



CERTIFICATE OF ANALYSIS

REPORTED TO	Alto Utilities Ltd. 10989 Maddock Avenue LAKE COUNTRY, BC V4V 2J5	WORK ORDER	9090718
ATTENTION	Brian Gutlnecht	RECEIVED / TEMP REPORTED	2019-09-09 14:54 / 16°C 2019-09-17 10:55
PO NUMBER		COC NUMBER	B82839
PROJECT	Water Bacteriology		
PROJECT INFO	No Project		

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO 17025:2005 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry



It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve



Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

Work Order Comments:

This is a revised report; please refer to Appendix 3 for details.

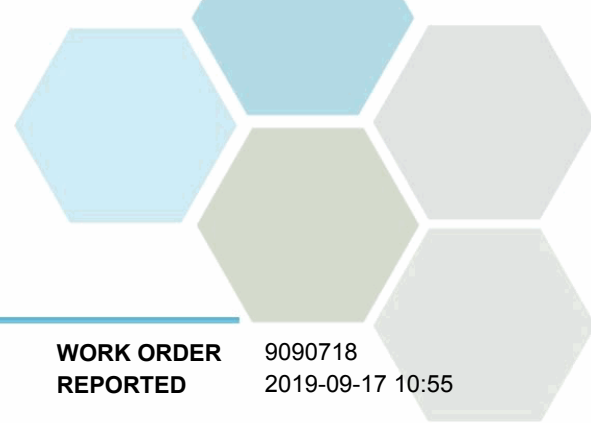
If you have any questions or concerns, please contact me at teamcaro@caro.ca

Authorized By:

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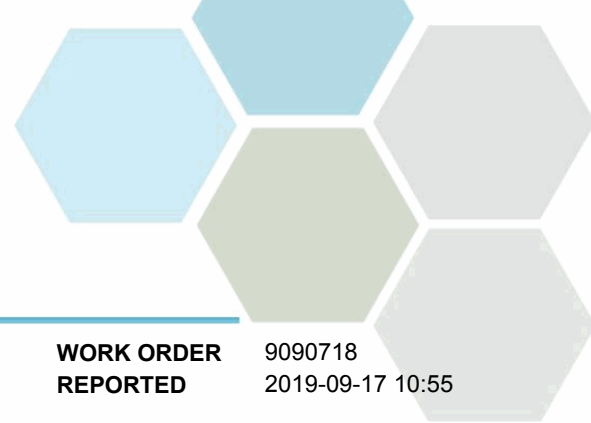


TEST RESULTS

REPORTED TO PROJECT Alto Utilities Ltd.
Water Bacteriology

WORK ORDER REPORTED 9090718
2019-09-17 10:55

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
1 - Velda - Distrubution (9090718-01) Matrix: Water Sampled: 2019-09-09 14:25					
Anions					
Chloride	64.5	AO ≤ 250	0.10 mg/L	2019-09-11	
Fluoride	0.26	MAC = 1.5	0.10 mg/L	2019-09-10	
Nitrate (as N)	< 0.010	MAC = 10	0.010 mg/L	2019-09-10	
Nitrite (as N)	< 0.010	MAC = 1	0.010 mg/L	2019-09-10	
Sulfate	67.4	AO ≤ 500	1.0 mg/L	2019-09-10	
Calculated Parameters					
Hardness, Total (as CaCO3)	362	None Required	0.500 mg/L	N/A	
Langelier Index	1.0	N/A	-5.0	2019-09-16	
Solids, Total Dissolved	492	AO ≤ 500	1.00 mg/L	N/A	
General Parameters					
Alkalinity, Total (as CaCO3)	298	N/A	1.0 mg/L	2019-09-11	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	2019-09-11	
Alkalinity, Bicarbonate (as CaCO3)	298	N/A	1.0 mg/L	2019-09-11	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	2019-09-11	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	2019-09-11	
Colour, True	< 5.0	AO ≤ 15	5.0 CU	2019-09-10	
Conductivity (EC)	861	N/A	2.0 µS/cm	2019-09-11	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020 mg/L	2019-09-12	
pH	8.02	7.0-10.5	0.10 pH units	2019-09-11	HT2
Temperature, at pH	23.4	N/A	°C	2019-09-11	HT2
Turbidity	0.29	OG < 1	0.10 NTU	2019-09-09	
Microbiological Parameters					
Coliforms, Total	< 1	MAC = 0	1 CFU/100 mL	2019-09-09	
E. coli	< 1	MAC = 0	1 CFU/100 mL	2019-09-09	
Total Metals					
Aluminum, total	< 0.0050	OG < 0.1	0.0050 mg/L	2019-09-13	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2019-09-13	
Arsenic, total	0.00075	MAC = 0.01	0.00050 mg/L	2019-09-13	
Barium, total	0.0604	MAC = 1	0.0050 mg/L	2019-09-13	
Boron, total	0.0380	MAC = 5	0.0050 mg/L	2019-09-13	
Cadmium, total	0.000017	MAC = 0.005	0.000010 mg/L	2019-09-13	
Calcium, total	89.5	None Required	0.20 mg/L	2019-09-13	
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2019-09-13	
Cobalt, total	0.00018	N/A	0.00010 mg/L	2019-09-13	
Copper, total	0.0595	MAC = 2	0.00040 mg/L	2019-09-13	
Iron, total	0.041	AO ≤ 0.3	0.010 mg/L	2019-09-13	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2019-09-13	
Magnesium, total	33.5	None Required	0.010 mg/L	2019-09-13	
Manganese, total	0.0759	MAC = 0.12	0.00020 mg/L	2019-09-13	
Mercury, total	< 0.000040	MAC = 0.001	0.000040 mg/L	2019-09-13	CT5



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Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
1 - Velda - Distrubution (9090718-01) Matrix: Water Sampled: 2019-09-09 14:25, Continued					
<i>Total Metals, Continued</i>					
Molybdenum, total	0.00524	N/A	0.00010 mg/L	2019-09-13	
Nickel, total	0.00244	N/A	0.00040 mg/L	2019-09-13	
Potassium, total	5.19	N/A	0.10 mg/L	2019-09-13	
Selenium, total	0.00212	MAC = 0.05	0.00050 mg/L	2019-09-13	
Sodium, total	50.7	AO ≤ 200	0.10 mg/L	2019-09-13	
Strontium, total	0.749	7	0.0010 mg/L	2019-09-13	
Uranium, total	0.0138	MAC = 0.02	0.000020 mg/L	2019-09-13	
Zinc, total	< 0.0040	AO ≤ 5	0.0040 mg/L	2019-09-13	

1 - Lodge Road 30 Pump - North Well (9090718-02) | Matrix: Water | Sampled: 2019-09-09 14:00

Anions

Chloride	65.0	AO ≤ 250	0.10 mg/L	2019-09-11	
Fluoride	0.25	MAC = 1.5	0.10 mg/L	2019-09-10	
Nitrate (as N)	0.696	MAC = 10	0.010 mg/L	2019-09-10	
Nitrite (as N)	< 0.010	MAC = 1	0.010 mg/L	2019-09-10	
Sulfate	67.1	AO ≤ 500	1.0 mg/L	2019-09-10	

Calculated Parameters

Hardness, Total (as CaCO ₃)	362	None Required	0.500 mg/L	N/A	
Langelier Index	1.1	N/A	-5.0	2019-09-16	
Solids, Total Dissolved	494	AO ≤ 500	1.00 mg/L	N/A	

General Parameters

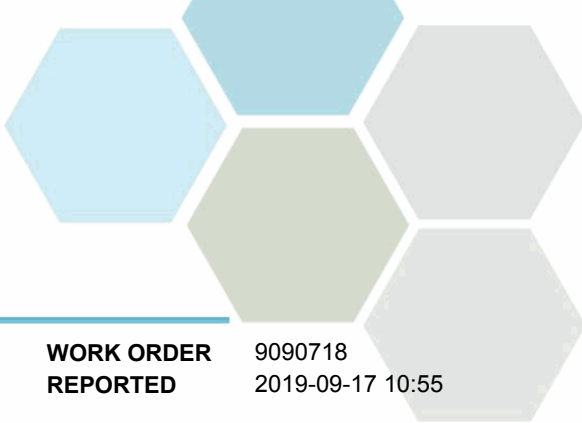
Alkalinity, Total (as CaCO ₃)	296	N/A	1.0 mg/L	2019-09-11	
Alkalinity, Phenolphthalein (as CaCO ₃)	< 1.0	N/A	1.0 mg/L	2019-09-11	
Alkalinity, Bicarbonate (as CaCO ₃)	296	N/A	1.0 mg/L	2019-09-11	
Alkalinity, Carbonate (as CaCO ₃)	< 1.0	N/A	1.0 mg/L	2019-09-11	
Alkalinity, Hydroxide (as CaCO ₃)	< 1.0	N/A	1.0 mg/L	2019-09-11	
Colour, True	< 5.0	AO ≤ 15	5.0 CU	2019-09-10	
Conductivity (EC)	862	N/A	2.0 µS/cm	2019-09-11	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020 mg/L	2019-09-12	
pH	8.07	7.0-10.5	0.10 pH units	2019-09-11	HT2
Temperature, at pH	23.4	N/A	°C	2019-09-11	HT2
Turbidity	1.22	OG < 1	0.10 NTU	2019-09-09	

Microbiological Parameters

Coliforms, Total	< 1	MAC = 0	1 CFU/100 mL	2019-09-09	
E. coli	< 1	MAC = 0	1 CFU/100 mL	2019-09-09	

Total Metals

Aluminum, total	< 0.0050	OG < 0.1	0.0050 mg/L	2019-09-13	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2019-09-13	



TEST RESULTS

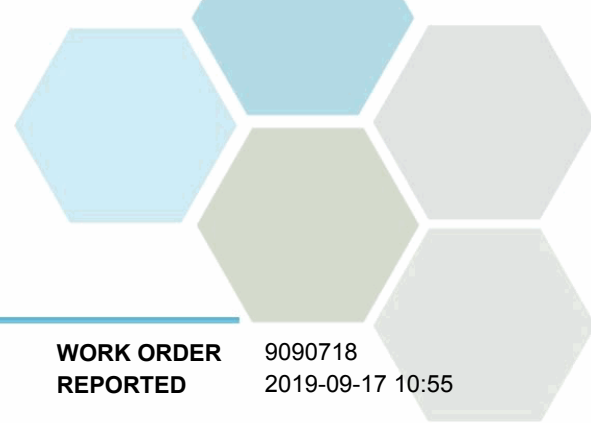
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Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
1 - Lodge Road 30 Pump - North Well (9090718-02) Matrix: Water Sampled: 2019-09-09 14:00, Continued					
<i>Total Metals, Continued</i>					
Arsenic, total	0.00099	MAC = 0.01	0.00050 mg/L	2019-09-13	
Barium, total	0.0614	MAC = 1	0.0050 mg/L	2019-09-13	
Boron, total	0.0383	MAC = 5	0.0050 mg/L	2019-09-13	
Cadmium, total	0.000022	MAC = 0.005	0.000010 mg/L	2019-09-13	
Calcium, total	90.2	None Required	0.20 mg/L	2019-09-13	
Chromium, total	0.00084	MAC = 0.05	0.00050 mg/L	2019-09-13	
Cobalt, total	0.00022	N/A	0.00010 mg/L	2019-09-13	
Copper, total	< 0.00040	MAC = 2	0.00040 mg/L	2019-09-13	
Iron, total	0.189	AO ≤ 0.3	0.010 mg/L	2019-09-13	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2019-09-13	
Magnesium, total	33.0	None Required	0.010 mg/L	2019-09-13	
Manganese, total	0.103	MAC = 0.12	0.00020 mg/L	2019-09-13	
Mercury, total	< 0.000040	MAC = 0.001	0.000040 mg/L	2019-09-13	CT5
Molybdenum, total	0.00521	N/A	0.00010 mg/L	2019-09-13	
Nickel, total	0.00243	N/A	0.00040 mg/L	2019-09-13	
Potassium, total	5.10	N/A	0.10 mg/L	2019-09-13	
Selenium, total	0.00206	MAC = 0.05	0.00050 mg/L	2019-09-13	
Sodium, total	49.5	AO ≤ 200	0.10 mg/L	2019-09-13	
Strontium, total	0.744	7	0.0010 mg/L	2019-09-13	
Uranium, total	0.0139	MAC = 0.02	0.000020 mg/L	2019-09-13	
Zinc, total	< 0.0040	AO ≤ 5	0.0040 mg/L	2019-09-13	

Sample Qualifiers:

- CT5 This sample has been incorrectly preserved for Mercury analysis
- HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Alto Utilities Ltd.
Water Bacteriology

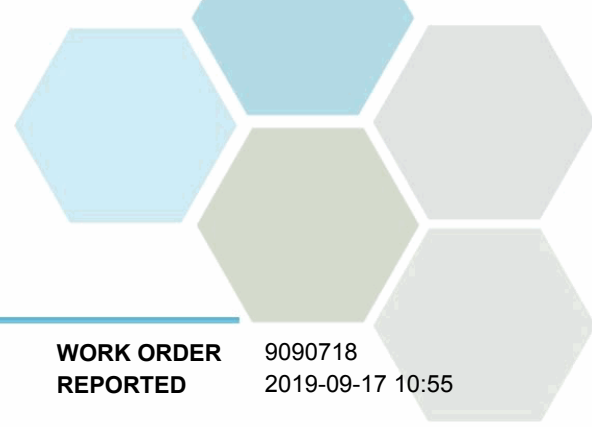
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Analysis Description	Method Ref.	Technique	Location
Alkalinity in Water	SM 2320 B* (2017)	Titration with H2SO4	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	Kelowna
Coliforms, Total in Water	SM 9222* (2017)	Membrane Filtration / Chromocult Agar	Kelowna
Colour, True in Water	SM 2120 C (2017)	Spectrophotometry (456 nm)	Kelowna
Conductivity in Water	SM 2510 B (2017)	Conductivity Meter	Kelowna
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection with In-Line UV Digestion and Amperometry	Kelowna
E. coli in Water	SM 9222* (2017)	Membrane Filtration / Chromocult Agar	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	N/A
Langelier Index in Water	SM 2330 B (2017)	Calculation	N/A
pH in Water	SM 4500-H+ B (2017)	Electrometry	Kelowna
Solids, Total Dissolved in Water	SM 1030 E (2017)	SM 1030 E (2011)	N/A
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	Kelowna

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
°C	Degrees Celcius
AO	Aesthetic Objective
CFU/100 mL	Colony Forming Units per 100 millilitres
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
µS/cm	Microsiemens per centimetre
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



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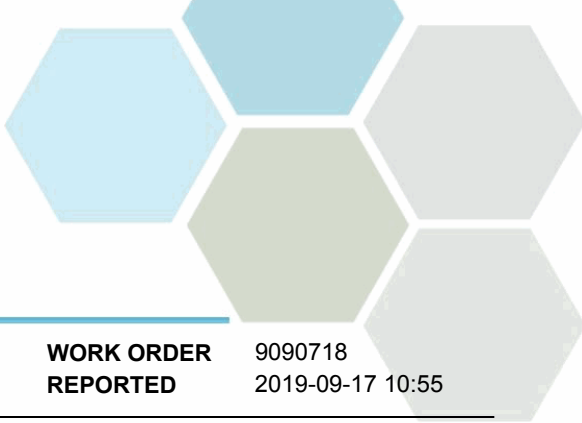
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PROJECT Water Bacteriology

WORK ORDER 9090718
REPORTED 2019-09-17 10:55

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: teamcaro@caro.ca



APPENDIX 3: REVISION HISTORY

REPORTED TO PROJECT	Alto Utilities Ltd. Water Bacteriology			WORK ORDER REPORTED	9090718 2019-09-17 10:55
Sample ID	Changed	Change	Analysis	Analyte(s)	
9090718-01	2019-09-17	Sample ID	N/A	N/A	
9090718-02	2019-09-17	Sample ID	N/A	N/A	