



12065 Lebanon Rd.  
Mt. Juliet, TN 37122  
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Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

Ken Kreie  
Olsson Associates - GJ, CO  
826 21 1/2 Road  
Grand Junction, CO 81505

## Report Summary

Monday June 14, 2010

Report Number: L462889

Samples Received: 06/05/10

Client Project: 010-1237

Description: Soil Background

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

John D. Blackman , ESC Representative

### Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487  
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704, ND - R-140  
NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233  
AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032008A

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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REPORT OF ANALYSIS

June 14, 2010

Ken Kreie
Olsson Associates - GJ, CO
826 21 1/2 Road
Grand Junction, CO 81505

Date Received : June 05, 2010
Description : Soil Background
Sample ID : BG 1 12-24IN
Collected By : Jess Vann
Collection Date : 06/03/10 09:20

ESC Sample # : L462889-01
Site ID :
Project # : 010-1237

Table with 7 columns: Parameter, Result, Det. Limit, Units, Method, Date, Dil. Rows include Chromium, Hexavalent, Chromium, Trivalent, ORP, pH, Sodium Adsorption Ratio, Specific Conductance, Mercury, Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, Silver, Zinc.

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 06/14/10 12:02 Printed: 06/14/10 12:03
L462889-01 (CR6) - diluted due to dark sample color following digestion
L462889-01 (PH) - 7.2@21.6C



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June 14, 2010

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826 21 1/2 Road
Grand Junction, CO 81505

Date Received : June 05, 2010
Description : Soil Background
Sample ID : BG 2 0-6IN
Collected By : Jess Vann
Collection Date : 06/03/10 09:20

ESC Sample # : L462889-02
Site ID :
Project # : 010-1237

Table with 7 columns: Parameter, Result, Det. Limit, Units, Method, Date, Dil. Rows include Chromium, Hexavalent; Chromium, Trivalent; ORP; pH; Sodium Adsorption Ratio; Specific Conductance; Mercury; Arsenic; Barium; Cadmium; Chromium; Copper; Lead; Nickel; Selenium; Silver; Zinc.

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 06/14/10 12:02 Printed: 06/14/10 12:03

L462889-02 (PH) - 6.8@21.4C

L462889-02 (CR6) - diluted due to dark sample color following digestion



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826 21 1/2 Road
Grand Junction, CO 81505

Date Received : June 05, 2010
Description : Soil Background
Sample ID : BG 3 6-24IN
Collected By : Jess Vann
Collection Date : 06/03/10 09:20

ESC Sample # : L462889-03
Site ID :
Project # : 010-1237

Table with 7 columns: Parameter, Result, Det. Limit, Units, Method, Date, Dil. Rows include Chromium, Hexavalent; Chromium, Trivalent; ORP; pH; Sodium Adsorption Ratio; Specific Conductance; Mercury; Arsenic; Barium; Cadmium; Chromium; Copper; Lead; Nickel; Selenium; Silver; Zinc.

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 06/14/10 12:02 Printed: 06/14/10 12:03

L462889-03 (PH) - 6.0@21.3C

L462889-03 (CR6) - diluted due to dark sample color following digestion



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June 14, 2010

Date Received : June 05, 2010  
 Description : Soil Background  
 Sample ID : BG 4 6-12IN  
 Collected By : Jess Vann  
 Collection Date : 06/03/10 09:20

ESC Sample # : L462889-04  
 Site ID :  
 Project # : 010-1237

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium,Hexavalent	BDL	20.	mg/kg	3060A/7196A	06/09/10	10
Chromium,Trivalent	25.	0.50	mg/kg	Calc.	06/13/10	1
ORP	-9.0		mV	2580	06/08/10	1
pH	7.0		su	9045D	06/08/10	1
Sodium Adsorption Ratio	0.74			Calc.	06/11/10	1
Specific Conductance	31.		umhos/cm	9050AMod	06/07/10	1
Mercury	BDL	0.020	mg/kg	7471	06/09/10	1
Arsenic	BDL	1.0	mg/kg	6010B	06/13/10	1
Barium	170	0.25	mg/kg	6010B	06/13/10	1
Cadmium	0.57	0.25	mg/kg	6010B	06/13/10	1
Chromium	25.	0.50	mg/kg	6010B	06/13/10	1
Copper	23.	1.0	mg/kg	6010B	06/13/10	1
Lead	18.	0.25	mg/kg	6010B	06/13/10	1
Nickel	19.	1.0	mg/kg	6010B	06/13/10	1
Selenium	6.9	1.0	mg/kg	6010B	06/13/10	1
Silver	BDL	0.50	mg/kg	6010B	06/13/10	1
Zinc	68.	1.5	mg/kg	6010B	06/13/10	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 06/14/10 12:02 Printed: 06/14/10 12:03  
 L462889-04 (CR6) - diluted due to dark sample color following digestion  
 L462889-04 (PH) - 7.0@21.2C



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REPORT OF ANALYSIS

June 14, 2010

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Date Received : June 05, 2010
Description : Soil Background
Sample ID : BG 5 6-12IN
Collected By : Jess Vann
Collection Date : 06/03/10 09:20

ESC Sample # : L462889-05
Site ID :
Project # : 010-1237

Table with 7 columns: Parameter, Result, Det. Limit, Units, Method, Date, Dil. Rows include Chromium, Hexavalent, Chromium, Trivalent, ORP, pH, Sodium Adsorption Ratio, Specific Conductance, Mercury, Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, Silver, Zinc.

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 06/14/10 12:02 Printed: 06/14/10 12:03

L462889-05 (PH) - 7.3@21.4C

L462889-05 (CR6) - diluted due to dark sample color following digestion

Attachment A  
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L462889-01	WG482349	SAMP	Chromium,Hexavalent	R1248408	O
L462889-02	WG482371	SAMP	Mercury	R1248288	O
	WG482349	SAMP	Chromium,Hexavalent	R1248408	O
L462889-03	WG482349	SAMP	Chromium,Hexavalent	R1248408	O
L462889-04	WG482349	SAMP	Chromium,Hexavalent	R1248408	O
L462889-05	WG482349	SAMP	Chromium,Hexavalent	R1248408	O

Attachment B  
Explanation of QC Qualifier Codes

Qualifier	Meaning
0	(ESC) Sample diluted due to matrix interferences that impaired the ability to make an accurate analytical determination. The detection limit is elevated in order to reflect the necessary dilution.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

- Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.
- Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Difference.
- Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromatography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.
- TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Summary of Remarks For Samples Printed  
06/14/10 at 12:03:20

TSR Signing Reports: 151  
R5 - Desired TAT

Sample: L462889-01 Account: CORCOMGCO Received: 06/05/10 09:00 Due Date: 06/11/10 00:00 RPT Date: 06/14/10 12:02  
Sample: L462889-02 Account: CORCOMGCO Received: 06/05/10 09:00 Due Date: 06/11/10 00:00 RPT Date: 06/14/10 12:02  
Sample: L462889-03 Account: CORCOMGCO Received: 06/05/10 09:00 Due Date: 06/11/10 00:00 RPT Date: 06/14/10 12:02  
Sample: L462889-04 Account: CORCOMGCO Received: 06/05/10 09:00 Due Date: 06/11/10 00:00 RPT Date: 06/14/10 12:02  
Sample: L462889-05 Account: CORCOMGCO Received: 06/05/10 09:00 Due Date: 06/11/10 00:00 RPT Date: 06/14/10 12:02



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Quality Assurance Report  
 Level II

L462889

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Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Specific Conductance	1.20	umhos/cm			WG482184	06/07/10 13:32
pH	5.30	su			WG482352	06/08/10 10:21
Mercury	< .02	mg/kg			WG482371	06/09/10 11:26
Chromium,Hexavalent	< 2	mg/kg			WG482349	06/09/10 15:37
Arsenic	< 1	mg/kg			WG482245	06/13/10 15:07
Barium	< .25	mg/kg			WG482245	06/13/10 15:07
Cadmium	< .25	mg/kg			WG482245	06/13/10 15:07
Chromium	< .5	mg/kg			WG482245	06/13/10 15:07
Copper	< 1	mg/kg			WG482245	06/13/10 15:07
Lead	< .25	mg/kg			WG482245	06/13/10 15:07
Nickel	< 1	mg/kg			WG482245	06/13/10 15:07
Selenium	< 1	mg/kg			WG482245	06/13/10 15:07
Silver	< .5	mg/kg			WG482245	06/13/10 15:07
Zinc	< 1.5	mg/kg			WG482245	06/13/10 15:07

Analyte	Units	Duplicate		RPD	Limit	Ref Samp	Batch
		Result	Duplicate				
Specific Conductance	umhos/cm	72.0	74.0	2.60	20	L462602-01	WG482184
ORP	mV	0	0	0	20	L462725-01	WG482172
pH	su	7.50	7.60	1.32*	1	L462978-03	WG482352
Mercury	mg/kg	0	0	0	20	L462883-07	WG482371
Chromium,Hexavalent	mg/kg	0	0	0	20	L463030-01	WG482349
Chromium,Hexavalent	mg/kg	0	0	0	20	L463212-01	WG482349
Arsenic	mg/kg	0	0	0	20	L462889-01	WG482245
Barium	mg/kg	110.	110.	0.913	20	L462889-01	WG482245
Cadmium	mg/kg	0.380	0.360	5.41	20	L462889-01	WG482245
Chromium	mg/kg	20.0	19.0	7.59	20	L462889-01	WG482245
Copper	mg/kg	17.0	17.0	2.33	20	L462889-01	WG482245
Lead	mg/kg	13.0	13.0	2.28	20	L462889-01	WG482245
Nickel	mg/kg	14.0	14.0	0.712	20	L462889-01	WG482245
Selenium	mg/kg	5.60	6.00	6.90	20	L462889-01	WG482245
Silver	mg/kg	0	0	0	20	L462889-01	WG482245
Zinc	mg/kg	58.0	55.0	4.44	20	L462889-01	WG482245

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Specific Conductance	umhos/cm	406	410.	101.	85-115	WG482184

\* Performance of this Analyte is outside of established criteria.  
 For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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Level II

L462889

June 14, 2010

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
ORP	mV	229	220.	96.1	95.6-104.37	WG482172
pH	su	9.36	9.30	99.4	98.9-102.0	WG482352
Mercury	mg/kg	8.77	9.62	110.	71.6-127.7	WG482371
Chromium,Hexavalent	mg/kg	100	101.	101.	50-143	WG482349
Arsenic	mg/kg	192	167.	87.0	78.6-120.8	WG482245
Barium	mg/kg	420	393.	93.6	78.8-121.4	WG482245
Cadmium	mg/kg	70.1	62.6	89.3	78.5-121.5	WG482245
Chromium	mg/kg	168	163.	97.0	80.4-120.2	WG482245
Copper	mg/kg	122	119.	97.5	81.6-119.7	WG482245
Lead	mg/kg	113	106.	93.8	77.3-122.1	WG482245
Nickel	mg/kg	74.1	71.4	96.4	78.8-121.2	WG482245
Selenium	mg/kg	176	167.	94.9	75.6-125.0	WG482245
Silver	mg/kg	115	103.	89.6	66-133.9	WG482245
Zinc	mg/kg	437	400.	91.5	78.5-121.7	WG482245

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Specific Conductance	umhos/	410.	410.	101.	85-115	0	20	WG482184
ORP	mV	220.	220.	96.0	95.6-104.37	0	20	WG482172
pH	su	9.30	9.30	99.0	98.9-102.0	0	20	WG482352
Chromium,Hexavalent	mg/kg	106.	101.	106.	50-143	4.83	20	WG482349

Analyte	Units	Matrix Spike			% Rec	Limit	Ref Samp	Batch
		MS Res	Ref Res	TV				
Mercury	mg/kg	0.248	0	.25	99.2	70-130	L462883-07	WG482371
Chromium,Hexavalent	mg/kg	15.6	0	20	78.0	50-150	L462978-01	WG482349
Arsenic	mg/kg	41.7	0	50	83.4	75-125	L462889-01	WG482245
Barium	mg/kg	155.	110.	50	90.0	75-125	L462889-01	WG482245
Cadmium	mg/kg	43.2	0.360	50	85.7	75-125	L462889-01	WG482245
Chromium	mg/kg	66.7	19.0	50	95.4	75-125	L462889-01	WG482245
Copper	mg/kg	64.1	17.0	50	94.2	75-125	L462889-01	WG482245
Lead	mg/kg	57.4	13.0	50	88.8	75-125	L462889-01	WG482245
Nickel	mg/kg	57.4	14.0	50	86.8	75-125	L462889-01	WG482245
Selenium	mg/kg	49.5	6.00	50	87.0	75-125	L462889-01	WG482245
Silver	mg/kg	43.8	0	50	87.6	75-125	L462889-01	WG482245
Zinc	mg/kg	98.3	55.0	50	86.6	75-125	L462889-01	WG482245

\* Performance of this Analyte is outside of established criteria.  
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Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Mercury	mg/kg	0.246	0.248	98.4	70-130	0.810	20	L462883-07	WG482371
Chromium,Hexavalent	mg/kg	16.3	15.6	81.5	50-150	4.39	20	L462978-01	WG482349
Arsenic	mg/kg	43.0	41.7	86.0	75-125	3.07	20	L462889-01	WG482245
Barium	mg/kg	160.	155.	100.	75-125	3.17	20	L462889-01	WG482245
Cadmium	mg/kg	44.8	43.2	88.9	75-125	3.64	20	L462889-01	WG482245
Chromium	mg/kg	70.2	66.7	102.	75-125	5.11	20	L462889-01	WG482245
Copper	mg/kg	66.6	64.1	99.2	75-125	3.83	20	L462889-01	WG482245
Lead	mg/kg	59.4	57.4	92.8	75-125	3.42	20	L462889-01	WG482245
Nickel	mg/kg	59.4	57.4	90.8	75-125	3.42	20	L462889-01	WG482245
Selenium	mg/kg	51.0	49.5	90.0	75-125	2.99	20	L462889-01	WG482245
Silver	mg/kg	45.6	43.8	91.2	75-125	4.03	20	L462889-01	WG482245
Zinc	mg/kg	102.	98.3	94.0	75-125	3.69	20	L462889-01	WG482245

Batch number /Run number / Sample number cross reference

WG482184: R1246529: L462889-01 02 03 04 05  
 WG482245: R1247291: L462889-01 02 03 04 05  
 WG482172: R1247550: L462889-01 02 03 04 05  
 WG482352: R1247558: L462889-01 02 03 04 05  
 WG482371: R1248288: L462889-01 02 03 04 05  
 WG482349: R1248408: L462889-01 02 03 04 05  
 WG482246: R1251277: L462889-01 02 03 04 05

\* \* Calculations are performed prior to rounding of reported values .  
 \* Performance of this Analyte is outside of established criteria.  
 For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.