Appendix L Data Validation Reports – March and June through July 2013

Chesapeake GeoSciences, Inc.

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May 15, 2013

Mr. Christopher Ralston
Program Administrator
Oil Control Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 620
Baltimore, Maryland 21230-1719

RE: Laboratory Data Validation (Sediment Sample)
Monrovia BP/Former Green Valley Citgo
11791 Fingerboard Road
Monrovia, Frederick County, MD 21770
MDE-OCP Case No. **2005-0834FR**
Remedial Management Services Contract
CGS Project No. CG-12-0788.05

Dear Mr. Ralston:

Chesapeake GeoSciences, Inc. (CGS) is pleased to provide you with the attached Data Validation Report for the Monrovia BP/Former Green Valley Citgo site in Monrovia, MD. The validated sample was a sediment soil sample collected on March 12, 2013 from a domestic supply well pressure tank at a residence near the former Green Valley Citgo. The sample was analyzed by Phase Separation Science, Inc. for metals via EPA SW 846 Method 6020A.

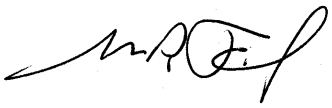
CGS contracted Laboratory Data Consultants, Inc. to perform the third party data validation. The analytical data for this project were validated according to review procedure IM2 guidelines for inorganics, as described in *EPA Region III Innovative Approaches to Data Validation (EPA, 1995)*. The attached table summarizes the qualified sample results, defines the qualifiers, and gives the reason for the qualifier. All instances of reported qualifiers are based on laboratory protocol/contractual deviations. These include continuing laboratory calibration that was not performed within the required recovery limits and interference check sample analyses that were not within required recovery limits. The qualified mercury sample result was due to the continuing laboratory calibration percentage of recovery being higher than the acceptable limit. However, the qualifier is only applicable if the analyte was detected above the reporting limit (mercury was not detected above the reporting limit). All of the other qualified metal sample results listed were due to the interference check sample analysis percentage of recoveries being higher than the acceptable limit. This indicates that the detected results may be biased high.

All of the validated laboratory data were determined to be usable for their intended purpose. The minor outliers identified above did not result in any data being rejected. The data fall within the limits of precision and accuracy prescribed in each analytical method and the EPA Region III Guidelines. A copy of the data validation report is attached.

Please contact me at (410) 740-1911 (x102) or via electronic mail at sdaniel@cgs.us.com if you have any questions regarding this submittal or the project itself. Thank you.

Sincerely,

Chesapeake GeoSciences, Inc.



Sean P. Daniel
Operations Manager

Attachments:

Data Validation Results Summary
Laboratory Data Consultants, Data Validation Report 29656

Monrovia BP/Former Green Valley Citgo
MDE Case No. **2005-0834FR**
Data Validation Results Summary – Qualified Results Only
Inorganic Metals (Method 6020A)

Sample ID	Flagged Analysis Reported Concentration (mg/kg)	Flagged Analysis	Validation Qualifiers	Reason for Qualifier
11712Serene-PTSediment	0.10 U	Method 6020A Mercury	K / P	1
	9.6	Method 6020A Arsenic	K / P	2
	120	Method 6020A Chromium	K / P	2
	13	Method 6020A Cobalt	K / P	2
	220	Method 6020A Copper	K / P	2
	41	Method 6020A Nickel	K / P	2
	5.4	Method 6020A Vanadium	K / P	2

Table Notes:
U - Analyte Not Detected Above Specified Reporting Limit
Bold - Detected analyte concentration
mg/kg - milligrams per kilogram (parts per million)
K - Indicates the reported value may be biased high for all detected concentrations.
P - Indicates the finding is related to a protocol/contractual deviation.
1 – Continuing calibration (Percents of recovery (%R) of 118%/125% are outside acceptable limit range of 90-110%)
2 – Interference check sample analysis (%R of 125% / 133% /127 % / 123% / 125% / 124% are outside the acceptable limit range of 80-120%)

Laboratory Data Consultants, Inc.

7750 El Camino Real, Ste. 2L Carlsbad, CA 92009

Phone 760.634.0437 **Web** www.lab-data.com **Fax** 760.634.0439

Chesapeake GeoScience, Inc.
5405 Twin Knolls Rd, Suite 1
Columbia, MD 21045
ATTN: Mr. Sean P. Daniel

May 14, 2013

SUBJECT: Green Valley Citgo Project, Data Validation

Dear Mr. Daniel,

Enclosed is the final validation report for the fraction listed below. This SDG was received on May 3, 2013. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 29656:

SDG #	Fraction
13031516	Metals

The data validation was performed under EPA Region III, Level IM2. The analyses were validated using the following documents, as applicable to each method:

- EPA Region III Innovative Approaches for Data Validation, EPA June 1995
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; Update IV, February 2007

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
Project Manager/Senior Chemist

Attachment 1

Level IV	LDC #29656 (Chesapeake GeoSciences, Inc- Columbia, MD / Green Valley Citgo Project)																																				
LDC	SDG#	DATE REC'D	(3) DATE DUE	Metals (6020A)																																	
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	13031516	05/03/13	05/24/13	0	1																																
Total	T/PG			0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Shaded cells indicate Level IV validation (all other cells are Level III validation). These sample counts do not include MS, MSD, or DUP's.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Green Valley Citgo Project
Collection Date:	March 12, 2013
LDC Report Date:	May 14, 2013
Matrix:	Sediment
Parameters:	Metals
Validation Level:	EPA Region III, Level IM2
Laboratory:	Phase Separation Science, Inc.
Sample Delivery Group (SDG):	13031516

Sample Identification

11712Serene-PTSediment

Introduction

This data review covers one sediment sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6020A for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows the EPA Region III Innovative Approaches for Data Validation (EPA June 1995).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

The following are definitions of the data qualifiers:

U Indicates the compound or element was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

K Indicates the reported value may be biased high.

L Indicates the reported value may be biased low.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or element was analyzed for but not detected. The sample detection limit is an estimated value.

UL Indicates the compound or element was analyzed for but not detected. The sample detection limit is probably higher.

B Indicates the compound or element was analyzed for but not detected substantially above the level reported in laboratory or field blanks.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
3/22/13	CCV 16:17	Mercury	118 (90-110)	11712Serene-PTSediment	K (all detects)	P
3/22/13	CCV 17:44	Mercury	125 (90-110)	11712Serene-PTSediment	K (all detects)	P

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No metal contaminants were found in the initial, continuing and preparation blanks.

No field blanks were identified in this SDG.

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met with the following exceptions:

ICS ID	Date/ Time	Analyte	%R (Limits)	Associated Samples	Flag	A or P
ICSAB	3/21/13 11:42	Arsenic Chromium Cobalt Copper Nickel Vanadium	125 (80-120) 133 (80-120) 127 (80-120) 123 (80-120) 125 (80-120) 124 (80-120)	11712Serene-PTSediment	K (all detects) K (all detects) K (all detects) K (all detects) K (all detects) K (all detects)	P

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Green Valley Citgo Project
Metals - Data Qualification Summary - SDG 13031516

SDG	Sample	Analyte	Flag	A or P	Reason
13031516	11712Serene-PTSediment	Mercury	K (all detects)	P	Continuing calibration (%R)
13031516	11712Serene-PTSediment	Arsenic Chromium Cobalt Copper Nickel Vanadium	K (all detects) K (all detects) K (all detects) K (all detects) K (all detects) K (all detects)	P	ICP interference check sample analysis (%R)

Green Valley Citgo Project
Metals - Laboratory Blank Data Qualification Summary - SDG 13031516

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Metals - Field Blank Data Qualification Summary - SDG 13031516

No Sample Data Qualified in this SDG

LDC #: 29656A4 **VALIDATION COMPLETENESS WORKSHEET** Date: 5-9-13
SDG #: 13031516 Level IV Page: 1 of 1
Laboratory: Phase Separation Science, Inc. Reviewer: MG
2nd Reviewer: V

METHOD: Metals (EPA SW846 Method 6020A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3-12-13
II.	ICP/MS Tune	A	
III.	Calibration	SW	
IV.	Blanks	~~SW~~ A	
V.	ICP Interference Check Sample (ICS) Analysis	SW	
VI.	Matrix Spike Analysis	N	client specified
VII.	Duplicate Sample Analysis	N	" "
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	~~SW~~ A	
X.	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not performed
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV	Field Blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Sed.

1	11712Serene-PTSediment	11		21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20	PBS	30		40	

Notes:

LDC #: 29656A4

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: L

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?		✓		
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓	✓		
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?		✓		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP (Soil) Water.		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.			✓	
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			✓	
Do all applicable analysies have duplicate injections? (Level IV only)			✓	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		✓		
Were all percent differences (%Ds) < 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓	✓		
If the %Rs were outside the criteria, was a reanalysis performed?		✓	✓	
XI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
XII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 29656A4

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MG
2nd reviewer: V

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1	S	(Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn) Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
ICP-MS	S	(Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn) Mo, B, Si, CN⁻, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻,

Comments: Mercury by CVAA if performed

LDC #: 29656A4

VALIDATION FINDINGS WORKSHEET
Calibration

Page: 1 of 1
Reviewer: MG
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?

Y (N) N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% for all analytes except mercury (80-120%) and cyanide (85-115%)?

LEVEL IV ONLY:

Y N (N/A) Was a midrange cyanide standard distilled?

(Y) N N/A Are all correlation coefficients ≥0.995?

(Y) N N/A Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recalculation Worksheet for recalculations.

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualification of Data
1	3-22-13	CCV (16:17)	Hg	118 (90-110)	1	K detects / P
2	3-22-13	CCV (17:44)	Hg	125 (↓)	↓	↓

Comments:

LDC #: 29656A4

VALIDATION FINDINGS WORKSHEET
ICP Interference Check Sample

Reviewer: MG
2nd Reviewer: V

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were ICP interference check samples performed as required?

Y (N) N/A Were the AB solution percent recoveries (%R) within the control limits of 80-120% ?

LEVEL IV ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	ICS Identification	Analyte	Finding	Associated Samples	Qualifications
1	3-21-13	ICSAB (11:42)	As	125 (80-120)	1	K dets / P
		↓	Cr	133 (↓)	↓	↓
			Co	127 ( )		
			Cu	123 ( )		
			Ni	125 ( )		
		↓	V	124 (↓)	↓	

Comments:

LDC #: 29656A4

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
	ICP (Initial calibration)						
1117 ICV	ICP/MS (Initial calibration)	Co	41.22	40.0	103.0	103.1	Y
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1710 CCV	ICP/MS (Continuing calibration)	Tl	38.87	40.0	97.2	97.2	↓
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 29656A4

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MG
2nd Reviewer: [signature]

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$$\%R = \frac{Found}{True} \times 100$$

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$

Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$$\%D = \frac{|I-SDR|}{I} \times 100$$

Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
1142 ICSAB	ICP interference check	As	25.06 (ug/L)	20 (ug/L)	125	125	Y
1252 LCS	Laboratory control sample	Sb	19.00 (mg/kg)	20.00 (mg/kg)	95	95	↓
—	Matrix spike	—	(SSR-SR) —	—	—	—	—
—	Duplicate	—	—	—	—	—	—
—	ICP serial dilution	—	—	—	—	—	—

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 29656A4

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MG
2nd reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Have results been reported and calculated correctly?
(Y) N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
(Y) N N/A Are all detection limits below the CRDL?

Detected analyte results for # 1, Mn were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

Recalculation:

$$\frac{(374.10\ mg/L)(0.500\ L)(10)}{(1.072\ g)(0.90)} = 1938.7\ \frac{mg}{g}\ \text{or}\ \frac{mg}{Kg}$$

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
1	1	Al	4500	4500	Y
		As	9.6	9.6	
		Ba	10	10	
		Ca	320	320	
		Cr	120	120	
		Co	13	13	
		Cu	220	220	
		Fe	430000	430000	
		Pb	46	46	
		Mg	1500	1500	
		Mn	1900	1900	
		Hg	0.086	0.086	
		Ni	41	41	
		K	190	190	
		Na	140	140	
		V	5.4	5.4	
		Zn	43	43	

Note:

Chesapeake GeoSciences, Inc.

5405 Twin Knolls Road, Suite 1 • Columbia, MD 21045 • ph: 410.740.1911 • fax: 410.740.3299 • www.cgs.us.com

August 29, 2013

Mr. Christopher Ralston
Program Administrator
Oil Control Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 620
Baltimore, Maryland 21230-1719

RE: Laboratory Data Validation
Monrovia BP/Former Green Valley Citgo
11791 Fingerboard Road
Monrovia, Frederick County, MD 21770
MDE-OCP Case No. **2005-0834FR**
Remedial Management Services Contract
CGS Project No. CG-12-0788.07

Dear Mr. Ralston:

Chesapeake GeoSciences, Inc. (CGS) is pleased to provide you with the attached Data Validation Report for the Monrovia BP/Former Green Valley Citgo site in Monrovia, MD. The sample analyses that were validated include analyses of water samples collected from domestic supply wells at residences near the former Green Valley Citgo from June 21 through July 11, 2013. The well water samples were analyzed by Enviro-Chem Laboratories, Inc. for total and dissolved chromium and lead, and for hexavalent chromium (chromate).

CGS contracted Laboratory Data Consultants, Inc. to perform the third party data validation. The analytical data for this project were reviewed following the IM2 guidelines for inorganics, as described in the *EPA Region III Innovative Approaches to Data Validation (June 1995).* The attached table summarizes the qualified sample results, defines the qualifiers, and gives the reason for the qualifier. The hexavalent chromium sample results listed on the table were qualified due to a matrix spike and matrix spike duplicate sample pair with percent recoveries that were below the acceptable limit. For detected analytes, this indicates that the reported value may be biased low, and for analytes not detected, it indicates that the detection limit is probably higher than what was reported. One dissolved lead sample result was qualified due to a laboratory internal standard (Bismuth-209) with a percent recovery that was greater than the acceptable limit. This indicates that the detection limit for that sample result is an estimated value.

All of the validated laboratory data were determined to be usable for their intended purpose. The minor outliers identified above did not result in any data being rejected. The data fall within the limits of precision and accuracy prescribed in each analytical method and the EPA Region III Guidelines. A copy of the data validation report is attached.

Please contact me at (410) 740-1911 (x102) or via electronic mail at sdaniel@cgs.us.com if you have any questions regarding this submittal or the project itself. Thank you.

Sincerely,

Chesapeake GeoSciences, Inc.

Sean P. Daniel
Operations Manager

Attachments:

Data Validation Results Summary
Laboratory Data Consultants, Data Validation Reports:
30160C4/30160C6/ 30160D4/30160D6/ 30160E4/30160E6/30160F4/30160F6

Monrovia BP/Former Green Valley Citgo
MDE Case No. **2005-0834FR**
Data Validation Results Summary – Qualified Results Only
Total & Dissolved Lead & Chromium (EPA 200.8) and Hexavalent Chromium/Chromate (EPA 218.7)

Sample ID	Flagged Analysis Reported Concentration (µg/L)	Flagged Analysis	Validation Qualifiers	Reason for Qualifier
3998Farm-POU	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3998Farm-PT1	**0.024**	Method 218.7 Hexavalent Chromium	**L / A**	1
3998Farm-PT1DB	**0.025**	Method 218.7 Hexavalent Chromium	**L / A**	1
3998Farm-PT2	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3998Farm-PT3	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3998Farm-PT4	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3998Farm-WP1	**0.023**	Method 218.7 Hexavalent Chromium	**L / A**	1
3998Farm-FB	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3740Blueberry-WP3	1.0 U	Method 200.8 Dissolved Lead	**UJ / P**	2
3740Blueberry-POU	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3740Blueberry-PT1	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3740Blueberry-PT/DB	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3740Blueberry-PT2	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3740Blueberry-PT3	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3740Blueberry-PT4	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3740Blueberry-WP1	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3740Blueberry-WP2	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3740Blueberry-WP3	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1
3740Blueberry-FB	0.020 U	Method 218.7 Hexavalent Chromium	**UL / A**	1

Table Notes:

L - Indicates the reported value may be biased low.

UL - Indicates the compound or element was analyzed for but not detected. The sample detection limit is probably higher.

UJ - Indicates the compound or element was analyzed for but not detected. The sample detection limit is an estimated value.

A -Indicates the finding is based upon technical validation criteria.

P -Indicates the finding is related to a protocol/contractual deviation.

U - Analyte Not Detected Above Specified Reporting Limit

Bold - Detected analyte concentration

µg/L - micrograms per liter or parts per billion (ppb)

1 - Matrix spike/Matrix spike duplicate (Percent recoveries (%R) of 76.3%/74.7% are below acceptable limit of 85%)

2 – Internal standards (%R of 138.669% is greater than the acceptable limit of 125%)

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L, Carlsbad, CA 92009 Bus: 760/634-0437 Fax: 760/634-0439

Chesapeake GeoScience, Inc.
5405 Twin Knolls Rd, Suite 1
Columbia, MD 21045
ATTN: Mr. Sean P. Daniel

August 13, 2013

SUBJECT: Green Valley Citgo Project, Data Validation

Dear Mr. Daniel,

Enclosed are the final validation reports for the fraction listed below. These SDGs were received on August 2, 2013. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 30160:

SDG #	Fraction
ECL028637/ECL028662	Metals
ECL028907	
ECL029474	
ECL029318	
ECL029507	
ECL029324	

The data validation was performed under EPA Region III, Level IM2. The analyses were validated using the following documents, as applicable to each method:

- EPA Region III Innovative Approaches for Data Validation, EPA June 1995

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
Project Manager/Senior Chemist

IV

LDC #30160 (Chesapeake GeoSciences, Inc- Columbia, MD / Green Valley Citgo Project)

LDC	SDG#	DATE REC'D	(3) DATE DUE	Cr, Pb (200.8)		Diss Cr, Pb (200.8)		Diss CrVI (218.7)																													
Matrix:	Water/Soil-Product			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	ECL028637/ ECL028662	08/02/13	08/23/13	12	0	12	0	12	0																														
B	ECL028907	08/02/13	08/23/13	7	0	7	0	7	0																														
C	ECL029474	08/02/13	08/23/13	8	0	8	0	8	0																														
D	ECL029318	08/02/13	08/23/13	10	0	10	0	10	0																														
E	ECL029507	08/02/13	08/23/13	10	0	10	0	10	0																														
F	ECL029324	08/02/13	08/23/13	10	0	10	0	10	0																														
Total	A/PG			57	0	57	0	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171

Shaded cells indicate Level IV validation (all other cells are Level III validation). These sample counts do not include MS, MSD, or DUP's.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Green Valley Citgo Project

Collection Date: July 9, 2013

LDC Report Date: August 9, 2013

Matrix: Water

Parameters: Chromium & Lead

Validation Level: EPA Region III, Level IM2

Laboratory: Enviro-Chem Laboratories, Inc.

Sample Delivery Group (SDG): ECL029474

Sample Identification

3998 Farm-POU Total
3998 Farm-POU Dissolved
3998 Farm-PT1 Total
3998 Farm-PT1 Dissolved
3998 Farm-PT1DB Total
3998 Farm-PT1DB Dissolved
3998 Farm-PT2 Total
3998 Farm-PT2 Dissolved
3998 Farm-PT3 Total
3998 Farm-PT3 Dissolved
3998 Farm-PT4 Total
3998 Farm-PT4 Dissolved
3998 Farm-WP1 Total
3998 Farm-WP1 Dissolved
3998 Farm-FB Total
3998 Farm-FB Dissolved
3998 Farm-PT4 TotalMS
3998 Farm-PT4 TotalDUP
3998 Farm-POU TotalMS
3998 Farm-POU TotalDUP

Introduction

This data review covers 20 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium and Lead.

This review follows the EPA Region III Innovative Approaches for Data Validation (EPA June 1995).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

The following are definitions of the data qualifiers:

U Indicates the compound or element was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

K Indicates the reported value may be biased high.

L Indicates the reported value may be biased low.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or element was analyzed for but not detected. The sample detection limit is an estimated value.

UL Indicates the compound or element was analyzed for but not detected. The sample detection limit is probably higher.

B Indicates the compound or element was analyzed for but not detected substantially above the level reported in laboratory or field blanks.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium or lead contaminants were found in the initial, continuing and preparation blanks.

Samples 3998 Farm-FB Total and 3998 Farm-FB Dissolved were identified as field blanks. No chromium or lead contaminants were found.

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required by the method.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met.

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples 3998 Farm-PT1 Total and 3998 Farm-PT1DB Total and samples 3998 Farm-PT1 Dissolved and 3998 Farm-PT1DB Dissolved were identified as field duplicates. No chromium or lead contaminants were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	3998 Farm-PT1 Total	3998 Farm-PT1DB Total	
Lead	10.2	6.7	41

Analyte	Concentration (ug/L)		RPD
	3998 Farm-PT1 Dissolved	3998 Farm-PT1DB Dissolved	
Lead	4.7	4.7	0

Green Valley Citgo Project
Chromium & Lead - Data Qualification Summary - SDG ECL029474

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Chromium & Lead - Laboratory Blank Data Qualification Summary - SDG ECL029474

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Chromium & Lead - Field Blank Data Qualification Summary - SDG ECL029474

No Sample Data Qualified in this SDG

LDC #: 30160C4 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/9/13
SDG #: ECL029474 Level IV Page: 1 of 1
Laboratory: Enviro-Chem Laboratories, Inc. Reviewer: a
2nd Reviewer: W

METHOD: Chromium & Lead (EPA Method 200.8)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 7/9/13
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	N	Not required
VI.	Matrix Spike Analysis	A	MS
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(3,5) (4,6)
XV	Field Blanks	ND	FB=15,16

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: water

1	3998 Farm-POU Total	11	3998 Farm-PT4 Total	21		31	
2	3998 Farm-POU Dissolved	12	3998 Farm-PT4 Dissolved	22		32	
3	3998 Farm-PT1 Total	13	3998 Farm-WP1 Total	23		33	
4	3998 Farm-PT1 Dissolved	14	3998 Farm-WP1 Dissolved	24		34	
5	3998 Farm-PT1DB Total	15	3998 Farm-FB Total	25		35	
6	3998 Farm-PT1DB Dissolved	16	3998 Farm-FB Dissolved	26		36	
7	3998 Farm-PT2 Total	17	3998 Farm-PT4 TotalMS	27		37	
8	3998 Farm-PT2 Dissolved	18	3998 Farm-PT4 TotalDUP	28		38	
9	3998 Farm-PT3 Total	19	(X) MS	29		39	
10	3998 Farm-PT3 Dissolved	20	↓ DUP	30		40	

Notes:

LDC #: 30160C4

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer:

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.	✓			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

LDC #: 30160C4

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			✓	
Do all applicable analysies have duplicate injections? (Level IV only)			✓	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?			✓	
Were all percent differences (%Ds) < 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?			✓	
XI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
XII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XV. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 30160C4

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: OR
2nd reviewer: [signature]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-16		Al, Sb, As, Ba, Be, **Cd**, Ca, **Cr**, Co, Cu, Fe, **Pb**, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
Q: 17,18		Al, Sb, As, Ba, Be, Cd, Ca, **Cr**, Co, Cu, Fe, **Pb**, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___

Comments: Mercury by CVAA if performed

LDC#: 30160C4

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: 1 of 1
Reviewer: [signature]
2nd Reviewer: [signature]

METHOD: Metals (EPA Method 6010B/7000)

Analyte	Concentration (ug/L)		RPD
	3	5	
Lead	10.2	6.7	41

Analyte	Concentration (ug/L)		RPD
	4	6	
Lead	4.7	4.7	0

\\LDCFILESERVER\Validation\FIELD DUPLICATES\FD_inorganic\30160C4.wpd

LDC #: 30160C4

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: QR
2nd Reviewer: LC

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
	ICP (Initial calibration)						
ICV	ICP/MS (Initial calibration)	Pb	97.68	100	98	98	Y
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
CCV	ICP/MS (Continuing calibration)	Cr	1934	200	97	97	Y
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160C4

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: 9R
2nd Reviewer: W

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result). True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration, D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$ Where, I = Initial Sample Result (mg/L), SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
N	ICP interference check						
LCS	Laboratory control sample	Cr	45.8	50	91.6	91.5	Y
19	Matrix spike	Cr	(SSR-SR) 47.0	50	94.0	93.7	↓
16	Duplicate	Cr	36.5	44.0	18.6	18.6	✓
N	ICP serial dilution						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160C4

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: CR
2nd reviewer: W

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for Pb were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

Recalculation:
from raw data
3 = 10.180 ug/L
4 = 4.690 ug/L

#	Sample ID	Analyte	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Acceptable (Y/N)
	3	Pb	10.2	10.2	Y
	4	Pb	4.7	4.7	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Green Valley Citgo Project
Collection Date:	July 9, 2013
LDC Report Date:	August 9, 2013
Matrix:	Water
Parameters:	Dissolved Chromate as Chromium
Validation Level:	EPA Region III, Level IM2
Laboratory:	Enviro-Chem Laboratories, Inc.
Sample Delivery Group (SDG):	ECL209474

Sample Identification

3998 Farm-POU Dissolved
3998 Farm-PT1 Dissolved
3998 Farm-PT1DB Dissolved
3998 Farm-PT2 Dissolved
3998 Farm-PT3 Dissolved
3998 Farm-PT4 Dissolved
3998 Farm-WP1 Dissolved
3998 Farm-FB Dissolved
3998 Farm-POU DissolvedMS
3998 Farm-POU DissolvedMSD

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 218.7 for Dissolved Chromate as Chromium.

This review follows the EPA Region III Innovative Approaches for Data Validation (EPA June 1995).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

The following are definitions of the data qualifiers:

U Indicates the compound or element was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

K Indicates the reported value may be biased high.

L Indicates the reported value may be biased low.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or element was analyzed for but not detected. The sample detection limit is an estimated value.

UL Indicates the compound or element was analyzed for but not detected. The sample detection limit is probably higher.

B Indicates the compound or element was analyzed for but not detected substantially above the level reported in laboratory or field blanks.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Calibration verification

Calibration verification frequency and analysis criteria were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No dissolved chromate as chromium was found in the initial, continuing and preparation blanks.

Sample 3998 Farm-FB Dissolved was identified as a field blank. No dissolved chromate as chromium was found.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
3998 Farm-POU DissolvedMS/MSD (All samples in SDG ECL029474)	Dissolved chromate as chromium	76.3 (85-115)	74.7 (85-115)	-	L (all detects) UL (all non-detects)	A

VI. Duplicates

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) were within the QC limits.

VIII. Sample Result Verification

All sample result verifications were acceptable.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples 3998 Farm-PT1 Dissolved and 3998 Farm-PT1DB Dissolved were identified as field duplicates. No dissolved chromate as chromium was detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/L)		RPD
	3998 Farm-PT1 Dissolved	3998 Farm-PT1DB	
Dissolved chromate as chromium	0.024	0.025	4

Green Valley Citgo Project
Dissolved Chromate as Chromium - Data Qualification Summary - SDG ECL209474

SDG	Sample	Analyte	Flag	A or P	Reason
ECL209474	3998 Farm-POU Dissolved 3998 Farm-PT1 Dissolved 3998 Farm-PT1DB Dissolved 3998 Farm-PT2 Dissolved 3998 Farm-PT3 Dissolved 3998 Farm-PT4 Dissolved 3998 Farm-WP1 Dissolved 3998 Farm-FB Dissolved	Dissolved chromate as chromium	L (all detects) UL (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

Green Valley Citgo Project
Dissolved Chromate as Chromium - Laboratory Blank Data Qualification Summary - SDG ECL209474

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Dissolved Chromate as Chromium - Field Blank Data Qualification Summary - SDG ECL209474

No Sample Data Qualified in this SDG

LDC #: 30160C6 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/9/13
SDG #: ECL029474 Level IV Page: 1 of 1
Laboratory: Enviro-Chem Laboratories, Inc. Reviewer: CA
2nd Reviewer: V

METHOD: Chromate (EPA Method 218.7)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 7/9/13
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Blanks	A	
V	Matrix Spike/Matrix Spike Duplicates	SW	MS/D
VI.	Duplicates	N	
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(2,3)
XI	Field blanks	ND	FB=8

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: water

1	3998 Farm-POU Dissolved	11		21		31	
2	3998 Farm-PT1 Dissolved	12		22		32	
3	3998 Farm-PT1DB Dissolved	13		23		33	
4	3998 Farm-PT2 Dissolved	14		24		34	
5	3998 Farm-PT3 Dissolved	15		25		35	
6	3998 Farm-PT4 Dissolved	16		26		36	
7	3998 Farm-WP1 Dissolved	17		27		37	
8	3998 Farm-FB Dissolved	18		28		38	
9	3998 Farm-POU DissolvedMS	19		29		39	
10	3998 Farm-POU DissolvedMSD	20		30		40	

Notes:

C #: 3016064

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: ✓

Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

C #: 30160CB

VALIDATION FINDINGS CHECKLIST

Reviewer: QR
2nd Reviewer: W

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
X. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 30160C96

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, EPA Method 218.7

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
	9/10	W	Chromate	76.3(85-115)	74.7(85-115)		All	3 L/UL/A

Comments: _____

LDC# 30160C6

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Reviewer: [signature]
2nd Reviewer: [signature]

Inorganics: Method See Cover

Analyte	Concentration (mg/L)		RPD
	2	3	
Chromate	0.024	0.025	4

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LDC #: 30160C6

Validation Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Reviewer: CR
2nd Reviewer: V

Method: Inorganics, Method 218.7

The correlation coefficient (r) for the calibration of CrO4 was recalculated. Calibration date: 6/24/13

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (mg/l)	uv*s	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	CrO4	s1	0.02	0.0506	*1.0000*	1.0000	Y
		s2	0.05	0.1208			
		s3	0.1	0.2176			
		s4	0.25	0.544			
		s5	0.5	1.0689			
		s6	1	2.1432			
		s7	5	10.6889			
Calibration verification	↓	CCV	1	1.0533	105	105	Y
Calibration verification							
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160C4

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = Found x 100 Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = |S-D| x 100 Where, S = Original sample concentration
(S+D)/2 D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
QCS	Laboratory control sample	Chromate	0.973	0.02	87	-	Y
9	Matrix spike sample	↓	(SSR-SR) 0.747	1	74.7	74.7	↓
9/10	Duplicate sample	↓	0.747	0.763	2.1	2.1	↓

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160C4

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: QR
2nd reviewer: [illegible]

METHOD: Inorganics, Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for Chromate reported with a positive detect were recalculated and verified using the following equation:

Concentration = $y = 2.1346x + 0.0089$

Recalculation: $\frac{0.06 - 0.0089}{2.1346} = 0.0239$ ug/L

#	Sample ID	Analyte	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Acceptable (Y/N)
	2	CrO4	0.024	0.024	Y

Note: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Green Valley Citgo Project

Collection Date: June 21, 2013

LDC Report Date: August 9, 2013

Matrix: Water

Parameters: Chromium & Lead

Validation Level: EPA Region III, Level IM2

Laboratory: Enviro-Chem Laboratories, Inc.

Sample Delivery Group (SDG): ECL029318

Sample Identification

11713 Serene-POU Total
11713 Serene-POU Dissolved
11713 Serene-PT1 Total
11713 Serene-PT1 Dissolved
11713 Serene-PT1DB Total
11713 Serene-PT1DB Dissolved
11713 Serene-PT2 Total
11713 Serene-PT2 Dissolved
11713 Serene-PT3 Total
11713 Serene-PT3 Dissolved
11713 Serene-PT4 Total
11713 Serene-PT4 Dissolved
11713 Serene-FB Total
11713 Serene-FB Dissolved
11713 Serene-WP1 Total
11713 Serene-WP1 Dissolved
11713 Serene-WP2 Total
11713 Serene-WP2 Dissolved
11713 Serene-WP3 Total
11713 Serene-WP3 Dissolved
11713 Serene-FB TotalMS
11713 Serene-FB TotalDUP
11713 Serene-PT1 TotalMS
11713 Serene-PT1 TotalDUP

Introduction

This data review covers 24 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium and Lead.

This review follows the EPA Region III Innovative Approaches for Data Validation (EPA June 1995).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

The following are definitions of the data qualifiers:

U Indicates the compound or element was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

K Indicates the reported value may be biased high.

L Indicates the reported value may be biased low.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or element was analyzed for but not detected. The sample detection limit is an estimated value.

UL Indicates the compound or element was analyzed for but not detected. The sample detection limit is probably higher.

B Indicates the compound or element was analyzed for but not detected substantially above the level reported in laboratory or field blanks.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium or lead contaminants were found in the initial, continuing and preparation blanks.

Samples 11713 Serene-FB Total and 11713 Serene-FB Dissolved were identified as field blanks. No chromium or lead contaminants were found.

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required by the method.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples 11713 Serene-PT1 Total and 11713 Serene-PT1DB Total and samples 11713 Serene-PT1 Dissolved and 11713 Serene-PT1DB Dissolved were identified as field duplicates. No chromium or lead contaminants were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	11713 Serene-PT1 Total	11713 Serene-PT1DB	
Chromium	10.5	6.5	47

Analyte	Concentration (ug/L)		RPD
	11713 Serene-PT1 Dissolved	11713 Serene-PT1DB Dissolved	
Chromium	4.4	4.6	4

Green Valley Citgo Project
Chromium & Lead - Data Qualification Summary - SDG ECL029318

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Chromium & Lead - Laboratory Blank Data Qualification Summary - SDG ECL029318

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Chromium & Lead - Field Blank Data Qualification Summary - SDG ECL029318

No Sample Data Qualified in this SDG

LDC #: 30160D4 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/9/13
SDG #: ECL029318 Level IV Page: 1 of 1
Laboratory: Enviro-Chem Laboratories, Inc. Reviewer: a
2nd Reviewer: W

METHOD: Chromium & Lead (EPA Method 200.8)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 6/21/13
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	N	Not required
VI.	Matrix Spike Analysis	A	MS
VII.	Duplicate Sample Analysis	A	Dup
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	
XI.	ICP Serial Dilution	N	
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(3,5) (4,6)
XV	Field Blanks	ND	FB= 13, 14

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: water

1	11713 Serene-POU Total	11	11713 Serene-PT4 Total	21	11713 Serene-FB TotalMS	31	
2	11713 Serene-POU Dissolved	12	11713 Serene-PT4 Dissolved	22	11713 Serene-FB TotalDUP	32	
3	11713 Serene-PT1 Total	13	11713 Serene-FB Total	23	(x3) MS	33	
4	11713 Serene-PT1 Dissolved	14	11713 Serene-FB Dissolved	24	↓ DUP	34	
5	11713 Serene-PT1DB Total	15	11713 Serene-WP1 Total	25	~~x3~~	35	
6	11713 Serene-PT1DB Dissolved	16	11713 Serene-WP1 Dissolved	26		36	
7	11713 Serene-PT2 Total	17	11713 Serene-WP2 Total	27		37	
8	11713 Serene-PT2 Dissolved	18	11713 Serene-WP2 Dissolved	28		38	
9	11713 Serene-PT3 Total	19	11713 Serene-WP3 Total	29		39	
10	11713 Serene-PT3 Dissolved	20	11713 Serene-WP3 Dissolved	30		40	

Notes:

LDC #: 30160D4

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: W

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?			✓	
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			✓	
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.	✓			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?		✓		

Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			✓	
Do all applicable analysies have duplicate injections? (Level IV only)			✓	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?			✓	
Were all percent differences (%Ds) < 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?			✓	
XI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
XII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XV. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 30160D7

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: OR
2nd reviewer: V

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-20		Al, Sb, As, Ba, Be, Cd, Ca, (Cr), Co, Cu, Fe, (Pb), Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
QC 21,22		Al, Sb, As, Ba, Be, Cd, Ca, (Cr), Co, Cu, Fe, (Pb), Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___

Comments: Mercury by CVAA if performed

LDC#: 30160D4

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CN
2nd Reviewer: V

METHOD: Metals (EPA Method 6010B/7000)

Analyte	Concentration (ug/L)		RPD
	3	5	
Chromium	10.5	6.5	47

Analyte	Concentration (ug/L)		RPD
	4	6	
Chromium	4.4	4.6	4

\\LDCFILESERVER\Validation\FIELD DUPLICATES\FD_inorganic\30160D4.wpd

LDC #: 30160Q4

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: QR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
	ICP (Initial calibration)						
ICV	ICP/MS (Initial calibration)	Cr	100.1	100	100	100	Y
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
CCV	ICP/MS (Continuing calibration)	Pb	199.3	200	100	100	Y
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160D4

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: QR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$$\%R = \frac{Found}{True} \times 100$$

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$

Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$$\%D = \frac{|I-SDR|}{I} \times 100$$

Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
N	ICP interference check						
LCS	Laboratory control sample	Cr	54.7	50	109.4	109.3	Y
23	Matrix spike	↓	(SSR-SR) 45.6	50	91.2	89.9	↓
24	Duplicate	↓	9.9	10.5	5.9	5.1	↓
N	ICP serial dilution						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160B4

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: CR
2nd reviewer: V

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for Cr were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

Recalculation:
from raw data
3 = 10.46 ug/L
4 = 4.447 ug/L

#	Sample ID	Analyte	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Acceptable (Y/N)
	3	Cr	10.5	10.5	Y
	4	Cr	4.4	4.4	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Green Valley Citgo Project

Collection Date: June 21, 2013

LDC Report Date: August 9, 2013

Matrix: Water

Parameters: Dissolved Chromate as Chromium

Validation Level: EPA Region III, Level IM2

Laboratory: Enviro-Chem Laboratories, Inc.

Sample Delivery Group (SDG): ECL029318

Sample Identification

11713 Serene-POU Dissolved
11713 Serene-PT1 Dissolved
11713 Serene-PT1DB Dissolved
11713 Serene-PT2 Dissolved
11713 Serene-PT3 Dissolved
11713 Serene-PT4 Dissolved
11713 Serene-FB Dissolved
11713 Serene-WP1 Dissolved
11713 Serene-WP2 Dissolved
11713 Serene-WP3 Dissolved
11713 Serene-WP1 DissolvedMS
11713 Serene-WP1 DissolvedMSD

Introduction

This data review covers 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 218.7 for Dissolved Chromate as Chromium.

This review follows the EPA Region III Innovative Approaches for Data Validation (EPA June 1995).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

The following are definitions of the data qualifiers:

U Indicates the compound or element was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

K Indicates the reported value may be biased high.

L Indicates the reported value may be biased low.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or element was analyzed for but not detected. The sample detection limit is an estimated value.

UL Indicates the compound or element was analyzed for but not detected. The sample detection limit is probably higher.

B Indicates the compound or element was analyzed for but not detected substantially above the level reported in laboratory or field blanks.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Calibration verification

Calibration verification frequency and analysis criteria were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No dissolved chromate as chromium was found in the initial, continuing and preparation blanks.

Sample 11713 Serene-FB Dissolved was identified as a field blank. No dissolved chromate as chromium was found.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicates

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) were within the QC limits.

VIII. Sample Result Verification

All sample result verifications were acceptable.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples 11713 Serene-PT1 Dissolved and 11713 Serene-PT1DB Dissolved were identified as field duplicates. No dissolved chromate as chromium was detected in any of the samples with the following exceptions:

Compound	Concentration (mg/L)		RPD
	11713 Serene-PT1 Dissolved	11713 Serene-PT1DB Dissolved	
Dissolved chromate as chromium	0.111	0.112	1

Green Valley Citgo Project
Dissolved Chromate as Chromium - Data Qualification Summary - SDG ECL029318

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Dissolved Chromate as Chromium - Laboratory Blank Data Qualification Summary - SDG ECL029318

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Dissolved Chromate as Chromium - Field Blank Data Qualification Summary - SDG ECL029318

No Sample Data Qualified in this SDG

LDC #: 30160D6
SDG #: ECL029318
Laboratory: Enviro-Chem Laboratories, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 8/9/13
Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Chromate (EPA Method 218.7)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 6/21/13
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Blanks	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VI.	Duplicates	N	
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(2,3)
XI	Field blanks	ND	FB= 7

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: water

1	11713 Serene-POU Dissolved	11	11713 Serene-WP1 DissolvedMS	21		31	
2	11713 Serene-PT1 Dissolved	12	11713 Serene-WP1 DissolvedMSD	22		32	
3	11713 Serene-PT1DB Dissolved	13		23		33	
4	11713 Serene-PT2 Dissolved	14		24		34	
5	11713 Serene-PT3 Dissolved	15		25		35	
6	11713 Serene-PT4 Dissolved	16		26		36	
7	11713 Serene-FB Dissolved	17		27		37	
8	11713 Serene-WP1 Dissolved	18		28		38	
9	11713 Serene-WP2 Dissolved	19		29		39	
10	11713 Serene-WP3 Dissolved	20		30		40	

Notes:

C #: 3016006

VALIDATION FINDINGS CHECKLIST

Reviewer: QR
2nd Reviewer: W

Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

C #: 3016006

VALIDATION FINDINGS CHECKLIST

Reviewer: QR
2nd Reviewer: W

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
X. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC# 30160D6

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Reviewer:

2nd Reviewer:

Inorganics: Method See Cover

Analyte	Concentration (mg/L)		RPD
	2	3	
Chromate	0.111	0.112	1

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LDC #: 30160B6

Validation Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: CL
2nd Reviewer: [illegible]

Method: Inorganics, Method 218.7

The correlation coefficient (r) for the calibration of CrO4 was recalculated. Calibration date: 6/24/13

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found X 100 / True

Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (mg/l)	uv*s	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	CrO4	s1	0.02	0.0506	*1.0000*	1.0000	Y
		s2	0.05	0.1208			
		s3	0.1	0.2176			
		s4	0.25	0.544			
		s5	0.5	1.0689			
		s6	1	2.1432			
		s7	5	10.6889			
Calibration verification	↓	CCV	5	4.9698	99	99	↓
Calibration verification	↓	↓	0.02	0.0219	110	110	↓
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 50160L6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = Found x 100 / True Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = |S-D| x 100 / (S+D)/2 Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
QCS	Laboratory control sample	Chromate	1.8226	2	91	—	Y
11	Matrix spike sample	@	(SSR-SR) ~~+0.3~~ 0.998	@ 1	100	100	
11/12	Duplicate sample		1.03	0.998	3	—	

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160056

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: QR
2nd reviewer: V

METHOD: Inorganics, Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for Chromate reported with a positive detect were recalculated and verified using the following equation:

Concentration = $y = 2.1346x + 0.0089$

Recalculation: $\frac{0.246 - 0.0089}{2.1346} = 0.1111 \mu g/L$

#	Sample ID	Analyte	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Acceptable (Y/N)
	2	Chromate	0.111	0.111	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Green Valley Citgo Project

Collection Date: July 11, 2013

LDC Report Date: August 9, 2013

Matrix: Water

Parameters: Chromium & Lead

Validation Level: EPA Region III, Level IM2

Laboratory: Enviro-Chem Laboratories, Inc.

Sample Delivery Group (SDG): ECL029507

Sample Identification

3740 Blueberry - POU total
3740 Blueberry - POU dissolved
3740 Blueberry - PT1 total
3740 Blueberry - PT1 dissolved
3740 Blueberry - PT/DB total
3740 Blueberry - PT/DB dissolved
3740 Blueberry - PT2 total
3740 Blueberry - PT2 dissolved
3740 Blueberry - PT3 total
3740 Blueberry - PT3 dissolved
3740 Blueberry - PT4 total
3740 Blueberry - PT4 dissolved
3740 Blueberry - WP1 total
3740 Blueberry - WP1 dissolved
3740 Blueberry - WP2 total
3740 Blueberry - WP2 dissolved
3740 Blueberry - WP3 total
3740 Blueberry - WP3 dissolved
3740 Blueberry - FB total
3740 Blueberry - FB dissolved
3740 Blueberry - POU totalMS
3740 Blueberry - POU totalDUP
3740 Blueberry - PT4 totalMS
3740 Blueberry - PT4 totalDUP

Introduction

This data review covers 24 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium and Lead.

This review follows the EPA Region III Innovative Approaches for Data Validation (EPA June 1995).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

The following are definitions of the data qualifiers:

U Indicates the compound or element was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

K Indicates the reported value may be biased high.

L Indicates the reported value may be biased low.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or element was analyzed for but not detected. The sample detection limit is an estimated value.

UL Indicates the compound or element was analyzed for but not detected. The sample detection limit is probably higher.

B Indicates the compound or element was analyzed for but not detected substantially above the level reported in laboratory or field blanks.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium or lead contaminants were found in the initial, continuing and preparation blanks.

Samples 3740 Blueberry - FB total and 3740 Blueberry - FB dissolved were identified as field blanks. No chromium or lead contaminants were found.

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required by the method.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits with the following exceptions:

Sample	Internal Standard	%R (Limits)	Analyte	Flag	A or P
3740 Blueberry - WP3 dissolved	Bismuth-209	138.669 (60-125)	Lead	J (all detects) UJ (all non-detects)	P

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples 3740 Blueberry - PT1 total and 3740 Blueberry - PT/DB total and samples 3740 Blueberry - PT1 dissolved and 3740 Blueberry - PT/DB dissolved were identified as field duplicates. No chromium or lead contaminants were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	3740 Blueberry - PT1 total	3740 Blueberry - PT/DB total	
Lead	32.3	41.5	25

Analyte	Concentration (ug/L)		RPD
	3740 Blueberry - PT1 dissolved	3740 Blueberry - PT/DB dissolved	
Lead	16.8	16.6	1

Green Valley Citgo Project
Chromium & Lead - Data Qualification Summary - SDG ECL029507

SDG	Sample	Analyte	Flag	A or P	Reason
ECL029507	3740 Blueberry - WP3 dissolved	Lead	J (all detects) UJ (all non-detects)	P	Internal standards (%R)

Green Valley Citgo Project
Chromium & Lead - Laboratory Blank Data Qualification Summary - SDG ECL029507

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Chromium & Lead - Field Blank Data Qualification Summary - SDG ECL029507

No Sample Data Qualified in this SDG

LDC #: 30160E4
SDG #: ECL029507
Laboratory: Enviro-Chem Laboratories, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 8/8/13
Page: 1 of 1
Reviewer: a
2nd Reviewer: [illegible]

METHOD: Chromium & Lead (EPA Method 200.8)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 7/11/13
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	N	Not required
VI.	Matrix Spike Analysis	A	MS
VII.	Duplicate Sample Analysis	A	Dup
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	SW	
X.	Furnace Atomic Absorption QC	N	
XI.	ICP Serial Dilution	N	
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(3,5) (4,6)
XV	Field Blanks	ND	FB= 19,20

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: water

1	3740 Blueberry - POU total	11	3740 Blueberry - PT4 total	21	3740 Blueberry - POU totalMS	31	
2	3740 Blueberry - POU dissolved	12	3740 Blueberry - PT4 dissolved	22	3740 Blueberry - POU totalDup ~~MSD~~	32	
3	3740 Blueberry - PT1 total	13	3740 Blueberry - WP1 total	23	3740 Blueberry - PT4 totalMS	33	
4	3740 Blueberry - PT1 dissolved	14	3740 Blueberry - WP1 dissolved	24	3740 Blueberry - PT4 totalDup ~~MSD~~	34	
5	3740 Blueberry - PT/DB total	15	3740 Blueberry - WP2 total	25		35	
6	3740 Blueberry - PT/DB dissolved	16	3740 Blueberry - WP2 dissolved	26		36	
7	3740 Blueberry - PT2 total	17	3740 Blueberry - WP3 total	27		37	
8	3740 Blueberry - PT2 dissolved	18	3740 Blueberry - WP3 dissolved	28		38	
9	3740 Blueberry - PT3 total	19	3740 Blueberry - FB total	29		39	
10	3740 Blueberry - PT3 dissolved	20	3740 Blueberry - FB dissolved	30		40	

Notes:

LDC #: 30160G9

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: [illegible]

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?			✓	
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			✓	
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.	✓			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

LDC #: 30160 E4

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: VV

Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			✓	
Do all applicable analysies have duplicate injections? (Level IV only)			✓	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?			✓	
Were all percent differences (%Ds) < 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?		✓		
If the %Rs were outside the criteria, was a reanalysis performed?		✓		
XI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
XII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XV. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 30160E4

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: OR
2nd reviewer: [signature]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-20		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
QC21-24		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ____

Comments: Mercury by CVAA if performed

LDC #: 30160E4

VALIDATION FINDINGS WORKSHEET
Internal Standards (ICP-MS)

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: Metals (EPA Method 200.8)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A — Were all internal standard percent recoveries within 60-125% of the intensity of the internal standard in the initial calibration standard ?

Y N N/A — If the response to the above question is no, were the samples reanalyzed as required ?

#	Date	Internal Standard	Associated Metals	%R (Limits)	Associated Samples	Qualifications
		Bi209	Pb	138.669	18	J/UJ/P
		~~Lu175~~	~~Er~~			
		~~Y89~~	~~Se~~	~~162.032~~	~~18~~	~~J/UJ/P~~ er

INTST.4SW

LDC#: 30160E4

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CV
2nd Reviewer: V

METHOD: Metals (EPA Method 6010B/7000)

Analyte	Concentration (ug/L)		RPD
	3	5	
Lead	32.3	41.5	25

Analyte	Concentration (ug/L)		RPD
	4	6	
Lead	16.8	16.6	1

\\LDCFILESERVER\Validation\FIELD DUPLICATES\FD_inorganic\30160E4.wpd

LDC #: 30160E9

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: QR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
	ICP (Initial calibration)						
ICV	ICP/MS (Initial calibration)	Pb	100.7	100	101	101	Y
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
CCV	ICP/MS (Continuing calibration)	Cr	194.7	200	97	97	Y
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160E4

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: 9R
2nd Reviewer: VR

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$ Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
N	ICP interference check						
LCS	Laboratory control sample	Pb	51.4	50	102.8	102.8	Y
23	Matrix spike	Pb	(SSR-SR) 49.2	50	98.4	98.3	↓
24	Duplicate	Pb	25	24.9	0.4	0.2	↓
N	ICP serial dilution						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160 E4

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: CR
2nd reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for Pb were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

Recalculation:

Raw data 3 = 32.260 ug/L

4 = 16,830 ug/L

#	Sample ID	Analyte	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Acceptable (Y/N)
	3	Pb	32.3	32.3	Y
	4	Pb	16.8	16.8	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Green Valley Citgo Project
Collection Date:	July 11, 2013
LDC Report Date:	August 9, 2013
Matrix:	Water
Parameters:	Dissolved Chromate as Chromium
Validation Level:	EPA Region III, Level IM2
Laboratory:	Enviro-Chem Laboratories, Inc.
Sample Delivery Group (SDG):	ECL029507

Sample Identification

3740 Blueberry - POU dissolved
3740 Blueberry - PT1 dissolved
3740 Blueberry - PT/DB dissolved
3740 Blueberry - PT2 dissolved
3740 Blueberry - PT3 dissolved
3740 Blueberry - PT4 dissolved
3740 Blueberry - WP1 dissolved
3740 Blueberry - WP2 dissolved
3740 Blueberry - WP3 dissolved
3740 Blueberry - FB dissolved

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 218.7 for Dissolved Chromate as Chromium.

This review follows the EPA Region III Innovative Approaches for Data Validation (EPA June 1995).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

The following are definitions of the data qualifiers:

U Indicates the compound or element was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

K Indicates the reported value may be biased high.

L Indicates the reported value may be biased low.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or element was analyzed for but not detected. The sample detection limit is an estimated value.

UL Indicates the compound or element was analyzed for but not detected. The sample detection limit is probably higher.

B Indicates the compound or element was analyzed for but not detected substantially above the level reported in laboratory or field blanks.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Calibration verification

Calibration verification frequency and analysis criteria were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No dissolved chromate as chromium was found in the initial, continuing and preparation blanks.

Sample 3740 Blueberry - FB dissolved was identified as a field blank. No dissolved chromate as chromium was found.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
3998 Farm-POU DissolvedMS/MSD (All samples in SDG ECL029507)	Dissolved chromate as chromium	76.3 (85-115)	74.7 (86-115)	-	L (all detects) UL (all non-detects)	A

VI. Duplicates

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) were within the QC limits.

VIII. Sample Result Verification

All sample result verifications were acceptable.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples 3740 Blueberry - PT1 dissolved and 3740 Blueberry - PT/DB dissolved were identified as field duplicates. No dissolved chromate as chromium was detected in any of the samples.

Green Valley Citgo Project
Dissolved Chromate as Chromium - Data Qualification Summary - SDG ECL029507

SDG	Sample	Analyte	Flag	A or P	Reason
ECL029507	3740 Blueberry - POU dissolved 3740 Blueberry - PT1 dissolved 3740 Blueberry - PT/DB dissolved 3740 Blueberry - PT2 dissolved 3740 Blueberry - PT3 dissolved 3740 Blueberry - PT4 dissolved 3740 Blueberry - WP1 dissolved 3740 Blueberry - WP2 dissolved 3740 Blueberry - WP3 dissolved 3740 Blueberry - FB dissolved	Dissolved chromate as chromium	L (all detects) UL (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

Green Valley Citgo Project
Dissolved Chromate as Chromium - Laboratory Blank Data Qualification Summary - SDG ECL029507

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Dissolved Chromate as Chromium - Field Blank Data Qualification Summary - SDG ECL029507

No Sample Data Qualified in this SDG

LDC #: 30160E6 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/8/13
SDG #: ECL029507 Level IV Page: 1 of 1
Laboratory: Enviro-Chem Laboratories, Inc. Reviewer: CL
2nd Reviewer: V

METHOD: Chromate (EPA Method 218.7)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 7/11/13
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Blanks	A	
V	Matrix Spike/Matrix Spike Duplicates	~~A~~SW	MS/D (ECL029474)
VI.	Duplicates	N	
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	
IX.	Overall assessment of data	A	
X.	Field duplicates	ND	(2,3)
XI	Field blanks	ND	FB=10

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: water

1	3740 Blueberry - POU dissolved	11		21		31	
2	3740 Blueberry - PT1 dissolved	12		22		32	
3	3740 Blueberry - PT/DB dissolved	13		23		33	
4	3740 Blueberry - PT2 dissolved	14		24		34	
5	3740 Blueberry - PT3 dissolved	15		25		35	
6	3740 Blueberry - PT4 dissolved	16		26		36	
7	3740 Blueberry - WP1 dissolved	17		27		37	
8	3740 Blueberry - WP2 dissolved	18		28		38	
9	3740 Blueberry - WP3 dissolved	19		29		39	
10	3740 Blueberry - FB dissolved	20		30		40	

Notes:

C#: 30160E6

VALIDATION FINDINGS CHECKLIST

Reviewer: QR
2nd Reviewer: W

Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓	✓	
Were the performance evaluation (PE) samples within the acceptance limits?				

C #: 30160 E6

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: ✓

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.		✓		
X. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 30160E6

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, EPA Method 218.7

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~ 85-115? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
	3998 Farm-POU	Dissolved MS/MSD	Chromate	76.3	74.7		All	J L/UL/A

Comments: _____

LDC #: 30160C6

Validation Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Reviewer: 02
2nd Reviewer: VC

Method: Inorganics, Method 218.7

The correlation coefficient (r) for the calibration of CrVI was recalculated. Calibration date: 6/24/13

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (mg/l)	uv*s	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	CrVI	s1	0.02	0.0506	*1.0000*	1.0000	Y
		s2	0.05	0.1208			
		s3	0.1	0.2176			
		s4	0.25	0.544			
		s5	0.5	1.0689			
		s6	1	2.1432			
		s7	5	10.6889			
Calibration verification		CCV	1	1.0533	105	—	
Calibration verification		↓	5	5.1759	104	—	↓
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 50005

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = Found / True x 100 Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = |S-D| / (S+D)/2 x 100 Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Cr6+	1.053	1	105	105	Y
3998 Farm POU dissolved	Matrix spike sample	↓	(SSR-SR) 0.747	1	74.7	74.7	↓
↓	Duplicate sample	↓	0.763	0.747	2.1	2.1	↓

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160E6

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: QR
2nd reviewer:

METHOD: Inorganics, Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for _____ reported with a positive detect were recalculated and verified using the following equation:

Concentration = Recalculation:

All ND

#	Sample ID	Analyte	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)

Note: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Green Valley Citgo Project

Collection Date: June 22, 2013

LDC Report Date: August 12, 2013

Matrix: Water

Parameters: Chromium & Lead

Validation Level: EPA Region III, Level IM2

Laboratory: Enviro-Chem Laboratories, Inc.

Sample Delivery Group (SDG): ECL029324

Sample Identification

3991 Farm-PT1
3991 Farm-PT1 Dissolved
3991 Farm-PT1DB
3991 Farm-PT1DB Dissolved
3991 Farm-PT2
3991 Farm-PT2 Dissolved
3991 Farm-PT3
3991 Farm-PT3 Dissolved
3991 Farm-PT4
3991 Farm-PT4 Dissolved
3991 Farm-POU
3991 Farm-POU Dissolved
3991 Farm-WP1
3991 Farm-WP1 Dissolved
3991 Farm-WP2
3991 Farm-WP2 Dissolved
3991 Farm-WP3
3991 Farm-WP3 Dissolved
3991 Farm-FB
3991 Farm-FB Dissolved
3991 Farm-PT1DBMS
3991 Farm-PT1DBDUP
3991 Farm-WP1MS
3991 Farm-WP1DUP

Introduction

This data review covers 24 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium and Lead.

This review follows the EPA Region III Innovative Approaches for Data Validation (EPA June 1995).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

The following are definitions of the data qualifiers:

U Indicates the compound or element was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

K Indicates the reported value may be biased high.

L Indicates the reported value may be biased low.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or element was analyzed for but not detected. The sample detection limit is an estimated value.

UL Indicates the compound or element was analyzed for but not detected. The sample detection limit is probably higher.

B Indicates the compound or element was analyzed for but not detected substantially above the level reported in laboratory or field blanks.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium or lead contaminants were found in the initial, continuing and preparation blanks.

Samples 3991 Farm-FB and 3991 Farm-FB Dissolved were identified as field blanks. No chromium or lead contaminants were found.

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required by the method.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples 3991 Farm-PT1 and 3991 Farm-PT1DB and samples 3991 Farm-PT1 Dissolved and 3991 Farm-PT1DB Dissolved were identified as field duplicates. No chromium or lead contaminants were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	3991 Farm-PT1	3991 Farm-PT1DB	
Lead	6.4	6.3	2

Analyte	Concentration (ug/L)		RPD
	3991 Farm-PT1 Dissolved	3991 Farm-PT1DB Dissolved	
Chromium	1.0U	1.8	200
Lead	6.4	6.5	2

Green Valley Citgo Project
Chromium & Lead - Data Qualification Summary - SDGECL029324

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Chromium & Lead - Laboratory Blank Data Qualification Summary - SDGECL029324

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Chromium & Lead - Field Blank Data Qualification Summary - SDGECL029324

No Sample Data Qualified in this SDG

LDC #: 30160F4
SDG #: ECL029324
Laboratory: Enviro-Chem Laboratories, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 8/8/13
Page: 1 of 1
Reviewer: CL
2nd Reviewer: V

METHOD: Chromium & Lead (EPA Method 200.8)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 6/22/13
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	N	Not required
VI.	Matrix Spike Analysis	A	MS
VII.	Duplicate Sample Analysis	A	Dup
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	
XI.	ICP Serial Dilution	N	
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(1,3) (2,4)
XV	Field Blanks	ND	FB=19,20

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: water

1	3991 Farm-PT1	11	3991 Farm-POU	21	3991 Farm-PT1DBMS	31	
2	3991 Farm-PT1 Dissolved	12	3991 Farm-POU Dissolved	22	3991 Farm-PT1DBDUP	32	
3	3991 Farm-PT1DB	13	3991 Farm-WP1	23	3991 Farm-WP1MS	33	
4	3991 Farm-PT1DB Dissolved	14	3991 Farm-WP1 Dissolved	24	3991 Farm-WP1DUP	34	
5	3991 Farm-PT2	15	3991 Farm-WP2	25		35	
6	3991 Farm-PT2 Dissolved	16	3991 Farm-WP2 Dissolved	26		36	
7	3991 Farm-PT3	17	3991 Farm-WP3	27		37	
8	3991 Farm-PT3 Dissolved	18	3991 Farm-WP3 Dissolved	28		38	
9	3991 Farm-PT4	19	3991 Farm-FB	29		39	
10	3991 Farm-PT4 Dissolved	20	3991 Farm-FB Dissolved	30		40	

Notes:

LDC #: 30160F4

VALIDATION FINDINGS CHECKLIST

Reviewer: AR
2nd Reviewer: [illegible]

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓		✓	
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	✓		✓	
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.	✓			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			✓	
Do all applicable analysies have duplicate injections? (Level IV only)			✓	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?			✓	
Were all percent differences (%Ds) < 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?			✓	
If the %Rs were outside the criteria, was a reanalysis performed?			✓	
XI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
XII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XV. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 30160F1

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: OR
2nd reviewer: [signature]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-20		Al, Sb, As, Ba, Be, Cd, Ca, **Cr**, Co, Cu, Fe, **Pb**, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
QC:21-24		Al, Sb, As, Ba, Be, Cd, Ca, **Cr**, Co, Cu, Fe, **Pb**, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti

Comments: Mercury by CVAA if performed

LDC#: 30160F4

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer:
2nd Reviewer:

METHOD: Metals (EPA Method 6010B/7000)

Analyte	Concentration (ug/L)		RPD
	1	3	
Lead	6.4	6.3	2

Analyte	Concentration (ug/L)		RPD
	2	4	
Chromium	1.0U	1.8	200
Lead	6.4	6.5	2

\\LDCFILESERVER\Validation\FIELD DUPLICATES\FD_inorganic\30160F4.wpd

LDC #: 30160F4

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: QR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
	ICP (Initial calibration)						
ICV	ICP/MS (Initial calibration)	Cr	100.2	100	100	100	Y
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
CCV	ICP/MS (Continuing calibration)	Pb	205.1	200	103	103	Y
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160F9

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: 9R
2nd Reviewer: LA

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$$\%R = \frac{Found}{True} \times 100$$

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$

Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$$\%D = \frac{|I-SDR|}{I} \times 100$$

Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
	ICP interference check						
LCS	Laboratory control sample	Pb	48.6	50	97.2	97.2	Y
21	Matrix spike	Cr	(SSR-SR) 47.9	50	95.8	94.9	
22	Duplicate	Pb	6.3	6.3	0	0	
	ICP serial dilution						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160F4

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: OR
2nd reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for Pb were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$ ~~Standard~~ Recalculation:

1 = 6.36 ug/L
2 = 6.450 ug/L

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

#	Sample ID	Analyte	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Acceptable (Y/N)
	1	Pb	6.4	6.4	Y
	2	Pb	6.4	6.5	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Green Valley Citgo Project

Collection Date: June 22, 2013

LDC Report Date: August 9, 2013

Matrix: Water

Parameters: Dissolved Chromate as Chromium

Validation Level: EPA Region III, Level IM2

Laboratory: Enviro-Chem Laboratories, Inc.

Sample Delivery Group (SDG): ECL029324

Sample Identification

3991 Farm-PT1 Dissolved
3991 Farm-PT1DB Dissolved
3991 Farm-PT2 Dissolved
3991 Farm-PT3 Dissolved
3991 Farm-PT4 Dissolved
3991 Farm-POU Dissolved
3991 Farm-WP1 Dissolved
3991 Farm-WP2 Dissolved
3991 Farm-WP3 Dissolved
3991 Farm-FB Dissolved
3991 Farm-PT3 DissolvedMS
3991 Farm-PT3 DissolvedMSD

Introduction

This data review covers 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 218.7 for Dissolved Chromate as Chromium.

This review follows the EPA Region III Innovative Approaches for Data Validation (EPA June 1995).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

The following are definitions of the data qualifiers:

U Indicates the compound or element was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

K Indicates the reported value may be biased high.

L Indicates the reported value may be biased low.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or element was analyzed for but not detected. The sample detection limit is an estimated value.

UL Indicates the compound or element was analyzed for but not detected. The sample detection limit is probably higher.

B Indicates the compound or element was analyzed for but not detected substantially above the level reported in laboratory or field blanks.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Calibration verification

Calibration verification frequency and analysis criteria were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No dissolved chromate as chromium was found in the initial, continuing and preparation blanks.

Sample 3991 Farm-FB Dissolved was identified as a field blank. No dissolved chromate as chromium was found.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicates

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) were within the QC limits.

VIII. Sample Result Verification

All sample result verifications were acceptable.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples 3991 Farm-PT1 Dissolved and 3991 Farm-PT1DB Dissolved were identified as field duplicates. No dissolved chromate as chromium was detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/L)		RPD
	3991 Farm-PT1 Dissolved	3991 Farm-PT1DB Dissolved	
Dissolved chromate as chromium	0.024	0.023	4

Green Valley Citgo Project
Dissolved Chromate as Chromium - Data Qualification Summary - SDG ECL029324

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Dissolved Chromate as Chromium - Laboratory Blank Data Qualification Summary - SDG ECL029324

No Sample Data Qualified in this SDG

Green Valley Citgo Project
Dissolved Chromate as Chromium - Field Blank Data Qualification Summary - SDG ECL029324

No Sample Data Qualified in this SDG

LDC #: 30160F6 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/8/13
SDG #: ECL029324 Level IV Page: 1 of 1
Laboratory: Enviro-Chem Laboratories, Inc. Reviewer: AR
2nd Reviewer:

METHOD: Chromate (EPA Method 218.7)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 6/22/13
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Blanks	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VI.	Duplicates	N	
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(1, 2)
XI.	Field blanks	ND	FB=10

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

1	3991 Farm-PT1 Dissolved	11	3991 Farm-PT3 DissolvedMS	21		31	
2	3991 Farm-PT1DB Dissolved	12	3991 Farm-PT3 DissolvedMSD	22		32	
3	3991 Farm-PT2 Dissolved	13		23		33	
4	3991 Farm-PT3 Dissolved	14		24		34	
5	3991 Farm-PT4 Dissolved	15		25		35	
6	3991 Farm-POU Dissolved	16		26		36	
7	3991 Farm-WP1 Dissolved	17		27		37	
8	3991 Farm-WP2 Dissolved	18		28		38	
9	3991 Farm-WP3 Dissolved	19		29		39	
10	3991 Farm-FB Dissolved	20		30		40	

Notes:

C #: 30160F6

VALIDATION FINDINGS CHECKLIST

Reviewer: QR
2nd Reviewer: ✓

Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.	✓			
V. Laboratory control samples	✓			
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

C#: 30160F6

VALIDATION FINDINGS CHECKLIST

Reviewer: GR
2nd Reviewer: V

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
X. Field blanks				
Field blanks were identified in this SDG.	✓	✓		
Target analytes were detected in the field blanks.		✓		

LDC# 30160F6

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: ___ of ___
Reviewer: ___
2nd Reviewer: ___

Inorganics: Method See Cover

Analyte	Concentration (mg/L)		RPD
	1	2	
Chromate	0.024	0.023	4

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LDC #: 30160F6

Validation Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Reviewer: a
2nd Reviewer: k

Method: Inorganics, Method 218.7

The correlation coefficient (r) for the calibration of Cr^{6+} was recalculated. Calibration date: 6/24/13

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (mg/l)	uv*s	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	Cr^{6+}	s1	0.02	0.0506	*1.0000*	1.0000	Y
		s2	0.05	0.1208			
		s3	0.1	0.2176			
		s4	0.25	0.544			
		s5	0.5	1.0689			
		s6	1	2.1432			
		s7	5	10.6889			
Calibration verification	↓	CCV	1	0.9894	99	99	↓
Calibration verification	↓	↓	5	4.9698	99	99	↓
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160T6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: CR
2nd Reviewer:

METHOD: Inorganics, Method See cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
QCS	Laboratory control sample	Cr6+	1.8226	2	91	-	Y
11	Matrix spike sample	↓	(SSR-SR) 0.95	1	95	95	↓
11/12	Duplicate sample	↓	0.971	0.965	0.6	-	↓

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 30160F6

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: QR
2nd reviewer:

METHOD: Inorganics, Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for Cr6+ reported with a positive detect were recalculated and verified using the following equation:

Concentration = $y = 2.1346x + 0.0089$

Recalculation: $\frac{0.06 - 0.0089}{2.1346} = 0.0239$ ug/L

#	Sample ID	Analyte	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Acceptable (Y/N)
	1	Chromate	0.024	0.024	Y

Note: