

SAF-RC-232
100-IU-2 & 100-IU-6 Remaining
Waste Sites – Soil Full Protocol
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

Kathy Wendt

H4-21

KW 8/27/13
INITIAL/DATE

COMMENTS:

SDG X0014

SAF-RC-232

Rad only

Chem only

Rad & Chem

Complete

Partial

Sample Location: 100-D-105 – Confirmatory Test Pits
Underlying Soils



August 19, 2013

Joan Kessner
WC-Hanford, Inc.
2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354

Re: RC-232 Soil
Work Order: 330705
SDG: X0014

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 01, 2013. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1616.

Sincerely,

Orlette Johnson
Project Manager

Purchase Order: 1510
Chain of Custody: RC-232-039
Enclosures



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Case Narrative

**Receipt Narrative
for
WC-HANFORD, INC.
SDG: X0014
Work Order: 330705**

August 19, 2013

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on August 01, 2013 for analysis.

Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
330705001	J1RV27
330705002	J1RV29

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: General Chemistry and Metals.



Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation



SAMPLE RECEIPT & REVIEW FORM

Client: <u>WCHN</u>		SDG/AR/COC/Work Order: <u>330705 330707</u>	
Received By: <u>H. Taylor</u>		Date Received: <u>080113</u>	
Suspected Hazard Information		Yes	No
COC/Samples marked as radioactive?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Classified Radioactive II or III by RSO?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
COC/Samples marked containing PCBs?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Package, COC, and/or Samples marked as beryllium or asbestos containing?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Samples identified as Foreign Soil?		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: <u>Ice bags</u> Blue ice Dry ice None Other (describe) <u>4</u> *all temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>51050004</u> Secondary Temperature Device Serial # (if Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7 Are Encore containers present?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7963 5899 9168-4</u>

Comments (Use Continuation Form if needed):

Laboratory Certifications

List of current GEL Certifications as of 19 August 2013

State	Certification
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP A2LA ISO 17025	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA130005
Maryland	270
Massachusetts	M-SC012
Nevada	SC000122011-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68-00485
Plant Material Permit	PDEP-12-00260
South Carolina Chemistry	10120001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235-13-8
Utah NELAP	SC000122013-8
Vermont	VT87156
Virginia NELAP	460202
Washington	C780-12
Wisconsin	999887790

Metals Analysis

Case Narrative

**Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG X0014**

Sample Analysis

Sample ID	Client ID
330705001	J1RV27
330705002	J1RV29
1202921950	Method Blank (MB) ICP
1202921951	Laboratory Control Sample (LCS)
1202921954	330705001(J1RV27L) Serial Dilution (SD)
1202921952	330705001(J1RV27D) Sample Duplicate (DUP)
1202921953	330705001(J1RV27S) Matrix Spike (MS)
1202929234	330705001(J1RV27PS) Post Spike (PS)
1202929129	Method Blank (MB) ICP-MS
1202929157	Laboratory Control Sample (LCS)
1202929140	330705001(J1RV27L) Serial Dilution (SD)
1202929131	330705001(J1RV27D) Sample Duplicate (DUP)
1202929149	330705001(J1RV27S) Matrix Spike (MS)
1202923910	Method Blank (MB) CVAA
1202923911	Laboratory Control Sample (LCS)
1202923917	330705001(J1RV27L) Serial Dilution (SD)
1202923915	330705001(J1RV27D) Sample Duplicate (DUP)
1202923916	330705001(J1RV27S) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" basis.

Method/Analysis Information

Analytical Batch:	1320256, 1323141 and 1321065
Prep Batch :	1320255, 1323139 and 1321064
Standard Operating Procedures:	GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 22, GL-MA-E-014 REV# 25 and GL-MA-E-010 REV# 26
Analytical Method:	SW846 3050B/6010C, SW846 3050B/6020A and SW846

7471B

Prep Method : SW846 3050B and SW846 7471B Prep

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

System Configuration

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis-ICP was performed on a PE 7300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 9000 inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadruple mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum. Operating conditions are set at 1400W power and combined argon pressures of 360+/-7 kPa for the plasma and auxiliary gases, and 0.85 L/min carrier gas flow, and an initial lens voltage of 5.2.

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 80 mL/min.

Calibration Information

Instrument Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

CRDL Requirements

All CRDL standards met the advisory control limits with the exception of potassium, sodium, and zinc. PQL03 (analyzed at 08:05 on 08/15/13) recovered low for potassium and sodium; however, the sample results were 2x greater than the PQL, therefore the data is reported. PQL03 (analyzed at 14:43 on 08/16/13) recovered high for zinc; however, the sample results were 2x greater than the PQL, therefore the data is reported.

ICSA/ICSAB Statement

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

Continuing Calibration Blank (CCB) Requirements

All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria.

Continuing Calibration Verification (CCV) Requirements

All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

Quality Control (QC) Information**Method Blank (MB) Statement**

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following sample was selected as the quality control (QC) sample for this SDG: 330705001 (J1RV27).

Matrix Spike (MS) Recovery Statement

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes with the exception of silicon.

Duplicate Relative Percent Difference (RPD) Statement

The relative percent difference (RPD) obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the contract required detection limit (RL), a control of +/-RL is used to evaluate the DUP results. All applicable analytes met these requirements with the exception of silicon.

Post Spike (PS) Recovery Statement

The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the presence of matrix interferences with the exception of silicon.

Serial Dilution % Difference Statement

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations that are 25X the IDL/MDL for CVAA, 50X the IDL/MDL for ICP, and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria of less than 10% difference (%D).

Technical Information

Holding Time Specifications

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Samples in this SDG required dilutions in order to bring raw values of titanium within the linear range of the instrument, and for the analytes antimony, cobalt, lead, vanadium, and zinc that titanium interferes with, in order to ensure that the inter-element correction factors were valid on the ICP. Samples in this SDG were diluted the standard 2x for solids on the ICPMS.

Preparation Information

The samples in this SDG were prepared exactly according to the cited SOP.

Miscellaneous Information

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has

DATA EXCEPTION REPORT

Mo.Day Yr. 19-AUG-13	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1320256	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 330705(X0014)			
Application Issues: Failed Recovery for MS/PS Failed RPD for DUP			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. Failed Recovery for MS/PS: QC 1202921953MS,1202929234PS</p> <p>2. Failed RPD for DUP: QC 1202921952DUP</p>		<p>1. The matrix spike recovery failed outside of the control limits for silicon. The post spike failed outside the required control limits for silicon but passed for all other analytes. This verifies the presence of a matrix interference for silicon and verifies the absence of a matrix interference for all the other analytes. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.</p> <p>2. The sample and sample duplicate % RPD failed outside the control limits for silicon due to possible sample non-homogeneity and/or matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.</p>	

Originator's Name:

Helen Camello 19-AUG-13

Data Validator/Group Leader:

Louise Smith 19-AUG-13

Sample Data Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0014 GEL Work Order: 330705 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

* Duplicate analysis not within control limits

B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).

C Target analyte was detected in the sample and the associated blank, and the sample concentration was ≤ 5 times the blank concentration.

D Results are reported from a diluted aliquot of sample.

N Spike Sample recovery is outside control limits.

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Orlette Johnson.

Reviewed by



OB | 20 | 13

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: August 19, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil

Client SDG: X0014

Client Sample ID: J1RV27
Sample ID: 330705001

Project: WCHN00213
Client ID: WCHN001

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7471B	
2	SW846 3050B/6010C	
3	SW846 3050B/6010C	
4	SW846 3050B/6020A	

Notes:

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: August 19, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil

Client SDG: X0014

Client Sample ID: J1RV29
Sample ID: 330705002

Project: WCHN00213
Client ID: WCHN001

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7471B	
2	SW846 3050B/6010C	
3	SW846 3050B/6010C	
4	SW846 3050B/6020A	

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: August 19, 2013

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WC-Hanford, Inc.
2620 Fermi Avenue
MSIN H4-21
Richland, Washington
Contact: Joan Kessner

Workorder: 330705

Client SDG: X0014

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1323141										
QC1202929131	330705001	DUP									
Selenium		DU	0.339	DU	0.337	mg/kg	N/A ^		PRB	08/19/13	01:26
QC1202929157	LCS										
Selenium	4.65			D	4.42	mg/kg		95.2 (80%-120%)		08/19/13	00:19
QC1202929129	MB										
Selenium				DU	0.289	mg/kg				08/19/13	00:14
QC1202929149	330705001	MS									
Selenium	4.59	DU	0.339	D	3.96	mg/kg		86.2 (75%-125%)		08/19/13	01:32
QC1202929140	330705001	SDILT									
Selenium		DU	-0.06	DU	1.70	ug/L	N/A	(0%-10%)		08/19/13	01:43
Metals Analysis-ICP											
Batch	1320256										
QC1202921952	330705001	DUP									
Aluminum			5100		5280	mg/kg	3.47	(0%-20%)	HSC	08/15/13	07:54
Antimony		DU	1.68	DU	1.72	mg/kg	N/A ^			08/16/13	14:27
Arsenic		B	2.09	B	2.37	mg/kg	12.4 ^	(+/-3.13)		08/15/13	07:54
Barium			54.4		56.2	mg/kg	3.09	(0%-20%)			
Beryllium		B	0.431	B	0.465	mg/kg	7.56 ^	(+/-0.522)			
Boron		U	1.02	U	1.04	mg/kg	N/A ^				
Cadmium		B	0.122	B	0.126	mg/kg	3.38 ^	(+/-0.522)			
Calcium			5890		6060	mg/kg	2.86	(0%-20%)			
Chromium			10.6		11.4	mg/kg	7.51	(0%-20%)			
Cobalt		D	5.99	D	6.59	mg/kg	9.47 ^	(+/-2.61)		08/16/13	14:27
Copper			12.3		13.2	mg/kg	6.63	(0%-20%)		08/15/13	07:54
Iron			18500		20500	mg/kg	10.1	(0%-20%)			

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QC Summary

Workorder: 330705

Client SDG: X0014

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1320256										
Lead	BD	3.28	BD	2.83	mg/kg	14.9	^	(+/-5.22)	HSC	08/16/13	14:27
Magnesium		3830		4220	mg/kg	9.72		(0%-20%)		08/15/13	07:54
Manganese		256		274	mg/kg	6.85		(0%-20%)			
Molybdenum	U	0.204	U	0.209	mg/kg	N/A	^				
Nickel		9.35		10.7	mg/kg	13.8		(0%-20%)			
Potassium		1020		973	mg/kg	4.47		(0%-20%)			
Silicon	*N	444	*	555	mg/kg	22.2*		(0%-20%)			
Silver		0.555	B	0.448	mg/kg	21.4	^	(+/-0.522)			
Sodium		125		131	mg/kg	4.35	^	(+/-26.1)			
Vanadium	D	43.4	D	48.2	mg/kg	10.3		(0%-20%)		08/16/13	14:27
Zinc	D	33.5	D	35.9	mg/kg	6.92		(0%-20%)			
QC1202921951	LCS										
Aluminum		479		469	mg/kg			97.9 (80%-120%)		08/15/13	07:46
Antimony		47.9		48.8	mg/kg			102 (80%-120%)		08/16/13	14:17
Arsenic		47.9		46.4	mg/kg			96.9 (80%-120%)		08/15/13	07:46
Barium		47.9		47.1	mg/kg			98.3 (80%-120%)			
Beryllium		47.9		47.7	mg/kg			99.7 (80%-120%)			
Boron		47.9		45.9	mg/kg			95.9 (80%-120%)			
Cadmium		47.9		47.8	mg/kg			99.9 (80%-120%)			
Calcium		479		498	mg/kg			104 (80%-120%)			
Chromium		47.9		45.9	mg/kg			95.8 (80%-120%)			
Cobalt		47.9		49.2	mg/kg			103 (80%-120%)		08/16/13	14:17

GEL LABORATORIES LLC

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QC Summary

Workorder: 330705

Client SDG: X0014

Project Description: RC-232 Soil

Page 3 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1320256										
Copper	47.9			47.9	mg/kg		100	(80%-120%)	HSC	08/15/13	07:46
Iron	479			494	mg/kg		103	(80%-120%)			
Lead	47.9			49.7	mg/kg		104	(80%-120%)		08/16/13	14:17
Magnesium	479			499	mg/kg		104	(80%-120%)		08/15/13	07:46
Manganese	47.9			46.5	mg/kg		97	(80%-120%)			
Molybdenum	47.9			46.3	mg/kg		96.7	(80%-120%)			
Nickel	47.9			45.6	mg/kg		95.3	(80%-120%)			
Potassium	479			486	mg/kg		102	(80%-120%)			
Silicon	479			398	mg/kg		83.1	(80%-120%)			
Silver	47.9			47.7	mg/kg		99.5	(80%-120%)			
Sodium	479			474	mg/kg		99	(80%-120%)			
Vanadium	47.9			49.3	mg/kg		103	(80%-120%)		08/16/13	14:17
Zinc	47.9			48.1	mg/kg		101	(80%-120%)			
QC1202921950	MB										
Aluminum			U	6.42	mg/kg					08/15/13	07:43
Antimony			U	0.311	mg/kg					08/16/13	14:14
Arsenic			U	0.472	mg/kg					08/15/13	07:43
Barium			U	0.0943	mg/kg						
Beryllium			U	0.0943	mg/kg						
Boron			U	0.943	mg/kg						
Cadmium			U	0.0943	mg/kg						
Calcium			U	7.55	mg/kg						

GEL LABORATORIES LLC

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QC Summary

Workorder: 330705

Client SDG: X0014

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1320256										
Chromium			U	0.142	mg/kg				HSC	08/15/13	07:43
Cobalt			U	0.142	mg/kg					08/16/13	14:14
Copper			U	0.283	mg/kg					08/15/13	07:43
Iron			U	7.55	mg/kg						
Lead			U	0.311	mg/kg					08/16/13	14:14
Magnesium			U	8.02	mg/kg					08/15/13	07:43
Manganese			U	0.189	mg/kg						
Molybdenum			U	0.189	mg/kg						
Nickel			B	0.232	mg/kg						
Potassium			U	6.04	mg/kg						
Silicon			U	1.42	mg/kg						
Silver			U	0.0943	mg/kg						
Sodium			U	6.60	mg/kg						
Vanadium			U	0.0943	mg/kg					08/16/13	14:14
Zinc			U	0.377	mg/kg						
QC1202921953 330705001 MS											
Aluminum	517			5100	6510	mg/kg	N/A	(75%-125%)		08/15/13	07:57
Antimony	51.7	DU		1.68	D	50.7	mg/kg	95.6	(75%-125%)	08/16/13	14:30
Arsenic	51.7	B		2.09		51.3	mg/kg	95.1	(75%-125%)	08/15/13	07:57
Barium	51.7			54.4		101	mg/kg	89.7	(75%-125%)		
Beryllium	51.7	B		0.431		49.8	mg/kg	95.4	(75%-125%)		
Boron	51.7	U		1.02		47.8	mg/kg	91.9	(75%-125%)		

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QC Summary

Workorder: 330705

Client SDG: X0014

Project Description: RC-232 Soil

Page 5 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1320256										
Cadmium	51.7	B		0.122		49.1	mg/kg	94.8	(75%-125%)	HSC	08/15/13 07:57
Calcium	517			5890		6770	mg/kg	N/A	(75%-125%)		
Chromium	51.7			10.6		60.3	mg/kg	96.1	(75%-125%)		
Cobalt	51.7	D		5.99	D	59.9	mg/kg	104	(75%-125%)		08/16/13 14:30
Copper	51.7			12.3		66.6	mg/kg	105	(75%-125%)		08/15/13 07:57
Iron	517			18500		21400	mg/kg	N/A	(75%-125%)		
Lead	51.7	BD		3.28	D	57.5	mg/kg	105	(75%-125%)		08/16/13 14:30
Magnesium	517			3830		4790	mg/kg	N/A	(75%-125%)		08/15/13 07:57
Manganese	51.7			256		330	mg/kg	N/A	(75%-125%)		
Molybdenum	51.7	U		0.204		47.7	mg/kg	92.3	(75%-125%)		
Nickel	51.7			9.35		56.5	mg/kg	91.1	(75%-125%)		
Potassium	517			1020		1530	mg/kg	99	(75%-125%)		
Silicon	517	*N		444	N	602	mg/kg	30.5*	(75%-125%)		
Silver	51.7			0.555		51.7	mg/kg	98.8	(75%-125%)		
Sodium	517			125		622	mg/kg	96.1	(75%-125%)		
Vanadium	51.7	D		43.4	D	106	mg/kg	121	(75%-125%)		08/16/13 14:30
Zinc	51.7	D		33.5	D	90.6	mg/kg	110	(75%-125%)		
QC1202929234 330705001 PS											
Silicon	5000	*N		4350		16200	ug/L	237*	(80%-120%)		08/17/13 15:36
QC1202921954 330705001 SDILT											
Aluminum				50000	D	10700	ug/L	6.51	(0%-10%)		08/15/13 07:59
Antimony		DU		2.35	D	3.42	ug/L	N/A	(0%-10%)		08/16/13 14:36
Arsenic		B		20.5	D	15.9	ug/L	289	(0%-10%)		08/15/13 07:59

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QC Summary

Workorder: 330705

Client SDG: X0014

Project Description: RC-232 Soil

Page 6 of 7

Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1320256										
Barium		534	D	109	ug/L	2.23		(0%-10%)	HSC	08/15/13	07:59
Beryllium	B	4.23	D	1.10	ug/L	30.3		(0%-10%)			
Boron	U	2.52	DU	5.10	ug/L	N/A		(0%-10%)			
Cadmium	B	1.19	DU	0.510	ug/L	N/A		(0%-10%)			
Calcium		57700	D	12100	ug/L	4.6		(0%-10%)			
Chromium		104	D	21.7	ug/L	4.51		(0%-10%)			
Cobalt	D	11.7	D	2.31	ug/L	1.49		(0%-10%)		08/16/13	14:36
Copper		121	D	23.1	ug/L	4.37		(0%-10%)		08/15/13	07:59
Iron		182000	D	37100	ug/L	2.07		(0%-10%)			
Lead	BD	6.44	DU	8.42	ug/L	N/A		(0%-10%)		08/16/13	14:36
Magnesium		37500	D	7840	ug/L	4.42		(0%-10%)		08/15/13	07:59
Manganese		2510	D	529	ug/L	5.5		(0%-10%)			
Molybdenum	U	-1.48	DU	1.02	ug/L	N/A		(0%-10%)			
Nickel		91.6	CD	20.1	ug/L	9.9		(0%-10%)			
Potassium		9980	D	1930	ug/L	3.51		(0%-10%)			
Silicon	*N	4350	D	907	ug/L	4.19		(0%-10%)			
Silver		5.44	D	1.34	ug/L	22.8		(0%-10%)			
Sodium		1220	D	225	ug/L	8.13		(0%-10%)			
Vanadium	D	85.1	D	17.0	ug/L	.254		(0%-10%)		08/16/13	14:36
Zinc	D	65.6	D	9.77	ug/L	25.5		(0%-10%)			

Metals Analysis-Mercury
Batch 1321065

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QC Summary

Workorder: 330705

Client SDG: X0014

Project Description: RC-232 Soil

Page 7 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury											
Batch	1321065										
QC1202923915	330705001	DUP									
Mercury		U	0.00407	U	0.00402	mg/kg	N/A ^		NOR1	08/11/13	10:37
QC1202923911	LCS										
Mercury	0.120				0.126	mg/kg		105 (80%-120%)		08/11/13	10:34
QC1202923910	MB										
Mercury			U		0.0039	mg/kg				08/11/13	10:32
QC1202923916	330705001	MS									
Mercury	0.125	U	0.00407		0.135	mg/kg		107 (80%-120%)		08/11/13	10:39
QC1202923917	330705001	SDILT									
Mercury		U	-0.024	DU	0.0203	ug/L	N/A	(0%-10%)		08/11/13	10:41

Notes:

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank, and the sample concentration was <= 5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

General Chem Analysis

Case Narrative

**General Chemistry Narrative
WC-HANFORD, INC. (WCHN)
SDG X0014**

Method/Analysis Information

Product: pH
Analytical Batch: 1320493 **Method:** SW9045D pH

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9045D:

Sample ID	Client ID
330705001	J1RV27
330705002	J1RV29
1202922462	Laboratory Control Sample (LCS)
1202922591	330705001(J1RV27) Sample Duplicate (DUP)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-008 REV# 21.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information

The Electrode analysis was performed on a PerpHect pH Meter Orion 370.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information (CCV)

All continuing calibration verification standards (CCVs) associated with reported data from this batch were within acceptance limits.

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 330705001 (J1RV27).

Duplicate Relative Percent Difference (RPD) Statement

The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times

The following samples from this sample group were received by the lab outside of the method specified holding time: 1202922591 (J1RV27), 330705001 (J1RV27) and 330705002 (J1RV29).

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

The samples in this SDG did not require re-analysis.

Miscellaneous Information**Data Exception (DER) Documentation**

The following DER was generated for this SDG: 1209143 1202922591 (J1RV27), 330705001 (J1RV27) and 330705002 (J1RV29).

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product: Ion Chromatography
Analytical Batch: 1320636 **Method:** SW846 9056A Anions
Prep Batch : 1320635 **Method:** SW846 9056A

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9056A:

Sample ID	Client ID
330705001	J1RV27
330705002	J1RV29
1202922856	Method Blank (MB)
1202922857	330705001(J1RV27) Sample Duplicate (DUP)
1202922858	330705001(J1RV27) Matrix Spike (MS)
1202922859	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-086 REV# 22.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information

The Ion Chromatography analysis was performed on a Dionex ICS-3000 Ion Chromatograph.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

All continuing calibration blanks (CCBs) associated with reported data from this batch were within acceptance limits.

Calibration Verification Information (CCV)

All continuing calibration verification standards (CCVs) associated with reported data from this batch were within

acceptance limits.

Y Intercept Rule

The absolute value of the intercept is less than 3 times the MDL.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 330705001 (J1RV27).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement

The MS/PS recovery for this sample set was within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

The samples in this SDG did not require re-analysis.

Miscellaneous Information

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Manual Integrations

The following samples from this sample group had to be manually integrated due to errors in the instrument software peak integration: 1202922857 (J1RV27) and 330705001 (J1RV27).

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product: Nitrate + Nitrite
Analytical Batch: 1320037 **Method:** EPA 353.2 Nitrogen and Nitrate/Nitrite
Prep Batch : 1320036 **Method:** EEPA 353.2 Modified

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 353.2 Modified:

Sample ID	Client ID
330705001	J1RV27
330705002	J1RV29
1202921411	Method Blank (MB)
1202921412	330705001(J1RV27) Sample Duplicate (DUP)
1202921415	330705001(J1RV27) Matrix Spike (MS)
1202921418	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-128 REV# 8.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information

The Nutrient analysis was performed on a Lachat QuickChem FIA+ 8500 Series.

Calibration Verification Information

All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria.

Continuing Calibration Blanks

All continuing calibration blanks (CCBs) associated with reported data from this batch were within acceptance limits.

Y Intercept Rule

The absolute value of the intercept is less than 3 times the MDL.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 330705001 (J1RV27).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement

The MS/PS recoveries for this sample set were within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

The samples in this SDG did not require re-analysis.

Miscellaneous Information

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents.

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product: Hexavalent Chromium
Analytical Batch: 1321464 **Method:** SW846_7196A Hexavalent Chromium
Prep Batch : 1321453 **Method:** SW846 3060A

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 7196A:

Sample ID	Client ID
330705001	J1RV27
330705002	J1RV29
1202924865	Method Blank (MB)
1202924866	Laboratory Control Sample (LCS)
1202924870	330705001(J1RV27) Sample Duplicate (DUP)
1202924871	330705001(J1RV27) Matrix Spike (MS)
1202924872	330705001(J1RV27) Matrix Spike Duplicate (MSD)
1202924909	Insoluble Lab Control Sample (ILCS)

The samples in this SDG were analyzed on a "dry weight" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV# 18.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information

The Spectrometric analysis was performed on a Spectronic 20D + Digital Spectrophotometer.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

All continuing calibration blanks (CCBs) associated with reported data from this batch were within acceptance limits.

Calibration Verification Information (CCV)

All continuing calibration verification standards (CCVs) associated with reported data from this batch were within acceptance limits.

Y Intercept Rule

The absolute value of the intercept is less than 3 times the MDL.

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 330705001 (J1RV27).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement

The MS/PS recovery for this sample set was within the required acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries for this sample set were within the required acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the spike and spike duplicate met the acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

The samples in this SDG did not require re-analysis.

Miscellaneous Information**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents.

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

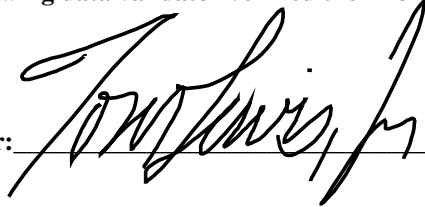
Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer:  Date: 15Aug13

DATA EXCEPTION REPORT

Mo.Day Yr. 07-AUG-13	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ELECTRODE	Test / Method: SW846 9045D	Matrix Type: Solid	Client Code: THCG, WCHN
Batch ID: 1320493	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 330494(X0012),330624(X0013),330705(X0014),330707(X0015),330790(X0016),330819,330841,330842			
Application Issues: Sample received out of holding			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. Sample received out of holding:</p> <p>330494 001,002,003</p> <p>330624 001,002,003</p> <p>330705 001,002</p> <p>330707 001</p> <p>330790 001</p> <p>330819 001</p> <p>330841 001</p> <p>330842 001</p> <p>QC 1202922460DUP,1202922461DUP, 1202922590DUP, 1202922591DUP, 1202922592DUP</p>		<p>1. Sample received out of holding</p>	

Originator's Name:

Lisa Gregory 07-AUG-13

Data Validator/Group Leader:

Thomas Lewis 10-AUG-13

Sample Data Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis Report
for**

WCHN001 WC-HANFORD, INC.

Client SDG: X0014 GEL Work Order: 330705 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

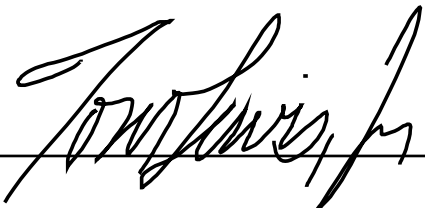
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Orlette Johnson.

Reviewed by



GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: August 15, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil

Client SDG: X0014

Client Sample ID: J1RV27
Sample ID: 330705001
Matrix: SOIL
Collect Date: 30-JUL-13 10:35
Receive Date: 01-AUG-13
Collector: Client
Moisture: 4.47%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Electrode Analysis											
SW9045D pH "As Received"											
pH at Temp 20.8C		8.93	0.010	0.100	pH	1	LYG1	08/07/13	0939	1320493	1
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.701	0.701	2.09	mg/kg	1	MAR1	08/09/13	1640	1320636	2
Chloride		3.31	0.701	2.09	mg/kg	1					
Fluoride	B	0.622	0.345	1.05	mg/kg	1					
Nitrate-N	B	0.450	0.345	1.05	mg/kg	1					
Nitrite-N	U	0.345	0.345	1.05	mg/kg	1					
O-Phosphate as P	B	0.803	0.701	2.09	mg/kg	1					
Sulfate	B	2.54	1.39	4.19	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.211	0.177	0.521	mg/kg	1	KLP1	08/15/13	1324	1320037	3
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.166	0.166	0.415	mg/kg	1	LXA1	08/13/13	1528	1321464	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	KLP1	08/15/13	1130	1320036
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	LXA1	08/10/13	1628	1321453
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/09/13	0825	1320635

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9045D	
2	SW846 9056A	
3	EPA 353.2 Modified	
4	SW846 7196A	

Notes:

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Certificate of Analysis

Report Date: August 15, 2013

Company : WC-Hanford, Inc.
 Address : 2620 Fermi Avenue
 MSIN H4-21
 Richland, Washington 99354
 Contact: Joan Kessner
 Project: RC-232 Soil

Client SDG: X0014

Client Sample ID: J1RV29	Project: WCHN00213
Sample ID: 330705002	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 30-JUL-13 12:20	
Receive Date: 01-AUG-13	
Collector: Client	
Moisture: 10.3%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Electrode Analysis											
SW9045D pH "As Received"											
pH at Temp 20.8C		8.90	0.010	0.100	pH	1	LYG1	08/07/13	0945	1320493	1
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.747	0.747	2.23	mg/kg	1	MAR1	08/09/13	1819	1320636	2
Chloride	B	1.23	0.747	2.23	mg/kg	1					
Fluoride	B	0.989	0.368	1.11	mg/kg	1					
Nitrate-N	B	0.704	0.368	1.11	mg/kg	1					
Nitrite-N	U	0.368	0.368	1.11	mg/kg	1					
O-Phosphate as P	B	0.884	0.747	2.23	mg/kg	1					
Sulfate		4.72	1.48	4.46	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.477	0.175	0.514	mg/kg	1	KLP1	08/15/13	1327	1320037	3
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.176	0.176	0.439	mg/kg	1	LXA1	08/13/13	1536	1321464	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	KLP1	08/15/13	1130	1320036
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	LXA1	08/10/13	1628	1321453
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/09/13	0825	1320635

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9045D	
2	SW846 9056A	
3	EPA 353.2 Modified	
4	SW846 7196A	

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: August 15, 2013

Page 1 of 3

WC-Hanford, Inc.
2620 Fermi Avenue
MSIN H4-21
Richland, Washington
Contact: Joan Kessner

Workorder: 330705

Client SDG: X0014

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Electrode Analysis											
Batch	1320493										
QC1202922591	330705001	DUP									
pH		8.93		8.83	pH	1.13		(0%-10%)	LYG1	08/07/13	09:43
QC1202922462	LCS										
pH	7.00			7.02	pH		100	(99%-101%)		08/07/13	09:23
Ion Chromatography											
Batch	1320636										
QC1202922857	330705001	DUP									
Bromide	U	0.701	U	0.701	mg/kg	N/A	^		MAR1	08/09/13	17:13
Chloride		3.31		3.32	mg/kg	0.253	^	(+/-2.09)			
Fluoride	B	0.622	B	0.627	mg/kg	0.838	^	(+/-1.05)			
Nitrate-N	B	0.450	B	0.455	mg/kg	1.16	^	(+/-1.05)			
Nitrite-N	U	0.345	U	0.345	mg/kg	N/A	^				
O-Phosphate as P	B	0.803	B	0.765	mg/kg	4.81	^	(+/-2.09)			
Sulfate	B	2.54	B	2.59	mg/kg	1.71	^	(+/-4.19)			
QC1202922859	LCS										
Bromide	12.5			13.0	mg/kg		104	(90%-110%)		08/09/13	16:07
Chloride	50.0			49.5	mg/kg		99	(90%-110%)			
Fluoride	25.0			25.6	mg/kg		102	(90%-110%)			
Nitrate-N	25.0			25.4	mg/kg		102	(90%-110%)			
Nitrite-N	25.0			25.7	mg/kg		103	(90%-110%)			
O-Phosphate as P	12.5			13.4	mg/kg		107	(90%-110%)			
Sulfate	100			101	mg/kg		101	(90%-110%)			
QC1202922856	MB										
Bromide			U	0.670	mg/kg					08/09/13	15:34

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QC Summary

Workorder: 330705

Client SDG: X0014

Project Description: RC-232 Soil

Page 2 of 3

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1320636										
Chloride			U	0.670	mg/kg				MAR1	08/09/13	15:34
Fluoride			U	0.330	mg/kg						
Nitrate-N			U	0.330	mg/kg						
Nitrite-N			U	0.330	mg/kg						
O-Phosphate as P			U	0.670	mg/kg						
Sulfate			U	1.33	mg/kg						
QC1202922858 330705001 MS											
Bromide	13.1	U	0.701	13.3	mg/kg		101	(70%-134%)		08/09/13	17:46
Chloride	52.3		3.31	52.9	mg/kg		94.7	(46%-150%)			
Fluoride	26.2	B	0.622	25.7	mg/kg		95.8	(34%-134%)			
Nitrate-N	26.2	B	0.450	25.6	mg/kg		96.1	(68%-129%)			
Nitrite-N	26.2	U	0.345	25.7	mg/kg		98.2	(68%-130%)			
O-Phosphate as P	13.1	B	0.803	13.2	mg/kg		95.1	(26%-124%)			
Sulfate	105	B	2.54	104	mg/kg		97.2	(50%-151%)			
Nutrient Analysis											
Batch	1320037										
QC1202921412 330705001 DUP											
Nitrogen, Nitrate/Nitrite		B	0.211	B	0.224	mg/kg	5.96 ^	(+/-0.520)	KLP1	08/15/13	13:25
QC1202921418 LCS											
Nitrogen, Nitrate/Nitrite	10.0			10.0	mg/kg		100	(90%-110%)		08/15/13	13:23
QC1202921411 MB											
Nitrogen, Nitrate/Nitrite			U	0.170	mg/kg					08/15/13	13:21
QC1202921415 330705001 MS											
Nitrogen, Nitrate/Nitrite	10.3	B	0.211	9.72	mg/kg		92	(75%-125%)		08/15/13	13:26
Spectrometric Analysis											
Batch	1321464										

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QC Summary

Workorder: 330705

Client SDG: X0014

Project Description: RC-232 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Spectrometric Analysis											
Batch	1321464										
QC1202924870	330705001	DUP									
Hexavalent Chromium		U	0.166	U	0.166	mg/kg	N/A ^		LXA1	08/13/13	15:28
QC1202924909	ILCS										
Hexavalent Chromium	8.00				7.66	mg/kg	95.8	(80%-120%)		08/13/13	15:09
QC1202924866	LCS										
Hexavalent Chromium	3.99				4.04	mg/kg	101	(80%-120%)		08/13/13	15:09
QC1202924865	MB										
Hexavalent Chromium			U		0.160	mg/kg				08/13/13	15:09
QC1202924871	330705001	MS									
Hexavalent Chromium	4.13	U	0.166		3.69	mg/kg	88.7	(75%-125%)		08/13/13	15:28
QC1202924872	330705001	MSD									
Hexavalent Chromium	4.18	U	0.166		3.68	mg/kg	0.377	87.3	(0%-30%)	08/13/13	15:28

Notes:

The Qualifiers in this report are defined as follows:

- > Result greater than quantifiable range or greater than upper limit of the analysis range
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank, and the sample concentration was <= 5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Miscellaneous

Moisture LogBook

Batch: 1319462

Analyst: DRS1

Date/Time: 01-AUG-2013

Procedure Code DRY WEIGHT

Procedure Description Dry Weight-Percent Moisture

Lab Sop: GL-OA-E-020

Sample St	Sample Id	Rpd(%)
DUP	1202920116	2.234

Sample Id	Sample Type	Original Hsn	Instrument	Run Time	Container Wt	Initial Wt	Final Wt (g)	Net Initial Wt (g)	Net Final Wt (g)	Moisture (%)
330705001	SAMPLE		BALHD2000D	17:16	7.272	37.212	35.873	29.94	28.601	4.47
330705002	SAMPLE		BALHD2000D	17:16	7.342	46.949	42.865	39.607	35.523	10.3
1202920116	DUP	330705001	BALHD2000D	17:16	7.18	34.984	33.768	27.804	26.588	4.37

Comments:

A) Result = (Net Initial - Net Final) /Net Initial * 100

Note: Aliquot is used for the determination of the effective MDL and PQL in LIMS