

## CERTIFICATE OF ANALYSIS

<b>REPORTED TO</b>	Lacombe County RR 3 Lacombe, AB T4L 2N3	<b>WORK ORDER</b>	0081373
<b>ATTENTION</b>	Darren Dempsey	<b>RECEIVED / TEMP REPORTED</b>	2020-08-14 09:15 / 12°C 2020-08-20 13:34
<b>PO NUMBER</b>		<b>COC NUMBER</b>	12212020
<b>PROJECT</b>	Lacombe County Water Samples		
<b>PROJECT INFO</b>	HWY 12/21 Total Metals		

### 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/IEC 17025:2017 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.

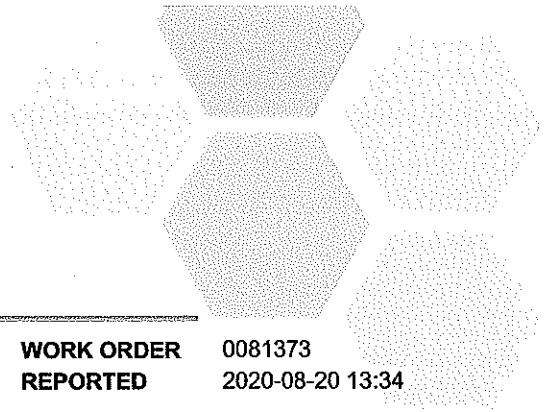
If you have any questions or concerns, please contact me at [sgulenchyn@caro.ca](mailto:sgulenchyn@caro.ca)

#### Authorized By:

Sara Gulenchyn, B.Sc, P.Chem.  
Client Service Manager

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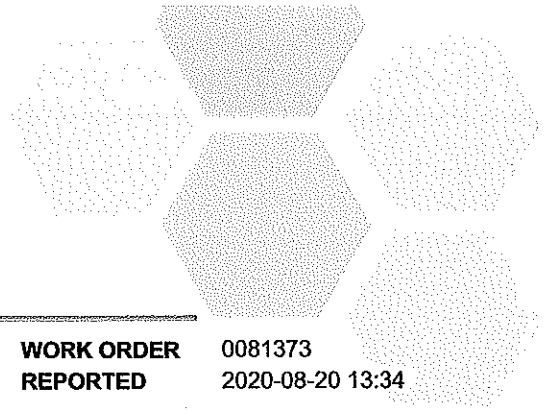


## TEST RESULTS

**REPORTED TO PROJECT** Lacombe County  
Lacombe County Water Samples

**WORK ORDER REPORTED** 0081373  
2020-08-20 13:34

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
<b>Total Metals (0081373-01)   Matrix: Water   Sampled: 2020-08-13 08:30</b>					
<i>Calculated Parameters</i>					
Hardness, Total (as CaCO3)	198	None Required	0.500 mg/L		N/A
<i>Total Metals</i>					
Aluminum, total	0.0485	OG < 0.1	0.0050 mg/L		2020-08-19
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L		2020-08-19
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L		2020-08-19
Barium, total	0.108	MAC = 2	0.0050 mg/L		2020-08-19
Beryllium, total	< 0.00010	N/A	0.00010 mg/L		2020-08-19
Bismuth, total	< 0.00010	N/A	0.00010 mg/L		2020-08-19
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L		2020-08-19
Cadmium, total	< 0.000010	MAC = 0.005	0.000010 mg/L		2020-08-19
Calcium, total	52.6	None Required	0.20 mg/L		2020-08-19
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L		2020-08-19
Cobalt, total	< 0.00010	N/A	0.00010 mg/L		2020-08-19
Copper, total	0.00106	MAC = 2	0.00040 mg/L		2020-08-19
Iron, total	< 0.010	AO ≤ 0.3	0.010 mg/L		2020-08-19
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L		2020-08-19
Lithium, total	0.00700	N/A	0.00010 mg/L		2020-08-19
Magnesium, total	16.2	None Required	0.010 mg/L		2020-08-19
Manganese, total	0.00405	MAC = 0.12	0.00020 mg/L		2020-08-19
Molybdenum, total	0.00101	N/A	0.00010 mg/L		2020-08-19
Nickel, total	0.00074	N/A	0.00040 mg/L		2020-08-19
Phosphorus, total	< 0.050	N/A	0.050 mg/L		2020-08-19
Potassium, total	2.18	N/A	0.10 mg/L		2020-08-19
Selenium, total	< 0.00050	MAC = 0.05	0.00050 mg/L		2020-08-19
Silicon, total	2.5	N/A	1.0 mg/L		2020-08-19
Silver, total	< 0.000050	None Required	0.000050 mg/L		2020-08-19
Sodium, total	24.1	AO ≤ 200	0.10 mg/L		2020-08-19
Strontium, total	0.377	7	0.0010 mg/L		2020-08-19
Sulfur, total	31.3	N/A	3.0 mg/L		2020-08-19
Tellurium, total	< 0.00050	N/A	0.00050 mg/L		2020-08-19
Thallium, total	< 0.000020	N/A	0.000020 mg/L		2020-08-19
Thorium, total	< 0.00010	N/A	0.00010 mg/L		2020-08-19
Tin, total	< 0.00020	N/A	0.00020 mg/L		2020-08-19
Titanium, total	< 0.0050	N/A	0.0050 mg/L		2020-08-19
Tungsten, total	< 0.0010	N/A	0.0010 mg/L		2020-08-19
Uranium, total	0.000159	MAC = 0.02	0.000020 mg/L		2020-08-19
Vanadium, total	< 0.0010	N/A	0.0010 mg/L		2020-08-19
Zinc, total	< 0.0040	AO ≤ 5	0.0040 mg/L		2020-08-19
Zirconium, total	< 0.00010	N/A	0.00010 mg/L		2020-08-19



