SAF-RC-189
100N Field Remediation – Soil Full Protocol
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

Kathy Wendt H4-21 KW 9/30/13
INITIAL/DATE

COMMENTS:

SDG XP0012 SAF-RC-189

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

Sample Location: 124-N-10 Verification

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 27, 2013

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

Re: RC-189 Soil
Work Order: 333295
SDG: XP0012

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 12, 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-189-234
Enclosures

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Case Narrative

Receipt Narrative
for
WC-HANFORD, INC.
SDG: XP0012
Work Order: 333295

September 27, 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 12, 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 NWTPH-Dx analysis. The laboratory has submitted PT results and applied for certification.

Sample Identification: The laboratory received the following sample:

Laboratory ID	Client ID
333295001	J1T0P1

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, GC Semivolatile PCB, General Chemistry, HPLC Polynuclear Aromatic Hydrocarbon and Metals.

Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation

333295

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-189-234

Page 1 of 1

Collector STOWE, QG	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Price Code 8L	**Data Turnaround** ~~21~~ 7 Days DH 9/9/13		
Project Designation 100N Field Remediation	**Sampling Location** 124-N-10, Verification		**SAF No.** RC-189
Ice Chest No. WCH-11-065	**Field Logbook No.** EL-1652-10	**COA** R24N102000	**Method of Shipment** Commercial Carrier fed EX
Shipped To ~~TestAmerica St. Louis~~ 9-11-13 cmb Gel Lab.	**Offsite Property No.** A120950 ~~A120838~~ 9-11-13 cmb		**Bill of Lading/Air Bill No.** Ste OSPC

Other Labs Shipped To

POSSIBLE SAMPLE HAZARDS/REMARKS

None

Special Handling and/or Storage

Preservation	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C					
Type of Container	G/P	G/P	G/P	G	aG	aG					
No. of Container(s)	1	0	1	1	1	1					
Volume	60mL	60mL	60mL	120mL	120mL	120mL					
Sample Analysis	See item (1) in Special Instructions	NO2/NO3 - 353.1	Chromium Hex - 7196	TPH-Diesel Range - WTPH-D +	PAHs - 8310	PCBs - 8082					

Sample No.	Matrix	Sample Date	Sample Time										
J1T0P1	SOIL	9/10/13	0910	X	X	X	X	X	X				

CHAIN OF POSSESSION / **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	9/10/13 1000	Dontei Delberg	9/10/13 1000
Dontei Delberg	9/10/13 1630	Cindra Bingham	9-10-13 1630
Cindra Bingham	9-10-13 1640	1060 Battelle fridge	lc 9-10-13 1640
1060 Battelle, fridge	lc 9-11-13 0900	Cindra Bingham	9-11-13 0900
Cindra Bingham	9-11-13 0930	fed EX	
FedEx		Jennifer Pellegrini	9-12-13 0855

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)

REVIEWED BY K Woodward DATE 9-11-13

XP0012

WCH-EE-011

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WCHN	**SDG/AR/COC/Work Order:** 333295
Received By: JP	**Date Received:** 9-12-13

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?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 cpm
Classified Radioactive II or III by RSO?		✓	If yes, Were swipes taken of sample contatiners < action levels?
COC/Samples marked containing PCBs?		✓	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		✓	If yes, samples are to be segregeated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		✓	

	Sample Receipt Criteria	**Yes**	**NA**	**No**	**Comments/Qualifiers (Required for Non-Conforming Items)**
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	✓			Preservation Method: (Ice bags) Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 6.0
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: 41502209 Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		✓		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
7	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			
14	Carrier and tracking number.				Circle Applicable: (FedEx Air) FedEx Ground UPS Field Services Courier Other 7966 0722 7427

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials JP Date 9-12-13 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 19 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 XP0012

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
333295001	J1T0P1
1202947759	Method Blank (MB)
1202947760	Laboratory Control Sample (LCS)
1202947763	333295001(J1T0P1) Matrix Spike (MS)
1202947764	333295001(J1T0P1) 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 333295001 (J1T0P1) 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 (1202947764). 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, 333295001 (J1T0P1). 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 (1202947764). 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, 333295001 (J1T0P1). 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: XP0012 GEL Work Order: 333295 Project: RC-189 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 XP0012 HPLC_PAH

This roadmap was analyzed by cww on 09-18-2013, 10:44.
This roadmap was reviewed by map on 09-18-2013, 11:13.
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/ph5i1710.d	333295001	17-SEP-2013	15:56	XP0012.sub	J1T0P1	1	1331143	

QC Sample

exclude	manual	datafile	smpid	sampletype	injdate	injtime	sublist	clientid	dilution	batchid	comment
☐	N	/chem/hplce.i/p091713.b/ph5i1704A.d	1202947759	mb	17-SEP-2013	11:43	XP0012.sub	PAHBLK01	1	1331143	
☐	N	/chem/hplce.i/p091713.b/ph5i1705A.d	1202947760	lcs	17-SEP-2013	12:25	XP0012.sub	PAHBLK01LCS	1	1331143	Pass
☐	N	/chem/hplce.i/p091713.b/ph5i1711.d	1202947763	ms	17-SEP-2013	16:38	XP0012.sub	J1T0P1MS	1	1331143	Pass
☐	N	/chem/hplce.i/p091713.b/ph5i1712.d	1202947764	msd	17-SEP-2013	17:21	XP0012.sub	J1T0P1MSD	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 19, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-189 Soil

Client SDG: XP0012

Client Sample ID: J1T0P1
Sample ID: 333295001
Matrix: SOIL
Collect Date: 10-SEP-13 09:10
Receive Date: 12-SEP-13
Collector: Client
Moisture: 2.37%

Project: WCHN00613
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	5.12	5.12	17.1	ug/kg	1	CWW	09/17/13	1556	1331143	1
Acenaphthylene	U	5.12	5.12	17.1	ug/kg	1					
Anthracene	TU	1.71	1.71	17.1	ug/kg	1					
Benzo(a)anthracene	U	0.546	0.546	1.71	ug/kg	1					
Benzo(a)pyrene	U	0.546	0.546	1.71	ug/kg	1					
Benzo(b)fluoranthene	U	0.546	0.546	1.71	ug/kg	1					
Benzo(ghi)perylene	U	0.546	0.546	1.71	ug/kg	1					
Benzo(k)fluoranthene	U	0.273	0.273	0.854	ug/kg	1					
Chrysene	U	0.546	0.546	1.71	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.546	0.546	1.71	ug/kg	1					
Fluoranthene	U	0.546	0.546	1.71	ug/kg	1					
Fluorene	U	5.12	5.12	17.1	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.546	0.546	1.71	ug/kg	1					
Naphthalene	U	5.12	5.12	17.1	ug/kg	1					
Phenanthrene	U	5.12	5.12	17.1	ug/kg	1					
Pyrene	U	0.546	0.546	1.71	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"	6670 ug/kg	8540	78.1	(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: **333295** **Client SDG:** XP0012 **Project Description:** RC-189 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: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 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%)		
QC1202947763 333295001 MS											
Acenaphthene	1700	U	5.12		1210	ug/kg		71.4	(49%-90%)		09/17/13 16:38
Acenaphthylene	1700	U	5.12		1210	ug/kg		71.3	(48%-97%)		
Anthracene	1700	TU	1.71		1390	ug/kg		81.6	(49%-91%)		
Benzo(a)anthracene	170	U	0.546		128	ug/kg		75.5	(29%-126%)		
Benzo(a)pyrene	170	U	0.546		125	ug/kg		73.4	(26%-130%)		
Benzo(b)fluoranthene	170	U	0.546		124	ug/kg		72.7	(32%-135%)		
Benzo(ghi)perylene	170	U	0.546		123	ug/kg		72.5	(34%-125%)		

