



# ALS Paragon



## Metals Case Narrative

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### **Colorado Oil & Gas Conservation Commission**

**Complaint 200204501**

**Work Order Number: 0904037**

1. This report consists of 1 water sample.
2. The sample was received cool and intact by ALS Paragon on 04/03/09.
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. 13.

The sample was prepared for ICP-MS analysis of arsenic and selenium by passing the digested sample and associated QC through a cation exchange column. The cation exchange column removes cations from the matrix and eliminates the CaCl<sup>+</sup> (mass 75) interferences on arsenic.

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. 11.

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. 6.

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 sample were filtered, preserved, and digested at the same time as the samples. There were not more than 20 samples associated with the filtered blank and laboratory control sample.
  - The filter (method) blank associated with this digestion batch was below the practical quantitation limit for each requested analyte.



- The laboratory control sample associated with this digestion batch was within the acceptance limits for each analyte. 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 200.8 were analyzed, and the high standard readbacks were within acceptance criteria.
- The interference check samples and high standard readbacks associated with Method 200.7 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.

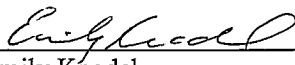
10. It is a standard ALS Paragon practice that samples for ICP-MS are analyzed at a dilution.

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.

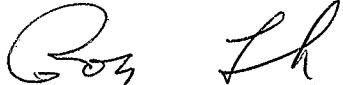
$$SAR = Na / (((Ca + Mg) / 2)^{1/2})$$

The analyte results are the 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 Paragon certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

  
Emily Khodel  
Inorganics Primary Data Reviewer

04-13-09  
Date

  
Inorganics Final Data Reviewer

4/13/09  
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.
  - S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

# ALS Paragon

## Sample Number(s) Cross-Reference Table

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**Paragon OrderNum:** 0904037

**Client Name:** Colorado Oil & Gas Conservation Commission

**Client Project Name:** Complaint 200204501

**Client Project Number:**

**Client PO Number:** OE PHA 090000000004

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Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
Dahl WW	0904037-1		WATER	02-Apr-09	12:18
Trip Blank	0904037-2		WATER	02-Apr-09	



Paragon Analyticals

A Division of DataChem Laboratories, Inc.

225 Commerce Drive Fort Collins, CO 80524

800-443-1511 or (970) 490-1511 (970) 490-1522 Fax

Accession Number (LAB ID)

Chain-of-Custody Date

Originator: Retain pink copy!

0904037

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Project Name/No.: <u>Contaminates</u>		Sampler(s): <u>Contaminates</u>		Turnaround (circle one) <u>Standard</u> or <u>Rush</u> (Due <u>14 days</u> )		Dispose: Date <u>30 days</u> or Return to Client			
Report To: <u>Peter Gintautas</u>		Phone: <u>719-846-3611</u>		Fax: <u>Peter.gintautas@state.co.us</u>		Company: <u>Cal. C. &amp; Gas Cons. Comm</u>		Address:	
Circle method (right); provide additional information as needed (comments).		Sample ID		Date	Time *	Lab ID	Matrix	Preservative	No. of Containers
VOCs		SW8260B - 25 Full + TICs							
BTEX (only in off-gas, off-gas effluents)		SW8270C - Full + TICs							
OC Pesticides - <u>TLC</u>		SW8081A							
PCBs		SW8082							
Herbicides		SW8151A							
Explosives		SW8330							
TCLP Organics SW1311		SW8260B 8270C 8081A 8151A							
TCLP Metals SW1311 Hg		SW6010B 7470							
Total Metals by ICP Hg		SW6010B 7470 7471 E200.7							
Dissolved Metals by ICP Hg		SW6010B 7470 E200.7							
Total Metals by ICP/MS		SW6020A E200.8							
Dissolved Metals by ICP/MS		SW6020A E200.8							
Hexavalent Chromium		SW1716A (specify in comments)							
Inorganic Anions		SW9056 E300.0 (specify in comments)							
Solids:		Total E160.3 TDS E160.1 TSS E160.2							
PH		SW9040B SW9045C							
TPH		SW8015B GRO DRO (circle one or both)							
Gross Alpha / Beta		SW9310 E900.0							
Actinides by Paragon SOP		Pu / U / Am / Th / Cm /							
Tritium		E906.0							
Total Alpha-Emitting Radium		SW9315 E903.0							
Radium 226		E903.1							
Radium 228		SW9320 E904.0							
Strontium 90 (Total RadioSr)		D5811-00							
Gamma Isotopes		E901.1							
Radon 222		SM7510Rn							
SAR calc.		Calc. - 1/11/11							
Relinquished By: (1)		Signature <u>[Signature]</u>		Printed Name <u>Peter Gintautas</u>		Date <u>2/1/11</u>		Time <u>16:10</u>	
Relinquished By: (2)		Signature <u>[Signature]</u>		Printed Name <u>[Signature]</u>		Date <u>[Signature]</u>		Time <u>[Signature]</u>	
Received By: (1)		Signature <u>[Signature]</u>		Printed Name <u>Lara J. Orban</u>		Date <u>4/3/09</u>		Time <u>1008</u>	
Received By: (2)		Signature <u>[Signature]</u>		Printed Name <u>[Signature]</u>		Date <u>[Signature]</u>		Time <u>[Signature]</u>	

**Paragon Analytics**

Workorder No: 09 04 037

Initials: LJO Date: 4/3/09

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

If applicable, was the client contacted? YES / NO / ~~NA~~ 6 Contact: \_\_\_\_\_ Date/Time: \_\_\_\_\_

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

# Dissolved Metals by 200.7

Method EPA200.7 Revision 4.4

## Sample Results

Lab Name: ALS Paragon

Work Order Number: 0904037

Client Name: Colorado Oil & Gas Conservation Commission

ClientProject ID: Complaint 200204501

Field ID: Dahl WW

Lab ID: 0904037-1

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 02-Apr-09

Date Extracted: 09-Apr-09

Date Analyzed: 09-Apr-09

Prep Method: EPA200.2 Rev 2.8

Prep Batch: IP090409-2

QCBatchID: IP090409-2-3

Run ID: IT090409-2A6

Cleanup: NONE

Basis: As Received

File Name: 090409A.

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	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	2.3	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	0.01	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	
7440-23-5	SODIUM	1	100	1		
	SODIUM ADSORPTION RATIO	1	14	0.17	S	
7440-24-6	STRONTIUM	1	0.068	0.01		
7440-66-6	ZINC	1	0.02	0.02	U	

Data Package ID: IT0904037-1

Date Printed: Sunday, April 12, 2009

ALS Paragon

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# Dissolved Metals by 200.8

Method EPA200.8 Revision 5.4

## Sample Results

Lab Name: ALS Paragon

Work Order Number: 0904037

Client Name: Colorado Oil & Gas Conservation Commission

ClientProject ID: Complaint 200204501

Field ID:	Dahl WW
Lab ID:	0904037-1

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 02-Apr-09

Date Extracted: 09-Apr-09

Date Analyzed: 10-Apr-09

Prep Method: EPA200.2 Rev 2.8

Prep Batch: IP090409-2

QCBatchID: IP090409-2-4

Run ID: IM090410-1A2

Cleanup: NONE

Basis: As Received

File Name: 10APR09A

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		
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	1.4	1		
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: IM0904037-1

Date Printed: Sunday, April 12, 2009

ALS Paragon

LIMS Version: 6.255A

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# Metals by 200.7

## Method EPA200.7 Revision 4.4

### Method Blank

Lab Name: ALS Paragon

Work Order Number: 0904037

Client Name: Colorado Oil & Gas Conservation Commission

ClientProject ID: Complaint 200204501

Lab ID: F090408-1MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 09-Apr-09

Date Analyzed: 09-Apr-09

Prep Method: EPA200.2 Rev 2.8

Prep Batch: IP090409-2

QCBatchID: IP090409-2-3

Run ID: IT090409-2A6

Cleanup: NONE

Basis: N/A

File Name: 090409A.

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	
7440-23-5	SODIUM	1	1	1	U	
7440-24-6	STRONTIUM	1	0.01	0.01	U	
7440-66-6	ZINC	1	0.02	0.02	U	

Data Package ID: IT0904037-1

Date Printed: Sunday, April 12, 2009

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# Metals by 200.7

## Method EPA200.7 Revision 4.4

### Laboratory Control Sample

Lab Name: ALS Paragon

Work Order Number: 0904037

Client Name: Colorado Oil & Gas Conservation Commission

ClientProject ID: Complaint 200204501

Lab ID: F090408-1LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 04/09/2009

Date Analyzed: 04/09/2009

Prep Method: EPA200.22.8

Prep Batch: IP090409-2

QCBatchID: IP090409-2-3

Run ID: IT090409-2A6

Cleanup: NONE

Basis: N/A

File Name: 090409A.

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	1.95	0.1		97	85 - 115%
7440-41-7	BERYLLIUM	0.05	0.0491	0.002		98	85 - 115%
7440-42-8	BORON	1	1.01	0.1		101	85 - 115%
7440-70-2	CALCIUM	40	40.6	1		101	85 - 115%
7440-47-3	CHROMIUM	0.2	0.198	0.01		99	85 - 115%
7440-48-4	COBALT	0.5	0.505	0.01		101	85 - 115%
7440-50-8	COPPER	0.25	0.245	0.01		98	85 - 115%
7439-89-6	IRON	1	0.962	0.1		96	85 - 115%
7439-93-2	LITHIUM	0.5	0.494	0.01		99	85 - 115%
7439-95-4	MAGNESIUM	40	40.7	1		102	85 - 115%
7439-96-5	MANGANESE	0.5	0.485	0.01		97	85 - 115%
7440-02-0	NICKEL	0.5	0.5	0.02		100	85 - 115%
7440-09-7	POTASSIUM	40	40.5	1		101	85 - 115%
7440-23-5	SODIUM	40	39.2	1		98	85 - 115%
7440-24-6	STRONTIUM	0.5	0.482	0.01		96	85 - 115%
7440-66-6	ZINC	0.5	0.499	0.02		100	85 - 115%

Data Package ID: IT0904037-1

Date Printed: Sunday, April 12, 2009

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# Metals by 200.8

## Method EPA200.8 Revision 5.4

### Method Blank

Lab Name: ALS Paragon

Work Order Number: 0904037

Client Name: Colorado Oil & Gas Conservation Commission

ClientProject ID: Complaint 200204501

Lab ID: F090408-1MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 09-Apr-09

Date Analyzed: 10-Apr-09

Prep Method: EPA200.2 Rev 2.8

Prep Batch: IP090409-2

QCBatchID: IP090409-2-4

Run ID: IM090410-1A2

Cleanup: NONE

Basis: N/A

File Name: 10APR09A

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: IM0904037-1

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# Metals by 200.8

## Method EPA200.8 Revision 5.4

### Laboratory Control Sample

Lab Name: ALS Paragon

Work Order Number: 0904037

Client Name: Colorado Oil & Gas Conservation Commission

ClientProject ID: Complaint 200204501

Lab ID: FM90408-1LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 04/09/2009

Date Analyzed: 04/10/2009

Prep Method: EPA200.22.8

Prep Batch: IP090409-2

QCBatchID: IP090409-2-4

Run ID: IM090410-1A2

Cleanup: NONE

Basis: N/A

File Name: 10APR09A

Sample Aliquot: 50 g

Final Volume: 50 g

Result Units: UG/L

Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7440-36-0	ANTIMONY	20	20.4	0.3		102	85 - 115%
7440-38-2	ARSENIC	40	38.8	2		97	85 - 115%
7440-43-9	CADMIUM	20	20.2	0.3		101	85 - 115%
7439-92-1	LEAD	100	104	0.5		104	85 - 115%
7439-98-7	MOLYBDENUM	20	20.6	1		103	85 - 115%
7782-49-2	SELENIUM	40	39.5	1		99	85 - 115%
7440-22-4	SILVER	20	21.2	0.1		106	85 - 115%
7440-28-0	THALLIUM	1	0.962	0.2		96	85 - 115%
7440-61-1	URANIUM	20	21.1	0.1		106	85 - 115%

Data Package ID: IM0904037-1

Date Printed: Sunday, April 12, 2009

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