**APPENDIX 1: SUPPORTING INFORMATION**

**REPORTED TO PROJECT** Lacombe County  
Lacombe County Water Samples

**WORK ORDER REPORTED** 0081373  
2020-08-20 13:34

Analysis Description	Method Ref.	Technique	Accredited	Location
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	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
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
OG	Operational Guideline (treated water)
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

**Guidelines Referenced in this Report:**

- AB Tier 1 Commercial (Feb 2016)
- Guidelines for Canadian Drinking Water Quality (Health Canada, June 2019)

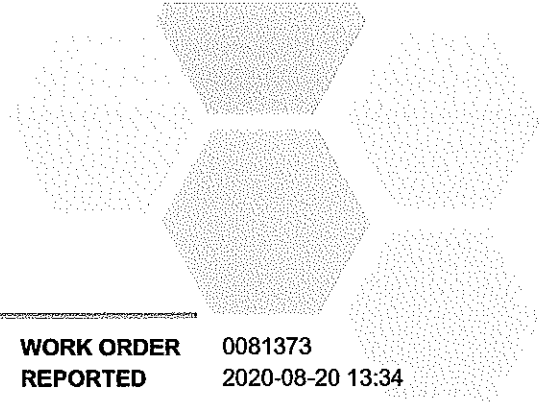
*Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user*

**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 unless otherwise 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: [sgulenchyn@caro.ca](mailto:sgulenchyn@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.*



## APPENDIX 2: QUALITY CONTROL RESULTS

**REPORTED TO** Lacombe County  
**PROJECT** Lacombe County Water Samples

**WORK ORDER** 0081373  
**REPORTED** 2020-08-20 13:34

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk):** A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup):** An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS):** A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS):** A second aliquot of sample is fortified with with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM):** A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

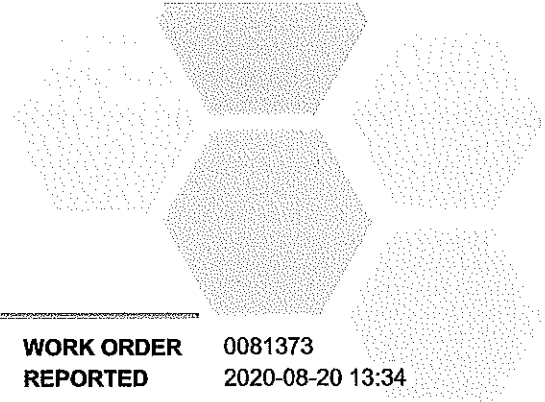
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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### Total Metals, Batch B0H1476

#### Blank (B0H1476-BLK1)

Prepared: 2020-08-18, Analyzed: 2020-08-19

Aluminum, total	< 0.0050	0.0050 mg/L							
Antimony, total	< 0.00020	0.00020 mg/L							
Arsenic, total	< 0.00050	0.00050 mg/L							
Barium, total	< 0.0050	0.0050 mg/L							
Beryllium, total	< 0.00010	0.00010 mg/L							
Bismuth, total	< 0.00010	0.00010 mg/L							
Boron, total	< 0.0500	0.0500 mg/L							
Cadmium, total	< 0.000010	0.000010 mg/L							
Calcium, total	< 0.20	0.20 mg/L							
Chromium, total	< 0.00050	0.00050 mg/L							
Cobalt, total	< 0.00010	0.00010 mg/L							
Copper, total	< 0.00040	0.00040 mg/L							
Iron, total	< 0.010	0.010 mg/L							
Lead, total	< 0.00020	0.00020 mg/L							
Lithium, total	< 0.00010	0.00010 mg/L							
Magnesium, total	< 0.010	0.010 mg/L							
Manganese, total	< 0.00020	0.00020 mg/L							
Molybdenum, total	< 0.00010	0.00010 mg/L							
Nickel, total	< 0.00040	0.00040 mg/L							
Phosphorus, total	< 0.050	0.050 mg/L							
Potassium, total	< 0.10	0.10 mg/L							
Selenium, total	< 0.00050	0.00050 mg/L							
Silicon, total	< 1.0	1.0 mg/L							
Silver, total	< 0.000050	0.000050 mg/L							
Sodium, total	< 0.10	0.10 mg/L							
Strontium, total	< 0.0010	0.0010 mg/L							
Sulfur, total	< 3.0	3.0 mg/L							
Tellurium, total	< 0.00050	0.00050 mg/L							
Thallium, total	< 0.000020	0.000020 mg/L							
Thorium, total	< 0.00010	0.00010 mg/L							
Tin, total	< 0.00020	0.00020 mg/L							
Titanium, total	< 0.0050	0.0050 mg/L							
Tungsten, total	< 0.0010	0.0010 mg/L							
Uranium, total	< 0.000020	0.000020 mg/L							
Vanadium, total	< 0.0010	0.0010 mg/L							
Zinc, total	< 0.0040	0.0040 mg/L							



## APPENDIX 2: QUALITY CONTROL RESULTS

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PROJECT Lacombe County Water Samples

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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**Total Metals, Batch B0H1476, Continued**

**Blank (B0H1476-BLK1), Continued**

Prepared: 2020-08-18, Analyzed: 2020-08-19

Zirconium, total	< 0.00010	0.00010 mg/L							
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**LCS (B0H1476-BS1)**

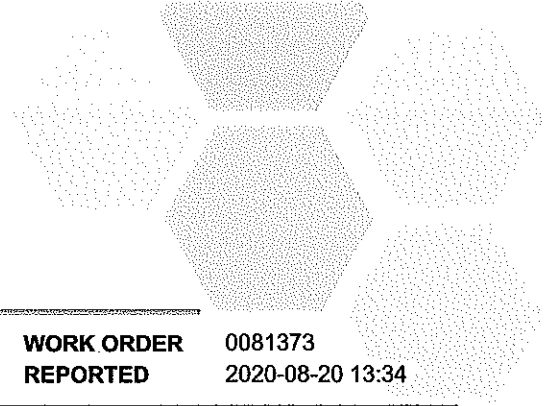
Prepared: 2020-08-18, Analyzed: 2020-08-19

Aluminum, total	0.0230	0.0050 mg/L	0.0199		116	80-120			
Antimony, total	0.0239	0.00020 mg/L	0.0200		120	80-120			
Arsenic, total	0.0237	0.00050 mg/L	0.0200		119	80-120			
Barium, total	0.0200	0.0050 mg/L	0.0198		101	80-120			
Beryllium, total	0.0209	0.00010 mg/L	0.0198		106	80-120			
Bismuth, total	0.0206	0.00010 mg/L	0.0200		103	80-120			
Boron, total	< 0.0500	0.0500 mg/L	0.0200		113	80-120			
Cadmium, total	0.0204	0.000010 mg/L	0.0199		103	80-120			
Calcium, total	2.23	0.20 mg/L	2.02		111	80-120			
Chromium, total	0.0232	0.00050 mg/L	0.0198		117	80-120			
Cobalt, total	0.0203	0.00010 mg/L	0.0199		102	80-120			
Copper, total	0.0205	0.00040 mg/L	0.0200		102	80-120			
Iron, total	2.03	0.010 mg/L	2.02		101	80-120			
Lead, total	0.0195	0.00020 mg/L	0.0199		98	80-120			
Lithium, total	0.0212	0.00010 mg/L	0.0200		106	80-120			
Magnesium, total	2.01	0.010 mg/L	2.02		100	80-120			
Manganese, total	0.0207	0.00020 mg/L	0.0199		104	80-120			
Molybdenum, total	0.0208	0.00010 mg/L	0.0200		104	80-120			
Nickel, total	0.0206	0.00040 mg/L	0.0200		103	80-120			
Phosphorus, total	2.13	0.050 mg/L	2.00		106	80-120			
Potassium, total	2.18	0.10 mg/L	2.02		108	80-120			
Selenium, total	0.0213	0.00050 mg/L	0.0200		106	80-120			
Silicon, total	2.2	1.0 mg/L	2.00		110	80-120			
Silver, total	0.0216	0.000050 mg/L	0.0200		108	80-120			
Sodium, total	2.01	0.10 mg/L	2.02		100	80-120			
Strontium, total	0.0229	0.0010 mg/L	0.0200		114	80-120			
Tellurium, total	0.0222	0.00050 mg/L	0.0200		111	80-120			
Thallium, total	0.0204	0.000020 mg/L	0.0199		102	80-120			
Thorium, total	0.0199	0.00010 mg/L	0.0200		100	80-120			
Tin, total	0.0214	0.00020 mg/L	0.0200		107	80-120			
Titanium, total	0.0233	0.0050 mg/L	0.0200		116	80-120			
Tungsten, total	0.0210	0.0010 mg/L	0.0200		105	80-120			
Uranium, total	0.0208	0.000020 mg/L	0.0200		104	80-120			
Vanadium, total	0.0232	0.0010 mg/L	0.0200		116	80-120			
Zinc, total	0.0227	0.0040 mg/L	0.0200		114	80-120			
Zirconium, total	0.0210	0.00010 mg/L	0.0200		105	80-120			

**Reference (B0H1476-SRM1)**

Prepared: 2020-08-18, Analyzed: 2020-08-19

Aluminum, total	0.341	0.0050 mg/L	0.299		114	70-130			
Antimony, total	0.0585	0.00020 mg/L	0.0517		113	70-130			
Arsenic, total	0.145	0.00050 mg/L	0.119		122	70-130			
Barium, total	0.810	0.0050 mg/L	0.801		101	70-130			
Beryllium, total	0.0564	0.00010 mg/L	0.0501		113	70-130			
Boron, total	3.91	0.0500 mg/L	4.11		95	70-130			
Cadmium, total	0.0520	0.000010 mg/L	0.0503		103	70-130			
Calcium, total	10.9	0.20 mg/L	10.7		102	70-130			
Chromium, total	0.295	0.00050 mg/L	0.250		118	70-130			
Cobalt, total	0.0401	0.00010 mg/L	0.0384		104	70-130			
Copper, total	0.520	0.00040 mg/L	0.487		107	70-130			
Iron, total	0.510	0.010 mg/L	0.504		101	70-130			
Lead, total	0.284	0.00020 mg/L	0.278		102	70-130			
Lithium, total	0.462	0.00010 mg/L	0.398		116	70-130			
Magnesium, total	3.85	0.010 mg/L	3.59		107	70-130			
Manganese, total	0.121	0.00020 mg/L	0.111		109	70-130			



**APPENDIX 2: QUALITY CONTROL RESULTS**

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Lacombe County Water Samples

**WORK ORDER REPORTED** 0081373  
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
<i>Total Metals, Batch B0H1476, Continued</i>									
<b>Reference (B0H1476-SRM1), Continued</b>					Prepared: 2020-08-18, Analyzed: 2020-08-19				
Molybdenum, total	0.204	0.00010 mg/L	0.196		104	70-130			
Nickel, total	0.260	0.00040 mg/L	0.248		105	70-130			
Phosphorus, total	0.272	0.050 mg/L	0.213		128	70-130			
Potassium, total	6.83	0.10 mg/L	5.89		116	70-130			
Selenium, total	0.136	0.00050 mg/L	0.120		114	70-130			
Sodium, total	9.30	0.10 mg/L	8.71		107	70-130			
Strontium, total	0.460	0.0010 mg/L	0.393		117	70-130			
Thallium, total	0.0838	0.000020 mg/L	0.0787		106	70-130			
Uranium, total	0.0346	0.000020 mg/L	0.0344		101	70-130			
Vanadium, total	0.463	0.0010 mg/L	0.391		118	70-130			
Zinc, total	2.75	0.0040 mg/L	2.50		110	70-130			