QC Summary

Workorder: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC-PAH											
Batch 1331143											
Benzo(k)fluoranthene	85.0	U	0.273		57.9	ug/kg		68.1	(48%-142%)	CWW	09/17/13 16:38
Chrysene	170	U	0.546		140	ug/kg		82.5	(39%-127%)		
Dibenzo(a,h)anthracene	170	U	0.546		145	ug/kg		85.3	(38%-130%)		
Fluoranthene	170	U	0.546		121	ug/kg		71.4	(20%-139%)		
Fluorene	1700	U	5.12		1240	ug/kg		73	(51%-90%)		
Indeno(1,2,3-cd)pyrene	170	U	0.546		132	ug/kg		77.3	(41%-145%)		
Naphthalene	1700	U	5.12		1180	ug/kg		69.4	(43%-87%)		
Phenanthrene	1700	U	5.12		1250	ug/kg		73.4	(50%-100%)		
Pyrene	170	U	0.546		131	ug/kg		77	(18%-149%)		
**Decafluorobiphenyl	8500		6670		6190	ug/kg		72.8	(23%-104%)		
QC1202947764 333295001 MSD											
Acenaphthene	1700	U	5.12		1310	ug/kg	7.80	77.3	(0%-30%)		09/17/13 17:21
Acenaphthylene	1700	U	5.12		1310	ug/kg	7.75	77.2	(0%-30%)		
Anthracene	1700	TU	1.71	T	1570	ug/kg	12.5	92.6*	(0%-30%)		
Benzo(a)anthracene	170	U	0.546		148	ug/kg	14.2	87.2	(0%-30%)		
Benzo(a)pyrene	170	U	0.546		145	ug/kg	14.9	85.3	(0%-30%)		
Benzo(b)fluoranthene	170	U	0.546		143	ug/kg	14.5	84.2	(0%-30%)		
Benzo(ghi)perylene	170	U	0.546		142	ug/kg	14.3	83.8	(0%-30%)		
Benzo(k)fluoranthene	84.9	U	0.273		67.0	ug/kg	14.6	78.9	(0%-30%)		
Chrysene	170	U	0.546		164	ug/kg	15.6	96.6	(0%-30%)		
Dibenzo(a,h)anthracene	170	U	0.546		167	ug/kg	14.2	98.5	(0%-30%)		
Fluoranthene	170	U	0.546		140	ug/kg	14.4	82.6	(0%-30%)		

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QC Summary

Workorder: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH												
Batch 1331143												
Fluorene	1700	U	5.12		1400	ug/kg	11.6	82.1	(0%-30%)	CWW	09/17/13	17:21
Indeno(1,2,3-cd)pyrene	170	U	0.546		152	ug/kg	14.5	89.6	(0%-30%)			
Naphthalene	1700	U	5.12		1260	ug/kg	6.79	74.4	(0%-30%)			
Phenanthrene	1700	U	5.12		1420	ug/kg	12.7	83.4	(0%-30%)			
Pyrene	170	U	0.546		151	ug/kg	14.0	88.7	(0%-30%)			
**Decafluorobiphenyl	8490		6670		6600	ug/kg		77.7	(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 XP0012

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
333295001	J1T0P1
1202947742	Method Blank (MB)
1202947743	Laboratory Control Sample (LCS)
1202947746	333295001(J1T0P1) Matrix Spike (MS)
1202947747	333295001(J1T0P1) 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 333295001 (J1T0P1) 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.

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Qualifier Definition Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0012 GEL Work Order: 333295 Project: RC-189 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

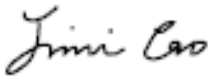
U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

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: 23 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-189 Soil

Client SDG: XP0012

Client Sample ID:	J1T0P1	Project:	WCHN00613
Sample ID:	333295001	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	10-SEP-13 09:10		
Receive Date:	12-SEP-13		
Collector:	Client		
Moisture:	2.37%		

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	2200	2200	6780	ug/kg	1	BYT1	09/17/13	1413	1331138	1
Motor Oil (C20-C36)	BJ	5530	2200	6780	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"	567 ug/kg	678	83.7	(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: **333295** **Client SDG:** XP0012 **Project Description:** RC-189 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%)			
QC1202947746 333295001 MS												
Diesel Range Organics (C10-C20)	68000	U	2200		66700	ug/kg		98.1	(70%-130%)		09/17/13	14:50
Motor Oil (C20-C36)	68000	BJ	5530	B	83000	ug/kg		114	(70%-130%)			
**o-Terphenyl	680		567		618	ug/kg		90.8	(50%-150%)			
QC1202947747 333295001 MSD												
Diesel Range Organics (C10-C20)	68200	U	2200		59500	ug/kg	11.4	87.3	(0%-20%)		09/17/13	15:27
Motor Oil (C20-C36)	68200	BJ	5530	B	71400	ug/kg	14.9	96.6	(0%-20%)			
**o-Terphenyl	682		567		540	ug/kg		79.2	(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: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 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

PCB Analysis

Case Narrative

PCB Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0012

Method/Analysis Information

Procedure:	**Analysis of Polychlorinated Biphenyls by ECD**
Analytical Method:	SW846 3541/8082A
Prep Method:	SW846 3541
Analytical Batch Number:	1331145
Prep Batch Number:	1331144

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 3541/8082A:

Sample ID	Client ID
333295001	J1T0P1
1202947765	Method Blank (MB)
1202947766	Laboratory Control Sample (LCS)
1202947769	333295001(J1T0P1) Matrix Spike (MS)
1202947770	333295001(J1T0P1) 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-040 REV# 20.

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

A complete list of the initial calibration data files are shown in the Calibration History report located in the Standard Data section of the data package.

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

Continuing Calibration Verification (CCV) Requirements
The associated calibration verification standards (ICV or CCV) did not meet the acceptance criteria.

The CCV standard bracketing the sample in this SDG failed to meet the acceptance criteria with positive bias; however, this had no adverse effects on the data as the WCHN field sample in this SDG was not detected with any of the target analtyes.

