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 9/3/13
INITIAL/DATE

COMMENTS:

SDG X0016 SAF-RC-232

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

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

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171 F 843.766.1178

www.gel.com

August 19, 2013

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

Re: RC-232 Soil
Work Order: 330790
SDG: X0016

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 02, 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: X0016
Work Order: 330790

August 19, 2013

Laboratory Identification:

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

Summary:

Sample receipt: The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on August 02, 2013 for analysis.

Sample Identification: The laboratory received the following sample:

Laboratory ID	Client ID
330790001	J1RV30

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

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-039

Collector: WF JACKSON	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location: 100-D-105 - Confirmatory Test Pits Underyling Soils		SAF No.: RC-232
Ice Chest No.: WCH-11-068	Field Logbook No.: EL-1667 - 01 MAB 7-31-13	COA: C1D105A000	Method of Shipment: fed EX
Shipped To: Eberline - GEL	Offsite Property No.: A120899		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8C

Data Turnaround: 15 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

None

Special Handling and/or Storage

Cool 4 C

330790

SAMPLE ANALYSIS

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Type of Container	No. of Container(s)	Volume	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	TPH-Diesel Range - WTPH-D +	PAHs - 8310	PCBs - 8082	VOA - 5035/8260 (TCL)
				Cool 4C	G/P	1	125mL							
				Cool 4C	G/P	1	125mL							
				None	G/P	1	125mL							
				Cool 4C	aG	1	125mL							
				Cool 4C	aG	1	125mL							
				Cool 4C	aG	1	125mL							
				Freeze	aGs*	5	40mL							
J1RV26	SOIL													
J1RV27	SOIL													
J1RV28	SOIL													
J1RV29	SOIL													
J1RV30	SOIL	7-31-13	1316					X	X	X				

MAB 7-31-13

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
W.(Bo) JACKSON, JR.	7.31.13/1330	MA Bamberger	7-31-13 1330
MA Bamberger	7-31-13 1425	B. Fahlberg	7-31-13 1425
B. Fahlberg	7.31.13 1610	John Harrie	7.31.13 1610
John Harrie	7.31.13 1611	Fed Ex #3C 1060 Battelle	7.31.13 1611
Fed Ex #3C 1060 Battelle	8.1.13 1045	John Harrie	8.1.13 1045
John Harrie	8.1.13 1046	Fed EX	
		P. Dent Patricia Dent	8.2.13 09:00

FINAL SAMPLE DISPOSITION

Disposal Method: | Disposed By: | Date/Time:

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV) {Mercury}
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.1 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

REVIEWED BY CMB DATE 8-1-13

WCH-EE-011

Generated Date/Time: 07/16/2013 08:47, PDT

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WCHN	**SDG/AR/COC/Work Order:** 330790
Received By: P. Quent	**Date Received:** 8-2-13

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		X	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM
Classified Radioactive II or III by RSO?		X	If yes, Were swipes taken of sample contatiners < action levels?
COC/Samples marked containing PCBs?		X	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		X	If yes, samples are to be segregeated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		X	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		X	

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	X			Circle Applicable: Seals broken Damaged container Leaking container Other (describe) 30
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	X			Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius
2a	Daily check performed and passed on IR temperature gun?	X			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): 61504649
3	Chain of custody documents included with shipment?	X			
4	Sample containers intact and sealed?	X			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		X		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		X		Sample ID's and containers affected:
7	Are Encore containers present?			X	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	X			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	X			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	X			Sample ID's affected:
11	Number of containers received match number indicated on COC?	X			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			X	Clients
13	COC form is properly signed in relinquished/received sections?	X			
14	Carrier and tracking number.	X			Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 7963 8978 8896-3

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials HH Date 080213 Page 1 of 1

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 X0016

Sample Analysis

Sample ID	Client ID
330790001	J1RV30
1202924954	Method Blank (MB) **ICP**
1202924955	Laboratory Control Sample (LCS)
1202924958	330790001(J1RV30L) Serial Dilution (SD)
1202924956	330790001(J1RV30D) Sample Duplicate (DUP)
1202924957	330790001(J1RV30S) Matrix Spike (MS)
1202929665	330790001(J1RV30PS) Post Spike (PS)
1202929129	Method Blank (MB) **ICP-MS**
1202929157	Laboratory Control Sample (LCS)
1202929142	330790001(J1RV30L) Serial Dilution (SD)
1202929133	330790001(J1RV30D) Sample Duplicate (DUP)
1202929151	330790001(J1RV30S) Matrix Spike (MS)
1202923910	Method Blank (MB) **CVAA**
1202923911	Laboratory Control Sample (LCS)
1202923923	330790001(J1RV30L) Serial Dilution (SD)
1202923921	330790001(J1RV30D) Sample Duplicate (DUP)
1202923922	330790001(J1RV30S) Matrix Spike (MS)

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

Method/Analysis Information

Analytical Batch:	1321480, 1323141 and 1321065
Prep Batch :	1321477, 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. PQL01 (analyzed at 13:41 on 08/14/13) recovered high for potassium; however, the sample result was 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: 330790001 (J1RV30).

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 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 established criteria of less than 10% difference (%D) with the exception of sodium.

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. Sample 330790001 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 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. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation
Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG: 1212758. A copy is included in the Miscellaneous Data section of this package.

Additional Comments
Additional comments were not required for this SDG.

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:** 08/20/13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
19-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ICP	SW846 3050B/6010C	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1321480	See Below		

Potentially affected work order(s)(SDG): 330790(X0016)

Application Issues:

Failed Recovery for MS/PS

Failed RPD for DUP

Specification and Requirements Exception Description:	**DER Disposition:**
1. Failed Recovery for MS/PS: QC 1202924957MS,1202929665PS 2. Failed RPD for DUP: QC 1202924956DUP	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. 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.

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: X0016 GEL Work Order: 330790 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).

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.

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 08/20/13

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: X0016

Client Sample ID: J1RV30
Sample ID: 330790001
Matrix: SOIL
Collect Date: 31-JUL-13 13:16
Receive Date: 02-AUG-13
Collector: Client
Moisture: 3.71%
Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	0.00417	0.00417	0.0124	mg/kg	1	NOR1	08/11/13	1054	1321065	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		3960	6.90	20.3	mg/kg	1	HSC	08/14/13	1800	1321480	2
Arsenic	U	0.507	0.507	3.04	mg/kg	1					
Barium		48.5	0.101	0.507	mg/kg	1					
Beryllium		0.862	0.101	0.507	mg/kg	1					
Boron	U	1.01	1.01	5.07	mg/kg	1					
Cadmium	B	0.481	0.101	0.507	mg/kg	1					
Calcium		6300	8.11	25.4	mg/kg	1					
Chromium		4.55	0.152	0.507	mg/kg	1					
Iron		26700	8.11	25.4	mg/kg	1					
Magnesium		4800	8.62	30.4	mg/kg	1					
Manganese		303	0.203	1.01	mg/kg	1					
Molybdenum	U	0.203	0.203	1.01	mg/kg	1					
Nickel		7.59	0.152	0.507	mg/kg	1					
Potassium		573	6.49	25.4	mg/kg	1					
Silicon	*N	406	1.52	10.1	mg/kg	1					
Silver	B	0.504	0.101	0.507	mg/kg	1					
Copper		18.2	0.304	1.01	mg/kg	1	HSC	08/17/13	1417	1321480	3
Sodium	M	406	7.10	25.4	mg/kg	1					
Antimony	DU	1.67	1.67	5.07	mg/kg	5	HSC	08/17/13	1333	1321480	4
Cobalt	D	10.8	0.761	2.54	mg/kg	5					
Lead	DU	1.67	1.67	5.07	mg/kg	5					
Vanadium	D	87.6	0.507	2.54	mg/kg	5					
Zinc	D	51.9	2.03	5.07	mg/kg	5					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.319	0.319	1.00	mg/kg	2	PRB	08/19/13	0238	1323141	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	BCD1	08/17/13	0926	1323139
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	08/13/13	1000	1321477
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	08/09/13	1605	1321064

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	Client SDG:	X0016
Project:	RC-232 Soil		

Client Sample ID:	J1RV30	Project:	WCHN00213
Sample ID:	330790001	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/6010C	
5	SW846 3050B/6020A	

Notes:

Quality Control Summary

QC Summary

Report Date: August 19, 2013

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

Contact: **Joan Kessner**

Workorder: **330790** **Client SDG:** X0016 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS											
Batch 1323141											
QC1202929133 330790001 DUP											
Selenium		DU	0.319	DU	0.314	mg/kg	N/A ^			PRB	08/19/13 02:44
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
QC1202929151 330790001 MS											
Selenium	4.74	DU	0.319	D	4.37	mg/kg		92.2	(75%-125%)		08/19/13 02:49
QC1202929142 330790001 SDILT											
Selenium		DU	-0.924	DU	1.60	ug/L	N/A		(0%-10%)		08/19/13 03:01
Metals Analysis-ICP											
Batch 1321480											
QC1202924956 330790001 DUP											
Aluminum			3960		4160	mg/kg	4.81		(0%-20%)	HSC	08/14/13 18:02
Antimony		DU	1.67	DU	1.66	mg/kg	N/A ^				08/17/13 13:36
Arsenic		U	0.507	B	0.822	mg/kg	146 ^		(+/-3.02)		08/14/13 18:02
Barium			48.5		55.8	mg/kg	14.1		(0%-20%)		
Beryllium			0.862		0.873	mg/kg	1.34 ^		(+/-0.504)		
Boron		U	1.01	U	1.01	mg/kg	N/A ^				
Cadmium		B	0.481		0.549	mg/kg	13.3 ^		(+/-0.504)		
Calcium			6300		6320	mg/kg	0.179		(0%-20%)		
Chromium			4.55		4.87	mg/kg	6.70		(0%-20%)		
Cobalt		D	10.8	D	10.0	mg/kg	7.68 ^		(+/-2.52)		08/17/13 13:36
Copper			18.2		17.4	mg/kg	4.59		(0%-20%)		08/17/13 14:20
Iron			26700		25800	mg/kg	3.33		(0%-20%)		08/14/13 18:02

QC Summary

Workorder: 330790 **Client SDG:** X0016 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1321480										
Lead	DU	1.67	DU	1.66	mg/kg	N/A ^			HSC	08/17/13 13:36
Magnesium		4800		4500	mg/kg	6.58		(0%-20%)		08/14/13 18:02
Manganese		303		303	mg/kg	0.120		(0%-20%)		
Molybdenum	U	0.203	U	0.202	mg/kg	N/A ^				
Nickel		7.59		7.19	mg/kg	5.41		(0%-20%)		
Potassium		573		574	mg/kg	0.179		(0%-20%)		
Silicon	*N	406	*	289	mg/kg	33.6*		(0%-20%)		
Silver	B	0.504	B	0.308	mg/kg	48.3 ^		(+/-0.504)		
Sodium	M	406		345	mg/kg	16.4		(0%-20%)		08/17/13 14:20
Vanadium	D	87.6	D	94.3	mg/kg	7.33		(0%-20%)		08/17/13 13:36
Zinc	D	51.9	D	51.7	mg/kg	0.457		(0%-20%)		
QC1202924955 LCS										
Aluminum	495			483	mg/kg		97.6	(80%-120%)		08/14/13 17:57
Antimony	49.5			48.3	mg/kg		97.6	(80%-120%)		08/17/13 13:30
Arsenic	49.5			48.0	mg/kg		97.1	(80%-120%)		08/14/13 17:57
Barium	49.5			49.0	mg/kg		98.9	(80%-120%)		
Beryllium	49.5			50.4	mg/kg		102	(80%-120%)		
Boron	49.5			48.2	mg/kg		97.4	(80%-120%)		
Cadmium	49.5			50.4	mg/kg		102	(80%-120%)		
Calcium	495			481	mg/kg		97.1	(80%-120%)		
Chromium	49.5			47.9	mg/kg		96.8	(80%-120%)		
Cobalt	49.5			49.3	mg/kg		99.5	(80%-120%)		08/17/13 13:30

QC Summary

Workorder: 330790 **Client SDG:** X0016 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1321480										
Copper	49.5			51.3	mg/kg		104	(80%-120%)	HSC	08/17/13 14:14
Iron	495			480	mg/kg		97	(80%-120%)		08/14/13 17:57
Lead	49.5			49.4	mg/kg		99.8	(80%-120%)		08/17/13 13:30
Magnesium	495			480	mg/kg		97	(80%-120%)		08/14/13 17:57
Manganese	49.5			49.0	mg/kg		98.9	(80%-120%)		
Molybdenum	49.5			46.9	mg/kg		94.8	(80%-120%)		
Nickel	49.5			47.0	mg/kg		94.9	(80%-120%)		
Potassium	495			508	mg/kg		103	(80%-120%)		
Silicon	495			433	mg/kg		87.5	(80%-120%)		
Silver	49.5			49.6	mg/kg		100	(80%-120%)		
Sodium	495			510	mg/kg		103	(80%-120%)		08/17/13 14:14
Vanadium	49.5			49.7	mg/kg		100	(80%-120%)		08/17/13 13:30
Zinc	49.5			49.9	mg/kg		101	(80%-120%)		
QC1202924954 MB										
Aluminum			U	6.49	mg/kg					08/14/13 17:54
Antimony			U	0.315	mg/kg					08/17/13 13:27
Arsenic			U	0.477	mg/kg					08/14/13 17:54
Barium			U	0.0954	mg/kg					
Beryllium			U	0.0954	mg/kg					
Boron			U	0.954	mg/kg					
Cadmium			U	0.0954	mg/kg					
Calcium			U	7.63	mg/kg					

QC Summary

Workorder: 330790 **Client SDG:** X0016 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1321480											
Chromium				U	0.143	mg/kg				HSC	08/14/13 17:54
Cobalt				U	0.143	mg/kg					08/17/13 13:27
Copper				U	0.286	mg/kg					08/17/13 14:11
Iron				U	7.63	mg/kg					08/14/13 17:54
Lead				U	0.315	mg/kg					08/17/13 13:27
Magnesium				U	8.11	mg/kg					08/14/13 17:54
Manganese				U	0.191	mg/kg					
Molybdenum				U	0.191	mg/kg					
Nickel				U	0.143	mg/kg					
Potassium				U	6.11	mg/kg					
Silicon				U	1.43	mg/kg					
Silver				U	0.0954	mg/kg					
Sodium				B	-11.7	mg/kg					08/17/13 14:11
Vanadium				U	0.0954	mg/kg					08/17/13 13:27
Zinc				U	0.382	mg/kg					
QC1202924957 330790001 MS											
Aluminum	505		3960		4380	mg/kg		N/A	(75%-125%)		08/14/13 18:05
Antimony	50.5	DU	1.67	D	47.2	mg/kg		93.5	(75%-125%)		08/17/13 13:39
Arsenic	50.5	U	0.507		45.3	mg/kg		89.5	(75%-125%)		08/14/13 18:05
Barium	50.5		48.5		89.3	mg/kg		80.8	(75%-125%)		
Beryllium	50.5		0.862		47.7	mg/kg		92.6	(75%-125%)		
Boron	50.5	U	1.01		45.5	mg/kg		89.3	(75%-125%)		

