

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

COMPLETE COPY OF DATA PACKAGE TO:

Kathy Wendt

H4-21

KW 3/18/14
INITIAL/DATE

COMMENTS:

SDG XP0056

SAF-RC-232

Rad only

Chem only

Rad & Chem

Complete

Partial

Sample Location: 600-384



March 14, 2014

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

Re: RC-232 Soil
Work Order: 344133
SDG: XP0056

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 07, 2014. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Orlette Johnson
Project Manager

Purchase Order: 1510
Chain of Custody: RC-232-081
Enclosures



Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	3
Laboratory Certifications.....	6
HPLC Polynuclear Aromatic Hydrocarbon Analysis.....	8
Sample Data Summary.....	15
QC Summary.....	17
Miscellaneous Data.....	22
FID Diesel Range Organics Analysis.....	24
Case Narrative.....	25
Sample Data Summary.....	31
Quality Control Summary.....	35
Miscellaneous.....	38
Pesticide Analysis.....	40
Case Narrative.....	41
Sample Data Summary.....	46
Quality Control Summary.....	49
Miscellaneous.....	55
PCB Analysis.....	57
Case Narrative.....	58
Sample Data Summary.....	64

Quality Control Summary.....	66
Miscellaneous.....	69
Herbicide Analysis.....	71
Case Narrative.....	72
Sample Data Summary.....	78
Quality Control Summary.....	80
Miscellaneous.....	84
Metals Analysis.....	86
Case Narrative.....	87
Sample Data Summary.....	94
Quality Control Summary.....	98
Miscellaneous.....	107

Case Narrative

**Receipt Narrative
for
WC-HANFORD, INC.
SDG: XP0056
Work Order: 344133**

March 14, 2014

Laboratory Identification:

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

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on March 07, 2014 for analysis.

Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
344133001	J1TFJ4
344133002	J1TFJ5
344133003	J1TFJ6

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 Herbicide, GC Semivolatile PCB, GC Semivolatile Pesticide, HPLC Polynuclear Aromatic Hydrocarbon and Metals.



Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation

SAMPLE RECEIPT & REVIEW FORM

Client: <u>WCHN</u>		SDG/AR/COC/Work Order: <u>34133</u>
Received By: <u>H. Taylor</u>		Date Received: <u>030714</u>
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0cpm</u>
Classified Radioactive II or III by RSO?	<input checked="" type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	<input checked="" type="checkbox"/>	
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input checked="" type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?	<input checked="" type="checkbox"/>	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: <u>Ice bags</u> Blue ice Dry ice None Other (describe) <u>3</u> *all temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>130462961</u> Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7 Are Encore containers present?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7981 3243 1132</u>

Comments (Use Continuation Form if needed):

Laboratory Certifications

List of current GEL Certifications as of 14 March 2014

State	Certification
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013-10
Idaho Chemistry	SC00012
Idaho Radiochemistry	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
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122014-1
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 GVL	23611001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235-14-9
Utah NELAP	SC000122013-11
Vermont	VT87156
Virginia NELAP	460202
Washington	C780-12
Wisconsin	999887790

HPLC Polynuclear Aromatic Hydrocarbon Analysis

**HPLC-PAH
WC-HANFORD, INC. (WCHN)
SDG XP0056**

Method/Analysis Information

Procedure: Polynuclear Aromatic Hydrocarbons
Analytical Method: SW846 8310
Prep Method: SW846 3550B
Analytical Batch Number: 1371545
Prep Batch Number: 1371544

Sample Analysis

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

Sample ID	Client ID
344133002	J1TFJ5
1203047932	Method Blank (MB)
1203047933	Laboratory Control Sample (LCS)
1203047934	344133002(J1TFJ5) Matrix Spike (MS)
1203047935	344133002(J1TFJ5) 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

Client sample 344133002 (J1TFJ5) 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

The MSD recoveries were within the established acceptance limits.

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

A data exception report (DER) was not generated for this SDG.

Manual Integrations

Some initial calibration standards, continuing calibration standards, and 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 100uL 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.

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: XP0056 GEL Work Order: 344133 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

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.

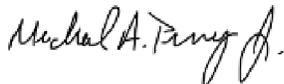
RE Indicates that sample is re-extracted.

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: Michael Penny

Date: 13 MAR 2014

Title: Group Leader

Roadmap for WCHN XP0056 HPLC_PAH

This roadmap was analyzed by cww on 03-13-2014, 10:01.

This roadmap was reviewed by map on 03-13-2014, 10:37.

This roadmap was packaged by map on 03-13-2014, 11:14.

Sample

exclude	manual	datafile	smpid	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p031114.b/ph5c1106.d	344133002	11-MAR-2014	13:55	XP0056.sub	J1TFJ5	1	1371545	<input type="checkbox"/>

QC Sample

exclude	manual	datafile	smpid	sampletype	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p031114.b/ph5c1104.d	1203047932	mb	11-MAR-2014	12:30	XP0056.sub	XBLK01	1	1371545	<input type="checkbox"/>
<input type="checkbox"/>	N	/chem/hplce.i/p031114.b/ph5c1105.d	1203047933	lcs	11-MAR-2014	13:13	XP0056.sub	XBLK01LCS	1	1371545	Pass
<input type="checkbox"/>	N	/chem/hplce.i/p031114.b/ph5c1107.d	1203047934	ms	11-MAR-2014	14:37	XP0056.sub	J1TFJ5MS	1	1371545	Pass
<input type="checkbox"/>	N	/chem/hplce.i/p031114.b/ph5c1108.d	1203047935	msd	11-MAR-2014	15:19	XP0056.sub	J1TFJ5MSD	1	1371545	Pass

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 13, 2014

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

Client SDG: XP0056

Client Sample ID: J1TFJ5	Project: WCHN00213
Sample ID: 344133002	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 06-MAR-14 08:10	
Receive Date: 07-MAR-14	
Collector: Client	
Moisture: 12.9%	

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	5.72	5.72	19.1	ug/kg	1	CWW	03/11/14	1355	1371545	1
Acenaphthylene	U	5.72	5.72	19.1	ug/kg	1					
Anthracene	U	1.91	1.91	19.1	ug/kg	1					
Benzo(a)anthracene		18.6	0.610	1.91	ug/kg	1					
Benzo(a)pyrene		14.7	0.610	1.91	ug/kg	1					
Benzo(b)fluoranthene		13.8	0.610	1.91	ug/kg	1					
Benzo(ghi)perylene		11.3	0.610	1.91	ug/kg	1					
Benzo(k)fluoranthene	U	0.305	0.305	0.954	ug/kg	1					
Chrysene		16.3	0.610	1.91	ug/kg	1					
Dibenzo(a,h)anthracene	J	1.38	0.610	1.91	ug/kg	1					
Fluoranthene		21.4	0.610	1.91	ug/kg	1					
Fluorene	U	5.72	5.72	19.1	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.610	0.610	1.91	ug/kg	1					
Naphthalene	U	5.72	5.72	19.1	ug/kg	1					
Phenanthrene	J	10.4	5.72	19.1	ug/kg	1					
Pyrene		29.7	0.610	1.91	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	AXV1	03/10/14	1732	1371544

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	9540	70.0	(23%-104%)

Notes:

QC Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: March 13, 2014

Page 1 of 4

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

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1371545										
QC1203047933	LCS										
Acenaphthene	1660			1360	ug/kg		81.6	(58%-99%)	CWW	03/11/14	13:13
Acenaphthylene	1660			1340	ug/kg		80.8	(58%-98%)			
Anthracene	1660			1530	ug/kg		91.9	(63%-94%)			
Benzo(a)anthracene	166			147	ug/kg		88.5	(73%-98%)			
Benzo(a)pyrene	166			138	ug/kg		83.1	(63%-99%)			
Benzo(b)fluoranthene	166			144	ug/kg		86.8	(70%-130%)			
Benzo(ghi)perylene	166			144	ug/kg		86.4	(70%-130%)			
Benzo(k)fluoranthene	83.2			67.3	ug/kg		80.9	(70%-130%)			
Chrysene	166			165	ug/kg		99.1	(70%-130%)			
Dibenzo(a,h)anthracene	166			169	ug/kg		101	(70%-130%)			
Fluoranthene	166			141	ug/kg		84.6	(70%-130%)			
Fluorene	1660			1400	ug/kg		84.4	(65%-130%)			
Indeno(1,2,3-cd)pyrene	166			154	ug/kg		92.6	(70%-130%)			
Naphthalene	1660			1300	ug/kg		78.1	(57%-130%)			
Phenanthrene	1660			1410	ug/kg		84.7	(70%-130%)			
Pyrene	166			152	ug/kg		91.6	(70%-130%)			
**Decafluorobiphenyl	8320			6710	ug/kg		80.7	(23%-104%)			
QC1203047932	MB										
Acenaphthene			U	5.00	ug/kg					03/11/14	12:30
Acenaphthylene			U	5.00	ug/kg						

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 2 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1371545										
Anthracene			U	1.67	ug/kg						
Benzo(a)anthracene			U	0.533	ug/kg				CWW	03/11/14	12:30
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	0.266	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			6520	ug/kg		78.3	(23%-104%)			
QC1203047934 344133002 MS											
Acenaphthene	1910	U	5.72	1430	ug/kg		75	(49%-90%)		03/11/14	14:37
Acenaphthylene	1910	U	5.72	1420	ug/kg		74.2	(48%-97%)			
Anthracene	1910	U	1.91	1670	ug/kg		87.7	(49%-91%)			
Benzo(a)anthracene	191		18.6	163	ug/kg		75.7	(29%-126%)			
Benzo(a)pyrene	191		14.7	160	ug/kg		76	(26%-130%)			
Benzo(b)fluoranthene	191		13.8	158	ug/kg		75.7	(32%-135%)			
Benzo(ghi)perylene	191		11.3	154	ug/kg		74.8	(34%-125%)			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 3 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1371545										
Benzo(k)fluoranthene	95.4	U	0.305	78.2	ug/kg		82	(48%-142%)	CWW	03/11/14	14:37
Chrysene	191		16.3	178	ug/kg		85	(39%-127%)			
Dibenzo(a,h)anthracene	191	J	1.38	178	ug/kg		92.7	(38%-130%)			
Fluoranthene	191		21.4	158	ug/kg		71.6	(20%-139%)			
Fluorene	1910	U	5.72	1510	ug/kg		79.4	(51%-90%)			
Indeno(1,2,3-cd)pyrene	191	U	0.610	162	ug/kg		85	(41%-145%)			
Naphthalene	1910	U	5.72	1310	ug/kg		68.8	(43%-87%)			
Phenanthrene	1910	J	10.4	1540	ug/kg		80.4	(50%-100%)			
Pyrene	191		29.7	176	ug/kg		76.8	(18%-149%)			
**Decafluorobiphenyl	9540		6670	6390	ug/kg		67	(23%-104%)			
QC1203047935 344133002 MSD											
Acenaphthene	1910	U	5.72	1300	ug/kg	9.73	67.9	(0%-30%)		03/11/14	15:19
Acenaphthylene	1910	U	5.72	1290	ug/kg	9.34	67.5	(0%-30%)			
Anthracene	1910	U	1.91	1530	ug/kg	8.82	80.2	(0%-30%)			
Benzo(a)anthracene	191		18.6	150	ug/kg	8.45	68.6	(0%-30%)			
Benzo(a)pyrene	191		14.7	148	ug/kg	7.42	69.9	(0%-30%)			
Benzo(b)fluoranthene	191		13.8	147	ug/kg	7.13	69.9	(0%-30%)			
Benzo(ghi)perylene	191		11.3	142	ug/kg	7.91	68.5	(0%-30%)			
Benzo(k)fluoranthene	95.5	U	0.305	71.7	ug/kg	8.60	75.1	(0%-30%)			
Chrysene	191		16.3	164	ug/kg	8.51	77.3	(0%-30%)			
Dibenzo(a,h)anthracene	191	J	1.38	163	ug/kg	8.87	84.6	(0%-30%)			
Fluoranthene	191		21.4	146	ug/kg	8.19	65	(0%-30%)			

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 4 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1371545										
Fluorene	1910	U	5.72	1370	ug/kg	10.1	71.6	(0%-30%)	CWW	03/11/14	15:19
Indeno(1,2,3-cd)pyrene	191	U	0.610	150	ug/kg	8.01	78.3	(0%-30%)			
Naphthalene	1910	U	5.72	1260	ug/kg	4.05	66	(0%-30%)			
Phenanthrene	1910	J	10.4	1410	ug/kg	9.42	73	(0%-30%)			
Pyrene	191		29.7	162	ug/kg	8.29	69.3	(0%-30%)			
*Decafluorobiphenyl	9550		6670	6080	ug/kg		63.7	(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 (Organics 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: 1371544 **Verified by:** _____
Analyst: Alberto Velasco
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)
1203047932 MB	10-MAR-2014 17:32:00	30.02	1	0.03331
1203047933 LCS	10-MAR-2014 17:32:00	30.06	1	0.03327
344133002	10-MAR-2014 17:32:00	30.09	1	0.03323
1203047934 MS (344133002)	10-MAR-2014 17:32:00	30.1	1	0.03322
1203047935 MSD (344133002)	10-MAR-2014 17:32:00	30.05	1	0.03328

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203047933	8310 PAH SPIKE	UE131224-15	1	mL	Verified By: AGS1
MS	1203047934	8310 PAH SPIKE	UE131224-15	1	mL	Final Solvent: Acetonitrile
MSD	1203047935	8310 PAH SPIKE	UE131224-15	1	mL	
SURR	All	Decafluorobiphenyl 250 mg/L	UE130808-07	1	mL	
REGNT	All	Methylene Chloride	2057826-D	300	mL	
REGNT	All	HPLC Grade Acetonitrile	2069348	5	mL	
SOURC	All	SODIUM SULFATE	2051933	30	g	

FID Diesel Range Organics Analysis

Case Narrative

**FID Diesel Range Organics
WC-HANFORD, INC. (WCHN)
SDG XP0056**

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: 1371412
Prep Batch Number: 1371411

Sample Analysis

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

Sample ID	Client ID
344133001	J1TFJ4
344133002	J1TFJ5
344133003	J1TFJ6
1203047619	Method Blank (MB)
1203047620	Laboratory Control Sample (LCS)
1203047621	344133001(J1TFJ4) Matrix Spike (MS)
1203047622	344133001(J1TFJ4) 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# 24.

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.

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 344133001 (J1TFJ4) 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 was slightly above the acceptance criteria due to relatively lower spike recovery in the MS.

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. DER #1273419 was generated for this SDG. 1203047622 (J1TFJ4) and All.

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.

DATA EXCEPTION REPORT

Mo.Day Yr. 11-MAR-14	Division: Federal	Quality Criteria: Specifications	Type: Process
Instrument Type: GC/FID	Test / Method: NWTPH-Dx in Soil	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1371412	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 344133(XP0056)			
Application Issues: Failed RPD for MS/MSD, or PS/PSD			
Specification and Requirements Exception Description:		DER Disposition:	
1. The relative percent difference between MS (1203047621) and MSD (1203047621) did not meet 0.0%-20.0% acceptance limits for Motor oil at 20.3%.		1. The individual spike recoveries were within the acceptance limits in both the MS and MSD. The data have been reported.	

Originator's Name:
Benjamin Taft 11-MAR-14

Data Validator/Group Leader:
Josh Brooks 11-MAR-14

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0056 GEL Work Order: 344133 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

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.

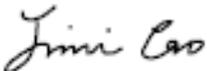
RA Indicates that sample is re-analyzed without re-extraction.

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: 12 MAR 2014

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 11, 2014

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

Client SDG: XP0056

Client Sample ID: J1TFJ5	Project: WCHN00213
Sample ID: 344133002	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 06-MAR-14 08:10	
Receive Date: 07-MAR-14	
Collector: Client	
Moisture: 12.9%	

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	2470	2470	7610	ug/kg	1	BYT1	03/11/14	0834	1371412	1
Motor Oil (C20-C36)		7890	2470	7610	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	VSG1	03/10/14	1030	1371411

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"	574 ug/kg	761	75.4	(50%-150%)

Notes:

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 11, 2014

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

Client SDG: XP0056

Client Sample ID: J1TFJ6 Project: WCHN00213
Sample ID: 344133003 Client ID: WCHN001
Matrix: SOIL
Collect Date: 06-MAR-14 08:20
Receive Date: 07-MAR-14
Collector: Client
Moisture: 4.36%

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	2230	2230	6870	ug/kg	1	BYT1	03/11/14	0913	1371412	1
Motor Oil (C20-C36)	J	4840	2230	6870	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	VSG1	03/10/14	1030	1371411

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"	566 ug/kg	687	82.3	(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: March 11, 2014

Page 1 of 2

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

Workorder: 344133 **Client SDG: XP0056** **Project Description: RC-232 Soil**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Diesel Range Organics											
Batch	1371412										
QC1203047620	LCS										
Diesel Range Organics (C10-C20)	66000			57500	ug/kg		87.1	(70%-130%)	BYT1	03/11/14	05:59
Motor Oil (C20-C36)	66000			58800	ug/kg		89	(70%-130%)			
**o-Terphenyl	660			584	ug/kg		88.5	(50%-150%)			
QC1203047619	MB										
Diesel Range Organics (C10-C20)			U	2150	ug/kg					03/11/14	05:21
Motor Oil (C20-C36)			U	2150	ug/kg						
**o-Terphenyl	663			549	ug/kg		82.8	(50%-150%)			
QC1203047621	344133001 MS										
Diesel Range Organics (C10-C20)	68700	U	2220	58400	ug/kg		85	(70%-130%)		03/11/14	07:16
Motor Oil (C20-C36)	68700	J	2790	60700	ug/kg		84.2	(70%-130%)			
**o-Terphenyl	687	561		587	ug/kg		85.5	(50%-150%)			
QC1203047622	344133001 MSD										
Diesel Range Organics (C10-C20)	68600	U	2220	69000	ug/kg	16.6	100	(0%-20%)		03/11/14	07:55
Motor Oil (C20-C36)	68600	J	2790	74300	ug/kg	20.3*	104	(0%-20%)			
**o-Terphenyl	686	561		699	ug/kg		102	(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

Miscellaneous

Prep Logbook

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

Batch ID: 1371411 Verified by: _____
 Analyst: Stacey Grant
 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)
1203047619 MB	10-MAR-2014 10:30:00	30.18	1	0.03313
1203047620 LCS	10-MAR-2014 10:30:00	30.29	1	0.03301
344133001	10-MAR-2014 10:30:00	30.3	1	0.033
1203047621 MS (344133001)	10-MAR-2014 10:30:00	30.11	1	0.03321
1203047622 MSD (344133001)	10-MAR-2014 10:30:00	30.15	1	0.03317
344133002	10-MAR-2014 10:30:00	30.16	1	0.03316
344133003	10-MAR-2014 10:30:00	30.43	1	0.03286

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203047620	AZDRO SPIKE LCS STD,4000ug/ml	WFI140304-52	1	mL	Final Solvent: CH2Cl2 Verified By: CR
MS	1203047621	AZDRO SPIKE LCS STD,4000ug/ml	WFI140304-52	1	mL	
MSD	1203047622	AZDRO SPIKE LCS STD,4000ug/ml	WFI140304-52	1	mL	
SURR	All	20 ppm surrogate	WE140227-04	1	mL	
REGNT	All	Methylene Chloride	2057826-D	120	mL	
SOURC	All	SODIUM SULFATE	2051933	30	g	

Pesticide Analysis

Case Narrative

**Pesticide Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0056**

Method/Analysis Information

Procedure: **Organochlorine Pesticides and Chlorinated Hydrocarbons**

Analytical Method: SW846 3541/8081B

Prep Method: SW846 3541

Analytical Batch Number: 1371410

Prep Batch Number: 1371409

Sample Analysis

Sample ID	Client ID
344133002	J1TFJ5
1203047615	Method Blank (MB)
1203047616	Laboratory Control Sample (LCS)
1203047617	344133002(J1TFJ5) Matrix Spike (MS)
1203047618	344133002(J1TFJ5) 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-041 REV# 13.

Raw data reports are processed and reviewed by the analyst using ChemStation software. False positives have been removed from the ChemStation 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

All calibration verification standards (CVS, ICV, or CCV) requirements have not been met for this SDG. Several target analytes failed acceptance criteria with a positive bias on one analytical column in the standards bracketing the samples in this SDG. The positive bias for the analytical data is a result of instrument response increasing after the initial calibration. These target analytes were not detected above the PQL in the samples; therefore, the non-compliance has no adverse effects on the data.

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 analytical batch for this SDG.

Laboratory Control Sample (LCS) Recovery

The laboratory control sample (LCS) spike recoveries met the acceptance limits.

QC Sample Designation

Sample 344133002 (J1TFJ5) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries for this SDG were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries for this SDG were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD values between the MS and MSD were within 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 in this analytical batch 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.

Sample Dilutions

The samples in this SDG in this analytical batch did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG in this analytical batch unless confirmations or dilutions were required.

Florisil

Florisil clean-up was not performed on client and quality control samples in this batch.

