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 9/30/13
INITIAL/DATE

COMMENTS:

SDG XP0011 SAF-RC-232

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

Sample Location: 600-370

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

September 18, 2013

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

Re: RC-232 Soil
Work Order: 333151
SDG: XP0011

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 11, 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-232-043
Enclosures

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Case Narrative

Receipt Narrative
for
WC-HANFORD, INC.
SDG: XP0011
Work Order: 333151

September 23, 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 September 11, 2013 for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. GEL is not currently certified for method NWTPH-Dx. The laboratory has analyzed PT samples and applied for the certification.

Sample Identification: The laboratory received the following sample:

Laboratory ID	Client ID
333151001	J1RVM6

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: Diesel Range Organics, HPLC Polynuclear Aromatic Hydrocarbon and Metals.

Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-043

Page ~~4 of 4~~

Collector A. DUNNUM	**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** 600-370		**SAF No.** RC-232
Ice Chest No. WCH-11-072	**Field Logbook No.** EL-1666 -01	**COA** 0603702000	**Method of Shipment** fed EX
Shipped To Eberline - GEL	**Offsite Property No.** A120949		**Bill of Lading/Air Bill No.** see OSPC

Price Code 8C **Data Turnaround** ~~15 Days~~ 7 MAB 9-10-13

POSSIBLE SAMPLE HAZARDS/REMARKS
None

Special Handling and/or Storage
Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C								
Type of Container	G/P	aG	aG								
No. of Container(s)	1	1	1								
Volume	125mL	125mL	125mL								
SAMPLE ANALYSIS 333151	See item (1) in Special Instructions	TPH-Diesel Range - WTPH-D +	PAHs - 8310								
Sample No.	**Matrix**	**Sample Date**	**Sample Time**								
J1RVM6	SOIL	9-10-13	0649	X	X	X					

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
T. Dunnum	0700 9-10-13	MA Bamberger	0700 9-10-13
MA Bamberger	0923 9-10-13	C. Martinez	0923 09/10/13
C. Martinez	1220 09/10/13	Cindra Bingham	1220 9-10-13
Cindra Bingham WCH	1245 9-10-13	fed EX	
		Patricia Dent	9/11/13 08:50

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}

REVIEWED BY K. Wood via email DATE 9-10-13

XP0011

FINAL SAMPLE DISPOSITION Disposal Method | Disposed By | Date/Time

WCH-EE-011

Generated Date/Time: 07/23/2013 16:30, PDT

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WCHN	**SDG/AR/COC/Work Order:** 333151
Received By: P. Weist	**Date Received:** 9-11-13

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)
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): 61524649
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 7966 5558 4830-2C

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials HA Date 9/11/13 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 18 September 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

HPLC Polynuclear Aromatic Hydrocarbon Analysis

HPLC-PAH
WC-HANFORD, INC. (WCHN)
SDG XP0011

Method/Analysis Information

Procedure:	**Polynuclear Aromatic Hydrocarbons**
Analytical Method:	SW846 8310
Prep Method:	SW846 3550B
Analytical Batch Number:	1331143
Prep Batch Number:	1331142

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8310:

Sample ID	Client ID
333151001	J1RVM6
1202947759	Method Blank (MB)
1202947760	Laboratory Control Sample (LCS)
1202947761	333151001(J1RVM6) Matrix Spike (MS)
1202947762	333151001(J1RVM6) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

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-OA-E-030 REV# 15.

Raw data reports are processed and reviewed by the analyst using the Target software package. False positives have been removed from the Target quantitation reports per standard operating procedures (SOP) section 18.0.

Calibration Information

Due to software limitations, the files displayed at the beginning of the Form 6 are only the last files uploaded for each individual level. A complete listing of all files used in the current ICAL are shown on the Calibration History that is included with each Level 4 or higher package. The last file by date in each level is the one currently uploaded for that level.

The linear equation used in Target and indicated on the initial calibration summary form is not a conventional linear equation (slope intercept formula) and does not match the equation found in SW-846 method 8000B. The x and y axes are inversed in Target, so that the instrument response is treated as the independent variable (x) and the concentration ratio is treated as the dependent variable (y). The equation used in Target to calculate sample results is adjusted to account for the linear equation inversion and reciprocal slope. The adjusted calculation has been independently verified to produce valid results.

Initial Calibration
All initial calibration requirements have been met for this SDG.

CCV Requirements
All associated calibration verification standards (ICV or CCV) met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries
All the surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

QC Sample Designation
Sample 333151001 (J1RVM6) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement
The MS recoveries were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement
A biased high recovery for Anthracene was observed in MSD (1202947762). The recovery was 93% and the acceptance range is 49-91%. The high recovery for Anthracene may be the result of variances in the extraction process. The LCS (1202947760) met acceptance criteria for all target analytes. Anthracene was not detected in the associated sample, 333151001 (J1RVM6). The data are "T" qualified and reported with the appropriate DER.

MS/MSD Relative Percent Difference (RPD) Statement
The RPDs between the MS and MSD met the acceptance limits.

Technical Information:

Holding Time Specifications
All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection or 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.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information:

Data Exception (DER) Documentation
Data Exception Report 1222322 was generated for this SDG.

A biased high recovery for Anthracene was observed in MSD (1202947762). The recovery was 93% and the acceptance range is 49-91%. The high recovery for Anthracene may be the result of variances in the extraction process. The LCS (1202947760) met acceptance criteria for all target analytes. Anthracene was not detected in the associated sample, 333151001 (J1RVM6). The data are "T" qualified and reported with the appropriate DER.

Manual Integrations
Some initial calibration standards, continuing calibration standards, and/or samples may have required manual integrations due to software limitations.

Please see the raw data in the Miscellaneous Section.

Additional Comments
The Form 8 is used only as a sequence of the analysis.

Electronic Package Comment

The following package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually 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 of each electronic package will indicate the analyst, reviewer, and report specialist names associated with the generation of the data and package. 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.

System Configuration

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for Polynuclear Aromatic Hydrocarbons analyses.

The chromatographic hardware system consists of a HP Model 1100 HPLC with programmable gradient pumping and a 100 uL loop injector.

The HPLC 1100 is coupled to a HP Model G1315A Diode Array UV detector which monitors absorbance at the following five wavelengths: 1) 224 nm; 2) 250 nm; 3) 270 nm; 4) 234 nm; 5) 300 nm.

The HPLC 1100 is also coupled to a HP Model G1321A Fluorescence Detector in series which monitors the following varying excitations and emissions 1) EX 230 nm EM 330 nm; 2) EX 210 nm EM 314 nm; 3) EX 250 nm EM 368 nm; 4) EX 237 nm EM 440 nm; 5) EX 277 nm EM 376 nm; 6) EX 255 nm EM 420 nm; 7) EX 230 nm EM 453 nm.

The Diode Array UV detector is used as the primary detector and the Fluorescence Detector is used as the confirmation detector. All results are reported from the primary Diode Array UV detector.

The HPLC system is identified with a designation of HPLC E in the raw data printouts.

Chromatographic Columns

Chromatographic separation of Polynuclear Aromatic Hydrocarbons is accomplished through analysis on the following reversed phase columns:

Phenomenex: Luna C18 (2), 100 A, 250 mm x 4.6 mm containing 5 um size particle.

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.

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
18-SEP-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
HPLC	SW846 8310	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1331143	See Below		

Potentially affected work order(s)(SDG): 333151(XP0011),333295(XP0012)

Application Issues:

Failed Recovery for MSD/PSD

Specification and Requirements Exception Description:	**DER Disposition:**
1. A biased high recovery for Anthracene was observed in MSD (1202947762). The recovery was 93% and the acceptance range is 49-91%. 2. A biased high recovery for Anthracene was observed in MSD (1202947764). The recovery was 93% and the acceptance range is 49-91%.	1. & 2. The high recovery for Anthracene may be the result of variances in the extraction process. The LCS (1202947760) met acceptance criteria for all target analytes. Anthracene was not detected in the associated samples. The data are "T" qualified and reported with the appropriate DER.

Originator's Name:

Charles Wilson 18-SEP-13

Data Validator/Group Leader:

Michael Penny 18-SEP-13

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: XP0011 GEL Work Order: 333151 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

T Spike and/or spike duplicate 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.

DL Indicates that sample is diluted.
RA Indicates that sample is re-analyzed without re-extraction.
RE Indicates that sample is re-extracted.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: Michael A. Penny Jr. **Name: Michael Penny**

Date: 21 SEP 2013 **Title: Group Leader**

Roadmap for WCHN XP0011 HPLC_PAH

This roadmap was analyzed by cww on 09-18-2013, 10:39.
This roadmap was reviewed by map on 09-18-2013, 10:59.
This roadmap was packaged by map on 09-21-2013, 11:18.

Sample

exclude	manual	datafile	smpid	injdate	injtime	sublist	clientid	dilution	batchid	comment
☐	N	/chem/hplce.i/p091713.b/ph5i1706.d	333151001	17-SEP-2013	13:07	XP0011.sub	J1RVM6	1	1331143	

QC Sample

exclude	manual	datafile	smpid	sampletype	injdate	injtime	sublist	clientid	dilution	batchid	comment
☐	N	/chem/hplce.i/p091713.b/ph5i1704.d	1202947759	mb	17-SEP-2013	11:43	XP0011.sub	PAHBLK01	1	1331143	
☐	N	/chem/hplce.i/p091713.b/ph5i1705.d	1202947760	lcs	17-SEP-2013	12:25	XP0011.sub	PAHBLK01LCS	1	1331143	Pass
☐	N	/chem/hplce.i/p091713.b/ph5i1707.d	1202947761	ms	17-SEP-2013	13:50	XP0011.sub	J1RVM6MS	1	1331143	Pass
☐	N	/chem/hplce.i/p091713.b/ph5i1708.d	1202947762	msd	17-SEP-2013	14:32	XP0011.sub	J1RVM6MSD	1	1331143	Anthracene high

Sample Data Summary

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

Certificate of Analysis

Report Date: September 18, 2013

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

Client SDG: XP0011

Client Sample ID: J1RVM6
Sample ID: 333151001
Matrix: SOIL
Collect Date: 10-SEP-13 06:49
Receive Date: 11-SEP-13
Collector: Client
Moisture: 3.87%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.18	5.18	17.3	ug/kg	1	CWW	09/17/13	1307	1331143	1
Acenaphthylene	U	5.18	5.18	17.3	ug/kg	1					
Anthracene	TU	1.73	1.73	17.3	ug/kg	1					
Benzo(a)anthracene	U	0.553	0.553	1.73	ug/kg	1					
Benzo(a)pyrene	U	0.553	0.553	1.73	ug/kg	1					
Benzo(b)fluoranthene	U	0.553	0.553	1.73	ug/kg	1					
Benzo(ghi)perylene	U	0.553	0.553	1.73	ug/kg	1					
Benzo(k)fluoranthene	U	0.276	0.276	0.864	ug/kg	1					
Chrysene	U	0.553	0.553	1.73	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.553	0.553	1.73	ug/kg	1					
Fluoranthene	U	0.553	0.553	1.73	ug/kg	1					
Fluorene	U	5.18	5.18	17.3	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.553	0.553	1.73	ug/kg	1					
Naphthalene	U	5.18	5.18	17.3	ug/kg	1					
Phenanthrene	U	5.18	5.18	17.3	ug/kg	1					
Pyrene	U	0.553	0.553	1.73	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	MXS4	09/13/13	1815	1331142

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8310	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	6510 ug/kg	8640	75.4	(23%-104%)

Notes:

QC Summary

QC Summary

Report Date: September 18, 2013

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

Contact: **Joan Kessner**

Workorder: **333151** **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch 1331143											
QC1202947760 LCS											
Acenaphthene	1670			1360	ug/kg		81.6	(58%-99%)	CWW	09/17/13	12:25
Acenaphthylene	1670			1360	ug/kg		81.5	(58%-98%)			
Anthracene	1670			1550	ug/kg		93	(63%-94%)			
Benzo(a)anthracene	167			146	ug/kg		87.9	(73%-98%)			
Benzo(a)pyrene	167			140	ug/kg		84.4	(63%-99%)			
Benzo(b)fluoranthene	167			141	ug/kg		84.6	(70%-130%)			
Benzo(ghi)perylene	167			139	ug/kg		83.7	(70%-130%)			
Benzo(k)fluoranthene	83.3			65.9	ug/kg		79.1	(70%-130%)			
Chrysene	167			160	ug/kg		96	(70%-130%)			
Dibenzo(a,h)anthracene	167			164	ug/kg		98.7	(70%-130%)			
Fluoranthene	167			138	ug/kg		83.1	(70%-130%)			
Fluorene	1670			1400	ug/kg		84	(65%-130%)			
Indeno(1,2,3-cd)pyrene	167			149	ug/kg		89.8	(70%-130%)			
Naphthalene	1670			1320	ug/kg		79.1	(57%-130%)			
Phenanthrene	1670			1400	ug/kg		84.2	(70%-130%)			
Pyrene	167			149	ug/kg		89.3	(70%-130%)			
**Decafluorobiphenyl	8330			6860	ug/kg		82.4	(23%-104%)			
QC1202947759 MB											
Acenaphthene			U	5.00	ug/kg					09/17/13	11:43
Acenaphthylene			U	5.00	ug/kg						

QC Summary

Workorder: 333151 **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH												
Batch 1331143												
Anthracene				U	1.67	ug/kg						
Benzo(a)anthracene				U	0.533	ug/kg				CWW	09/17/13	11:43
Benzo(a)pyrene				U	0.533	ug/kg						
Benzo(b)fluoranthene				U	0.533	ug/kg						
Benzo(ghi)perylene				U	0.533	ug/kg						
Benzo(k)fluoranthene				U	0.267	ug/kg						
Chrysene				U	0.533	ug/kg						
Dibenzo(a,h)anthracene				U	0.533	ug/kg						
Fluoranthene				U	0.533	ug/kg						
Fluorene				U	5.00	ug/kg						
Indeno(1,2,3-cd)pyrene				U	0.533	ug/kg						
Naphthalene				U	5.00	ug/kg						
Phenanthrene				U	5.00	ug/kg						
Pyrene				U	0.533	ug/kg						
**Decafluorobiphenyl	8330				6300	ug/kg		75.6	(23%-104%)			
QC1202947761 333151001 MS												
Acenaphthene	1730	U	5.18		1300	ug/kg		75.3	(49%-90%)		09/17/13	13:50
Acenaphthylene	1730	U	5.18		1300	ug/kg		75.3	(48%-97%)			
Anthracene	1730	TU	1.73		1510	ug/kg		87	(49%-91%)			
Benzo(a)anthracene	173	U	0.553		143	ug/kg		82.4	(29%-126%)			
Benzo(a)pyrene	173	U	0.553		140	ug/kg		81.1	(26%-130%)			
Benzo(b)fluoranthene	173	U	0.553		137	ug/kg		79.1	(32%-135%)			
Benzo(ghi)perylene	173	U	0.553		135	ug/kg		78	(34%-125%)			

QC Summary

Workorder: 333151 **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH												
Batch 1331143												
Benzo(k)fluoranthene	86.5	U	0.276		63.7	ug/kg		73.7	(48%-142%)	CWW	09/17/13	13:50
Chrysene	173	U	0.553		154	ug/kg		89	(39%-127%)			
Dibenzo(a,h)anthracene	173	U	0.553		160	ug/kg		92.6	(38%-130%)			
Fluoranthene	173	U	0.553		136	ug/kg		78.9	(20%-139%)			
Fluorene	1730	U	5.18		1350	ug/kg		78.1	(51%-90%)			
Indeno(1,2,3-cd)pyrene	173	U	0.553		147	ug/kg		85.2	(41%-145%)			
Naphthalene	1730	U	5.18		1280	ug/kg		73.9	(43%-87%)			
Phenanthrene	1730	U	5.18		1370	ug/kg		79.3	(50%-100%)			
Pyrene	173	U	0.553		146	ug/kg		84.2	(18%-149%)			
**Decafluorobiphenyl	8650		6510		6530	ug/kg		75.4	(23%-104%)			
QC1202947762 333151001 MSD												
Acenaphthene	1730	U	5.18		1410	ug/kg	7.86	81.3	(0%-30%)		09/17/13	14:32
Acenaphthylene	1730	U	5.18		1430	ug/kg	9.31	82.5	(0%-30%)			
Anthracene	1730	TU	1.73	T	1610	ug/kg	6.84	93*	(0%-30%)			
Benzo(a)anthracene	173	U	0.553		153	ug/kg	7.03	88.3	(0%-30%)			
Benzo(a)pyrene	173	U	0.553		152	ug/kg	8.22	87.9	(0%-30%)			
Benzo(b)fluoranthene	173	U	0.553		147	ug/kg	7.37	85	(0%-30%)			
Benzo(ghi)perylene	173	U	0.553		146	ug/kg	7.61	84.1	(0%-30%)			
Benzo(k)fluoranthene	86.7	U	0.276		68.5	ug/kg	7.21	79	(0%-30%)			
Chrysene	173	U	0.553		166	ug/kg	7.70	96	(0%-30%)			
Dibenzo(a,h)anthracene	173	U	0.553		172	ug/kg	7.40	99.5	(0%-30%)			
Fluoranthene	173	U	0.553		147	ug/kg	7.40	84.8	(0%-30%)			

QC Summary

Workorder: 333151 **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH												
Batch 1331143												
Fluorene	1730	U	5.18		1450	ug/kg	7.24	83.8	(0%-30%)	CWW	09/17/13	14:32
Indeno(1,2,3-cd)pyrene	173	U	0.553		158	ug/kg	7.16	91.4	(0%-30%)			
Naphthalene	1730	U	5.18		1390	ug/kg	8.55	80.3	(0%-30%)			
Phenanthrene	1730	U	5.18		1460	ug/kg	6.42	84.4	(0%-30%)			
Pyrene	173	U	0.553		157	ug/kg	7.30	90.4	(0%-30%)			
**Decafluorobiphenyl	8670		6510		7100	ug/kg		81.9	(23%-104%)			

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J 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).Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate 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.
- 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
- o Analyte failed to recover within LCS limits (0rganics only)

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 Data

Prep Logbook

Extraction of Semivolatile and Nonvolatile Organic Compounds from Soil, Sludge, and Other Miscellaneous Solid Samples

Batch ID: 1331142 **Verified by:** _____
Analyst: Matthew Selepack
Method: SW846 3550B

Lab SOP: GL-OA-E-010 REV# 21
Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1202947759 MB	13-SEP-2013 18:15:00	30.01	1	0.03332
1202947760 LCS	13-SEP-2013 18:15:00	30.03	1	0.0333
333151001	13-SEP-2013 18:15:00	30.1	1	0.03322
1202947761 MS (333151001)	13-SEP-2013 18:15:00	30.06	1	0.03327
1202947762 MSD (333151001)	13-SEP-2013 18:15:00	30.01	1	0.03332
333295001	13-SEP-2013 18:15:00	30	1	0.03333
1202947763 MS (333295001)	13-SEP-2013 18:15:00	30.11	1	0.03321
1202947764 MSD (333295001)	13-SEP-2013 18:15:00	30.15	1	0.03317

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202947760	8310 PAH SPIKE	UE130325-15	1	mL
MS	1202947761	8310 PAH SPIKE	UE130325-15	1	mL
MS	1202947763	8310 PAH SPIKE	UE130325-15	1	mL
MSD	1202947762	8310 PAH SPIKE	UE130325-15	1	mL
MSD	1202947764	8310 PAH SPIKE	UE130325-15	1	mL
SURR	All	Decafluorobiphenyl 250 mg/L	UE130808-07	1	mL
REGNT	All	Methylene Chloride	1952037-D	300	mL
REGNT	All	HPLC Grade Acetonitrile	1959597	5	mL
SOURC	All	SODIUM SULFATE	1948175	30	g

Comments:

Final Solvent: Acetonitrile
Verified by: AV

FID Diesel Range Organics Analysis

Case Narrative

FID Diesel Range Organics
WC-HANFORD, INC. (WCHN)
SDG XP0011

Method/Analysis Information

Procedure:	**Analysis of Diesel Range Organics by Flame Ionization Detector**
Analytical Method:	NWTPH-Dx in Soil
Prep Method:	SW846 3541
Analytical Batch Number:	1331138
Prep Batch Number:	1331137

Sample Analysis

The following samples were analyzed using the analytical protocol as established in NWTPH-Dx in Soil:

Sample ID	Client ID
333151001	J1RVM6
1202947742	Method Blank (MB)
1202947743	Laboratory Control Sample (LCS)
1202947744	333151001(J1RVM6) Matrix Spike (MS)
1202947745	333151001(J1RVM6) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

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-OA-E-003 REV# 23.

Raw data reports are processed and reviewed by the analyst using the Chemstation software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP).

Calibration Information

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

Continuing Calibration Verification (CCV) Requirements
All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria. Analyte peaks eluted within the established retention time windows for this method.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria; however, the MB contained low level (below the PQL) of hydrocarbons within motor oily range.

Surrogate Recoveries
All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

QC Sample Designation
Sample 333151001 (J1RVM6) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement
The MS recovery was within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD recovery was within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement
The RPD between the MS and MSD met the acceptance limits.

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. Analyte peaks eluted within the established retention time windows for this method.

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Electronic Package Comment

This package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually 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 Exception (DER) Documentation
Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A DER was not required for the samples in this SDG in this batch. A data exception report (DER) was not generated for this SDG.

Manual Integrations
Certain standards and samples may have required manual integration to correctly position the baseline as set in the calibration standard injections. If manual integration was performed, copies of all manual integration peak profiles are included in the raw data section of this fraction.

Additional Comments
The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The additional comments were not required.

System Configuration

The Diesel Range Organics analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
FID7.I	Agilent Gas Chromatograph	Agilent 6890N GC/FID	DB-5MS	30m x 0.25mm, 0.25um(J&W)

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.

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: XP0011 GEL Work Order: 333151 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

B The analyte was detected in both the associated QC blank and in the sample.

J 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).Value is estimated

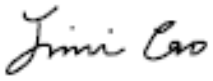
U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

DL Indicates that sample is diluted.
RA Indicates that sample is re-analyzed without re-extraction.
RE Indicates that sample is re-extracted.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:  **Name: Jimin Cao**

Date: 20 SEP 2013 **Title: Data Validator**

Sample Data Summary

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

Certificate of Analysis

Report Date: September 18, 2013

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

Client SDG: XP0011

Client Sample ID: J1RVM6
Sample ID: 333151001
Matrix: SOIL
Collect Date: 10-SEP-13 06:49
Receive Date: 11-SEP-13
Collector: Client
Moisture: 3.87%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Diesel Range Organics											
SW 3541/NWTPH-Dx in Soil "Dry Weight Corrected"											
Diesel Range Organics (C10-C20)	U	2240	2240	6900	ug/kg	1	BYT1	09/17/13	1223	1331138	1
Motor Oil (C20-C36)	BJ	6590	2240	6900	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	AXV1	09/13/13	1725	1331137

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	NWTPH-Dx in Soil	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
o-Terphenyl	SW 3541/NWTPH-Dx in Soil "Dry Weight Corrected"	401 ug/kg	690	58.2	(50%-150%)

Notes:

Quality Control Summary

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

QC Summary

Report Date: September 18, 2013

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

Contact: **Joan Kessner**

Workorder: **333151** **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Diesel Range Organics										
Batch 1331138										
QC1202947743 LCS										
Diesel Range Organics (C10-C20)	66600			53200	ug/kg		79.9	(70%-130%)	BYT1	09/17/13 11:46
Motor Oil (C20-C36)	66600		B	61000	ug/kg		91.5	(70%-130%)		
**o-Terphenyl	666			478	ug/kg		71.7	(50%-150%)		
QC1202947742 MB										
Diesel Range Organics (C10-C20)			U	2160	ug/kg					09/17/13 11:09
Motor Oil (C20-C36)			J	4240	ug/kg					
**o-Terphenyl	666			514	ug/kg		77.3	(50%-150%)		
QC1202947744 333151001 MS										
Diesel Range Organics (C10-C20)	69200	U	2240	68500	ug/kg		99	(70%-130%)		09/17/13 13:00
Motor Oil (C20-C36)	69200	BJ	6590 B	85800	ug/kg		114	(70%-130%)		
**o-Terphenyl	692		401	607	ug/kg		87.6	(50%-150%)		
QC1202947745 333151001 MSD										
Diesel Range Organics (C10-C20)	69200	U	2240	57600	ug/kg	17.4	83.2	(0%-20%)		09/17/13 13:36
Motor Oil (C20-C36)	69200	BJ	6590 B	76600	ug/kg	11.4	101	(0%-20%)		
**o-Terphenyl	692		401	508	ug/kg		73.5	(50%-150%)		

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J 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).Value is estimated

QC Summary

Workorder: 333151 **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

P Aroclor target analyte with greater than 25% difference between column analyses.

T Spike and/or spike duplicate 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.

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

o Analyte failed to recover within LCS limits (0rganics only)

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

Prep Logbook

Extraction of Semivolatile and Nonvolatile Organic Compounds from Soil, Sludge, and Other Miscellaneous Solid Samples

Batch ID: 1331137 **Verified by:** _____
Analyst: Alberto Velasco
Method: SW846 3541

Lab SOP: GL-OA-E-010 REV# 21
Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1202947742 MB	13-SEP-2013 17:25:00	30.05	1	0.03328
1202947743 LCS	13-SEP-2013 17:25:00	30.02	1	0.03331
333151001	13-SEP-2013 17:25:00	30.17	1	0.03315
1202947744 MS (333151001)	13-SEP-2013 17:25:00	30.06	1	0.03327
1202947745 MSD (333151001)	13-SEP-2013 17:25:00	30.08	1	0.03324
333295001	13-SEP-2013 17:25:00	30.23	1	0.03308
1202947746 MS (333295001)	13-SEP-2013 17:25:00	30.12	1	0.0332
1202947747 MSD (333295001)	13-SEP-2013 17:25:00	30.03	1	0.0333

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202947743	AZDRO SPIKE LCS STD,4000ug/ml	WFI130905-52	1	mL
MS	1202947744	AZDRO SPIKE LCS STD,4000ug/ml	WFI130905-52	1	mL
MS	1202947746	AZDRO SPIKE LCS STD,4000ug/ml	WFI130905-52	1	mL
MSD	1202947745	AZDRO SPIKE LCS STD,4000ug/ml	WFI130905-52	1	mL
MSD	1202947747	AZDRO SPIKE LCS STD,4000ug/ml	WFI130905-52	1	mL
SURR	All	20 ppm surrogate	WE130910-04	1	mL
REGNT	All	Methylene Chloride	1952037-D	120	mL
SOURC	All	SODIUM SULFATE	1948175	30	g

Comments:

Final Solvent: CH2Cl2
Verified: MJS

Metals Analysis

Case Narrative

Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0011

Sample Analysis

Sample ID	Client ID
333151001	J1RVM6
1202946024	Method Blank (MB) **ICP**
1202946025	Laboratory Control Sample (LCS)
1202946028	333151001(J1RVM6L) Serial Dilution (SD)
1202946026	333151001(J1RVM6D) Sample Duplicate (DUP)
1202946027	333151001(J1RVM6S) Matrix Spike (MS)
1202949880	333151001(J1RVM6PS) Post Spike (PS)
1202946029	Method Blank (MB) **ICP-MS**
1202946033	Laboratory Control Sample (LCS)
1202946031	333151001(J1RVM6L) Serial Dilution (SD)
1202946030	333151001(J1RVM6D) Sample Duplicate (DUP)
1202946032	333151001(J1RVM6S) Matrix Spike (MS)
1202946387	Method Blank (MB) **CVAA**
1202946388	Laboratory Control Sample (LCS)
1202946395	333151001(J1RVM6L) Serial Dilution (SD)
1202946393	333151001(J1RVM6D) Sample Duplicate (DUP)
1202946394	333151001(J1RVM6S) Matrix Spike (MS)

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

Method/Analysis Information

Analytical Batch:	1330457, 1330459 and 1330613
Prep Batch :	1330456, 1330458 and 1330611
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 6100E 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 iron. PQL05 (analyzed at 11:32 on 09/16/13) recovered high for iron; 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: 333151001 (J1RVM6).

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 reporting 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. Sample 333151001 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: 1222567. 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:** 09/19/13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
18-SEP-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ICP	SW846 3050B/6010C	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1330457	See Below		

Potentially affected work order(s)(SDG): 333151(XP0011)

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 1202946027MS,1202949880PS 2. Failed RPD for DUP: QC 1202946026DUP	1. The matrix spike recovery failed outside of the control limits for silicon. The post spike failed outside the required control limits for silicon. This verifies the presence of a matrix interference for silicon. 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 18-SEP-13

Data Validator/Group Leader:

Jamie Johnson 18-SEP-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: XP0011 GEL Work Order: 333151 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 09/19/13

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

Certificate of Analysis

Report Date: September 18, 2013

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

Client SDG: XP0011

Client Sample ID: J1RVM6
Sample ID: 333151001
Matrix: SOIL
Collect Date: 10-SEP-13 06:49
Receive Date: 11-SEP-13
Collector: Client
Moisture: 3.87%

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	0.00406	0.00406	0.0121	mg/kg	1	NOR1	09/13/13	1227	1330613	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		5230	6.78	19.9	mg/kg	1	HSC	09/16/13	1118	1330457	2
Arsenic	B	2.44	0.498	2.99	mg/kg	1					
Barium		72.8	0.0996	0.498	mg/kg	1					
Beryllium		1.01	0.0996	0.498	mg/kg	1					
Boron	U	0.996	0.996	4.98	mg/kg	1					
Cadmium		0.654	0.0996	0.498	mg/kg	1					
Calcium		3730	7.97	24.9	mg/kg	1					
Chromium		7.09	0.149	0.498	mg/kg	1					
Copper		42.1	0.299	0.996	mg/kg	1					
Iron		28600	7.97	24.9	mg/kg	1					
Magnesium		4660	8.47	29.9	mg/kg	1					
Manganese		384	0.199	0.996	mg/kg	1					
Molybdenum	B	0.743	0.199	0.996	mg/kg	1					
Nickel		8.79	0.149	0.498	mg/kg	1					
Potassium		1380	6.38	24.9	mg/kg	1					
Silver	B	0.223	0.0996	0.498	mg/kg	1					
Sodium		135	6.98	24.9	mg/kg	1					
Silicon	*N	672	1.49	9.96	mg/kg	1	HSC	09/16/13	1135	1330457	3
Antimony	DU	1.64	1.64	4.98	mg/kg	5	HSC	09/16/13	1143	1330457	4
Cobalt	D	8.55	0.747	2.49	mg/kg	5					
Lead	D	7.44	1.64	4.98	mg/kg	5					
Vanadium	D	85.8	0.498	2.49	mg/kg	5					
Zinc	D	71.1	1.99	4.98	mg/kg	5					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.320	0.320	1.00	mg/kg	2	SKJ	09/17/13	0619	1330459	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	09/13/13	0900	1330458
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	09/13/13	0900	1330456
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	09/12/13	1659	1330611

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Certificate of Analysis

Report Date: September 18, 2013

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0011
Project:	RC-232 Soil		

Client Sample ID:	J1RVM6	Project:	WCHN00213
Sample ID:	333151001	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: September 19, 2013

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

Contact: **Joan Kessner**

Workorder: **333151** **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS											
Batch 1330459											
QC1202946030 333151001 DUP											
Selenium		DU	0.320	DU	0.329	mg/kg	N/A ^			SKJ	09/17/13 06:25
QC1202946033 LCS											
Selenium	4.77			D	4.37	mg/kg		91.6	(80%-120%)		09/17/13 06:01
QC1202946029 MB											
Selenium				DU	0.311	mg/kg					09/17/13 05:55
QC1202946032 333151001 MS											
Selenium	4.84	DU	0.320	D	3.91	mg/kg		80.7	(75%-125%)		09/17/13 06:31
QC1202946031 333151001 SDILT											
Selenium		DU	-0.837	DU	1.60	ug/L	N/A		(0%-10%)		09/17/13 06:43
Metals Analysis-ICP											
Batch 1330457											
QC1202946026 333151001 DUP											
Aluminum			5230		4910	mg/kg	6.26		(0%-20%)	HSC	09/16/13 11:20
Antimony		DU	1.64	DU	1.60	mg/kg	N/A ^				09/16/13 11:45
Arsenic		B	2.44	B	2.39	mg/kg	2.01 ^		(+/-2.90)		09/16/13 11:20
Barium			72.8		64.7	mg/kg	11.7		(0%-20%)		
Beryllium			1.01		0.937	mg/kg	7.23 ^		(+/-0.483)		
Boron		U	0.996	U	0.967	mg/kg	N/A ^				
Cadmium			0.654		0.565	mg/kg	14.6 ^		(+/-0.483)		
Calcium			3730		3560	mg/kg	4.78		(0%-20%)		
Chromium			7.09		5.84	mg/kg	19.3		(0%-20%)		
Cobalt		D	8.55	D	8.26	mg/kg	3.43 ^		(+/-2.42)		09/16/13 11:45
Copper			42.1		47.1	mg/kg	11.2		(0%-20%)		09/16/13 11:20
Iron			28600		25700	mg/kg	10.6		(0%-20%)		

QC Summary

Workorder: 333151 **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1330457											
Lead		D	7.44	D	9.82	mg/kg	27.6 ^		(+/-4.83)	HSC	09/16/13 11:45
Magnesium			4660		4420	mg/kg	5.29		(0%-20%)		09/16/13 11:20
Manganese			384		344	mg/kg	11.1		(0%-20%)		
Molybdenum		B	0.743	B	0.675	mg/kg	9.61 ^		(+/-0.967)		
Nickel			8.79		7.77	mg/kg	12.3		(0%-20%)		
Potassium			1380		1320	mg/kg	4.68		(0%-20%)		
Silicon		*N	672	*	497	mg/kg	30.0*		(0%-20%)		09/16/13 11:37
Silver		B	0.223	B	0.201	mg/kg	10.4 ^		(+/-0.483)		09/16/13 11:20
Sodium			135		127	mg/kg	6.22		(0%-20%)		
Vanadium		D	85.8	D	80.1	mg/kg	6.92		(0%-20%)		09/16/13 11:45
Zinc		D	71.1	D	67.5	mg/kg	5.24		(0%-20%)		
QC1202946025 LCS											
Aluminum	475				511	mg/kg		108	(80%-120%)		09/16/13 11:14
Antimony	47.5				46.2	mg/kg		97.2	(80%-120%)		09/16/13 11:32
Arsenic	47.5				48.1	mg/kg		101	(80%-120%)		09/16/13 11:14
Barium	47.5				49.1	mg/kg		103	(80%-120%)		
Beryllium	47.5				49.9	mg/kg		105	(80%-120%)		
Boron	47.5				48.4	mg/kg		102	(80%-120%)		
Cadmium	47.5				50.1	mg/kg		105	(80%-120%)		
Calcium	475				490	mg/kg		103	(80%-120%)		
Chromium	47.5				47.5	mg/kg		99.9	(80%-120%)		
Cobalt	47.5				47.9	mg/kg		101	(80%-120%)		09/16/13 11:32

QC Summary

Workorder: 333151 **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1330457										
Copper	47.5			49.1	mg/kg		103	(80%-120%)	HSC	09/16/13 11:14
Iron	475			497	mg/kg		105	(80%-120%)		
Lead	47.5			48.6	mg/kg		102	(80%-120%)		09/16/13 11:32
Magnesium	475			505	mg/kg		106	(80%-120%)		09/16/13 11:14
Manganese	47.5			47.5	mg/kg		99.9	(80%-120%)		
Molybdenum	47.5			47.2	mg/kg		99.3	(80%-120%)		
Nickel	47.5			49.4	mg/kg		104	(80%-120%)		
Potassium	475			502	mg/kg		106	(80%-120%)		
Silicon	475			424	mg/kg		89.1	(80%-120%)		09/16/13 11:32
Silver	47.5			50.2	mg/kg		106	(80%-120%)		09/16/13 11:14
Sodium	475			491	mg/kg		103	(80%-120%)		
Vanadium	47.5			47.4	mg/kg		99.7	(80%-120%)		09/16/13 11:32
Zinc	47.5			46.9	mg/kg		98.6	(80%-120%)		
QC1202946024 MB										
Aluminum			U	6.38	mg/kg					09/16/13 11:11
Antimony			U	0.310	mg/kg					09/16/13 11:29
Arsenic			B	-0.778	mg/kg					09/16/13 11:11
Barium			U	0.0938	mg/kg					
Beryllium			U	0.0938	mg/kg					
Boron			U	0.938	mg/kg					
Cadmium			U	0.0938	mg/kg					
Calcium			U	7.50	mg/kg					

QC Summary

Workorder: 333151 **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1330457											
Chromium				U	0.141	mg/kg				HSC	09/16/13 11:11
Cobalt				U	0.141	mg/kg					09/16/13 11:29
Copper				U	0.281	mg/kg					09/16/13 11:11
Iron				U	7.50	mg/kg					
Lead				U	0.310	mg/kg					09/16/13 11:29
Magnesium				U	7.97	mg/kg					09/16/13 11:11
Manganese				U	0.188	mg/kg					
Molybdenum				U	0.188	mg/kg					
Nickel				U	0.141	mg/kg					
Potassium				U	6.00	mg/kg					
Silicon				U	1.41	mg/kg					09/16/13 11:29
Silver				U	0.0938	mg/kg					09/16/13 11:11
Sodium				B	-7.88	mg/kg					
Vanadium				U	0.0938	mg/kg					09/16/13 11:29
Zinc				B	0.508	mg/kg					
QC1202946027 333151001 MS											
Aluminum	505		5230		6200	mg/kg		N/A	(75%-125%)		09/16/13 11:23
Antimony	50.5	DU	1.64	D	45.9	mg/kg		90.9	(75%-125%)		09/16/13 11:48
Arsenic	50.5	B	2.44		50.4	mg/kg		94.9	(75%-125%)		09/16/13 11:23
Barium	50.5		72.8		115	mg/kg		84.2	(75%-125%)		
Beryllium	50.5		1.01		50.1	mg/kg		97.2	(75%-125%)		
Boron	50.5	U	0.996		48.2	mg/kg		94.4	(75%-125%)		

QC Summary

Workorder: 333151 **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1330457											
Cadmium	50.5		0.654		49.0	mg/kg		95.8	(75%-125%)	HSC	09/16/13 11:23
Calcium	505		3730		4390	mg/kg		N/A	(75%-125%)		
Chromium	50.5		7.09		53.8	mg/kg		92.5	(75%-125%)		
Cobalt	50.5	D	8.55	D	57.9	mg/kg		97.7	(75%-125%)		09/16/13 11:48
Copper	50.5		42.1		88.9	mg/kg		92.7	(75%-125%)		09/16/13 11:23
Iron	505		28600		27600	mg/kg		N/A	(75%-125%)		
Lead	50.5	D	7.44	D	56.8	mg/kg		97.8	(75%-125%)		09/16/13 11:48
Magnesium	505		4660		5230	mg/kg		N/A	(75%-125%)		09/16/13 11:23
Manganese	50.5		384		415	mg/kg		N/A	(75%-125%)		
Molybdenum	50.5	B	0.743		48.6	mg/kg		94.7	(75%-125%)		
Nickel	50.5		8.79		55.9	mg/kg		93.3	(75%-125%)		
Potassium	505		1380		1860	mg/kg		95.4	(75%-125%)		
Silicon	505	*N	672	N	758	mg/kg		17*	(75%-125%)		09/16/13 11:40
Silver	50.5	B	0.223		51.0	mg/kg		101	(75%-125%)		09/16/13 11:23
Sodium	505		135		659	mg/kg		104	(75%-125%)		
Vanadium	50.5	D	85.8	D	135	mg/kg		97.5	(75%-125%)		09/16/13 11:48
Zinc	50.5	D	71.1	D	118	mg/kg		93.4	(75%-125%)		
QC1202949880 333151001 PS											
Silicon	5000	*N	6740		20600	ug/L		277*	(80%-120%)		09/18/13 11:32
QC1202946028 333151001 SDILT											
Aluminum			52500	D	11300	ug/L	7.93		(0%-10%)		09/16/13 11:26
Antimony		DU	-0.605	DU	8.22	ug/L	N/A		(0%-10%)		09/16/13 11:50
Arsenic		B	24.4	DU	2.49	ug/L	N/A		(0%-10%)		09/16/13 11:26

QC Summary

Workorder: 333151 **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1330457										
Barium		731	D	153	ug/L	4.47		(0%-10%)	HSC	09/16/13 11:26
Beryllium		10.1	D	2.15	ug/L	6.07		(0%-10%)		
Boron	U	4.98	DU	4.98	ug/L	N/A		(0%-10%)		
Cadmium		6.56	D	1.22	ug/L	7.3		(0%-10%)		
Calcium		37500	D	7850	ug/L	4.69		(0%-10%)		
Chromium		71.2	D	14.6	ug/L	2.52		(0%-10%)		
Cobalt	D	17.2	D	3.67	ug/L	6.83		(0%-10%)		09/16/13 11:50
Copper		423	D	84.3	ug/L	.201		(0%-10%)		09/16/13 11:26
Iron		287000	D	61700	ug/L	7.33		(0%-10%)		
Lead	D	14.9	D	4.25	ug/L	42.4		(0%-10%)		09/16/13 11:50
Magnesium		46800	D	9870	ug/L	5.45		(0%-10%)		09/16/13 11:26
Manganese		3860	D	835	ug/L	8.25		(0%-10%)		
Molybdenum	B	7.46	DU	0.996	ug/L	N/A		(0%-10%)		
Nickel		88.3	D	18.1	ug/L	2.54		(0%-10%)		
Potassium		13900	D	2900	ug/L	4.42		(0%-10%)		
Silicon	*N	6740	D	1460	ug/L	8.21		(0%-10%)		09/16/13 11:41
Silver	B	2.24	DU	0.498	ug/L	N/A		(0%-10%)		09/16/13 11:26
Sodium		1360	D	257	ug/L	5.3		(0%-10%)		
Vanadium	D	172	D	35.1	ug/L	2.01		(0%-10%)		09/16/13 11:50
Zinc	D	143	CD	29.7	ug/L	3.89		(0%-10%)		
Metals Analysis-Mercury										
Batch 1330613										

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

QC Summary

Workorder: 333151 **Client SDG:** XP0011 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-Mercury										
Batch 1330613										
QC1202946393 333151001 DUP										
Mercury	U	0.00406	U	0.00417	mg/kg	N/A ^			NOR1	09/13/13 12:33
QC1202946388 LCS										
Mercury	0.116			0.116	mg/kg		100	(80%-120%)		09/13/13 12:05
QC1202946387 MB										
Mercury			U	0.00384	mg/kg					09/13/13 12:03
QC1202946394 333151001 MS										
Mercury	0.123	U	0.00406	0.123	mg/kg		99.6	(80%-120%)		09/13/13 12:28
QC1202946395 333151001 SDILT										
Mercury		U	0.006	DU 0.0203	ug/L	N/A		(0%-10%)		09/13/13 12:35

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.

Miscellaneous

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID: **1330456.0**
Analyst: Monifa Basdeo
Method: SW846 3050B
Lab SOP: GL-MA-E-009 REV# 22
Instrument: BAL-001

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1202946025	Metals Spike Mix I	UI1943364-01	.25	mL
LCS	1202946025	Metals Spike Mix II	UI1943367-06	.25	mL
MS	1202946027	Metals Spike Mix I	UI1943364-01	.25	mL
MS	1202946027	Metals Spike Mix II	UI1943367-06	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1202946024 MB	13-SEP-2013 09:00:52	Soil	0.533	50	93.80863
1202946025 LCS	13-SEP-2013 09:00:52	Soil	0.526	50	95.05703
333151001	13-SEP-2013 09:00:52	Soil	0.522	50	95.78544
1202946026 DUP (333151001)	13-SEP-2013 09:00:52	Soil	0.538	50	92.9368
1202946027 MS (333151001)	13-SEP-2013 09:00:52	Soil	0.515	50	97.08738
1202946028 SDILT (333151001)	13-SEP-2013 09:00:52	Soil	0.522	50	95.78544

Reagent/Solvent Lot ID	Description	Amount
1949994	HYDROCHLORIC ACID	10 mL
1961850	Concentrated Nitric Acid	1.25 mL

Comments:

Block Temperature: 93 C

Thermometer ID: 118840

Hot Block ID: 9

qc sample was a multi-colored black and beige soil.

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID: **1330458.0**
Analyst: Monifa Basdeo
Method: SW846 3050B
Lab SOP: GL-MA-E-009 REV# 22
Instrument: BAL-001

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1202946033	ICP-MS spiking soluiton A	UI1936142-A	.25	mL
LCS	1202946033	ICP-MS spiking solution B	UI1936146-B	.25	mL
MS	1202946032	ICP-MS spiking soluiton A	UI1936142-A	.25	mL
MS	1202946032	ICP-MS spiking solution B	UI1936146-B	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1202946029 MB	13-SEP-2013 09:00:52	Soil	0.53	50	94.33962
1202946033 LCS	13-SEP-2013 09:00:52	Soil	0.524	50	95.41985
333151001	13-SEP-2013 09:00:52	Soil	0.537	50	93.10987
1202946030 DUP (333151001)	13-SEP-2013 09:00:52	Soil	0.522	50	95.78544
1202946031 SDILT (333151001)	13-SEP-2013 09:00:52	Soil	0.537	50	93.10987
1202946032 MS (333151001)	13-SEP-2013 09:00:52	Soil	0.537	50	93.10987

Reagent/Solvent Lot ID	Description	Amount
1904936-02	Hydrogen Peroxide 30%	1.5 mL
1961850	Concentrated Nitric Acid	5 mL

Comments:

Block Temperature: 93 C

Thermometer ID: 118840

Hot Block ID: 9

qc was a multi-colored black and beige soil.

Prep Logbook

Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Batch ID: **1330611.0**
Analyst: Alan Stanley
Method: SW846 7471B Prep
Lab SOP: GL-MA-E-010 REV# 26
Instrument: Metals Manual Instrument

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1202946388	MHGSOILMSSPIKE	WHG130912-14	.3	mL
MS	1202946389	MHGSOILMSSPIKE	WHG130912-14	.3	mL
MS	1202946394	MHGSOILMSSPIKE	WHG130912-14	.3	mL
MSD	1202946390	MHGSOILMSSPIKE	WHG130912-14	.3	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1202946387 MB	12-SEP-2013 16:59:54	Soil	0.524	30	57.25191
1202946388 LCS	12-SEP-2013 16:59:54	Soil	0.519	30	57.80347
332351001	12-SEP-2013 16:59:54	Soil	0.504	30	59.52381
1202946389 MS (332351001)	12-SEP-2013 16:59:54	Soil	0.501	30	59.88024
1202946390 MSD (332351001)	12-SEP-2013 16:59:54	Soil	0.511	30	58.70841
1202946391 SDILT (332351001)	12-SEP-2013 16:59:54	Soil	0.504	30	59.52381
1202946392 DUP (332351001)	12-SEP-2013 16:59:54	Soil	0.52	30	57.69231
332351002	12-SEP-2013 16:59:54	Soil	0.538	30	55.76208
332351003	12-SEP-2013 16:59:54	Soil	0.54	30	55.55556
332351004	12-SEP-2013 16:59:54	Soil	0.515	30	58.25243
332351005	12-SEP-2013 16:59:54	Soil	0.525	30	57.14286
332351006	12-SEP-2013 16:59:54	Soil	0.511	30	58.70841
333151001	12-SEP-2013 16:59:54	Soil	0.515	30	58.25243
1202946393 DUP (333151001)	12-SEP-2013 16:59:54	Soil	0.502	30	59.76096
1202946394 MS (333151001)	12-SEP-2013 16:59:54	Soil	0.508	30	59.05512
1202946395 SDILT (333151001)	12-SEP-2013 16:59:54	Soil	0.515	30	58.25243
333179003	12-SEP-2013 16:59:54	Soil	0.502	30	59.76096
333179006	12-SEP-2013 16:59:54	Soil	0.535	30	56.07477

Reagent/Solvent Lot ID	Description	Amount
130712-A	Hydrochloric Acid Conc.	1.125 mL
130717-1	NITRIC ACID	.375 mL
1895265-C	Hg reducing agent	2 mL
1952486-C	5% KMnO4 solution	7.5 mL
WHG130912-07	Mercury Working Standard 1st Source CAL S 0.2/CRA	30 uL

Comments:

Digestion Start Date: 12-SEP-2013 16:21
Digestion End Date: 12-SEP-2013 16:51
Block Temperature: 95 C
Thermometer ID: 118629
Hot Block ID: 7
Both QC's were sand like material.

Prep Logbook

Batch ID: **1330611.0**
Analyst: Alan Stanley
Method: SW846 7471B Prep
Lab SOP: GL-MA-E-010 REV# 26
Instrument: Metals Manual Instrument

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1202946388	MHGSOILMSSPIKE	WHG130912-14	.3	mL
MS	1202946389	MHGSOILMSSPIKE	WHG130912-14	.3	mL
MS	1202946394	MHGSOILMSSPIKE	WHG130912-14	.3	mL
MSD	1202946390	MHGSOILMSSPIKE	WHG130912-14	.3	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)

Reagent/Solvent Lot ID	Description	Amount
WHG130912-08	Mercury Working Standard 1st Source CAL S 0.5	75 uL
WHG130912-09	Mercury Working 1st Source CAL S 2.0	300 uL
WHG130912-10	Mercury Working 1st Source CAL S 5.0/CCV	750 uL
WHG130912-11	Mercury Working 1st Source CAL S 10.0	1500 uL
WHG130912-12	Mercury Working 2nd Source S 5.0/ICV	750 uL

Comments: