	N/A	1.0 µg/L	2021-07-13
1,2-Dichlorobenzene	< 0.5	AO ≤ 3	0.5 µg/L	2021-07-13
1,3-Dichlorobenzene	< 1.0	N/A	1.0 µg/L	2021-07-13
1,4-Dichlorobenzene	< 1.0	AO ≤ 1	1.0 µg/L	2021-07-13
1,1-Dichloroethane	< 1.0	N/A	1.0 µg/L	2021-07-13
1,2-Dichloroethane	< 1.0	MAC = 5	1.0 µg/L	2021-07-13
1,1-Dichloroethylene	< 1.0	MAC = 14	1.0 µg/L	2021-07-13
cis-1,2-Dichloroethylene	< 1.0	N/A	1.0 µg/L	2021-07-13
trans-1,2-Dichloroethylene	< 1.0	N/A	1.0 µg/L	2021-07-13
Dichloromethane	< 3.0	MAC = 50	3.0 µg/L	2021-07-13
1,2-Dichloropropane	< 1.0	N/A	1.0 µg/L	2021-07-13
1,3-Dichloropropane (cis + trans)	< 1.0	N/A	1.0 µg/L	2021-07-13
Ethylbenzene	< 1.0	AO ≤ 1.6	1.0 µg/L	2021-07-13
Methyl tert-butyl ether	< 1.0	AO ≤ 15	1.0 µg/L	2021-07-13
Styrene	< 1.0	N/A	1.0 µg/L	2021-07-13
1,1,2,2-Tetrachloroethane	< 0.5	N/A	0.5 µg/L	2021-07-13
Tetrachloroethylene	< 1.0	MAC = 10	1.0 µg/L	2021-07-13
Toluene	< 1.0	AO ≤ 24	1.0 µg/L	2021-07-13
1,1,1-Trichloroethane	< 1.0	N/A	1.0 µg/L	2021-07-13
1,1,2-Trichloroethane	< 1.0	N/A	1.0 µg/L	2021-07-13
Trichloroethylene	< 1.0	MAC = 5	1.0 µg/L	2021-07-13
Trichlorofluoromethane	< 1.0	N/A	1.0 µg/L	2021-07-13
Vinyl chloride	< 1.0	MAC = 2	1.0 µg/L	2021-07-13
Xylenes (total)	< 2.0	AO ≤ 20	2.0 µg/L	2021-07-13
Surrogate: Toluene-d8	103		70-130 %	2021-07-13
Surrogate: 4-Bromofluorobenzene	109		70-130 %	2021-07-13

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Okotoks, Town of
PROJECT Schedule 4

WORK ORDER 21G0783
REPORTED 2021-07-21 16:04

Analysis Description	Method Ref.	Technique	Accredited	Location
Acid Herbicides in Water in Water	In-House	N/A	✓	Richmond
Alkalinity in Water	SM 2320 B* (2017)	Titration with H ₂ SO ₄	✓	Edmonton
Ammonia, Total in Water	SM 4500-NH ₃ D* (2017)	Ion Selective Electrode	✓	Edmonton
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Edmonton
Bromate in Water	SM 4110 B (2017)	Ion Chromatography	✓	Sublet
Carbon, Total Organic in Water	SM 5310 B (2017)	Combustion, Infrared CO ₂ Detection	✓	Kelowna
Chlorine, Free in Water	SM 4500-Cl G (2017)	Colorimetry (DPD)	✓	Edmonton
Chlorine, Total in Water	SM 4500-Cl G (2017)	Colorimetry (DPD)	✓	Edmonton
Colour, True in Water	SM 2120 C (2017)	Spectrophotometry (456 nm)	✓	Edmonton
Conductivity in Water	SM 2510 B (2017)	Conductivity Meter	✓	Edmonton
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection with In-Line UV Digestion and Amperometry	✓	Kelowna
Glyphosate in Water	EPA 547*	Direct Aqueous Injection HPLC with Post-Column Derivatization and Fluorescence Detection	✓	Richmond
Hardness in Water	SM 2340 B (2017)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	✓	N/A
Mercury, total in Water	EPA 245.7*	BrCl ₂ Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Nitritriacetic Acid in Water	EPA 430.1	Manual Colorimetry (Zinc-Zincon)		Kelowna
Pesticides in Water	EPA 3510C* / EPA 8270D*	Liquid-Liquid DCM Extraction (B/N) / GC-MSD (SIM)	✓	Richmond
pH in Water	SM 4500-H+ B (2017)	Electrometry	✓	Edmonton
Phenols, Chlorinated in Water	EPA 3510C* / EPA 8270D	Liquid-Liquid DCM Extraction (Acidic) / GC-MSD (SIM)	✓	Richmond
Polycyclic Aromatic Hydrocarbons in Water	EPA 3511* / EPA 8270D	Hexane MicroExtraction (Base/Neutral) / GC-MSD (SIM)	✓	Richmond
Solids, Total Dissolved in Water	SM 1030 E (2017)	SM 1030 E (2011)	✓	N/A
Sulfide, Total in Water	SM 4500-S ₂ D* (2017)	Colorimetry (Methylene Blue)	✓	Edmonton
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO ₃ +HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
Turbidity in Water	SM 2130 B (2017)	Nephelometry	✓	Edmonton
Volatile Organic Compounds in Water	EPA 5030B / EPA 8200D	Purge&Trap / GC-MSD (SIM)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
CU	Colour Units (referenced against a platinum cobalt standard)
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
OG	Operational Guideline (treated water)
pH units	pH < 7 = acidic, pH > 7 = basic
µg/L	Micrograms per litre
µS/cm	Microsiemens per centimetre

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: rpshyk@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

15. Treated Water – Cyanobacterial Toxins (as Microcystin-LR)

Distribution Grab Sample # 1 – Sampling Period: August 1st – 16th

REPORTED TO PROJECT	Okotoks, Town of Microcystin	WORK ORDER REPORTED	21H1054 2021-08-17 12:33
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Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
Aug 2021 Microcystin (21H1054-01) Matrix: Water Sampled: 2021-08-10					
<i>Microbiological Parameters</i>					
Microcystin, total	< 0.05	MAC = 1.5	0.02 µg/L	2021-08-13	

Analysis Description	Method Ref.	Technique	Accredited	Location
Cyanobacterial Toxins in Water	EPA 546*	Adda Enzyme-Linked Immunosorbent Assay (ELISA)	✓	Sublet
<i>Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method</i>				

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
MAC	Maximum Acceptable Concentration (health based)
µg/L	Micrograms per litre
EPA	United States Environmental Protection Agency Test Methods

Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, June 2019\)](#)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: rpschyk@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

Distribution Grab Sample # 2 – Sampling Period: September 1st – 16th

REPORTED TO PROJECT	Okotoks, Town of Microcystin	WORK ORDER REPORTED	2111618 2021-09-22 14:10
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Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
Sept 2021 Microcystin (2111618-01) Matrix: Water Sampled: 2021-09-13 11:30					
Microbiological Parameters					
Microcystin, total	< 0.05	MAC = 1.5	0.05 µg/L	2021-09-21	

Analysis Description	Method Ref.	Technique	Accredited	Location
Cyanobacterial Toxins in Water	EPA 546*	Adda Enzyme-Linked Immunosorbent Assay (ELISA)	✓	Sublet

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
MAC	Maximum Acceptable Concentration (health based)
µg/L	Micrograms per litre
EPA	United States Environmental Protection Agency Test Methods

Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, June 2019\)](#)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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Okotoks Waterworks System Annual Report 2021

16. Annual Summary – Incidents reported to AEP

OKOTOKS WT & WDS AEP CONTRAVENTIONS 2021 - SUMMARY SHEET							
Date	AENV Ref #	Description	Contravention Reported Date/Time	7 Day Letter Complete?	Contravention Date & Time	Location	Additional Details
5-Aug-21	382242	Low water pressure in Cimarron community	09-Aug-21	Yes	Aug 5, 2021 4:40am to 5:12pm	WDS • 219 Cimarron Drive 4:56am, 271 Cimarron Vista Court 5:00am, 302 Cimarron Blvd 5:04am, 72 Cimarron Grove Way 5:08am, 178 Woodburn Crescent 5:13am, 112 Cimarron Grove Road 5:13am, 53 Cimarron Vista Circle 5:15am, 67 Cimarron Vista Circle 5:18am and 2 Cimarron Grove Way 5:22am	<p>August 5th at approximately 5:00am the on call operator was called by dispatch to a low pressure alarm at 219 Cimarron Drive. On his way to the address he received several more calls from the Cimarron area advising of low pressure. At that point he went straight down to the WTP and found all the distribution pumps to be off as a result of the south reservoir being in a low level alarm state. He quickly turned two distribution pumps on in hand 5:12am to try and keep the positive pressure in the system. He then called the lead hand in for assistance to try and determine what the cause was. When the lead hand got to site the WTP was totally off no raw water coming in. After doing a walk around and resetting any alarms that needed we got the WTP back up and running around 5:00am. Was determined through SCADA that the south reservoir pumps were off from 4:40am to 5:12am about 32 minutes. Once the plant was back up and running we were able to look through trending and come up with conclusive findings of what went wrong. On August 4th around 5:45pm one of the chlorine pumps faulted resulting in a low chlorine alarm at stage 1. This alarm shuts the WTP down till an operator can assess the situation. The low chlorine alarm did in fact call out to the auto diater but the auto diater failed and in return no call out alarm was sent to the on call operator. As a result of this the WTP was not producing any water from 5:45pm on August 4th till approximately 6:00am August 5th. This meant we were solely running off the water in the south reservoir. When the south reservoir went low level is when the calls started on August 5th around 5:00am. After looking through trending and getting the pressure readings off of SCADA for the affected zones its hard to say for sure if we did in fact lose total pressure to the south distribution system. Here are the SCADA readings from each location. Pumps off at 4:40am and back on at 5:12am. Suntech Electric was called to site and they confirmed our findings. A new auto diater was installed and tested and we are in the process of developing a better strategy to make sure this can never happen again. All reservoirs and booster stations were then checked by operators to make sure things were running as normal. Chlorine samples were grabbed at several locations and all the results were good. We were not able to flush any of the areas as a result of the very low south reservoir level 25.10% way below recommended fire flows and our comfortable operating levels. Bac 1 samples were taken as part of our usual schedule on Monday August 9th and an additional 4 other samples taken in the Cimarron area on August 10th. Cause of incident: Auto diater failed to call out on call operator. Corrective measures: New auto diater installed and tested. New programming and controls being put into place to avoid a recurrence.</p>
24-Aug-21	382504	Zone 3N & 4N Boil Water Advisory	Aug 15, 2021 between 4:00pm to 6:00pm	Yes	Aug 15, 2021 starting approximately 10:40am to 7:00pm	WDS includes Zone 3 and Zone 2 and Zone 3/4 Reservoirs	<p>Due to both zone 2 reservoir and zone 3,4 reservoirs getting to critically low water levels we ended up running the Zone 3,4 reservoir just about dry. We were under the false assumption that the Zone 3,4 reservoir still had water because the level transmitter was reading 34%. It appears the level transmitter was not scaled properly at installation and in fact 34% was really more like 5%. When the operator finally released what was happening he shutdown the Zone 3,4 reservoir station and started feeding the entire north areas of town from the Zone 2 reservoir creating the low pressure in certain areas. Total units in 3N and 4N Zones: Resident – 2473 and Condo 240 units, 3 schools, Rec center, fire hall, Beach house and one church. Boil Water Advisory issued for Zone 3 and 4 August 16th 5:31 PM. Boil water advisory lifted for Zone 3 Tuesday August 17th found no homes to be affected after mapping out the call outs received from the call center. After talking to multiple residents in the area the only thing they noticed was a bit of loss of pressure when Zone 3,4 was shutdown and the zone was then being feed from Zone 2. Several bacteriological samples were collected from Zone 3N and Zone 4N and sent in for analysis. Turbidity and Chlorine sample analysis on site. Chlorine and turbidity number found acceptable. As recommended by AHS and AEP all the affected areas in the Zone 4 areas were uni-directional flushed on Wednesday the 18th. Chlorine and turbidity samples were taken on site and mapped out. An additional 4 bac 1 samples were taken and sent into the provincial health lab for analysis. Turbidity and chlorine samples result were acceptable as well as the flushing hydrants. Bacti sample resulted were acceptable. When we received the results the next afternoon and everything came back absent the Boil water advisory was fully lifted Thursday 4:18 PM August 19th 2021. The duration of the incident was August 15th 10:00AM- 4:00PM Intermittent. The cause Critically low reservoir levels at Zone 2 and Zone 3,4. As a result of this we found a possible programming or installation error of the Zone 3N & 4N reservoir level transmitter. Corrective measures taken Review and optimize the reservoir volume balancing philosophy, which allow using dead stored water. Correct the level transmitter reads Zero % at the top of bottom of the reservoir floor, not the top of bottom of the sump. Review and revise water ban communication plan which include internal and external stakeholders.</p>
13-Sep-21	382504	Failed Bacteriological Sample	Sept 8, 2021 Contacted by AE that the failed bacteriological sample that occurred during the boil water event had not been reported and 7 day letter had not been received.	Yes Letter filed late.	Aug 15, 2021 approximately 7:30pm	WDS 132 Milligan Drive	<p>Initial event: The incident, Reference number 382504, reported to AEP and AHS on August 15, 2021 between 4PM and 6PM with a Boil Water Order being put in place in the affected areas. Bacteriological Water Sample collected on Aug 15, 2021 @ 7:30PM, 132 Milligan Drive. Corrective measures Review the SOP procedure with team. Ensure the screen cleaning procedure take in place before sample. On Aug 17, 2021 A repeat sample was collected at 132 Milligan Drive, with additional samples collected, one sample collected upstream and a sample collected downstream of this address.</p>

OKOTOKS WT & WDS AEP NOTIFICATIONS 2021- SUMMARY SHEET							
Date	AENV Ref #	Description	Date/Time	7 Day Letter Complete?	Notification Date & Time	Location	Additional Details
15-Sep-21	373516	Notification of water service depressurization in the 300 block of Bannister Drive	Sept 15, 2021 11:30am to 7:30pm	Yes	Sept 15, 2021 11:30am to 7:30pm	WDS	<p>04 Sept 2021 Residential callout for a water surfacing in the roadway. Attended the site and determined the hydrant valve for fire hydrant #317 was leaking located in front of 315 Bannister Drive. The valve was turned off until repair could be scheduled. The fire department was notified that the hydrant was out of service. The repair to the hydrant valve took place on 15 Sept 2021, 23 homes would be affected by a water shut off in the area of the hydrant repair. Affected residents were notified of the service interruption and advised to flush their cold water lines for 10 – 15 mins after service is restored. They were also advised to contact the Town of Okotoks on call operator if there was any colour, odor or any other concerns about the water quality after flushing. Upon completion of the repair the water line was flushed through the hydrant. Samples were collected from residences within the affected area and sent to the Provincial Health Lab for analysis. Results - Absent. The incident was caused due to valve bonnet failure and a new valve was installed.</p>

17. Annual Operational Summary

January

Jan 4 Operators working on water break Ardiel Drive, doing WTP inspections
Jan 6 AEP online data submitted Ref# 2480475 for December report
Jan 7 Operator- Well 9 turned down 10 l/s to 8 l/s shutting down on low level
Jan 7 AWI on site to perform audits on cells 1,2,6,10, UH3 heater not working WO submitted to Facilities Group
Jan 8 Suntech on site to set up alarms for the siphons high level alarms
Jan 8 Operator-Started cleaning acti flo #2 in preparation for inspection
Jan 11 Tradesman checked well 3 and found motor needs to be replaced
Jan 13 Operator Lowered BW time to 480 seconds
Jan 14 Operator received Chlorine delivery, High Country cleaning out acti flo 2
Jan 15 Operator put Acti flo 2 back in service
Jan 18 Suntech running new wires for new chlorine analyzer
Jan 19 Operator started cleaning acti flo , Suntech installing new receptacle for flow meter
Jan 21 High Country cleaning out acti flo 1, Operator performing draw down tests on wells
Jan 25 Operator performed draw down testing on both coagulant pumps
Jan 27 Information Services Group working on HACH WHIMS platform
Jan 29 Operator installed new gauges on coagulant pump 1

February

Feb 1 Information Systems onsite installing and testing hardware in preparation of HACHwims
Feb 5 Tradesman changed out UV sensors in UV reactors #1 & #2
Feb 16-20 & 22-24 Balzers and AWI onsite for the Filter 2 Refresh project

March

Mar 3 Operators tested of Pason siphon line
Mar 3 Suntech preparing for coagulant pump switch over
Mar 8 Operator shut down Actiflo 1 for coagulant pump installation
Mar 9 Operator shut down UV#1 and filter 1 and filter 3 for the start of the second stress test on filter 2
Mar 12 Operators concluded the stress test in coordination with consultant
Mar 22 Suntech on site to trouble shoot the intermittent bwp faults
Mar 23 Operators started stress test #3 in coordination with consultant
Mar 23 Communication failure from wtp, zone 2 west well field and south reservoir, problem corrected by Suntech
Mar 24 Headloss programming added to filter 2
Mar 25 HACHWims – entering data begins by Operators
Mar 26 Operators in coordination with consultant complete stress test

April

Apr 23 Aaron Drilling on site to pull and replace Well #7 pump and motor
Apr 30 Fire Inspection at wtp

May

May 4 Facilities Group on site with HVAC contractor
May 10 SCADA 1 is frozen, reboot
May 12 PLC Drop 5 PLC Card Fault, PLC Trouble Alarm – Suntech to troubleshoot
May 13 PLC Drop 5, 6, 4 PLC Card Fault, PLC Trouble Alarm – Suntech to troubleshoot
May 21 Tradesman on site with contractors to review UV valves
May 21 Hot Standby PLC Logic Mismatch, PLC Standby Card Fault – Suntech to troubleshoot

June

June 8 Tradesman changes oil in the pumps
June 8 Suntech looking at South Reservoir Pump 5 fault
June 14 Suntech making changes in SCADA, reports have locked into incorrect values, not auto adjusting daily.
June 15 Installed vacuum breakers on polymer hot water tank for polymer flushing lines
June 22 Tradesman gets parks pump system operational – pump from ftw tank
June 23 Insurance adjuster onsite

July

July 7 Suntech on site to make changes to reservoir trending
July 8 Suntech installing new cable line for Zone 2 meter
July 9 Callout alarms with no voice descriptor, determine Stockton, Suntech to troubleshoot and repair
July 10 Network computer not working
July 11 WTP PLC Standby Card Faults and PLC Trouble alarms, Suntech replaces power supply card
July 11 Historical Manager in SCADA 2 stopped June 25, missing alarm logs. Suntech to troubleshoot and repair
July 12 Operators put Well 12 in hand will not run in auto, Suntech to troubleshoot and repair
July 13 Aaron Drilling Well 1 rehab program maintenance
July 16 WTP PLC Standby Card Faults and PLC Trouble alarms, Suntech replaces power supply card
July 17 Zone 3/4 comm alarms
July 17 Power failure wtp
July 17 Well 5 comm alarms
July 19 Aaron Drilling well 5 rehab program maintenance
July 21 Capital H2O onsite to set up chlorine pumps, Suntech setting up lead lag to meet dosing points
July 22 Tradesman wired new sensor to chlorine pump
July 24 Suntech sets up cell 1 to backwash and air scour at the same time and stop draining at 0.30m
July 27 Suntech testing and programming cell 1 backwash
July 29 Contractor load testing generator

August

Aug 2 Low reservoir alarm Zone 3 and 4 (53%)
Aug 2 Zone 2 fire pump running – reset
Aug 4 Waterplant shut down due to a chlorine pump failure, dialer did not call the operator
Aug 5 Callouts for low water pressure on the south side of Okotoks
Aug 5 Town issued community wide messaging requesting residents use water conservatively for the next 24 hours so reservoirs could recover
Aug 9 Low level alarms in Zone 2 and Zone 3/4
Aug 11 Actiflo 1 faults in high turb mode, Tradesman accesses and determines it's the VFD, Suntech assesses and confirms, part is put on order
Aug 11 Request to Suntech to fix the CT calculations for Aug 5 plant shutdown.
Aug 12 Operator makes recommendation to Manager and Director to stop outdoor watering for the weekend, expected high demand due to the hot weather and the reservoirs on the north side of Okotoks are alarming on low level
Aug 12 Operator advises that water reservoirs are low and not enough recovery time prior to weekend watering. Zone 3/4 reservoir is operating at a low low level
Aug 13 low reservoir levels requires operations to be reservoir balancing constantly throughout the day
Aug 14 low reservoir levels requires operations to be reservoir balancing constantly throughout the day
Aug 15 Low reservoir and reservoir shut down, EOC in place, complete watering ban implemented and Precautionary Boil Water Order in place
Aug 15 Failed Bacteriological sample – resample Aug 17
Aug 17 BWO in effect bacteriological samples collected
Aug 18 BWO in effect, flushing of lines in the affected areas with bacteriological samples collected
Aug 19 Precautionary Boil Water Order removed

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Aug 21 Chlorine flow meter to Stage 1 is plugged, clear blockage
Aug 23 Plant shut down due to plugged chlorine line to Stage 1, cleared line and changed over to line 2
Aug 23 Hot standby alarms, operator unable to log on to SCADA with laptop, laptop issues reported to Information Systems
Aug 25 Chlorine lines plugged, cleared
Aug 25 WMLS com alarms, cannot acknowledge, laptop issues, Suntech accessed and acknowledged. Laptop given to IT to repair
Aug 26 WMLS ongoing com alarms, Suntech replaces PLC card, does not fix the problem. Stopped into station observed normal operation of station, no issues besides comms
Aug 27 WMLS new HMI and comm card installed, station operating properly
Note intermittent issues throughout the month accessing HACH wims to enter data
Note intermittent issues throughout the month receiving HACH wims reports and sensus reports, exclusive permissions to office admin to correct, operators do not have access to fix or enable
Note intermittent network issues creating access issues to network etc

September

Sept 1 Chlorine delivery – Operators tested percent concentration, determined to be 13% should be 16%, reported to Manager
Sept 1 Suntech moved Wells 1 and 4 level sensors to a different analog input card as both channels have failed
Sept 2 Repairs to leaking valves on Well 10
Sept 3 Balzers installing the new pump #3 and have discovered a shaft piece is missing
Sept 3 Suntech checking all level sensors for accuracy
Sept 3 Actiflo#1 M2103 maturation mixer failed and needs to be replaced
Sept 8 Suntech onsite to investigate false reading errors on coagulant tote #1
Sept 9 Cell 8 air scour valve not opening, Suntech replaced the relay and confirmed operation
Sept 10 Balzers onsite to complete installation of pump 3
Sept 17 Security alarms, monitoring station advises issues with response codes, reported to Manager, previous reporting to Facilities Group yielded no results in correcting the problem
Sept 22 North pump well pump 4 has been disconnected and removed to install extension
Note intermittent issues throughout the month accessing HACH wims to enter data
Note intermittent issues throughout the month receiving HACH wims reports and sensus reports, exclusive permissions to office admin to correct, operators do not have access to fix or enable
Note intermittent network issues creating access issues to network etc

October

Oct 4-8 New chlorine lines installed
Oct 7 AE Security inspects alarm system
Oct 10-13
Oct 14 UV alarms shutting down UV
Oct 14 Coagulant Pump 1 plugged, pulled apart and cleaned
Oct 15 Suntech replaces VFD on Aciflo 1
Oct 16 Plant shut down due to Well 4 failing to start and UV underdosing
Oct 16 Zone 3/4 low UPS alarm, monitor Brendan to look at
Oct 19 Maintenance to blower
Oct 21 SCADA computer replacement
Oct 21-24 Intermittent alarms from wwf for wells failing to start or failing to stop
Oct 26 Balzers at Zone 2 installing new valves on pumps 6-8
Oct 28 WTP shutdown on low chlorine at Stage 1, leak on chlorine line repaired
Oct 28 Balzers installs pump 4 in the north pumpwell
Oct 28 Reports stopped being generated in SCADA 1 on Oct 22, Suntech resolved issue
Oct 29 Information Systems performing network maintenance in SCADA

November

Nov 1 Suntech working on chlorine flow meter and ACTIFLO display panel
Nov 2 West well field communications alarms
Nov 2 Plant shut down twice on low chlorine at Stage 1
Nov 3 Tradesman repaired chlorine lines
Nov 5 Cell 3 backwash valve failed to open during backwash, operated via scada
Nov 5 West well field communications alarms
Nov 6 West well field communications alarms
Nov 7 Plant shut down on high turbidity at Stage 1
Nov 9 E&H onsite performing flow meter verifications
Nov 10 West well field communications alarms
Nov 11 SCADA remote access issues
Nov 11 West well field and Zone 2 communications alarms
Nov 12 Operator performing plumbing work, installing sample tap in north pumpwell
Nov 12 Tundra and Suntech on site to calibrate chlorine flow meter
Nov 15 Communications failures Zone 2, Stockton, West well field 7 Westmount Booster Station PLC failure
Nov 15 Plant shutdown on low chlorine at Stage 1
Nov 16 Overland Channel cleanup
Nov 17 Operator working on sodium hypo system tubing
Nov 17 Suntech making changes in SCADA and calibrating new valves at Zone 2
Nov 22 Cell 4 backwash valve failed to open during backwash, operated via scada
Nov 23 Plant shutdown for UV #1 maintenance
Nov 25 Tradesman working on baffles in filter cells
Nov 29 Numerous times throughout the month, alarms for UPS battery Zone 3 and 4. Tradesman to access and replace
Nov 29 Numerous times throughout the month HACH Wims has not generated a report, Utility Technologist and Network Tech working on fixing the issue
Nov 29 Berg Mechanical installs AC unit at Well 13
Nov 30 UV #1 Bulb replacement
Nov 30 Fire Inspection

December

Dec 1 Balzars and Iron Clad replace 6 valves that isolate the 3 UV's
Dec 2 Suntech fixed South Reservoir issue where 2 pumps were not responding based on demand - 2 loose wires in a junction box
Dec 3 The backwash valve for Cell 3 was open during the backwash on Cell 1, Suntech and Operator fixed issue
Dec 5 Increased the backwash time to 480 seconds from 360 seconds, the top of the filters are getting dirty, cell turbidity after backwash and filter to waste have increased drastically.
Dec 6 HACH onsite to perform annual maintenance of lab and field testing equipment and all onsite analyzers
Dec 6 High Country onsite to clean polymer tanks, lines and drain line
Dec 10 Balzars to access for chlorine line upgrade
Dec 15 Stage 1 level sensor malfunctions, level sensor battery is replaced
Dec 15 Tradesman opens heat damper in chlorine room as temperature drops to 4 ° C
Dec 15 Suntech reprograms milltronics, memory loss due to battery replacement
Dec 16 Adjusted water pressure on polymer system
Dec 17 Polymer system cleaned out, drawdown test performed, dosing adjustments made

18. Operator Certification

As required under section 4.2 of Approval No. 1029-03-00, the water treatment facility is classified as **Class III** and the water distribution system is classified as **Class III**. The facilities are classified in accordance with the *Water and Wastewater Operators' Certification Guidelines*.

As per approval section 4.2.3, the operation of the water treatment facility shall be performed by, or under the direction of:

- a) An operator who holds a valid Level III (or higher) Water Treatment Operators Certificate of qualification; and
- b) At least one other operator who holds a valid Level II (or higher) Water Treatment Operators Certificate

As per approval section 4.2.4, the operation of the water distribution system shall be performed by, or under the direction of:

- a) An operator who holds a valid Level III (or higher) Water Distribution Operators Certificate; and
- b) At least one other operator who holds a valid Level II (or higher) Water Distribution Operators Certificate

- The operators in Okotoks are certified as shown within the table below:

Name	Position	Water Treatment	Water Distribution	Cert. Number
Pacer Wilson	Lead hand	Level 3	Level 4	2956
Bryan Steed	Operator	Level 3	Level 4	2292
Patti Kjinserdahl	Operator	Level 3	Level 2	2429
Marlon Anthony	Operator	Level 2	Level 2	4944
Jordan Ballard	Operator	Level 1	Level 1	3714
James McElmon	Lead hand	N/A	Level 2	4045
Terry Sapsford	Operator	N/A	Level 2	4318
Johnathan Bartisch	Operator	N/A	Level 1	2944
Terry Novak	Operator	Level 2	Level 2	5316
Marcus Hladik	Operator	Level 2	Level 2	5936
Zanil Azeez	Operator	Level 2	Level 2	1551

Site Manager Contact Information:

Rakesh Savani
 Water Services Site Manager
 Okotoks Water Services
 200 – 1118 North Railway Street
 Okotoks, AB T1S 1K1
 Bus: (403) 938-1230
 Cell: (587) 432-6448
 Email: rsavani@okotoks.ca

Supervising Operator Contact Information:

Pacer Wilson
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 Bus: (403) 938-1230
 Cell: (403) 899-6349
 Email: pwilson@okotoks.ca

19. Operations Program

Updates were made to the Operations Manual.

1. Standard Operating Procedures

20. Drinking Water Safety Plan

The DWSP was updated with the following changes.

1. Population, length of distribution line, increased the number of service connections.

21. Lead Program

1. **Lead mitigation plan including program successes for the reporting year.**


In 2020 Okotoks took on the initial phase of the AEP program to manage lead in municipal drinking water supplies. This included a review of current infrastructure and targeted testing based on the most qualified areas. As the Town of Okotoks is lead free in its public infrastructure the testing was used to help identify possible issue areas where private water supplies would most likely have lead present. This is based off the age of piping, age of building construction and the age of the water in the system (distance from the treatment plant). Upon completing 60+ tests all but 1 building was above the MAC (0.005 micrograms/L). Upon further review the building was determined to have very little water usage and was built in the early 1900's. When retested the building was below the MAC. A filter was recommended on that system to remove lead contents and was successfully implemented. These results gave us further confidence in our distribution system and the quality of our public infrastructure.


2. **Next steps expected for the following year.**

As the next step, the Town of Okotoks is looking for the AEP rollout of the Phase 2 guidelines.

3. **All addresses sampled and lead results will be reported annually as a separate electronic excel file with the Annual Water Operations Report. No sampling completed in 2021, nothing to report.**

22. Supervising Operator

Reviewed / Approved	Supervising Operator	
	Pacer Wilson	2956
Signature	Printed	Certificate #

Reviewed	Water Services Manager
	Rakesh Savani
Signature	Printed

Report prepared by: Patti Kjinserdahl

Date: Feb 05, 2022