Surrogate recovery did not meet the acceptance criteria in the standards analyzed for this SDG; however, this had no adverse effects on the data as all associated samples recovered well within the acceptance range for the surrogate.

All analytes were 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.

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 333295001 (J1T0P1) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement
The MS recoveries for SDG 333295 were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD recoveries for SDG 333295 were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement
The RPD between the MS and MSD for SDG 333295 was within the established 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. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported analyte concentrations were confirmed on dissimilar columns. All sample extracts were cleaned using alumina. Additionally, copper was added to all sample extracts to remove sulfur.

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

Sample Re-extraction/Re-analysis
Re-extractions were not required for the samples reported in this batch.

Miscellaneous Information

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. 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.

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.

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 PCB 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 following additional comments were required:

The higher results from either column have been chosen and reported in the data package for the client samples, MB and LCS. The data reported for the MS and MSD are from the same analytical column as the parent sample.

Due to software issue, the surrogate recovery range was not indicated or possibly indicated incorrectly in Quantitation Report. Please see Surrogate Recovery Report for correct surrogate acceptance limits.

Due to rounding differences in the calculation between the forms, the data reported in Sample Summary (form 1) and Spike Recovery Report (form 3) may differ slightly from the data reported in Identification Summary (form 10).

Aroclors quantitated on the raw data report by ChemStation data system do not necessarily represent positive Aroclor identification. In order for positive identification to be made, the Aroclor must match in pattern and retention time; as well as quantitate relatively close between the primary and confirmation columns, as specified in SW846 method 8000. When these conditions are not met, the Aroclor is reported as a non-detect on the data report.

System Configuration

The Semi-Volatiles-PCB analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD8A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series ECD	Rtx-CLP I	30m x 0.25mm, 0.25um (Rtx-CLPesticide I)
ECD8A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series ECD	Rtx-CLP II	30m x 0.25mm, 0.20um (Rtx-CLPesticide II)

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.

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-189 Soil

Client SDG: XP0012

Client Sample ID: J1T0P1
Sample ID: 333295001
Matrix: SOIL
Collect Date: 10-SEP-13 09:10
Receive Date: 12-SEP-13
Collector: Client
Moisture: 2.37%

Project: WCHN00613
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.13	1.13	3.40	ug/kg	1	JXM	09/16/13	1225	1331145	1
Aroclor-1221	U	1.13	1.13	3.40	ug/kg	1					
Aroclor-1232	U	1.13	1.13	3.40	ug/kg	1					
Aroclor-1242	U	1.13	1.13	3.40	ug/kg	1					
Aroclor-1248	U	1.13	1.13	3.40	ug/kg	1					
Aroclor-1254	U	1.13	1.13	3.40	ug/kg	1					
Aroclor-1260	U	1.13	1.13	3.40	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	AXV1	09/13/13	1725	1331144

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	6.46 ug/kg	6.81	94.9	(35%-119%)
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.44 ug/kg	6.81	80.0	(44%-106%)

Notes:

Quality Control Summary

QC Summary

Report Date: September 18, 2013

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

Contact: **Joan Kessner**

Workorder: **333295** **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-PCB										
Batch 1331145										
QC1202947766 LCS										
Aroclor-1016	33.3			26.3	ug/kg		78.9	(39%-120%)	JXM	09/16/13 10:12
Aroclor-1260	33.3			23.0	ug/kg		69	(50%-116%)		
**4cmx	6.66			5.64	ug/kg		84.7	(44%-106%)		
**Decachlorobiphenyl	6.66			6.83	ug/kg		103	(35%-119%)		
QC1202947765 MB										
Aroclor-1016			U	1.11	ug/kg					09/16/13 10:00
Aroclor-1221			U	1.11	ug/kg					
Aroclor-1232			U	1.11	ug/kg					
Aroclor-1242			U	1.11	ug/kg					
Aroclor-1248			U	1.11	ug/kg					
Aroclor-1254			U	1.11	ug/kg					
Aroclor-1260			U	1.11	ug/kg					
**4cmx	6.65			5.34	ug/kg		80.3	(44%-106%)		
**Decachlorobiphenyl	6.65			6.17	ug/kg		92.8	(35%-119%)		
QC1202947769 333295001 MS										
Aroclor-1016	34.0	U	1.13	27.5	ug/kg		81.1	(25%-125%)		09/16/13 12:40
Aroclor-1260	34.0	U	1.13	24.2	ug/kg		71.2	(28%-127%)		
**4cmx	6.80		5.44	6.19	ug/kg		91.1	(44%-106%)		
**Decachlorobiphenyl	6.80		6.46	7.77	ug/kg		114	(35%-119%)		
QC1202947770 333295001 MSD										
Aroclor-1016	33.9	U	1.13	26.9	ug/kg	2.36	79.3	(0%-30%)		09/16/13 12:54

GEL LABORATORIES LLC

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

QC Summary

Workorder: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB												
Batch 1331145												
Aroclor-1260	33.9	U	1.13		24.4	ug/kg	0.746	71.9	(0%-30%)			
**4cmx	6.78		5.44		5.87	ug/kg		86.6	(44%-106%)	JXM	09/16/13	12:54
**Decachlorobiphenyl	6.78		6.46		7.72	ug/kg		114	(35%-119%)			

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

Prep Logbook

Automated Soxhlet Extraction

Batch ID: 1331144 **Verified by:** _____
Analyst: Alberto Velasco
Method: SW846 3541

Lab SOP: GL-OA-E-066 REV# 5
Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Aliquot (g)	Clean Up	Amount 1 (mL)	Amount 2 (mL)	Amount 3 (mL)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1202947765 MB	13-SEP-2013 17:25:00	30.07	H2SO4/KMnO4	2	2	9	1	0.03326
1202947766 LCS	13-SEP-2013 17:25:00	30.03	H2SO4/KMnO4	2	2	9	1	0.0333
332351001	13-SEP-2013 17:25:00	30.14	H2SO4/KMnO4	2	2	9	1	0.03318
1202947767 MS (332351001)	13-SEP-2013 17:25:00	30.04	H2SO4/KMnO4	2	2	9	1	0.03329
1202947768 MSD (332351001)	13-SEP-2013 17:25:00	30.06	H2SO4/KMnO4	2	2	9	1	0.03327
332351002	13-SEP-2013 17:25:00	30.09	H2SO4/KMnO4	2	2	9	1	0.03323
332351003	13-SEP-2013 17:25:00	30.11	H2SO4/KMnO4	2	2	9	1	0.03321
332351004	13-SEP-2013 17:25:00	30.03	H2SO4/KMnO4	2	2	9	1	0.0333
332351005	13-SEP-2013 17:25:00	30.16	H2SO4/KMnO4	2	2	9	1	0.03316
333295001	13-SEP-2013 17:25:00	30.09	H2SO4/KMnO4	2	2	9	1	0.03323
1202947769 MS (333295001)	13-SEP-2013 17:25:00	30.14	H2SO4/KMnO4	2	2	9	1	0.03318
1202947770 MSD (333295001)	13-SEP-2013 17:25:00	30.2	H2SO4/KMnO4	2	2	9	1	0.03311

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202947766	PCB Laboratory Control	WE130819-04	1	mL
MS	1202947767	PCB Laboratory Control	WE130819-04	1	mL
MS	1202947769	PCB Laboratory Control	WE130819-04	1	mL
MSD	1202947768	PCB Laboratory Control	WE130819-04	1	mL
MSD	1202947770	PCB Laboratory Control	WE130819-04	1	mL
SURR	All	PEST LOW LEVEL SURROGATE 200 UG/L	WE130807-01	1	mL
REGNT	All	Hexane	130906-B4	120	mL
REGNT	All	50g KMnO4 per 1L DI H2O	1961551	5	mL
REGNT	All	1:1 sulfuric acid	1961995	5	mL
SOURC	All	SODIUM SULFATE	1948175	30	g

Comments:

Final Solvent: Hexane
Clean up Initials: AV
Verified: MJS
Clean up SOP: GL-OA-E-037
Clean up Date: 9-13-13

Metals Analysis

Case Narrative

Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0012

Sample Analysis

Sample ID	Client ID
333295001	J1T0P1
1202946753	Method Blank (MB) **ICP**
1202946754	Laboratory Control Sample (LCS)
1202946757	333295001(J1T0P1L) Serial Dilution (SD)
1202946755	333295001(J1T0P1D) Sample Duplicate (DUP)
1202946756	333295001(J1T0P1S) Matrix Spike (MS)
1202950686	333295001(J1T0P1PS) Post Spike (PS)
1202946748	Method Blank (MB) **ICP-MS**
1202946749	Laboratory Control Sample (LCS)
1202946752	333295001(J1T0P1L) Serial Dilution (SD)
1202946750	333295001(J1T0P1D) Sample Duplicate (DUP)
1202946751	333295001(J1T0P1S) Matrix Spike (MS)
1202948110	Method Blank (MB) **CVAA**
1202948111	Laboratory Control Sample (LCS)
1202948117	333295001(J1T0P1L) Serial Dilution (SD)
1202948115	333295001(J1T0P1D) Sample Duplicate (DUP)
1202948116	333295001(J1T0P1S) Matrix Spike (MS)

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

Method/Analysis Information

Analytical Batch:	1330744, 1330742 and 1331292
Prep Batch :	1330743, 1330741 and 1331288
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 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 aluminum. PQL01 (analyzed at 07:43 on 09/19/13) and PQL03 (analyzed at 10:05 on 09/19/13) recovered low for aluminum; 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: 333295001 (J1T0P1).

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 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 RL, a control of +/-RL is used to evaluate the DUP results. All applicable analytes met these requirements.

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 absence 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 333295001 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: 1222983. 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:** 09/20/13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
19-SEP-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ICP	SW846 3050B/6010C	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1330744	See Below		

Potentially affected work order(s)(SDG): 333295(XP0012)

Application Issues:

Failed Recovery for MS/PS

Specification and Requirements Exception Description:	**DER Disposition:**
1. Failed Recovery for MS/PS: QC 1202946756MS	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.

Originator's Name:

Helen Camello 19-SEP-13

Data Validator/Group Leader:

Jamie Johnson 19-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: XP0012 GEL Work Order: 333295 Project: RC-189 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 09/20/13

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

Certificate of Analysis

Report Date: September 20, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-189 Soil

Client SDG: XP0012

Client Sample ID: J1T0P1
Sample ID: 333295001
Matrix: SOIL
Collect Date: 10-SEP-13 09:10
Receive Date: 12-SEP-13
Collector: Client
Moisture: 2.37%

Project: WCHN00613
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	0.00397	0.00397	0.0118	mg/kg	1	NOR1	09/17/13	1614	1331292	1
Metals Analysis-ICP											
ICP METALS 6010TR Client List "Dry Weight Corrected"											
Aluminum		9570	6.62	19.5	mg/kg	1	HSC	09/19/13	0941	1330744	2
Arsenic	BC	2.04	0.487	2.92	mg/kg	1					
Barium		86.1	0.0974	0.487	mg/kg	1					
Beryllium	B	0.442	0.0974	0.487	mg/kg	1					
Boron	B	2.17	0.974	4.87	mg/kg	1					
Cadmium		0.501	0.0974	0.487	mg/kg	1					
Calcium		3200	7.79	24.3	mg/kg	1					
Chromium		13.8	0.146	0.487	mg/kg	1					
Copper		14.1	0.292	0.974	mg/kg	1					
Iron		23400	7.79	24.3	mg/kg	1					
Magnesium		4280	8.28	29.2	mg/kg	1					
Manganese		419	0.195	0.974	mg/kg	1					
Molybdenum	U	0.195	0.195	0.974	mg/kg	1					
Nickel		11.5	0.146	0.487	mg/kg	1					
Silicon	N	1310	1.46	9.74	mg/kg	1					
Silver	U	0.0974	0.0974	0.487	mg/kg	1					
Sodium		223	6.82	24.3	mg/kg	1					
Potassium		2240	6.23	24.3	mg/kg	1	HSC	09/19/13	1246	1330744	3
Antimony	DU	1.61	1.61	4.87	mg/kg	5	HSC	09/19/13	0950	1330744	4
Cobalt	D	8.88	0.730	2.43	mg/kg	5					
Lead	D	5.80	1.61	4.87	mg/kg	5					
Vanadium	D	57.0	0.487	2.43	mg/kg	5					
Zinc	D	45.5	1.95	4.87	mg/kg	5					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.330	0.330	1.00	mg/kg	2	SKJ	09/17/13	0507	1330742	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	AXG2	09/16/13	0820	1330741
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	09/16/13	0900	1330743
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	09/16/13	1710	1331288

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

Certificate of Analysis

Report Date: September 20, 2013

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0012
Project:	RC-189 Soil		

Client Sample ID:	J1T0P1	Project:	WCHN00613
Sample ID:	333295001	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 20, 2013

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

Contact: **Joan Kessner**

Workorder: **333295** **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS											
Batch 1330742											
QC1202946750 333295001 DUP											
Selenium		DU	0.330	DU	0.311	mg/kg	N/A ^			SKJ	09/17/13 05:13
QC1202946749 LCS											
Selenium	4.53			D	4.17	mg/kg		92.1	(80%-120%)		09/17/13 04:49
QC1202946748 MB											
Selenium				DU	0.320	mg/kg					09/17/13 04:44
QC1202946751 333295001 MS											
Selenium	4.53	DU	0.330	D	3.65	mg/kg		80.6	(75%-125%)		09/17/13 05:19
QC1202946752 333295001 SDILT											
Selenium		DU	-0.495	DU	1.65	ug/L	N/A		(0%-10%)		09/17/13 05:31
Metals Analysis-ICP											
Batch 1330744											
QC1202946755 333295001 DUP											
Aluminum			9570		9400	mg/kg	1.83		(0%-20%)	HSC	09/19/13 09:43
Antimony		DU	1.61	DU	1.65	mg/kg	N/A ^				09/19/13 09:53
Arsenic		BC	2.04	BC	1.68	mg/kg	19.8 ^		(+/-2.99)		09/19/13 09:43
Barium			86.1		83.5	mg/kg	3.08		(0%-20%)		
Beryllium		B	0.442	B	0.424	mg/kg	4.16 ^		(+/-0.499)		
Boron		B	2.17	B	1.89	mg/kg	13.4 ^		(+/-4.99)		
Cadmium			0.501	B	0.476	mg/kg	5.28 ^		(+/-0.499)		
Calcium			3200		3170	mg/kg	0.824		(0%-20%)		
Chromium			13.8		13.7	mg/kg	1.13		(0%-20%)		
Cobalt		D	8.88	D	8.46	mg/kg	4.79 ^		(+/-2.50)		09/19/13 09:53
Copper			14.1		13.6	mg/kg	4.01		(0%-20%)		09/19/13 09:43
Iron			23400		22500	mg/kg	4.07		(0%-20%)		

QC Summary

Workorder: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1330744											
Lead		D	5.80	BD	4.28	mg/kg	30.2 ^		(+/-4.99)	HSC	09/19/13 09:53
Magnesium			4280		4110	mg/kg	4.01		(0%-20%)		09/19/13 09:43
Manganese			419		393	mg/kg	6.40		(0%-20%)		
Molybdenum		U	0.195	U	0.200	mg/kg	N/A ^				
Nickel			11.5		11.1	mg/kg	3.58		(0%-20%)		
Potassium			2240		2180	mg/kg	2.47		(0%-20%)		09/19/13 12:48
Silicon		N	1310		1270	mg/kg	2.65		(0%-20%)		09/19/13 09:43
Silver		U	0.0974	U	0.0998	mg/kg	N/A ^				
Sodium			223		219	mg/kg	1.71		(0%-20%)		
Vanadium		D	57.0	D	52.5	mg/kg	8.29		(0%-20%)		09/19/13 09:53
Zinc		D	45.5	D	43.3	mg/kg	5.00		(0%-20%)		
QC1202946754 LCS											
Aluminum	482				500	mg/kg		104	(80%-120%)		09/19/13 09:38
Antimony	48.2				48.6	mg/kg		101	(80%-120%)		
Arsenic	48.2				48.7	mg/kg		101	(80%-120%)		
Barium	48.2				49.0	mg/kg		102	(80%-120%)		
Beryllium	48.2				49.0	mg/kg		102	(80%-120%)		
Boron	48.2				45.1	mg/kg		93.7	(80%-120%)		
Cadmium	48.2				49.3	mg/kg		102	(80%-120%)		
Calcium	482				481	mg/kg		99.9	(80%-120%)		
Chromium	48.2				48.3	mg/kg		100	(80%-120%)		
Cobalt	48.2				49.4	mg/kg		103	(80%-120%)		

QC Summary

Workorder: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1330744										
Copper	48.2			49.7	mg/kg		103	(80%-120%)	HSC	09/19/13 09:38
Iron	482			489	mg/kg		101	(80%-120%)		
Lead	48.2			50.0	mg/kg		104	(80%-120%)		
Magnesium	482			480	mg/kg		99.7	(80%-120%)		
Manganese	48.2			48.0	mg/kg		99.6	(80%-120%)		
Molybdenum	48.2			48.6	mg/kg		101	(80%-120%)		
Nickel	48.2			49.1	mg/kg		102	(80%-120%)		
Potassium	482			516	mg/kg		107	(80%-120%)		09/19/13 12:43
Silicon	482			439	mg/kg		91.2	(80%-120%)		09/19/13 09:38
Silver	48.2			49.3	mg/kg		102	(80%-120%)		
Sodium	482			528	mg/kg		110	(80%-120%)		
Vanadium	48.2			48.6	mg/kg		101	(80%-120%)		
Zinc	48.2			48.1	mg/kg		99.8	(80%-120%)		
QC1202946753 MB										
Aluminum			B	-18.6	mg/kg					09/19/13 09:35
Antimony			U	0.310	mg/kg					
Arsenic			B	0.575	mg/kg					
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: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1330744											
Chromium				U	0.141	mg/kg				HSC	09/19/13 09:35
Cobalt				U	0.141	mg/kg					
Copper				U	0.281	mg/kg					
Iron				U	7.50	mg/kg					
Lead				U	0.310	mg/kg					
Magnesium				U	7.97	mg/kg					
Manganese				U	0.188	mg/kg					
Molybdenum				U	0.188	mg/kg					
Nickel				U	0.141	mg/kg					
Potassium				B	-6.05	mg/kg					09/19/13 12:40
Silicon				U	1.41	mg/kg					09/19/13 09:35
Silver				B	0.172	mg/kg					
Sodium				B	-10.6	mg/kg					
Vanadium				U	0.0938	mg/kg					
Zinc				U	0.375	mg/kg					
QC1202946756 333295001 MS											
Aluminum	486		9570		12200	mg/kg		N/A	(75%-125%)		09/19/13 09:45
Antimony	48.6	DU	1.61	D	42.9	mg/kg		88.2	(75%-125%)		09/19/13 09:56
Arsenic	48.6	BC	2.04		47.1	mg/kg		92.7	(75%-125%)		09/19/13 09:45
Barium	48.6		86.1		135	mg/kg		100	(75%-125%)		
Beryllium	48.6	B	0.442		46.9	mg/kg		95.6	(75%-125%)		
Boron	48.6	B	2.17		44.9	mg/kg		87.9	(75%-125%)		

QC Summary

Workorder: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1330744											
Cadmium	48.6		0.501		46.4	mg/kg		94.5	(75%-125%)	HSC	09/19/13 09:45
Calcium	486		3200		3790	mg/kg		N/A	(75%-125%)		
Chromium	48.6		13.8		60.5	mg/kg		96	(75%-125%)		
Cobalt	48.6	D	8.88	D	57.6	mg/kg		100	(75%-125%)		09/19/13 09:56
Copper	48.6		14.1		63.6	mg/kg		102	(75%-125%)		09/19/13 09:45
Iron	486		23400		24000	mg/kg		N/A	(75%-125%)		
Lead	48.6	D	5.80	D	54.8	mg/kg		101	(75%-125%)		09/19/13 09:56
Magnesium	486		4280		4890	mg/kg		N/A	(75%-125%)		09/19/13 09:45
Manganese	48.6		419		449	mg/kg		N/A	(75%-125%)		
Molybdenum	48.6	U	0.195		45.5	mg/kg		93.5	(75%-125%)		
Nickel	48.6		11.5		58.3	mg/kg		96.3	(75%-125%)		
Potassium	486		2240		2930	mg/kg		N/A	(75%-125%)		09/19/13 12:51
Silicon	486	N	1310	N	1310	mg/kg		1.67*	(75%-125%)		09/19/13 09:45
Silver	48.6	U	0.0974		47.1	mg/kg		97	(75%-125%)		
Sodium	486		223		768	mg/kg		112	(75%-125%)		
Vanadium	48.6	D	57.0	D	103	mg/kg		94.9	(75%-125%)		09/19/13 09:56
Zinc	48.6	D	45.5	D	95.5	mg/kg		103	(75%-125%)		
QC1202950686 333295001 PS											
Silicon	5000	N	13400		20800	ug/L		147*	(80%-120%)		09/19/13 12:52
QC1202946757 333295001 SDILT											
Aluminum			98300	D	19900	ug/L	1.4		(0%-10%)		09/19/13 09:47
Antimony		DU	-1.5	DU	8.03	ug/L	N/A		(0%-10%)		09/19/13 09:58
Arsenic		BC	21.0	CD	11.2	ug/L	168		(0%-10%)		09/19/13 09:47

QC Summary

Workorder: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1330744										
Barium		885	D	179	ug/L	.883		(0%-10%)	HSC	09/19/13 09:47
Beryllium	B	4.54	DU	0.487	ug/L	N/A		(0%-10%)		
Boron	B	22.2	DU	4.87	ug/L	N/A		(0%-10%)		
Cadmium		5.15	D	1.12	ug/L	8.82		(0%-10%)		
Calcium		32800	D	6720	ug/L	2.37		(0%-10%)		
Chromium		142	D	28.2	ug/L	.805		(0%-10%)		
Cobalt	D	18.2	D	3.53	ug/L	3.33		(0%-10%)		09/19/13 09:58
Copper		145	D	27.5	ug/L	4.97		(0%-10%)		09/19/13 09:47
Iron		240000	D	49800	ug/L	3.54		(0%-10%)		
Lead	D	11.9	D	4.27	ug/L	79.2		(0%-10%)		09/19/13 09:58
Magnesium		44000	D	9060	ug/L	3		(0%-10%)		09/19/13 09:47
Manganese		4310	D	884	ug/L	2.58		(0%-10%)		
Molybdenum	U	0.398	DU	0.974	ug/L	N/A		(0%-10%)		
Nickel		119	D	23.5	ug/L	.823		(0%-10%)		
Potassium		23000	D	4700	ug/L	2.35		(0%-10%)		09/19/13 12:53
Silicon	N	13400	D	2840	ug/L	5.76		(0%-10%)		09/19/13 09:47
Silver	U	-1.49	DU	0.487	ug/L	N/A		(0%-10%)		
Sodium		2290	D	362	ug/L	21		(0%-10%)		
Vanadium	D	117	D	23.2	ug/L	1.04		(0%-10%)		09/19/13 09:58
Zinc	D	93.5	D	18.1	ug/L	3.22		(0%-10%)		
Metals Analysis-Mercury										
Batch 1331292										

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QC Summary

Workorder: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-Mercury										
Batch 1331292										
QC1202948115 333295001 DUP										
Mercury	U	0.00397	U	0.00388	mg/kg	N/A ^			NOR1	09/17/13 16:16
QC1202948111 LCS										
Mercury	0.105			0.106	mg/kg		101	(80%-120%)		09/17/13 15:50
QC1202948110 MB										
Mercury			U	0.00376	mg/kg					09/17/13 15:49
QC1202948116 333295001 MS										
Mercury	0.114	U	0.00397	0.120	mg/kg		103	(80%-120%)		09/17/13 16:17
QC1202948117 333295001 SDILT										
Mercury	U	0.060	DU	0.0198	ug/L	N/A		(0%-10%)		09/17/13 16:21

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: **1330743.0**
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	1202946754	Metals Spike Mix I	UI1943364-01	.25	mL
LCS	1202946754	Metals Spike Mix II	UI1943367-06	.25	mL
MS	1202946756	Metals Spike Mix I	UI1943364-01	.25	mL
MS	1202946756	Metals Spike Mix II	UI1943367-06	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1202946753 MB	16-SEP-2013 09:00:55	Soil	0.533	50	93.80863
1202946754 LCS	16-SEP-2013 09:00:55	Soil	0.519	50	96.33911
333295001	16-SEP-2013 09:00:55	Soil	0.526	50	95.05703
1202946755 DUP (333295001)	16-SEP-2013 09:00:55	Soil	0.513	50	97.46589
1202946756 MS (333295001)	16-SEP-2013 09:00:55	Soil	0.527	50	94.87666
1202946757 SDILT (333295001)	16-SEP-2013 09:00:55	Soil	0.526	50	95.05703

Reagent/Solvent Lot ID	Description	Amount
1961850	Concentrated Nitric Acid	1.25 mL
1961852	HYDROCHLORIC ACID	10 mL

Comments:

Block Temperature: 94 C

Thermometer ID: 118840

Hot Block ID: 9

qc sample is a brown granular solid.

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID: **1330741.0**
Analyst: Anthony Green
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	1202946749	ICP-MS spiking soluiton A	UI1960544-A	.25	mL
LCS	1202946749	ICP-MS spiking solution B	UI1960549-B	.25	mL
MS	1202946751	ICP-MS spiking soluiton A	UI1960544-A	.25	mL
MS	1202946751	ICP-MS spiking solution B	UI1960549-B	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1202946748 MB	16-SEP-2013 08:20:15	Soil	0.516	50	96.89922
1202946749 LCS	16-SEP-2013 08:20:15	Soil	0.552	50	90.57971
333295001	16-SEP-2013 08:20:15	Soil	0.512	50	97.65625
1202946750 DUP (333295001)	16-SEP-2013 08:20:15	Soil	0.544	50	91.91176
1202946751 MS (333295001)	16-SEP-2013 08:20:15	Soil	0.565	50	88.49558
1202946752 SDILT (333295001)	16-SEP-2013 08:20:15	Soil	0.512	50	97.65625

Reagent/Solvent Lot ID	Description	Amount
1904936-02	Hydrogen Peroxide 30%	1.5 mL
1924940	Concentrated Nitric Acid	5 mL

Comments:

Block Temperature: 94 C

Thermometer ID: 119015

Hot Block ID: 13

Prep Logbook

Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Batch ID: **1331288.0**
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	1202948111	MHGSOILMSSPIKE	WHG130916-14	.3	mL
LCSD	1202948635	MHGSOILMSSPIKE	WHG130916-14	.3	mL
MS	1202948116	MHGSOILMSSPIKE	WHG130916-14	.3	mL
MSD	1202948113	MHGSOILMSSPIKE	WHG130916-14	.3	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1202948110 MB	16-SEP-2013 17:10:30	Misc Solid	0.534	30	56.17978
1202948111 LCS	16-SEP-2013 17:10:30	Misc Solid	0.571	30	52.5394
1202948635 LCSD	16-SEP-2013 17:10:30	Misc Solid	0.511	30	58.70841
332483003	16-SEP-2013 17:10:30	Misc Solid	0.53	30	56.60377
332614003	16-SEP-2013 17:10:30	Misc Solid	0.571	30	52.5394
332614008	16-SEP-2013 17:10:30	Misc Solid	0.522	30	57.47126
332719003	16-SEP-2013 17:10:30	Misc Solid	0.524	30	57.25191
332719006	16-SEP-2013 17:10:30	Misc Solid	0.509	30	58.9391
332719009	16-SEP-2013 17:10:30	Misc Solid	0.511	30	58.70841
332719012	16-SEP-2013 17:10:30	Misc Solid	0.528	30	56.81818
332719015	16-SEP-2013 17:10:30	Misc Solid	0.51	30	58.82353
332873001	16-SEP-2013 17:10:30	Misc Solid	0.513	30	58.47953
333022001	16-SEP-2013 17:10:30	Misc Solid	0.522	30	57.47126
333295001	16-SEP-2013 17:10:30	Soil	0.519	30	57.80347
1202948115 DUP (333295001)	16-SEP-2013 17:10:30	Misc Solid	0.53	30	56.60377
1202948116 MS (333295001)	16-SEP-2013 17:10:30	Misc Solid	0.541	30	55.45287
1202948113 MSD (333295001)	16-SEP-2013 17:10:30	Misc Solid	0.533	30	56.28518
1202948117 SDILT (333295001)	16-SEP-2013 17:10:30	Misc Solid	0.519	30	57.80347

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
WHG130916-07	Mercury Working Standard 1st Source CAL S 0.2/CRA	30 uL

Comments:

Digestion Start Date: 16-SEP-2013 17:12
Digestion End Date: 16-SEP-2013 17:42
Block Temperature: 95 C
Thermometer ID: 126-AI
Hot Block ID: 6
The QC was a brown powder like material. LCSD used due to limited sample volume at the PM's request.

Prep Logbook

Batch ID: **1331288.0**
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	1202948111	MHGSOILMSSPIKE	WHG130916-14	.3	mL
LCSD	1202948635	MHGSOILMSSPIKE	WHG130916-14	.3	mL
MS	1202948116	MHGSOILMSSPIKE	WHG130916-14	.3	mL
MSD	1202948113	MHGSOILMSSPIKE	WHG130916-14	.3	mL

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

Reagent/Solvent Lot ID	Description	Amount
WHG130916-08	Mercury Working Standard 1st Source CAL S 0.5	75 uL
WHG130916-09	Mercury Working 1st Source CAL S 2.0	300 uL
WHG130916-10	Mercury Working 1st Source CAL S 5.0/CCV	750 uL
WHG130916-11	Mercury Working 1st Source CAL S 10.0	1500 uL
WHG130916-12	Mercury Working 2nd Source S 5.0/ICV	750 uL

Comments:

General Chem Analysis

Case Narrative

General Chemistry Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0012

Method/Analysis Information

Product:	**Nitrate + Nitrite**		
Analytical Batch:	1331341	**Method:**	EPA 353.2 Nitrogen and Nitrate/Nitrite
Prep Batch :	1331340	**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
333295001	J1T0P1
1202948271	Method Blank (MB)
1202948272	Laboratory Control Sample (LCS)
1202948273	333295001(J1T0P1) Sample Duplicate (DUP)
1202948274	333295001(J1T0P1) Matrix Spike (MS)

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: 333295001 (J1T0P1).

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.

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:	1331518	**Method:**	SW846_7196A Hexavalent Chromium
Prep Batch :	1331517	**Method:**	SW846 3060A

Sample Analysis

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

Sample ID	Client ID
333295001	J1T0P1
1202948688	Method Blank (MB)
1202948689	333295001(J1T0P1) Sample Duplicate (DUP)
1202948690	333295001(J1T0P1) Matrix Spike (MS)
1202948692	333295001(J1T0P1) Matrix Spike Duplicate (MSD)
1202948694	Laboratory Control Sample (LCS)
1202948695	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: 333295001 (J1T0P1).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The spike recovery falls outside of the established acceptance limits due to matrix interference: 1202948690 (J1T0P1).

Matrix Spike Duplicate (MSD) Recovery Statement
The spike duplicate recovery falls outside of the established acceptance limits due to matrix interference: 1202948692 (J1T0P1).

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 values for the sample and duplicate are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable. 1202948689 (J1T0P1).

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
The following DER was generated for this SDG: 1222343 1202948690 (J1T0P1) and 1202948692 (J1T0P1).

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.

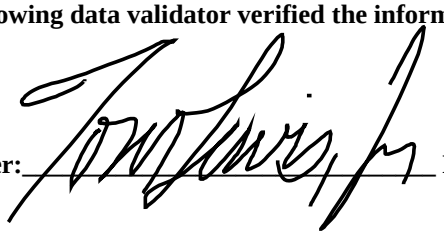
Certification Statement

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:** 26Sept13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
18-SEP-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
VIS SPECTROMETER	SW846 7196A	Solid	ENRG, WCHN
Batch ID:	**Sample Numbers:**		
1331518	See below.		

Potentially affected work order(s)(SDG): 333196,333295(XP0012)

Application Issues:

Failed Recovery for MS/PS

Failed Recovery for MSD/PSD

Specification and Requirements Exception Description:	**DER Disposition:**
2. Failed Recovery for MS/MSD: QC 1202948690MS and QC 1202948692MSD	1. The MS recovery falls outside of the established acceptance limits. The MSD verifies the recovery failure with a passing RPD; therefore, the failure is attributed to matrix interference. The failures were further verified by a second MS and MSD performed for parent sample 333295001 with QC IDs: QC 1202948691MS and QC 1202948693MSD The recoveries for sample 333295001 are 67.6%, 74.6%, 70.4%, and 71.8%.

Originator's Name:

Travis Tola 18-SEP-13

Data Validator/Group Leader:

Julia Hamilton 19-SEP-13

Sample Data Summary

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

Certificate of Analysis Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0012 GEL Work Order: 333295 Project: RC-189 Soil

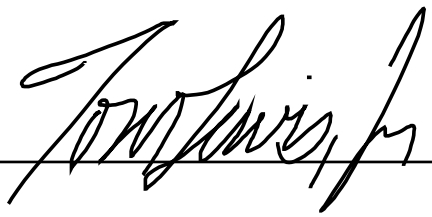
The Qualifiers in this report are defined as follows:

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 

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

Certificate of Analysis

Report Date: September 23, 2013

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-189 Soil

Client SDG: XP0012

Client Sample ID:	J1T0P1	Project:	WCHN00613
Sample ID:	333295001	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	10-SEP-13 09:10		
Receive Date:	12-SEP-13		
Collector:	Client		
Moisture:	2.37%		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite		5.13	0.175	0.515	mg/kg	1	KLP1	09/19/13	1104	1331341	1
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.164	0.164	0.409	mg/kg	1	TXT1	09/18/13	0922	1331518	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	KLP1	09/19/13	1000	1331340
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	TXT1	09/17/13	1115	1331517

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 353.2 Modified	
2	SW846 7196A	

Notes:

Quality Control Summary

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

QC Summary

Report Date: September 23, 2013

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

Contact: **Joan Kessner**

Workorder: **333295** **Client SDG:** XP0012 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Nutrient Analysis											
Batch 1331341											
QC1202948273 333295001 DUP											
Nitrogen, Nitrate/Nitrite			5.13		4.79	mg/kg	6.85		(0%-20%)	KLP1	09/19/13 11:05
QC1202948272 LCS											
Nitrogen, Nitrate/Nitrite	10.0				9.59	mg/kg		95.9	(90%-110%)		09/19/13 11:03
QC1202948271 MB											
Nitrogen, Nitrate/Nitrite					-0.176	mg/kg					09/19/13 11:02
QC1202948274 333295001 MS											
Nitrogen, Nitrate/Nitrite	10.4		5.13		15.0	mg/kg		94.8	(75%-125%)		09/19/13 11:11
Spectrometric Analysis											
Batch 1331518											
QC1202948689 333295001 DUP											
Hexavalent Chromium		U	0.164	U	0.162	mg/kg	N/A ^			TXT1	09/18/13 09:40
QC1202948695 ILCS											
Hexavalent Chromium	7.81				7.03	mg/kg		90	(80%-120%)		09/18/13 09:14
QC1202948694 LCS											
Hexavalent Chromium	3.98				3.75	mg/kg		94.3	(80%-120%)		09/18/13 09:11
QC1202948688 MB											
Hexavalent Chromium				U	0.157	mg/kg					09/18/13 09:09
QC1202948690 333295001 MS											
Hexavalent Chromium	4.08	U	0.164		2.76	mg/kg		67.6*	(75%-125%)		09/18/13 09:43
QC1202948692 333295001 MSD											
Hexavalent Chromium	4.09	U	0.164		3.05	mg/kg	10.1	74.6*	(0%-30%)		09/18/13 09:46

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.

QC Summary

Workorder: 333295 **Client SDG:** XP0012 **Project Description:** RC-189 Soil

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

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: 1330686
Analyst: CXC1
Date/Time: 12-SEP-2013
Procedure Code DRY WEIGHT
Procedure Description Dry Weight-Percent Moisture
Lab Sop: GL-OA-E-020

Sample St	Sample Id	Rpd(%)
DUP	1202946601	**5.957**

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 (%)
333258001	SAMPLE		BALHD2000D	14:40	7.008	27.572	19.415	20.564	12.407	39.7
333258002	SAMPLE		BALHD2000D	14:40	7.191	37.956	26.372	30.765	19.181	37.7
333258003	SAMPLE		BALHD2000D	14:40	7.237	32.902	22.91	25.665	15.673	38.9
333258004	SAMPLE		BALHD2000D	14:40	7.247	36.097	25.323	28.85	18.076	37.3
333295001	SAMPLE		BALHD2000D	14:40	7.025	28.851	28.334	21.826	21.309	2.37
1202946601	DUP	333258001	BALHD2000D	14:40	7.206	29.046	20.88	21.84	13.674	37.4

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

Prep Logbook

Colorimetric Determination of Hexavalent Chromium

Batch ID: **1331517.0**
Analyst: Travis Tola
Method: SW846 3060A
Lab SOP: GL-GC-E-044 REV# 18
Instrument: Sartorius Balance B-001

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
ILCS	1202948695	100mg/kg for cr6	IMM130422-HVC	.08	g
LCS	1202948694	Cr6 LCS 10mg/L	WD130917-1	.4	mL
MS	1202948690	Cr6 Intermediate Spike 10mg/L	130917-A	.4	mL
MS	1202948691	Cr6 Intermediate Spike 10mg/L	130917-A	.4	mL
MSD	1202948692	Cr6 Intermediate Spike 10mg/L	130917-A	.4	mL
MSD	1202948693	Cr6 Intermediate Spike 10mg/L	130917-A	.4	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)	pH Check
1202948688 MB	17-SEP-2013 11:15:00	Soil	1.0166	40	39.34684	7.76
1202948694 LCS	17-SEP-2013 11:15:00	Soil	1.0043	40	39.82874	7.72
1202948695 ILCS	17-SEP-2013 11:15:00	Soil	1.0239	40	39.06632	7.43
333196001	17-SEP-2013 11:15:00	Misc Solid	1.139	40	35.11853	7.25
333295001	17-SEP-2013 11:15:00	Soil	1.001	40	39.96004	7.52
1202948689 DUP (333295001)	17-SEP-2013 11:15:00	Misc Solid	1.0124	40	39.51008	7.75
1202948690 MS (333295001)	17-SEP-2013 11:15:00	Misc Solid	1.0045	40	39.82081	7.92
1202948692 MSD (333295001)	17-SEP-2013 11:15:00	Misc Solid	1.0021	40	39.91618	7.60
1202948691 MS (333295001)	17-SEP-2013 11:15:00	Misc Solid	1.004	40	39.84064	7.36
1202948693 MSD (333295001)	17-SEP-2013 11:15:00	Misc Solid	1.009	40	39.64321	7.48

Reagent/Solvent Lot ID	Description	Amount
130815-C	MAGNESIUM CHLORIDE SOLUTION FOR CR+6	.4 mL
IMM130510-HVCS	PHOSPHATE BUFFER SOLUTION FOR CR+6	.2 mL
IMM130522-HVC	5M Nitric Acid Solution for Cr+6	2 mL
IMM130910b-HVCS	DIGESTION SOLUTION FOR CR+6	20 mL

Comments:

Prep Logbook

Nitrate/Nitrite (NO3+NO2) Analysis Using the Lachat QuikChem FIA+ 8000 Series Instrument

Batch ID: **1331340.0**
Analyst: Kristen Parson
Method: EPA 353.2 Modified
Lab SOP: GL-GC-E-128 REV# 8
Instrument: Sartorius Balance B-001

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1202948272	TRASPIKE2	UTR1960897-02	.4	mL
MS	1202948274	TRASPIKE2	UTR1960897-02	.4	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)	pH Check
1202948271 MB	19-SEP-2013 10:00:00	Soil	4	40	10	
1202948272 LCS	19-SEP-2013 10:00:00	Soil	4	40	10	
333295001	19-SEP-2013 10:00:00	Soil	3.98	40	10.05025	
1202948273 DUP (333295001)	19-SEP-2013 10:00:00	Soil	3.98	40	10.05025	
1202948274 MS (333295001)	19-SEP-2013 10:00:00	Soil	3.93	40	10.17812	
333333001	19-SEP-2013 10:00:00	Sludge	4.05	40	9.87654	

Reagent/Solvent Lot ID	Description	Amount
1927169-C	0.04N H2SO4 Solution	40 mL

Comments: