



# Metals

## Case Narrative

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### **COGCC**

### **DCU6-Orphan**

Work Order Number: 1007167

1. This report consists of 1 water sample.
2. The sample was received cool and intact by ALS on 07/16/10.
3. The sample was to be analyzed for dissolved metals. The sample was filtered through a 0.45 micron filter and preserved with nitric acid to a pH less than two prior to analysis.
4. The sample was prepared for analysis 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 sample and associated QC to improve the sodium and potassium quantitation.

For analysis by Trace ICP and ICP-MS, the sample was digested following method 200.2 and SOP 806 Rev. 14.

5. The sample was analyzed following Methods for the Determination of Metals in Environmental Samples – Supplement 1 procedures.

Analysis by Trace ICP followed method 200.7 and SOP 807 Rev. 12.

The relationship between intensity and concentration for each element is established using at least four standards, one of which is a blank solution.

During sample analysis concentrations are computed by the software and the results are printed in mg/L. The instrument software does not provide a printout which gives both intensity and concentration. The validity of the calibration equation is tested by analyzing the following solutions: a blank, a low level check solution with concentrations near the reporting limit, an Initial Calibration Verification (ICV) standard from a 2<sup>nd</sup> source standard solution with concentrations near the middle of the analytical range, a



Continuing Calibration Verification (CCV) standard with concentrations at two times those in the ICV, and a readback of the highest calibration standard.

These solutions provide verification that the calibration equations are functioning properly throughout the analytical range of the instrument. During sample analysis dilutions are made for analytes found at concentrations above the highest calibration standard. No results are taken from extrapolations beyond the highest standard.

Analysis by ICP-MS followed method 200.8 and SOP 827 Rev. 7.

The relationship between intensity and concentration for each element is established using at least four standards, one of which is a blank solution. A calibration equation relating instrument response to concentration is developed by the instrument software. The equation is a higher order polynomial. This type of equation is used to improve quantitation accuracy at lower concentrations where the relationship between concentration and instrument response is non-linear.

During sample analysis concentrations are computed by the software and the results are printed in ug/L. The validity of the calibration equation is tested by analyzing the following solutions: a blank, a low level check solution with concentrations near the reporting limit, an Initial Calibration Verification (ICV) standard from a 2<sup>nd</sup> source standard solution with concentrations near the middle of the analytical range, a Continuing Calibration Verification (CCV) standard with concentrations near the middle of the analytical range but different than those in the ICV, and a readback of the highest calibration standard.

These solutions provide verification that the calibration equations are functioning properly throughout the analytical range of the instrument. During sample analysis dilutions are made for analytes found at concentrations above the highest calibration standard. No results are taken from extrapolations beyond the highest standard.

6. All standards and solutions are NIST traceable and were used within their recommended shelf life.
7. The sample was 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 samples were filtered, preserved, and digested at the same time as the samples. There were not more than 20 samples associated with each filtered blank and laboratory control sample.
  - The preparation (method) blank associated with this digestion batch was below the reporting limit for the requested analytes.



- The laboratory control samples associated with this digestion batch were within the acceptance limits. This indicates complete digestions according to the method.
- All initial and continuing calibration blanks associated with each analytical batch were below the practical quantitation limits for the requested analytes.
- All initial and continuing calibration verifications associated with each analytical batch were within the acceptance criteria for the requested analytes. This indicates a valid calibration and stable instrument conditions.
- The interference check samples associated with Method 200.7 were within acceptance criteria.
- The interference check samples associated with Method 200.8 were analyzed, and the high standard readbacks were within acceptance criteria.

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. The sample 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 Ratio (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 me/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.

Megan Johnson  
Emily Knodel  
Inorganics Primary Data Reviewer

8/17/10  
Date

Joe E. Miller  
Inorganics Final Data Reviewer

8-17-10  
Date



### **Inorganic Data Reporting Qualifiers**

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

- Result qualifier -- If the analyte was analyzed for but not detected a "U" is entered.
- 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.

# ALS Laboratory Group -- FC

## Sample Number(s) Cross-Reference Table

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**Paragon OrderNum:** 1007167

**Client Name:** COGCC

**Client Project Name:** DCU6-Orphan

**Client Project Number:**

**Client PO Number:** OE PHA 11000000014

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Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
DCU #6	1007167-1		WATER	15-Jul-10	12:00
Trip Blank	1007167-2		WATER	15-Jul-10	





CONDITION OF SAMPLE UPON RECEIPT FORM

Client: COGCC

Workorder No: 1007167

Project Manager: ARW

Initials: LAS Date: 7/16/10

1. Does this project require any special handling in addition to standard Paragon procedures?		YES	<input checked="" type="radio"/> NO
2. Are custody seals on shipping containers intact?	NONE	<input checked="" type="radio"/> YES	NO
3. Are Custody seals on sample containers intact?	<input checked="" type="radio"/> NONE	YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?		<input checked="" type="radio"/> YES	NO
5. Are the COC and bottle labels complete and legible?		<input checked="" type="radio"/> YES	NO
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		<input checked="" type="radio"/> YES	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	<input checked="" type="radio"/> YES	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	YES	<input checked="" type="radio"/> NO
9. Are all aqueous non-preserved samples pH 4-9?	N/A	<input checked="" type="radio"/> YES	NO
10. Is there sufficient sample for the requested analyses?		<input checked="" type="radio"/> YES	NO
11. Were all samples placed in the proper containers for the requested analyses?		<input checked="" type="radio"/> YES	NO
12. Are all samples within holding times for the requested analyses?		<input checked="" type="radio"/> YES	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		<input checked="" type="radio"/> YES	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: <input checked="" type="checkbox"/> < green pea <input type="checkbox"/> > green pea	N/A	YES	<input checked="" type="radio"/> NO
15. Do perchlorate LCMS-MS samples have headspace? (at least 1/3 of container required)	<input checked="" type="radio"/> N/A	YES	NO
16. Were samples checked for and free from the presence of residual chlorine? (Applicable when PM has indicated samples are from a chlorinated water source; note if field preservation with sodium thiosulfate was not observed.)	<input checked="" type="radio"/> N/A	YES	NO
17. Were the samples shipped on ice?		<input checked="" type="radio"/> YES	NO
18. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: <input checked="" type="radio"/> #2 <input type="radio"/> #4		RAD ONLY	<input checked="" type="radio"/> YES <input type="radio"/> NO
Cooler #: <u>1</u>			
Temperature (°C): <u>2.6</u>			
No. of custody seals on cooler: <u>2</u>			
External µR/hr reading: <u>12</u>			
Background µR/hr reading: <u>10</u>			
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? <input checked="" type="radio"/> YES <input type="radio"/> NO <input type="radio"/> NA (If no, see Form 008.)			

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

\*8 1007167-1-10 (DCU#6) 125ml amber initial pH = 7  
0.4mL H<sub>2</sub>SO<sub>4</sub> (Lot #49245) added by LAS @ 1040 7/16/10  
Final pH < 2

\*14 1007167-1-5, 1-6 40mL vials for GRO have headspace < pea size

If applicable, was the client contacted?  YES  NO  NA Contact: Linda Sping Drouke Date/Time: 7/19/10

Project Manager Signature / Date: [Signature] 7/19/10

\*IR Gun #2: Oakton, SN 29922500201-0066

\*IR Gun #4: Oakton, SN 2372220101-0002

# Dissolved Metals by 200.7

Method EPA200.7 Revision 4.4

## Sample Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 1007167

Client Name: COGCC

ClientProject ID: DCU6-Orphan

Field ID:	DCU #6
Lab ID:	1007167-1

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 15-Jul-10

Date Extracted: 28-Jul-10

Date Analyzed: 30-Jul-10

Prep Method: EPA200.2 Rev 2.8

Prep Batch: IP100728-3

QCBatchID: IP100728-3-3

Run ID: IT100730-1A4

Cleanup: NONE

Basis: As Received

File Name: T100730A

Sample Aliquot: 50 g

Final Volume: 50 g

Result Units: mg/l

Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-39-3	BARIUM	1	4.9	0.1		
7440-41-7	BERYLLIUM	1	0.002	0.002	U	
7440-42-8	BORON	1	1.4	0.1		
7440-70-2	CALCIUM	1	14	1		
7440-47-3	CHROMIUM	1	0.01	0.01	U	
7440-48-4	COBALT	1	0.01	0.01	U	
7440-50-8	COPPER	1	0.01	0.01	U	
7439-89-6	IRON	1	0.1	0.1	U	
7439-93-2	LITHIUM	1	0.82	0.01		
7439-95-4	MAGNESIUM	1	2.8	1		
7439-96-5	MANGANESE	1	0.01	0.01	U	
7440-02-0	NICKEL	1	0.02	0.02	U	
7440-09-7	POTASSIUM	1	21	1		
7440-21-3	SILICON	1	10	0.05		
7440-23-5	SODIUM	10	950	10		
	SODIUM ADSORPTION RATIO	10	61	1.7		
7440-24-6	STRONTIUM	1	1.4	0.01		
7440-62-2	VANADIUM	1	0.01	0.01	U	
7440-66-6	ZINC	1	0.02	0.02	U	

Data Package ID: IT1007167-1

# Dissolved Metals by 200.8

Method EPA200.8 Revision 5.4

## Sample Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 1007167

Client Name: COGCC

ClientProject ID: DCU6-Orphan

Field ID:	DCU #6
Lab ID:	1007167-1

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 15-Jul-10

Date Extracted: 28-Jul-10

Date Analyzed: 29-Jul-10

Prep Method: EPA200.2 Rev 2.8

Prep Batch: IP100728-3

QCBatchID: IP100728-3-2

Run ID: IM100729-10A2

Cleanup: NONE

Basis: As Received

File Name: 037SMPL\_

Sample Aliquot: 50 g

Final Volume: 50 g

Result Units: UG/L

Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	10	0.3	0.3	U	
7440-38-2	ARSENIC	10	2	2	U	
7440-43-9	CADMIUM	10	0.3	0.3	U	
7439-92-1	LEAD	10	0.5	0.5	U	
7439-98-7	MOLYBDENUM	10	1	1	U	
7782-49-2	SELENIUM	10	1	1	U	
7440-22-4	SILVER	10	0.1	0.1	U	
7440-28-0	THALLIUM	10	0.2	0.2	U	
7440-61-1	URANIUM	10	0.1	0.1	U	

Data Package ID: IM1007167-1

# Metals by 200.7

Method EPA200.7 Revision 4.4

Method Blank

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 1007167

Client Name: COGCC

ClientProject ID: DCU6-Orphan

Lab ID: IP100728-3MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 28-Jul-10

Date Analyzed: 30-Jul-10

Prep Method: EPA200.2 Rev 2.8

Prep Batch: IP100728-3

QCBatchID: IP100728-3-3

Run ID: IT100730-1A4

Cleanup: NONE

Basis: N/A

File Name: T100730A

Sample Aliquot: 50 g

Final Volume: 50 g

Result Units: mg/l

Clean DF: 1

CASNO	Target Analyte	DF	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-39-3	BARIUM	1	0.1	0.1	U	
7440-41-7	BERYLLIUM	1	0.002	0.002	U	
7440-42-8	BORON	1	0.1	0.1	U	
7440-70-2	CALCIUM	1	1	1	U	
7440-47-3	CHROMIUM	1	0.01	0.01	U	
7440-48-4	COBALT	1	0.01	0.01	U	
7440-50-8	COPPER	1	0.01	0.01	U	
7439-89-6	IRON	1	0.1	0.1	U	
7439-93-2	LITHIUM	1	0.01	0.01	U	
7439-95-4	MAGNESIUM	1	1	1	U	
7439-96-5	MANGANESE	1	0.01	0.01	U	
7440-02-0	NICKEL	1	0.02	0.02	U	
7440-09-7	POTASSIUM	1	1	1	U	
7440-21-3	SILICON	1	0.05	0.05	U	
7440-23-5	SODIUM	1	1	1	U	
7440-24-6	STRONTIUM	1	0.01	0.01	U	
7440-62-2	VANADIUM	1	0.01	0.01	U	
7440-66-6	ZINC	1	0.02	0.02	U	

Data Package ID: IT1007167-1

Date Printed: Sunday, August 15, 2010

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# Metals by 200.7

## Method EPA200.7 Revision 4.4

### Laboratory Control Sample

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 1007167

Client Name: COGCC

ClientProject ID: DCU6-Orphan

Lab ID: IP100728-3LCS

Sample Matrix: WATER  
% Moisture: N/A  
Date Collected: N/A  
Date Extracted: 07/28/2010  
Date Analyzed: 07/30/2010  
Prep Method: EPA200.22.8

Prep Batch: IP100728-3  
QCBatchID: IP100728-3-3  
Run ID: IT100730-1A4  
Cleanup: NONE  
Basis: N/A  
File Name: T100730A

Sample Aliquot: 50 g  
Final Volume: 50 g  
Result Units: mg/l  
Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7440-39-3	BARIUM	2	2.02	0.1		101	85 - 115%
7440-41-7	BERYLLIUM	0.05	0.0479	0.002		96	85 - 115%
7440-42-8	BORON	1	1.02	0.1		102	85 - 115%
7440-70-2	CALCIUM	40	40	1		100	85 - 115%
7440-47-3	CHROMIUM	0.2	0.195	0.01		98	85 - 115%
7440-48-4	COBALT	0.5	0.49	0.01		98	85 - 115%
7440-50-8	COPPER	0.25	0.249	0.01		100	85 - 115%
7439-89-6	IRON	1	1.11	0.1		111	85 - 115%
7439-93-2	LITHIUM	0.5	0.497	0.01		99	85 - 115%
7439-95-4	MAGNESIUM	40	41	1		102	85 - 115%
7439-96-5	MANGANESE	0.5	0.501	0.01		100	85 - 115%
7440-02-0	NICKEL	0.5	0.499	0.02		100	85 - 115%
7440-09-7	POTASSIUM	40	42.1	1		105	85 - 115%
7440-21-3	SILICON	2	2.01	0.05		101	85 - 115%
7440-23-5	SODIUM	40	40.9	1		102	85 - 115%
7440-24-6	STRONTIUM	0.5	0.506	0.01		101	85 - 115%
7440-62-2	VANADIUM	0.5	0.502	0.01		100	85 - 115%
7440-66-6	ZINC	0.5	0.493	0.02		99	85 - 115%

Data Package ID: IT1007167-1

Date Printed: Sunday, August 15, 2010

ALS Laboratory Group -- FC

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# Metals by 200.8

Method EPA200.8 Revision 5.4

Method Blank

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 1007167

Client Name: COGCC

ClientProject ID: DCU6-Orphan

Lab ID: IM100728-3MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 28-Jul-10

Date Analyzed: 29-Jul-10

Prep Method: EPA200.2 Rev 2.8

Prep Batch: IP100728-3

QCBatchID: IP100728-3-2

Run ID: IM100729-10A2

Cleanup: NONE

Basis: N/A

File Name: 034SMPL\_

Sample Aliquot: 50 g

Final Volume: 50 g

Result Units: UG/L

Clean DF: 1

CASNO	Target Analyte	DF	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	10	0.3	0.3	U	
7440-38-2	ARSENIC	10	2	2	U	
7440-43-9	CADMIUM	10	0.3	0.3	U	
7439-92-1	LEAD	10	0.5	0.5	U	
7439-98-7	MOLYBDENUM	10	1	1	U	
7782-49-2	SELENIUM	10	1	1	U	
7440-22-4	SILVER	10	0.1	0.1	U	
7440-28-0	THALLIUM	10	0.2	0.2	U	
7440-61-1	URANIUM	10	0.1	0.1	U	

Data Package ID: IM1007167-1

Date Printed: Sunday, August 15, 2010

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# Metals by 200.8

## Method EPA200.8 Revision 5.4

### Laboratory Control Sample

**Lab Name:** ALS Laboratory Group -- FC  
**Work Order Number:** 1007167  
**Client Name:** COGCC  
**ClientProject ID:** DCU6-Orphan

Lab ID: IM100728-3LCS

<b>Sample Matrix:</b> WATER	<b>Prep Batch:</b> IP100728-3	<b>Sample Aliquot:</b> 50 g
<b>% Moisture:</b> N/A	<b>QCBatchID:</b> IP100728-3-2	<b>Final Volume:</b> 50 g
<b>Date Collected:</b> N/A	<b>Run ID:</b> IM100729-10A2	<b>Result Units:</b> UG/L
<b>Date Extracted:</b> 07/28/2010	<b>Cleanup:</b> NONE	<b>Clean DF:</b> 1
<b>Date Analyzed:</b> 07/29/2010	<b>Basis:</b> N/A	
<b>Prep Method:</b> EPA200.22.8	<b>File Name:</b> 036SMPL_	

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7440-36-0	ANTIMONY	30	26.9	0.3		90	85 - 115%
7440-38-2	ARSENIC	100	93.7	2		94	85 - 115%
7440-43-9	CADMIUM	30	27.3	0.3		91	85 - 115%
7439-92-1	LEAD	50	46.6	0.5		93	85 - 115%
7439-98-7	MOLYBDENUM	100	89.7	1		90	85 - 115%
7782-49-2	SELENIUM	100	91.5	1		91	85 - 115%
7440-22-4	SILVER	10	9.91	0.1		99	85 - 115%
7440-28-0	THALLIUM	1	0.99	0.2		99	85 - 115%
7440-61-1	URANIUM	10	9.43	0.1		94	85 - 115%

**Data Package ID:** IM1007167-1