

CERTIFICATE OF ANALYSIS

REPORTED TO	Yukon Government - Department of Education 1000 Lewes Blvd. Whitehorse, YT Y1A 6N2	WORK ORDER	9081535
ATTENTION	Trevor Justason	RECEIVED / TEMP REPORTED	2019-08-15 12:49 / 19°C 2019-08-20 08:43
PO NUMBER			
PROJECT	Department of Education 2019 Water Testing Program		
PROJECT INFO	Contract No. C00044694 (JV Clark Mayo)		

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.

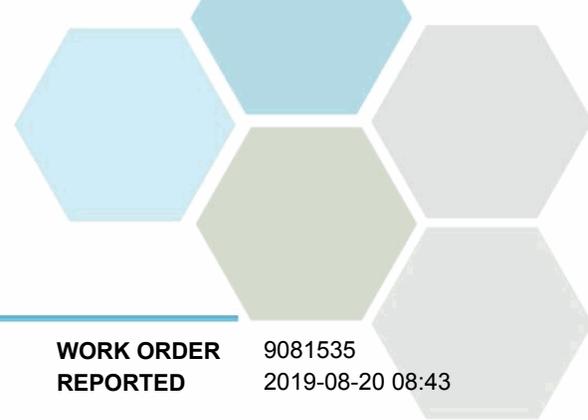
If you have any questions or concerns, please contact me at bshaw@caro.ca

Authorized By:

Bryan Shaw, Ph.D., P.Chem.
Client Service Coordinator

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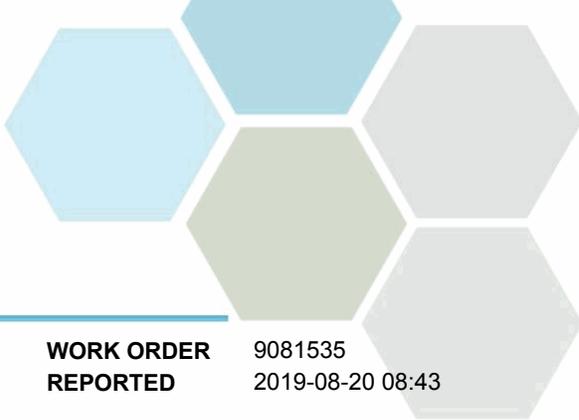


TEST RESULTS

REPORTED TO PROJECT Yukon Government - Department of Education
Department of Education 2019 Water Testing Program

WORK ORDER REPORTED 9081535
2019-08-20 08:43

Analyte	Result	RL	Units	Analyzed	Qualifier
KS1 (JV Clark Mayo) (9081535-01) Matrix: Water Sampled: 2019-08-14 08:01					
<i>Total Metals</i>					
Lead, total	6.97	0.20	µg/L	2019-08-18	
BS1 (JV Clark Mayo) (9081535-02) Matrix: Water Sampled: 2019-08-14 08:01					
<i>Total Metals</i>					
Lead, total	51.6	0.20	µg/L	2019-08-18	
KS1 Tier 2 (JV Clark Mayo) (9081535-03) Matrix: Water Sampled: 2019-08-14 08:01					
<i>Total Metals</i>					
Lead, total	2.47	0.20	µg/L	2019-08-18	
BS2 (JV Clark Mayo) (9081535-04) Matrix: Water Sampled: 2019-08-14 08:01					
<i>Total Metals</i>					
Lead, total	64.2	0.20	µg/L	2019-08-18	
CS1 (JV Clark Mayo) (9081535-05) Matrix: Water Sampled: 2019-08-14 08:07					
<i>Total Metals</i>					
Lead, total	152	0.20	µg/L	2019-08-18	
CS2 (JV Clark Mayo) (9081535-06) Matrix: Water Sampled: 2019-08-14 08:07					
<i>Total Metals</i>					
Lead, total	110	0.20	µg/L	2019-08-18	
BS3 (JV Clark Mayo) (9081535-07) Matrix: Water Sampled: 2019-08-14 08:12					
<i>Total Metals</i>					
Lead, total	69.9	0.20	µg/L	2019-08-18	
BS4 (JV Clark Mayo) (9081535-08) Matrix: Water Sampled: 2019-08-14 08:12					
<i>Total Metals</i>					
Lead, total	48.2	0.20	µg/L	2019-08-18	
BS5 (JV Clark Mayo) (9081535-09) Matrix: Water Sampled: 2019-08-14 08:12					
<i>Total Metals</i>					

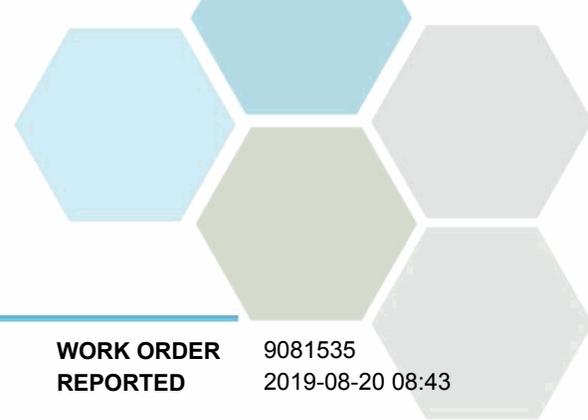


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Analyte	Result	RL	Units	Analyzed	Qualifier
BS5 (JV Clark Mayo) (9081535-09) Matrix: Water Sampled: 2019-08-14 08:12, Continued					
<i>Total Metals, Continued</i>					
Lead, total	75.2	0.20	µg/L	2019-08-18	
CS3 (JV Clark Mayo) (9081535-10) Matrix: Water Sampled: 2019-08-14 08:18					
<i>Total Metals</i>					
Lead, total	53.6	0.20	µg/L	2019-08-18	
DF1 (JV Clark Mayo) (9081535-11) Matrix: Water Sampled: 2019-08-14 08:18					
<i>Total Metals</i>					
Lead, total	17.8	0.20	µg/L	2019-08-18	
CS4 (JV Clark Mayo) (9081535-12) Matrix: Water Sampled: 2019-08-14 08:18					
<i>Total Metals</i>					
Lead, total	98.1	0.20	µg/L	2019-08-18	
DF2 (JV Clark Mayo) (9081535-13) Matrix: Water Sampled: 2019-08-14 08:18					
<i>Total Metals</i>					
Lead, total	31.0	0.20	µg/L	2019-08-18	
CS5 (JV Clark Mayo) (9081535-14) Matrix: Water Sampled: 2019-08-14 08:23					
<i>Total Metals</i>					
Lead, total	35.5	0.20	µg/L	2019-08-18	
DF3 (JV Clark Mayo) (9081535-15) Matrix: Water Sampled: 2019-08-14 08:23					
<i>Total Metals</i>					
Lead, total	19.8	0.20	µg/L	2019-08-18	
CS6 (JV Clark Mayo) (9081535-16) Matrix: Water Sampled: 2019-08-14 08:23					
<i>Total Metals</i>					
Lead, total	54.3	0.20	µg/L	2019-08-18	
DF4 (JV Clark Mayo) (9081535-17) Matrix: Water Sampled: 2019-08-14 08:23					
<i>Total Metals</i>					

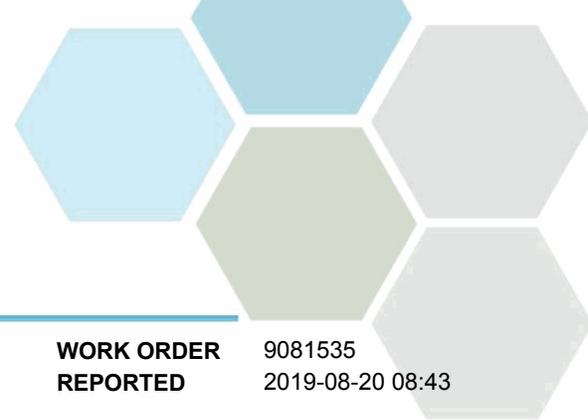


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2019-08-20 08:43

Analyte	Result	RL	Units	Analyzed	Qualifier
DF4 (JV Clark Mayo) (9081535-17) Matrix: Water Sampled: 2019-08-14 08:23, Continued					
<i>Total Metals, Continued</i>					
Lead, total	37.5	0.20	µg/L	2019-08-18	
BS6 (JV Clark Mayo) (9081535-18) Matrix: Water Sampled: 2019-08-14 08:23					
<i>Total Metals</i>					
Lead, total	54.2	0.20	µg/L	2019-08-18	
CS7 (JV Clark Mayo) (9081535-19) Matrix: Water Sampled: 2019-08-14 08:30					
<i>Total Metals</i>					
Lead, total	121	0.20	µg/L	2019-08-18	
DF5 (JV Clark Mayo) (9081535-20) Matrix: Water Sampled: 2019-08-14 08:30					
<i>Total Metals</i>					
Lead, total	29.7	0.20	µg/L	2019-08-18	
CS8 (JV Clark Mayo) (9081535-21) Matrix: Water Sampled: 2019-08-14 08:30					
<i>Total Metals</i>					
Lead, total	32.8	0.20	µg/L	2019-08-18	
DF6 (JV Clark Mayo) (9081535-22) Matrix: Water Sampled: 2019-08-14 08:30					
<i>Total Metals</i>					
Lead, total	30.3	0.20	µg/L	2019-08-18	
KS2 (JV Clark Mayo) (9081535-23) Matrix: Water Sampled: 2019-08-14 08:38					
<i>Total Metals</i>					
Lead, total	54.7	0.20	µg/L	2019-08-18	
KS3 (JV Clark Mayo) (9081535-24) Matrix: Water Sampled: 2019-08-14 08:38					
<i>Total Metals</i>					
Lead, total	69.0	0.20	µg/L	2019-08-18	
KS4 (JV Clark Mayo) (9081535-25) Matrix: Water Sampled: 2019-08-14 08:38					
<i>Total Metals</i>					

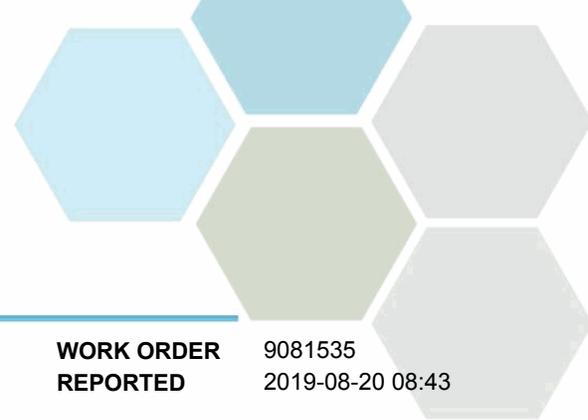


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Analyte	Result	RL	Units	Analyzed	Qualifier
KS4 (JV Clark Mayo) (9081535-25) Matrix: Water Sampled: 2019-08-14 08:38, Continued					
<i>Total Metals, Continued</i>					
Lead, total	68.2	0.20	µg/L	2019-08-18	
KS3 Tier 2 (JV Clark Mayo) (9081535-26) Matrix: Water Sampled: 2019-08-14 08:38					
<i>Total Metals</i>					
Lead, total	4.41	0.20	µg/L	2019-08-18	
DF7 (JV Clark Mayo) (9081535-27) Matrix: Water Sampled: 2019-08-14 08:44					
<i>Total Metals</i>					
Lead, total	11.5	0.20	µg/L	2019-08-18	
BS7 (JV Clark Mayo) (9081535-28) Matrix: Water Sampled: 2019-08-14 08:44					
<i>Total Metals</i>					
Lead, total	68.6	0.20	µg/L	2019-08-18	
BS8 (JV Clark Mayo) (9081535-29) Matrix: Water Sampled: 2019-08-14 08:44					
<i>Total Metals</i>					
Lead, total	36.7	0.20	µg/L	2019-08-18	
BS9 (JV Clark Mayo) (9081535-30) Matrix: Water Sampled: 2019-08-14 08:44					
<i>Total Metals</i>					
Lead, total	62.4	0.20	µg/L	2019-08-18	
DF8 (JV Clark Mayo) (9081535-31) Matrix: Water Sampled: 2019-08-14 08:51					
<i>Total Metals</i>					
Lead, total	16.0	0.20	µg/L	2019-08-18	
BS10 (JV Clark Mayo) (9081535-32) Matrix: Water Sampled: 2019-08-14 08:51					
<i>Total Metals</i>					
Lead, total	49.5	0.20	µg/L	2019-08-18	
BS11 (JV Clark Mayo) (9081535-33) Matrix: Water Sampled: 2019-08-14 08:51					
<i>Total Metals</i>					

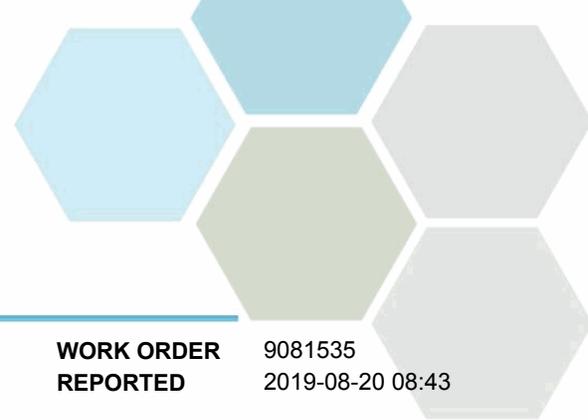


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2019-08-20 08:43

Analyte	Result	RL	Units	Analyzed	Qualifier
BS11 (JV Clark Mayo) (9081535-33) Matrix: Water Sampled: 2019-08-14 08:51, Continued					
<i>Total Metals, Continued</i>					
Lead, total	47.7	0.20	µg/L	2019-08-18	
BS12 (JV Clark Mayo) (9081535-34) Matrix: Water Sampled: 2019-08-14 08:51					
<i>Total Metals</i>					
Lead, total	57.8	0.20	µg/L	2019-08-18	
CS9 (JV Clark Mayo) (9081535-35) Matrix: Water Sampled: 2019-08-14 08:57					
<i>Total Metals</i>					
Lead, total	134	0.20	µg/L	2019-08-18	
KS5 (JV Clark Mayo) (9081535-36) Matrix: Water Sampled: 2019-08-14 09:00					
<i>Total Metals</i>					
Lead, total	5.07	0.20	µg/L	2019-08-18	
KS5 Tier 2 (JV Clark Mayo) (9081535-37) Matrix: Water Sampled: 2019-08-14 09:00					
<i>Total Metals</i>					
Lead, total	1.72	0.20	µg/L	2019-08-18	
BS13 (JV Clark Mayo) (9081535-38) Matrix: Water Sampled: 2019-08-14 09:00					
<i>Total Metals</i>					
Lead, total	10.9	0.20	µg/L	2019-08-18	
BS14 (JV Clark Mayo) (9081535-39) Matrix: Water Sampled: 2019-08-14 09:00					
<i>Total Metals</i>					
Lead, total	64.2	0.20	µg/L	2019-08-18	
BS15 (JV Clark Mayo) (9081535-40) Matrix: Water Sampled: 2019-08-14 09:05					
<i>Total Metals</i>					
Lead, total	63.8	0.20	µg/L	2019-08-18	
BS16 (JV Clark Mayo) (9081535-41) Matrix: Water Sampled: 2019-08-14 09:05					
<i>Total Metals</i>					

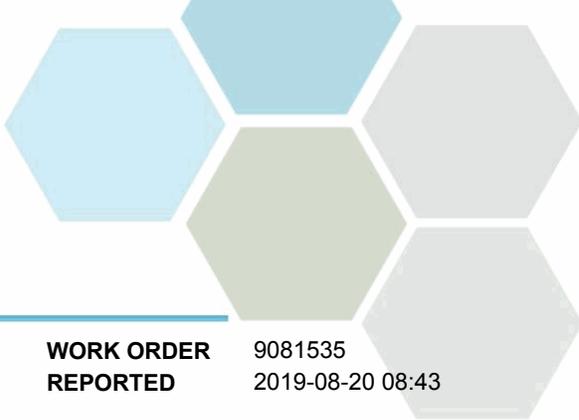


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Analyte	Result	RL	Units	Analyzed	Qualifier
BS16 (JV Clark Mayo) (9081535-41) Matrix: Water Sampled: 2019-08-14 09:05, Continued					
<i>Total Metals, Continued</i>					
Lead, total	26.5	0.20	µg/L	2019-08-18	
BS17 (JV Clark Mayo) (9081535-42) Matrix: Water Sampled: 2019-08-14 09:07					
<i>Total Metals</i>					
Lead, total	47.7	0.20	µg/L	2019-08-18	
BS18 (JV Clark Mayo) (9081535-43) Matrix: Water Sampled: 2019-08-14 09:07					
<i>Total Metals</i>					
Lead, total	73.0	0.20	µg/L	2019-08-18	
CS10 (JV Clark Mayo) (9081535-44) Matrix: Water Sampled: 2019-08-14 09:10					
<i>Total Metals</i>					
Lead, total	59.4	0.20	µg/L	2019-08-18	
DF9 (JV Clark Mayo) (9081535-45) Matrix: Water Sampled: 2019-08-14 09:10					
<i>Total Metals</i>					
Lead, total	7.22	0.20	µg/L	2019-08-18	
CS11 (JV Clark Mayo) (9081535-46) Matrix: Water Sampled: 2019-08-14 09:10					
<i>Total Metals</i>					
Lead, total	55.7	0.20	µg/L	2019-08-18	
DF10 (JV Clark Mayo) (9081535-47) Matrix: Water Sampled: 2019-08-14 09:10					
<i>Total Metals</i>					
Lead, total	6.64	0.20	µg/L	2019-08-18	
CS12 (JV Clark Mayo) (9081535-48) Matrix: Water Sampled: 2019-08-14 09:17					
<i>Total Metals</i>					
Lead, total	126	0.20	µg/L	2019-08-18	
DF11 (JV Clark Mayo) (9081535-49) Matrix: Water Sampled: 2019-08-14 09:17					
<i>Total Metals</i>					

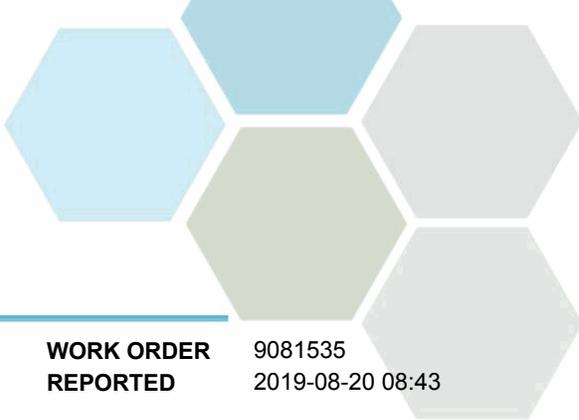


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Analyte	Result	RL	Units	Analyzed	Qualifier
DF11 (JV Clark Mayo) (9081535-49) Matrix: Water Sampled: 2019-08-14 09:17, Continued					
<i>Total Metals, Continued</i>					
Lead, total	19.4	0.20	µg/L	2019-08-18	
CS13 (JV Clark Mayo) (9081535-50) Matrix: Water Sampled: 2019-08-14 09:17					
<i>Total Metals</i>					
Lead, total	374	0.20	µg/L	2019-08-18	
CS14 (JV Clark Mayo) (9081535-51) Matrix: Water Sampled: 2019-08-14 09:17					
<i>Total Metals</i>					
Lead, total	419	0.20	µg/L	2019-08-18	
CS15 (JV Clark Mayo) (9081535-52) Matrix: Water Sampled: 2019-08-14 09:17					
<i>Total Metals</i>					
Lead, total	338	0.20	µg/L	2019-08-18	
CS16 (JV Clark Mayo) (9081535-53) Matrix: Water Sampled: 2019-08-14 09:25					
<i>Total Metals</i>					
Lead, total	21.8	0.20	µg/L	2019-08-18	
CS17 (JV Clark Mayo) (9081535-54) Matrix: Water Sampled: 2019-08-14 09:25					
<i>Total Metals</i>					
Lead, total	47.8	0.20	µg/L	2019-08-18	
DF12 (JV Clark Mayo) (9081535-55) Matrix: Water Sampled: 2019-08-14 09:25					
<i>Total Metals</i>					
Lead, total	11.7	0.20	µg/L	2019-08-18	
CS18 (JV Clark Mayo) (9081535-56) Matrix: Water Sampled: 2019-08-14 09:30					
<i>Total Metals</i>					
Lead, total	65.3	0.20	µg/L	2019-08-18	
DF13 (JV Clark Mayo) (9081535-57) Matrix: Water Sampled: 2019-08-14 09:30					
<i>Total Metals</i>					

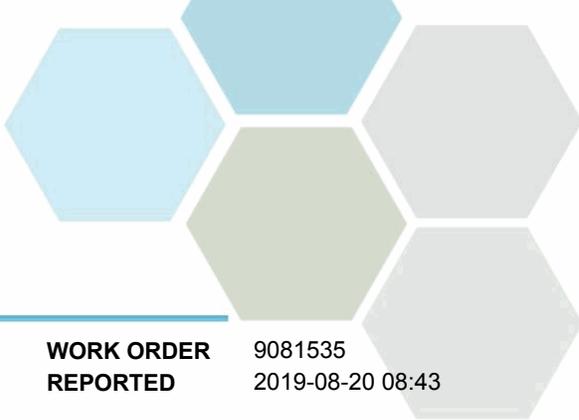


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2019-08-20 08:43

Analyte	Result	RL	Units	Analyzed	Qualifier
DF13 (JV Clark Mayo) (9081535-57) Matrix: Water Sampled: 2019-08-14 09:30, Continued					
<i>Total Metals, Continued</i>					
Lead, total	8.53	0.20	µg/L	2019-08-18	



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Yukon Government - Department of Education
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WORK ORDER REPORTED 9081535
2019-08-20 08:43

Analysis Description	Method Ref.	Technique	Location
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

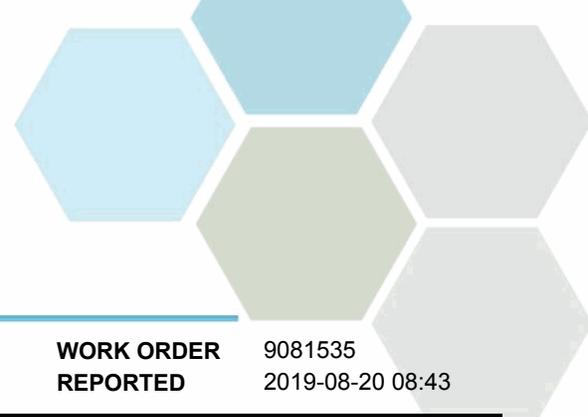
Glossary of Terms:

RL	Reporting Limit (default)
µg/L	Micrograms per litre
EPA	United States Environmental Protection Agency Test Methods

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: bshaw@caro.ca



APPENDIX 2: QUALITY CONTROL RESULTS

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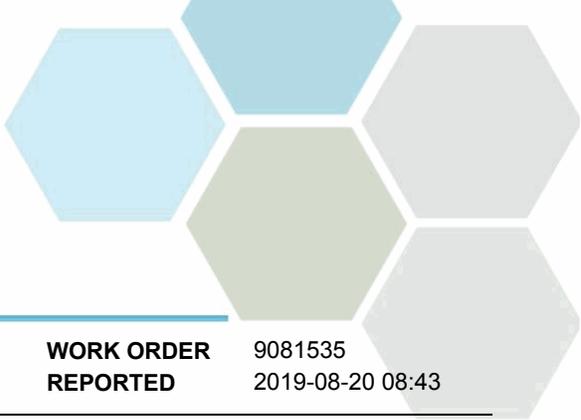
WORK ORDER REPORTED 9081535
2019-08-20 08:43

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
Total Metals, Batch B9H1462									
Blank (B9H1462-BLK1)			Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	< 0.20	0.20 µg/L							
Blank (B9H1462-BLK2)			Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	< 0.20	0.20 µg/L							
LCS (B9H1462-BS1)			Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	20.2	0.20 µg/L	20.0		101	80-120			
Duplicate (B9H1462-DUP1)			Source: 9081535-43 Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	73.5	0.20 µg/L		73.0			< 1	20	
Reference (B9H1462-SRM1)			Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	218	0.20 µg/L	204		107	90-110			
Total Metals, Batch B9H1463									
Blank (B9H1463-BLK1)			Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	< 0.20	0.20 µg/L							
Blank (B9H1463-BLK2)			Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	< 0.20	0.20 µg/L							
Blank (B9H1463-BLK3)			Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	< 0.20	0.20 µg/L							
LCS (B9H1463-BS1)			Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	20.1	0.20 µg/L	20.0		101	80-120			
LCS (B9H1463-BS2)			Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	20.2	0.20 µg/L	20.0		101	80-120			
Duplicate (B9H1463-DUP1)			Source: 9081535-02 Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	48.8	0.20 µg/L		51.6			6	20	
Duplicate (B9H1463-DUP2)			Source: 9081535-40 Prepared: 2019-08-16, Analyzed: 2019-08-18						
Lead, total	63.4	0.20 µg/L		63.8			< 1	20	



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B9H1463, Continued									
Reference (B9H1463-SRM1)				Prepared: 2019-08-16, Analyzed: 2019-08-18					
Lead, total	209	0.20 µg/L	204		102	90-110			
Reference (B9H1463-SRM2)				Prepared: 2019-08-16, Analyzed: 2019-08-18					
Lead, total	213	0.20 µg/L	204		104	90-110			