

Metals

Case Narrative

COGCC

Work Order Number: 1606358

1. This report consists of 2 water samples.
2. The samples were received cool and intact by ALS on 06/21/16.
3. The samples were to be analyzed for dissolved metals. The samples were filtered through a 0.45 micron filter and preserved with nitric acid to a pH less than 2 prior to analysis.
4. The samples were prepared and analyzed based on Methods for the Determination of Metals in Environmental Samples – Supplement 1 procedures.

Prior to analysis by Trace ICP, an ionization buffer was added to the samples to improve the sodium and potassium quantitation.

For analysis by Trace ICP and ICP-MS, the sample was digested following method 200.2 and the current revision of SOP 806.

5. Analysis by Trace ICP followed method 200.7 and the current revision of SOP 807.

Analysis by ICP-MS followed method 200.8 and the current revision of SOP 827.

6. All standards and solutions are NIST traceable and were used within their recommended shelf life.
7. The samples were prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

8. General quality control procedures.
 - A filter (method) blank and laboratory control sample were filtered, preserved, and digested at the same time as the samples.



- The preparation (method) blank associated with this digestion batch was below the reporting limit for the requested analytes.
- All laboratory control sample criteria were met.
- All initial and continuing calibration blanks were below the reporting limit for the requested analytes.
- All initial and continuing calibration verifications were within the acceptance criteria for the requested analytes.
- The interference check samples associated with Method 200.7 were within acceptance criteria.
- The interference check samples associated with Method 200.8 were analyzed.

9. Matrix specific quality control procedures.

Per method requirements, matrix QC was performed for each analysis. Since a sample from this order number was not the selected quality control (QC) sample, matrix specific QC results are not included in this report.

10. Sample 1606358-1 required a dilution to bring sodium into the analytical range of the Trace ICP.

It is a standard practice that samples for ICP-MS are analyzed at a dilution.

11. Sodium Adsorption Ration (SAR) was determined by calculation based on a reference from the client. Calcium, magnesium, and sodium concentrations were determined by ICP, Method 200.7.

$$SAR = Na / (((Ca + Mg) / 2)^{1/2})$$

The analyte results are the meq/L concentrations based on conversions from their mg/L concentrations. Please note that the SAR value is unitless.



The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Jill Latelle
Jill Latelle
Inorganics Primary Data Reviewer

6/28/16
Date

C. Wolf
Inorganics Final Data Reviewer

6/29/16
Date



Inorganic Data Reporting Qualifiers

The following qualifiers are used by the laboratory when reporting results of inorganic analyses.

- Result qualifier -- A “J” is entered if the reported value was obtained from a reading that was less than the Reporting Limit but greater than or equal to the Method Detection Limit (MDL). If the analyte was analyzed for but not detected a “U” is entered. For samples, negative values are reported as non-detects (“U” flagged). For blanks, if the absolute value of the negative value is above the MDL and below the reporting limit, then the result is “J” flagged.
- QC qualifier -- Specified entries and their meanings are as follows:
 - E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
 - M - Duplicate injection precision was not met.
 - N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
 - Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
 - * - Duplicate analysis (relative percent difference) not within control limits.
 - S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

ALS Environmental -- FC

Sample Number(s) Cross-Reference Table

OrderNum: 1606358

Client Name: COGCC

Client Project Name:

Client Project Number:

Client PO Number: CT 2016-141

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
754914 Sump	1606358-1		WATER	20-Jun-16	
754915 Ret. Pond	1606358-2		WATER	20-Jun-16	13:52



ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: COGCC

Workorder No: 1606358

Project Manager: ARW

Initials: RM Date: 6/21/16

1. Does this project require any special handling in addition to standard ALS procedures?		YES	<u>(NO)</u>
2. Are custody seals on shipping containers intact?	<u>NONE</u>	YES	NO
3. Are Custody seals on sample containers intact?	<u>NONE</u>	YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?		<u>(YES)</u>	NO
5. Are the COC and bottle labels complete and legible?		<u>(YES)</u>	NO
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		<u>(YES)</u>	NO
7. Were airbills / shipping documents present and/or removable?	<u>(DROP OFF)</u>	<u>(YES)</u>	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	<u>(N/A)</u>	YES	NO
9. Are all aqueous non-preserved samples pH 4-9?	<u>(N/A)</u>	<u>(YES)</u>	NO
10. Is there sufficient sample for the requested analyses?		<u>(YES)</u>	NO
11. Were all samples placed in the proper containers for the requested analyses?		<u>(YES)</u>	NO
12. Are all samples within holding times for the requested analyses?		<u>(YES)</u>	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		<u>(YES)</u>	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: <u> </u> < green pea <u> </u> > green pea	<u>(N/A)</u>	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: <u>X</u> dusting <u> </u> moderate <u> </u> heavy	<u>(N/A)</u>	<u>(YES)</u>	NO
16. Were the samples shipped on ice?		<u>(YES)</u>	NO
17. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #2 <u>(#4)</u> RAD ONLY		<u>(YES)</u>	NO
Cooler #: <u>1</u>			
Temperature (°C): <u>4.0°C</u>			
No. of custody seals on cooler: <u>0</u>			
External µR/hr reading: <u>NA</u>			
Background µR/hr reading: <u>11</u>			
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES / NO / <u>(NA)</u> (If no, see Form 008.)			

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

15) Sample 2 has dusting of sediment.

If applicable, was the client contacted? YES / NO / (NA) Contact: _____ Date/Time: _____

Project Manager Signature / Date: Gudy 6/22/16

Dissolved Metals by 200.7

Method EPA200.7 Revision 4.4

Sample Results

Lab Name: ALS Environmental -- FC

Work Order Number: 1606358

Client Name: COGCC

ClientProject ID:

Field ID: 754914 Sump

Lab ID: 1606358-1

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 20-Jun-16

Date Extracted: 24-Jun-16

Date Analyzed: 27-Jun-16

Prep Method: EPA200.2 Rev 2.2

Prep Batch: IP160624-1

QC Batch ID: IP160624-1-1

Run ID: IT160627-1A2

Cleanup: NONE

Basis: As Received

File Name: 160627A.

Analyst: Steve Workman

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	RptLimit/LOQ/LOD	MDL/DL	Result Qualifier	EPA Qualifier
7440-41-7	BERYLLIUM	1	0.00048	0.002	0.00048	U	
7440-42-8	BORON	1	0.22	0.1	0.0099		
7440-70-2	CALCIUM	1	190	1	0.031		
7440-47-3	CHROMIUM	1	0.0014	0.01	0.0014	U	
7439-89-6	IRON	1	0.014	0.1	0.014	U	
7439-93-2	LITHIUM	1	0.09	0.01	0.0016		
7439-95-4	MAGNESIUM	1	60	1	0.019		
7440-02-0	NICKEL	1	0.0019	0.02	0.0019	U	
7440-09-7	POTASSIUM	1	14	1	0.25		
7440-21-3	SILICON	1	8.5	0.05	0.012		
7440-23-5	SODIUM	10	340	10	0.39		
	SODIUM ADSORPTION RATIO	10	5.5	1.7	0.42		
7440-62-2	VANADIUM	1	0.0021	0.01	0.0012	J	

Data Package ID: *it1606358-1*

Date Printed: Tuesday, June 28, 2016

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Dissolved Metals by 200.7

Method EPA200.7 Revision 4.4

Sample Results

Lab Name: ALS Environmental -- FC

Work Order Number: 1606358

Client Name: COGCC

ClientProject ID:

Field ID: 754915 Ret. Pond

Lab ID: 1606358-2

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 20-Jun-16

Date Extracted: 24-Jun-16

Date Analyzed: 27-Jun-16

Prep Method: EPA200.2 Rev 2.2

Prep Batch: IP160624-1

QCBatchID: IP160624-1-1

Run ID: IT160627-1A2

Cleanup: NONE

Basis: As Received

File Name: 160627A.

Analyst: Steve Workman

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	RptLimit/LOQ/LOD	MDL/DL	Result Qualifier	EPA Qualifier
7440-41-7	BERYLLIUM	1	0.00048	0.002	0.00048	U	
7440-42-8	BORON	1	0.12	0.1	0.0099		
7440-70-2	CALCIUM	1	61	1	0.031		
7440-47-3	CHROMIUM	1	0.0014	0.01	0.0014	U	
7439-89-6	IRON	1	0.014	0.1	0.014	U	
7439-93-2	LITHIUM	1	0.019	0.01	0.0016		
7439-95-4	MAGNESIUM	1	6.7	1	0.019		
7440-02-0	NICKEL	1	0.012	0.02	0.0019	J	
7440-09-7	POTASSIUM	1	11	1	0.25		
7440-21-3	SILICON	1	3.4	0.05	0.012		
7440-23-5	SODIUM	1	62	1	0.039		
	SODIUM ADSORPTION RATIO	1	2	0.17	0.042		
7440-62-2	VANADIUM	1	0.0052	0.01	0.0012	J	

Data Package ID: *it1606358-1*

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Dissolved Metals by 200.8

Method EPA200.8 Revision 5.4

Sample Results

Lab Name: ALS Environmental -- FC

Work Order Number: 1606358

Client Name: COGCC

ClientProject ID:

Field ID: 754914 Sump

Lab ID: 1606358-1

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 20-Jun-16

Date Extracted: 24-Jun-16

Date Analyzed: 25-Jun-16

Prep Method: EPA200.2 Rev 2.2

Prep Batch: IP160624-1

QCBatchID: IP160624-1-2

Run ID: IM160625-10A2

Cleanup: NONE

Basis: As Received

File Name: 045SMPL_

Analyst: Brent A. Stanfield

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	RptLimit/LOQ/LOD	MDL/DL	Result Qualifier	EPA Qualifier
7429-90-5	ALUMINUM	10	0.014	0.05	0.014	U	
7440-36-0	ANTIMONY	10	0.00013	0.0003	0.00011	J	
7440-38-2	ARSENIC	10	0.00079	0.002	0.0002	J	
7440-39-3	BARIUM	10	0.1	0.001	0.00016		
7440-43-9	CADMIUM	10	0.000088	0.0003	0.000088	U	
7440-48-4	COBALT	10	0.00026	0.001	0.000083	J	
7440-50-8	COPPER	10	0.0019	0.01	0.0012	J	
7439-92-1	LEAD	10	0.00033	0.0005	0.00017	J	
7439-96-5	MANGANESE	10	0.00034	0.002	0.00034	U	
7439-98-7	MOLYBDENUM	10	0.0014	0.001	0.00038		
7782-49-2	SELENIUM	10	0.022	0.001	0.00066		
7440-22-4	SILVER	10	0.000041	0.0001	0.000041	U	
7440-23-5	SODIUM	10	320	1	0.2		
7440-24-6	STRONTIUM	10	2.7	0.001	0.0003		
7440-28-0	THALLIUM	10	0.000018	0.0002	0.000018	U	
7440-29-1	THORIUM	10	0.00005	0.0002	0.000023	J	
7440-61-1	URANIUM	10	0.027	0.0001	0.00002		
7440-66-6	ZINC	10	0.029	0.02	0.0098		

Data Package ID: im1606358-1

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Dissolved Metals by 200.8

Method EPA200.8 Revision 5.4

Sample Results

Lab Name: ALS Environmental -- FC

Work Order Number: 1606358

Client Name: COGCC

ClientProject ID:

Field ID: 754915 Ret. Pond

Lab ID: 1606358-2

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 20-Jun-16

Date Extracted: 24-Jun-16

Date Analyzed: 25-Jun-16

Prep Method: EPA200.2 Rev 2.2

Prep Batch: IP160624-1

QCBatchID: IP160624-1-2

Run ID: IM160625-10A2

Cleanup: NONE

Basis: As Received

File Name: 046SMPL_

Analyst: Brent A. Stanfield

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	RptLimit/LOQ/LOD	MDL/DL	Result Qualifier	EPA Qualifier
7429-90-5	ALUMINUM	10	0.014	0.05	0.014	U	
7440-36-0	ANTIMONY	10	0.00072	0.0003	0.00011		
7440-38-2	ARSENIC	10	0.0092	0.002	0.0002		
7440-39-3	BARIUM	10	0.15	0.001	0.00016		
7440-43-9	CADMIUM	10	0.000088	0.0003	0.000088	U	
7440-48-4	COBALT	10	0.0018	0.001	0.000083		
7440-50-8	COPPER	10	0.0024	0.01	0.0012	J	
7439-92-1	LEAD	10	0.00026	0.0005	0.00017	J	
7439-96-5	MANGANESE	10	0.054	0.002	0.00034		
7439-98-7	MOLYBDENUM	10	0.035	0.001	0.00038		
7782-49-2	SELENIUM	10	0.002	0.001	0.00066		
7440-22-4	SILVER	10	0.000041	0.0001	0.000041	U	
7440-23-5	SODIUM	10	60	1	0.2		
7440-24-6	STRONTIUM	10	4.2	0.001	0.0003		
7440-28-0	THALLIUM	10	0.000018	0.0002	0.000018	U	
7440-29-1	THORIUM	10	0.000023	0.0002	0.000023	U	
7440-61-1	URANIUM	10	0.0017	0.0001	0.00002		
7440-66-6	ZINC	10	0.015	0.02	0.0098	J	

Data Package ID: *im1606358-1*

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Metals by 200.7

Method EPA200.7 Revision 4.4

Method Blank

Lab Name: ALS Environmental -- FC

Work Order Number: 1606358

Client Name: COGCC

ClientProject ID:

Lab ID: FP160624-1MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 24-Jun-16

Date Analyzed: 27-Jun-16

Prep Batch: IP160624-1

QCBatchID: IP160624-1-1

Run ID: IT160627-1A2

Cleanup: NONE

Basis: N/A

File Name: 160627A.

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	DF	Result	RptLimit/ LOQ/LOD	MDL/DL	Result Qualifier	EPA Qualifier
7440-41-7	BERYLLIUM	1	0.00048	0.002	0.00048	U	
7440-42-8	BORON	1	0.0099	0.1	0.0099	U	
7440-70-2	CALCIUM	1	0.031	1	0.031	U	
7440-47-3	CHROMIUM	1	0.0014	0.01	0.0014	U	
7439-89-6	IRON	1	0.014	0.1	0.014	U	
7439-93-2	LITHIUM	1	0.0042	0.01	0.0016	J	
7439-95-4	MAGNESIUM	1	0.019	1	0.019	U	
7440-02-0	NICKEL	1	0.0019	0.02	0.0019	U	
7440-09-7	POTASSIUM	1	0.25	1	0.25	U	
7440-21-3	SILICON	1	0.012	0.05	0.012	U	
7440-23-5	SODIUM	1	0.082	1	0.039	J	
7440-62-2	VANADIUM	1	-0.0014	0.01	0.0012	J	

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Metals by 200.7

Method EPA200.7 Revision 4.4

Laboratory Control Sample

Lab Name: ALS Environmental -- FC

Work Order Number: 1606358

Client Name: COGCC

ClientProject ID:

Lab ID: FP160624-1LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 06/24/2016

Date Analyzed: 06/27/2016

Prep Method: EPA200.22.2

Prep Batch: IP160624-1

QCBatchID: IP160624-1-1

Run ID: IT160627-1A2

Cleanup: NONE

Basis: N/A

File Name: 160627A.

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7440-41-7	BERYLLIUM	0.05	0.0491	0.002		98	85 - 115%
7440-42-8	BORON	1	0.995	0.1		99	85 - 115%
7440-70-2	CALCIUM	40	40.1	1		100	85 - 115%
7440-47-3	CHROMIUM	0.2	0.203	0.01		101	85 - 115%
7439-89-6	IRON	1	0.95	0.1		95	85 - 115%
7439-93-2	LITHIUM	0.5	0.511	0.01		102	85 - 115%
7439-95-4	MAGNESIUM	40	40.1	1		100	85 - 115%
7440-02-0	NICKEL	0.5	0.491	0.02		98	85 - 115%
7440-09-7	POTASSIUM	40	44.6	1		112	85 - 115%
7440-21-3	SILICON	1	1.01	0.05		101	85 - 115%
7440-23-5	SODIUM	40	41.2	1		103	85 - 115%
7440-62-2	VANADIUM	0.5	0.485	0.01		97	85 - 115%

Data Package ID: *it1606358-1*

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Metals by 200.8

Method EPA200.8 Revision 5.4

Method Blank

Lab Name: ALS Environmental -- FC

Work Order Number: 1606358

Client Name: COGCC

ClientProject ID:

Lab ID: FP160624-1MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 24-Jun-16

Date Analyzed: 25-Jun-16

Prep Batch: IP160624-1

QCBatchID: IP160624-1-2

Run ID: IM160625-10A2

Cleanup: NONE

Basis: N/A

File Name: 042SMPL_

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	DF	Result	RptLimit/ LOQ/LOD	MDL/DL	Result Qualifier	EPA Qualifier
7429-90-5	ALUMINUM	10	0.014	0.05	0.014	U	
7440-36-0	ANTIMONY	10	0.00011	0.0003	0.00011	U	
7440-38-2	ARSENIC	10	0.0002	0.002	0.0002	U	
7440-39-3	BARIUM	10	0.00082	0.001	0.00016	J	
7440-43-9	CADMIUM	10	0.000088	0.0003	0.000088	U	
7440-48-4	COBALT	10	0.000083	0.001	0.000083	U	
7440-50-8	COPPER	10	0.0012	0.01	0.0012	U	
7439-92-1	LEAD	10	0.00044	0.0005	0.00017	J	
7439-96-5	MANGANESE	10	0.00034	0.002	0.00034	U	
7439-98-7	MOLYBDENUM	10	0.00038	0.001	0.00038	U	
7782-49-2	SELENIUM	10	0.00066	0.001	0.00066	U	
7440-22-4	SILVER	10	0.000041	0.0001	0.000041	U	
7440-23-5	SODIUM	10	0.2	1	0.2	U	
7440-24-6	STRONTIUM	10	-0.00033	0.001	0.0003	J	
7440-28-0	THALLIUM	10	0.000018	0.0002	0.000018	U	
7440-29-1	THORIUM	10	0.000023	0.0002	0.000023	U	
7440-61-1	URANIUM	10	0.00002	0.0001	0.00002	U	
7440-66-6	ZINC	10	0.0098	0.02	0.0098	U	

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Metals by 200.8

Method EPA200.8 Revision 5.4

Laboratory Control Sample

Lab Name: ALS Environmental -- FC

Work Order Number: 1606358

Client Name: COGCC

ClientProject ID:

Lab ID: FM160624-1LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 06/24/2016

Date Analyzed: 06/25/2016

Prep Method: EPA200.22.2

Prep Batch: IP160624-1

QCBatchID: IP160624-1-2

Run ID: IM160625-10A2

Cleanup: NONE

Basis: N/A

File Name: 044SMPL_

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7429-90-5	ALUMINUM	5	5.04	0.05		101	85 - 115%
7440-36-0	ANTIMONY	0.03	0.0268	0.0003		89	85 - 115%
7440-38-2	ARSENIC	0.1	0.104	0.002		104	85 - 115%
7440-39-3	BARIUM	0.1	0.103	0.001		103	85 - 115%
7440-43-9	CADMIUM	0.03	0.0304	0.0003		101	85 - 115%
7440-48-4	COBALT	0.1	0.106	0.001		106	85 - 115%
7440-50-8	COPPER	1	1.01	0.01		101	85 - 115%
7439-92-1	LEAD	0.05	0.0495	0.0005		99	85 - 115%
7439-96-5	MANGANESE	0.1	0.105	0.002		105	85 - 115%
7439-98-7	MOLYBDENUM	0.1	0.104	0.001		104	85 - 115%
7782-49-2	SELENIUM	0.1	0.104	0.001		104	85 - 115%
7440-22-4	SILVER	0.01	0.00996	0.0001		100	85 - 115%
7440-23-5	SODIUM	10	8.85	1		88	85 - 115%
7440-24-6	STRONTIUM	0.1	0.104	0.001		104	85 - 115%
7440-28-0	THALLIUM	0.002	0.00206	0.0002		103	85 - 115%
7440-29-1	THORIUM	0.01	0.0109	0.0002		109	85 - 115%
7440-61-1	URANIUM	0.01	0.0103	0.0001		103	85 - 115%
7440-66-6	ZINC	2	1.96	0.02		98	85 - 115%

Data Package ID: *im1606358-1*

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