QC Summary

Workorder: 330790 **Client SDG:** X0016 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1321480											
Cadmium	50.5	B	0.481		47.0	mg/kg		92	(75%-125%)	HSC	08/14/13 18:05
Calcium	505		6300		6370	mg/kg		N/A	(75%-125%)		
Chromium	50.5		4.55		50.9	mg/kg		91.9	(75%-125%)		
Cobalt	50.5	D	10.8	D	60.0	mg/kg		97.3	(75%-125%)		08/17/13 13:39
Copper	50.5		18.2		73.4	mg/kg		109	(75%-125%)		08/17/13 14:23
Iron	505		26700		25100	mg/kg		N/A	(75%-125%)		08/14/13 18:05
Lead	50.5	DU	1.67	D	51.0	mg/kg		98.7	(75%-125%)		08/17/13 13:39
Magnesium	505		4800		4820	mg/kg		N/A	(75%-125%)		08/14/13 18:05
Manganese	50.5		303		341	mg/kg		N/A	(75%-125%)		
Molybdenum	50.5	U	0.203		44.6	mg/kg		88.3	(75%-125%)		
Nickel	50.5		7.59		51.4	mg/kg		86.7	(75%-125%)		
Potassium	505		573		989	mg/kg		82.3	(75%-125%)		
Silicon	505	*N	406	N	430	mg/kg		4.79*	(75%-125%)		
Silver	50.5	B	0.504		48.5	mg/kg		95.1	(75%-125%)		
Sodium	505	M	406		992	mg/kg		116	(75%-125%)		08/17/13 14:23
Vanadium	50.5	D	87.6	D	136	mg/kg		96	(75%-125%)		08/17/13 13:39
Zinc	50.5	D	51.9	D	97.8	mg/kg		90.8	(75%-125%)		
QC1202929665 330790001 PS											
Silicon	5000	*N	4000		14900	ug/L		217*	(80%-120%)		08/17/13 14:25
QC1202924958 330790001 SDILT											
Aluminum			39100	D	8190	ug/L	4.86		(0%-10%)		08/14/13 18:08
Antimony		DU	0.0403	DU	8.37	ug/L	N/A		(0%-10%)		08/17/13 13:45
Arsenic		U	1.27	D	10.7	ug/L	N/A		(0%-10%)		08/14/13 18:08

QC Summary

Workorder: 330790 **Client SDG:** X0016 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1321480										
Barium		478	D	98.7	ug/L	3.2		(0%-10%)	HSC	08/14/13 18:08
Beryllium		8.50	D	2.34	ug/L	37.5		(0%-10%)		
Boron	U	3.78	DU	5.07	ug/L	N/A		(0%-10%)		
Cadmium	B	4.74	D	1.64	ug/L	73.2		(0%-10%)		
Calcium		62200	D	12800	ug/L	2.82		(0%-10%)		
Chromium		44.9	D	9.24	ug/L	2.95		(0%-10%)		
Cobalt	D	21.3	D	4.01	ug/L	5.78		(0%-10%)		08/17/13 13:45
Copper		179	D	36.8	ug/L	2.64		(0%-10%)		08/17/13 14:28
Iron		263000	D	54300	ug/L	3.19		(0%-10%)		08/14/13 18:08
Lead	DU	2.27	DU	8.37	ug/L	N/A		(0%-10%)		08/17/13 13:45
Magnesium		47400	D	9670	ug/L	2.05		(0%-10%)		08/14/13 18:08
Manganese		2980	D	634	ug/L	6.2		(0%-10%)		
Molybdenum	U	-1.28	DU	1.01	ug/L	N/A		(0%-10%)		
Nickel		74.8	D	15.6	ug/L	4.49		(0%-10%)		
Potassium		5650	D	1050	ug/L	7		(0%-10%)		
Silicon	*N	4000	D	838	ug/L	4.75		(0%-10%)		
Silver	B	4.97	DU	0.507	ug/L	N/A		(0%-10%)		
Sodium	M	4010	DM	894	ug/L	11.6*		(0%-10%)		08/17/13 14:28
Vanadium	D	173	D	33.6	ug/L	2.69		(0%-10%)		08/17/13 13:45
Zinc	D	102	D	19.1	ug/L	6.63		(0%-10%)		
Metals Analysis-Mercury										
Batch 1321065										

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QC Summary

Workorder: 330790 **Client SDG:** X0016 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-Mercury										
Batch 1321065										
QC1202923921 330790001 DUP										
Mercury	U	0.00417	U	0.00404	mg/kg	N/A ^			NOR1	08/11/13 10:56
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
QC1202923922 330790001 MS										
Mercury	0.123	U 0.00417		0.131	mg/kg		107	(80%-120%)		08/11/13 10:57
QC1202923923 330790001 SDILT										
Mercury	U	-0.014	DU	0.0208	ug/L	N/A		(0%-10%)		08/11/13 10:59

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 X0016

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
330790001	J1RV30
1202922462	Laboratory Control Sample (LCS)
1202922592	330790001(J1RV30) 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: 330790001 (J1RV30).

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: 1202922592 (J1RV30) and 330790001 (J1RV30).

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 1202922592 (J1RV30) and 330790001 (J1RV30).

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:	1320640	**Method:**	SW846 9056A Anions
Prep Batch :	1320639	**Method:**	SW846 9056A

Sample Analysis

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

Sample ID	Client ID
330790001	J1RV30
1202922864	Method Blank (MB)
1202922865	330790001(J1RV30) Sample Duplicate (DUP)
1202922866	330790001(J1RV30) Matrix Spike (MS)
1202922867	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: 330790001 (J1RV30).

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: 1202922865 (J1RV30) and 330790001 (J1RV30).

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
330790001	J1RV30
1202921411	Method Blank (MB)
1202921414	330790001(J1RV30) Sample Duplicate (DUP)
1202921417	330790001(J1RV30) 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: 330790001 (J1RV30).

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
330790001	J1RV30
1202924865	Method Blank (MB)
1202924866	Laboratory Control Sample (LCS)
1202924873	330790001(J1RV30) Sample Duplicate (DUP)
1202924874	330790001(J1RV30) Matrix Spike (MS)
1202924875	330790001(J1RV30) 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: 330790001 (J1RV30).

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.

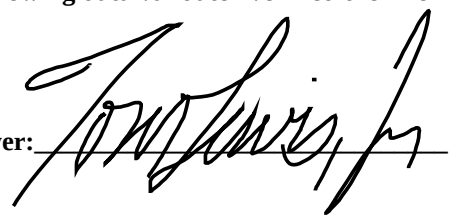
Certification Statement

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:** 16Aug13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
07-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ELECTRODE	SW846 9045D	Solid	THCG, WCHN
Batch ID:	**Sample Numbers:**		
1320493	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:**
1. Sample received out of holding: 330494 001,002,003 330624 001,002,003 330705 001,002 330707 001 330790 001 330819 001 330841 001 330842 001 QC 1202922460DUP,1202922461DUP, 1202922590DUP, 1202922591DUP, 1202922592DUP	1. Sample received out of holding

Originator's Name:

Lisa Gregory 07-AUG-13

Data Validator/Group Leader:

Thomas Lewis 10-AUG-13

Sample Data Summary

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Certificate of Analysis Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: X0016 GEL Work Order: 330790 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: X0016

Client Sample ID: J1RV30
Sample ID: 330790001
Matrix: SOIL
Collect Date: 31-JUL-13 13:16
Receive Date: 02-AUG-13
Collector: Client
Moisture: 3.71%

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		9.04	0.010	0.100	pH	1	LYG1	08/07/13	0948	1320493	1
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.696	0.696	2.08	mg/kg	1	MAR1	08/09/13	1249	1320640	2
Chloride	B	0.915	0.696	2.08	mg/kg	1					
Fluoride	B	1.03	0.343	1.04	mg/kg	1					
Nitrate-N	B	0.619	0.343	1.04	mg/kg	1					
Nitrite-N	U	0.343	0.343	1.04	mg/kg	1					
O-Phosphate as P	B	0.750	0.696	2.08	mg/kg	1					
Sulfate		22.1	1.38	4.15	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.212	0.174	0.512	mg/kg	1	KLP1	08/15/13	1332	1320037	3
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.163	0.163	0.406	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	0820	1320639

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

QC Summary

Report Date: August 15, 2013

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

Contact: **Joan Kessner**

Workorder: **330790** **Client SDG:** X0016 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Electrode Analysis										
Batch 1320493										
QC1202922592 330790001 DUP										
pH		9.04		9.07	pH	0.331		(0%-10%)	LYG1	08/07/13 09:51
QC1202922462 LCS										
pH	7.00			7.02	pH		100	(99%-101%)		08/07/13 09:23
Ion Chromatography										
Batch 1320640										
QC1202922865 330790001 DUP										
Bromide	U	0.696	U	0.696	mg/kg	N/A ^			MAR1	08/09/13 13:22
Chloride	B	0.915	B	0.896	mg/kg	2.06 ^		(+/-2.08)		
Fluoride	B	1.03		1.04	mg/kg	1.01 ^		(+/-1.04)		
Nitrate-N	B	0.619	B	0.602	mg/kg	2.72 ^		(+/-1.04)		
Nitrite-N	U	0.343	U	0.343	mg/kg	N/A ^				
O-Phosphate as P	B	0.750	B	0.708	mg/kg	5.70 ^		(+/-2.08)		
Sulfate		22.1		22.2	mg/kg	0.347		(0%-20%)		
QC1202922867 LCS										
Bromide	12.5			13.0	mg/kg		104	(90%-110%)		08/09/13 12:17
Chloride	50.0			49.6	mg/kg		99.3	(90%-110%)		
Fluoride	25.0			25.5	mg/kg		102	(90%-110%)		
Nitrate-N	25.0			25.5	mg/kg		102	(90%-110%)		
Nitrite-N	25.0			25.6	mg/kg		102	(90%-110%)		
O-Phosphate as P	12.5			12.9	mg/kg		103	(90%-110%)		
Sulfate	100			102	mg/kg		102	(90%-110%)		
QC1202922864 MB										
Bromide			U	0.670	mg/kg					08/09/13 11:44

QC Summary

Workorder: 330790 **Client SDG:** X0016 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography											
Batch 1320640											
Chloride				U	0.670	mg/kg				MAR1	08/09/13 11:44
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					
QC1202922866 330790001 MS											
Bromide	13.0	U	0.696		13.1	mg/kg		101	(70%-134%)		08/09/13 13:55
Chloride	51.9	B	0.915		50.2	mg/kg		94.9	(46%-150%)		
Fluoride	26.0	B	1.03		26.3	mg/kg		97.4	(34%-134%)		
Nitrate-N	26.0	B	0.619		26.0	mg/kg		97.6	(68%-129%)		
Nitrite-N	26.0	U	0.343		25.8	mg/kg		99.5	(68%-130%)		
O-Phosphate as P	13.0	B	0.750		13.0	mg/kg		94.2	(26%-124%)		
Sulfate	104		22.1		122	mg/kg		96.5	(50%-151%)		
Nutrient Analysis											
Batch 1320037											
QC1202921414 330790001 DUP											
Nitrogen, Nitrate/Nitrite		B	0.212	B	0.190	mg/kg	10.7 ^		(+/-0.512)	KLP1	08/15/13 13:38
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
QC1202921417 330790001 MS											
Nitrogen, Nitrate/Nitrite	10.0	B	0.212		9.96	mg/kg		97.2	(75%-125%)		08/15/13 13:39
Spectrometric Analysis											
Batch 1321464											

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QC Summary

Workorder: 330790 **Client SDG:** X0016 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Spectrometric Analysis											
Batch 1321464											
QC1202924873 330790001 DUP											
Hexavalent Chromium		U	0.163	U	0.161	mg/kg	N/A ^			LXA1	08/13/13 15:36
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
QC1202924874 330790001 MS											
Hexavalent Chromium	4.15	U	0.163		3.71	mg/kg		87.3	(75%-125%)		08/13/13 15:36
QC1202924875 330790001 MSD											
Hexavalent Chromium	4.03	U	0.163		3.60	mg/kg	2.92	87.2	(0%-30%)		08/13/13 15:36

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: 1319790
Analyst: LYT1
Date/Time: 05-AUG-2013
Procedure Code DRY WEIGHT
Procedure Description Dry Weight-Percent Moisture
Lab Sop: GL-OA-E-020

Sample St	Sample Id	Rpd(%)
DUP	1202921214	**2.993**

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 (%)
330787001	SAMPLE		BALHD2000D	08:05	7.209	20.679	18.877	13.47	11.668	13.4
330787002	SAMPLE		BALHD2000D	08:05	7.29	19.372	17.812	12.082	10.522	12.9
330787003	SAMPLE		BALHD2000D	08:05	7.161	23.336	21.245	16.175	14.084	12.9
330787004	SAMPLE		BALHD2000D	08:05	7.143	17.321	16.241	10.178	9.098	10.6
330788001	SAMPLE		BALHD2000D	08:05	7.313	25.599	25.446	18.286	18.133	.837
330790001	SAMPLE		BALHD2000D	08:05	7.291	34.656	33.64	27.365	26.349	3.71
330801001	SAMPLE		BALHD2000D	08:05	7.244	30.242	28.204	22.998	20.96	8.86
1202921214	DUP	330801001	BALA 200S	08:30	7.288	23.907	22.49	16.619	15.202	8.53

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