

CERTIFICATE OF ANALYSIS

REPORTED TO Yukon Government - Department of Education
1000 Lewes Blvd.
Whitehorse, YT Y1A 6N2

ATTENTION Trevor Justason

PO NUMBER

PROJECT Department of Education 2018 Water Testing Program

PROJECT INFO Contract No. C00044694 (Hidden Valley Elementary)

WORK ORDER 9071499

RECEIVED / TEMP REPORTED 2019-07-15 13:08 / NA
2019-07-22 09:18

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.

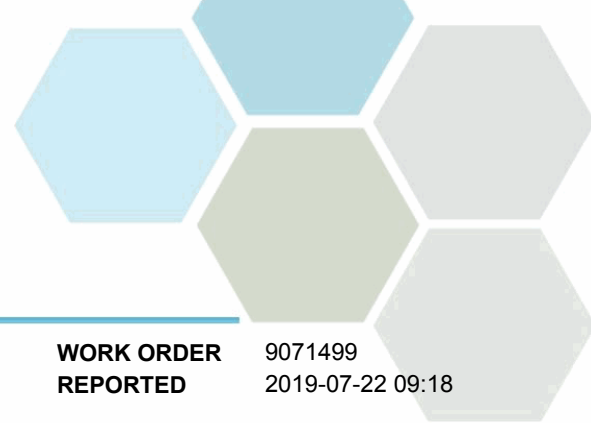
If you have any questions or concerns, please contact me at bshaw@caro.ca

Authorized By:

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#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7

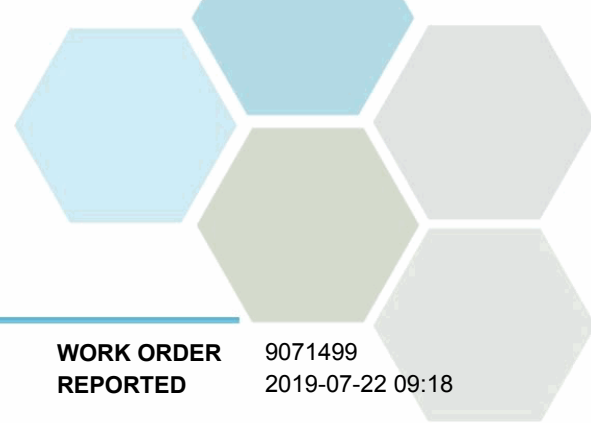


TEST RESULTS

REPORTED TO PROJECT Yukon Government - Department of Education
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WORK ORDER REPORTED 9071499
2019-07-22 09:18

| Analyte | Result | RL | Units | Analyzed | Qualifier |
|--|--------|------|-------|------------|-----------|
| CS-1 (9071499-01) Matrix: Water Sampled: 2019-07-11 12:06 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 10.8 | 0.20 | µg/L | 2019-07-21 | |
| CS-2 (9071499-02) Matrix: Water Sampled: 2019-07-11 12:06 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 1.39 | 0.20 | µg/L | 2019-07-21 | |
| BS-1 (9071499-03) Matrix: Water Sampled: 2019-07-11 12:06 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 2.37 | 0.20 | µg/L | 2019-07-21 | |
| BS-2 (9071499-04) Matrix: Water Sampled: 2019-07-11 12:06 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 3.62 | 0.20 | µg/L | 2019-07-21 | |
| BS-3 (9071499-05) Matrix: Water Sampled: 2019-07-11 12:10 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 2.50 | 0.20 | µg/L | 2019-07-21 | |
| BS-4 (9071499-06) Matrix: Water Sampled: 2019-07-11 12:10 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 7.89 | 0.20 | µg/L | 2019-07-21 | |
| DF-1 (9071499-07) Matrix: Water Sampled: 2019-07-11 12:12 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | < 0.20 | 0.20 | µg/L | 2019-07-21 | |
| KS-1 (9071499-08) Matrix: Water Sampled: 2019-07-11 12:19 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 2.06 | 0.20 | µg/L | 2019-07-21 | |
| BS-5 (9071499-09) Matrix: Water Sampled: 2019-07-11 12:23 | | | | | |
| <i>Total Metals</i> | | | | | |

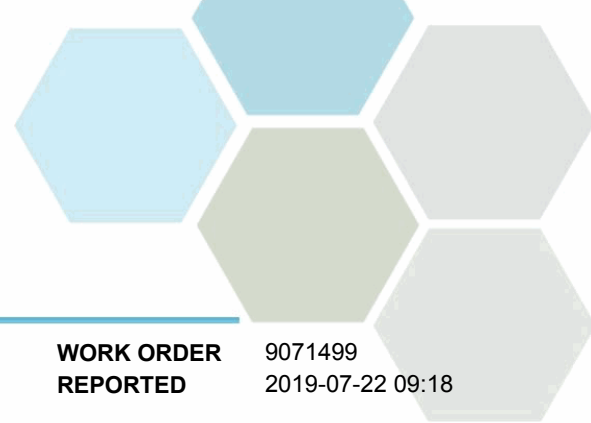


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| Analyte | Result | RL | Units | Analyzed | Qualifier |
|---|--------|------|-------|------------|-----------|
| BS-5 (9071499-09) Matrix: Water Sampled: 2019-07-11 12:23, Continued | | | | | |
| <i>Total Metals, Continued</i> | | | | | |
| Lead, total | 1.26 | 0.20 | µg/L | 2019-07-21 | |
| BS-6 (9071499-10) Matrix: Water Sampled: 2019-07-11 12:23 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 1.74 | 0.20 | µg/L | 2019-07-21 | |
| BS-7 (9071499-11) Matrix: Water Sampled: 2019-07-11 12:23 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 2.07 | 0.20 | µg/L | 2019-07-21 | |
| BS-8 (9071499-12) Matrix: Water Sampled: 2019-07-11 12:29 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 0.87 | 0.20 | µg/L | 2019-07-21 | |
| BS-9 (9071499-13) Matrix: Water Sampled: 2019-07-11 12:29 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 0.75 | 0.20 | µg/L | 2019-07-21 | |
| BS-10 (9071499-14) Matrix: Water Sampled: 2019-07-11 12:29 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 1.47 | 0.20 | µg/L | 2019-07-21 | |
| BS-11 (9071499-15) Matrix: Water Sampled: 2019-07-11 12:29 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 0.59 | 0.20 | µg/L | 2019-07-21 | |
| BS-12 (9071499-16) Matrix: Water Sampled: 2019-07-11 12:36 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 4.55 | 0.20 | µg/L | 2019-07-21 | |
| BS-13 (9071499-17) Matrix: Water Sampled: 2019-07-11 12:38 | | | | | |
| <i>Total Metals</i> | | | | | |

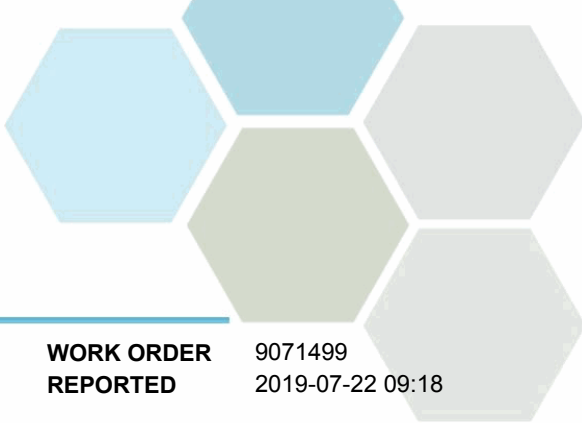


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| Analyte | Result | RL | Units | Analyzed | Qualifier |
|--|--------|------|-------|------------|-----------|
| BS-13 (9071499-17) Matrix: Water Sampled: 2019-07-11 12:38, Continued | | | | | |
| <i>Total Metals, Continued</i> | | | | | |
| Lead, total | 0.46 | 0.20 | µg/L | 2019-07-21 | |
| BS-14 (9071499-18) Matrix: Water Sampled: 2019-07-11 12:38 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 0.21 | 0.20 | µg/L | 2019-07-21 | |
| KS-2 (9071499-19) Matrix: Water Sampled: 2019-07-11 12:42 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 2.56 | 0.20 | µg/L | 2019-07-21 | |
| CS-3 (9071499-20) Matrix: Water Sampled: 2019-07-11 12:45 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 3.04 | 0.20 | µg/L | 2019-07-21 | |
| BS-15 (9071499-21) Matrix: Water Sampled: 2019-07-11 12:45 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 0.84 | 0.20 | µg/L | 2019-07-21 | |
| DF-2 (9071499-22) Matrix: Water Sampled: 2019-07-11 12:45 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 7.40 | 0.20 | µg/L | 2019-07-21 | |
| CS-4 (9071499-23) Matrix: Water Sampled: 2019-07-11 12:50 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 9.00 | 0.20 | µg/L | 2019-07-21 | |
| DF-3 (9071499-24) Matrix: Water Sampled: 2019-07-11 12:50 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 12.0 | 0.20 | µg/L | 2019-07-21 | |
| CS-5 (9071499-25) Matrix: Water Sampled: 2019-07-11 12:53 | | | | | |
| <i>Total Metals</i> | | | | | |

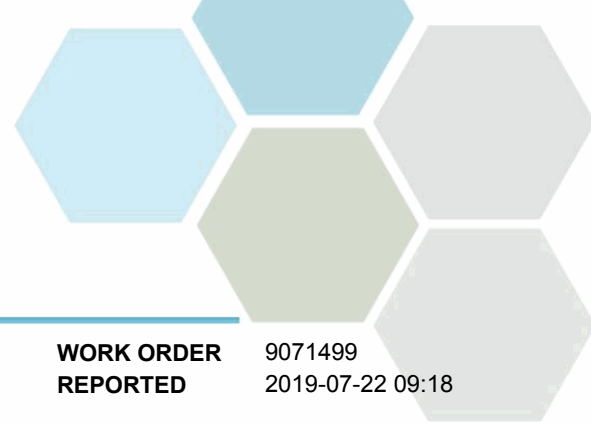


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| Analyte | Result | RL | Units | Analyzed | Qualifier |
|---|--------|------|-------|------------|-----------|
| CS-5 (9071499-25) Matrix: Water Sampled: 2019-07-11 12:53, Continued | | | | | |
| <i>Total Metals, Continued</i> | | | | | |
| Lead, total | 2.27 | 0.20 | µg/L | 2019-07-21 | |
| DF-4 (9071499-26) Matrix: Water Sampled: 2019-07-11 12:53 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 3.19 | 0.20 | µg/L | 2019-07-21 | |
| CS-6 (9071499-27) Matrix: Water Sampled: 2019-07-11 12:57 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 3.05 | 0.20 | µg/L | 2019-07-21 | |
| DF-5 (9071499-28) Matrix: Water Sampled: 2019-07-11 12:57 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 5.47 | 0.20 | µg/L | 2019-07-21 | |
| BS-16 (9071499-29) Matrix: Water Sampled: 2019-07-11 12:57 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 0.47 | 0.20 | µg/L | 2019-07-21 | |
| CS-7 (9071499-30) Matrix: Water Sampled: 2019-07-11 13:05 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 2.94 | 0.20 | µg/L | 2019-07-21 | |
| DF-6 (9071499-31) Matrix: Water Sampled: 2019-07-11 13:05 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 2.20 | 0.20 | µg/L | 2019-07-21 | |
| CS-8 (9071499-32) Matrix: Water Sampled: 2019-07-11 13:08 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 1.01 | 0.20 | µg/L | 2019-07-21 | |
| DF-7 (9071499-33) Matrix: Water Sampled: 2019-07-11 13:08 | | | | | |
| <i>Total Metals</i> | | | | | |

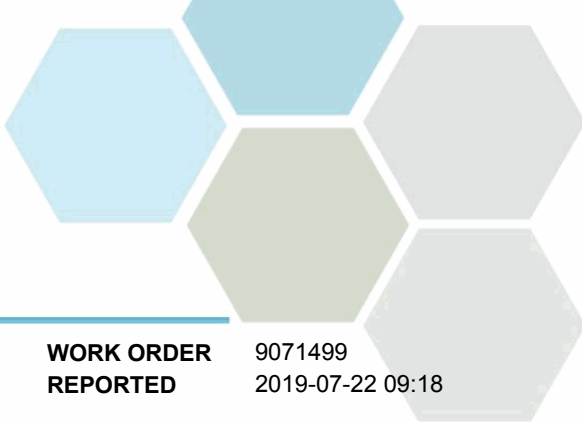


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| Analyte | Result | RL | Units | Analyzed | Qualifier |
|---|--------|------|-------|------------|-----------|
| DF-7 (9071499-33) Matrix: Water Sampled: 2019-07-11 13:08, Continued | | | | | |
| <i>Total Metals, Continued</i> | | | | | |
| Lead, total | 20.5 | 0.20 | µg/L | 2019-07-21 | |
| CS-9 (9071499-34) Matrix: Water Sampled: 2019-07-11 13:11 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 2.14 | 0.20 | µg/L | 2019-07-21 | |
| DF-8 (9071499-35) Matrix: Water Sampled: 2019-07-11 13:11 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 1.99 | 0.20 | µg/L | 2019-07-21 | |
| CS-10 (9071499-36) Matrix: Water Sampled: 2019-07-11 13:14 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 2.56 | 0.20 | µg/L | 2019-07-21 | |
| DF-9 (9071499-37) Matrix: Water Sampled: 2019-07-11 13:14 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 5.08 | 0.20 | µg/L | 2019-07-21 | |
| Tier 2 KS-1 (9071499-38) Matrix: Water Sampled: 2019-07-11 13:17 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 0.24 | 0.20 | µg/L | 2019-07-21 | |
| Tier 2 KS-2 (9071499-39) Matrix: Water Sampled: 2019-07-11 13:17 | | | | | |
| <i>Total Metals</i> | | | | | |
| Lead, total | 0.41 | 0.20 | µg/L | 2019-07-21 | |



APPENDIX 1: SUPPORTING INFORMATION

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| Analysis Description | Method Ref. | Technique | Location |
|-----------------------|------------------------|---|----------|
| Total Metals in Water | EPA 200.2* / EPA 6020B | HNO ₃ +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

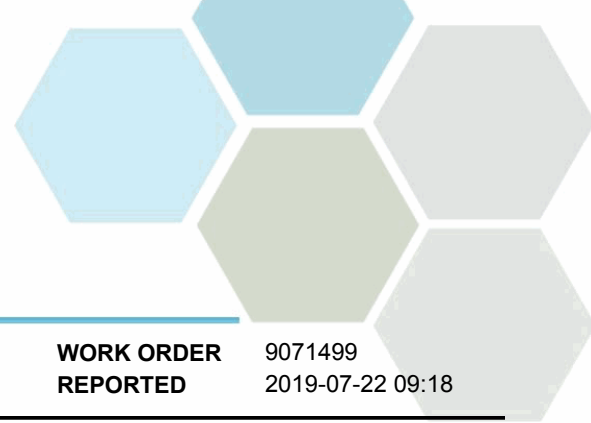
Glossary of Terms:

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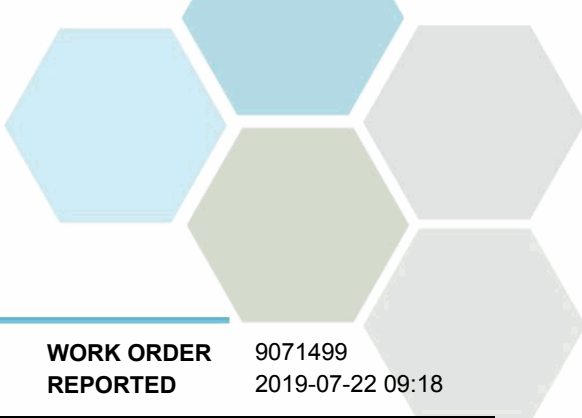
The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in “batches” and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **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 B9G1498 | | | | | | | | | |
| Blank (B9G1498-BLK1) | | | Prepared: 2019-07-17, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | < 0.20 | 0.20 µg/L | | | | | | | |
| Blank (B9G1498-BLK2) | | | Prepared: 2019-07-17, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | < 0.20 | 0.20 µg/L | | | | | | | |
| Blank (B9G1498-BLK3) | | | Prepared: 2019-07-17, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | < 0.20 | 0.20 µg/L | | | | | | | |
| LCS (B9G1498-BS1) | | | Prepared: 2019-07-17, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | 21.8 | 0.20 µg/L | 20.0 | | 109 | 80-120 | | | |
| Duplicate (B9G1498-DUP1) | | | Source: 9071499-21 Prepared: 2019-07-17, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | 0.83 | 0.20 µg/L | | 0.84 | | | | 20 | |
| Reference (B9G1498-SRM1) | | | Prepared: 2019-07-17, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | 192 | 0.20 µg/L | 204 | | 94 | 90-110 | | | |
| Total Metals, Batch B9G1734 | | | | | | | | | |
| Blank (B9G1734-BLK1) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | < 0.20 | 0.20 µg/L | | | | | | | |
| Blank (B9G1734-BLK2) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | < 0.20 | 0.20 µg/L | | | | | | | |
| Blank (B9G1734-BLK3) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | < 0.20 | 0.20 µg/L | | | | | | | |
| LCS (B9G1734-BS1) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | 21.1 | 0.20 µg/L | 20.0 | | 105 | 80-120 | | | |
| Reference (B9G1734-SRM1) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | 188 | 0.20 µg/L | 204 | | 92 | 90-110 | | | |

Total Metals, Batch B9G1735



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 B9G1735, Continued | | | | | | | | | |
| Blank (B9G1735-BLK1) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | < 0.20 | 0.20 µg/L | | | | | | | |
| Blank (B9G1735-BLK2) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | < 0.20 | 0.20 µg/L | | | | | | | |
| Blank (B9G1735-BLK3) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | < 0.20 | 0.20 µg/L | | | | | | | |
| LCS (B9G1735-BS1) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | 21.2 | 0.20 µg/L | 20.0 | | 106 | 80-120 | | | |
| Duplicate (B9G1735-DUP1) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| | | | | Source: 9071499-13 | | | | | |
| Lead, total | 0.80 | 0.20 µg/L | | 0.75 | | | | 20 | |
| Reference (B9G1735-SRM1) | | | Prepared: 2019-07-19, Analyzed: 2019-07-21 | | | | | | |
| Lead, total | 187 | 0.20 µg/L | 204 | | 92 | 90-110 | | | |