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

Manual Integrations

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 pesticide 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:

Detected target analytes were reported from the analytical column with the higher concentration. Results below the method detection limit (non-detects) were reported from column one.

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 recovery 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).

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD7A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7673 Autosampler	HP6890 Series ECD	Rtx-CLP I	30m x 0.25mm, 0.25um (Rtx-CLPesticide I)
ECD7A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7673 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.

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0056 GEL Work Order: 344133 Project: RC-232 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.

DL Indicates that sample is diluted.

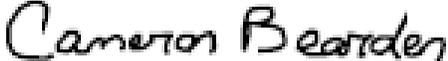
RA Indicates that sample is re-analyzed without re-extraction.

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: Cameron Bearden

Date: 12 MAR 2014

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: XP0056

Client Sample ID: J1TFJ5	Project: WCHN00213
Sample ID: 344133002	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 06-MAR-14 08:10	
Receive Date: 07-MAR-14	
Collector: Client	
Moisture: 12.9%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.383	0.383	1.53	ug/kg	1	LOF	03/10/14	1952	1371410	1
4,4'-DDE	U	0.383	0.383	1.53	ug/kg	1					
4,4'-DDT	U	0.383	0.383	1.53	ug/kg	1					
Aldrin	U	0.191	0.191	0.765	ug/kg	1					
Dieldrin	U	0.383	0.383	1.53	ug/kg	1					
Endosulfan I	U	0.191	0.191	0.765	ug/kg	1					
Endosulfan II	U	0.383	0.383	1.53	ug/kg	1					
Endosulfan sulfate	U	0.383	0.383	1.53	ug/kg	1					
Endrin	U	0.383	0.383	1.53	ug/kg	1					
Endrin aldehyde	U	0.383	0.383	1.53	ug/kg	1					
Endrin ketone	U	0.383	0.383	1.53	ug/kg	1					
Heptachlor	U	0.191	0.191	0.765	ug/kg	1					
Heptachlor epoxide	U	0.191	0.191	0.765	ug/kg	1					
Methoxychlor	U	1.91	1.91	7.65	ug/kg	1					
Toxaphene	U	6.37	6.37	19.1	ug/kg	1					
alpha-BHC	U	0.191	0.191	0.765	ug/kg	1					
alpha-Chlordane	U	0.191	0.191	0.765	ug/kg	1					
beta-BHC	U	0.191	0.191	0.765	ug/kg	1					
delta-BHC	U	0.191	0.191	0.765	ug/kg	1					
gamma-BHC (Lindane)	U	0.191	0.191	0.765	ug/kg	1					
gamma-Chlordane	U	0.191	0.191	0.765	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SJW1	03/10/14	1027	1371409

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	
2	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	29.5 ug/kg	38.3	77.2	(32%-120%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	32.3 ug/kg	38.3	84.3	(37%-129%)

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Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: XP0056

Client Sample ID: J1TFJ5
Sample ID: 344133002

Project: WCHN00213
Client ID: WCHN001

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: March 12, 2014

Page 1 of 5

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

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1371410										
QC1203047616	LCS										
4,4'-DDD	41.6			38.1	ug/kg		91.5	(51%-124%)	LOF	03/10/14	19:37
4,4'-DDE	41.6			35.0	ug/kg		84.1	(51%-119%)			
4,4'-DDT	41.6			40.4	ug/kg		97.1	(50%-128%)			
Aldrin	16.6			13.1	ug/kg		78.5	(48%-113%)			
Dieldrin	41.6			33.5	ug/kg		80.5	(51%-112%)			
Endosulfan I	16.6			12.8	ug/kg		76.7	(43%-110%)			
Endosulfan II	41.6			32.9	ug/kg		79.1	(49%-111%)			
Endosulfan sulfate	41.6			35.4	ug/kg		85.1	(54%-121%)			
Endrin	41.6			45.2	ug/kg		109	(54%-134%)			
Endrin aldehyde	41.6			35.5	ug/kg		85.4	(49%-117%)			
Endrin ketone	41.6			32.6	ug/kg		78.5	(48%-110%)			
Heptachlor	16.6			14.4	ug/kg		86.8	(52%-117%)			
Heptachlor epoxide	16.6			13.0	ug/kg		78.1	(53%-115%)			
Methoxychlor	166			176	ug/kg		106	(48%-117%)			
alpha-BHC	16.6			13.6	ug/kg		81.6	(50%-122%)			
alpha-Chlordane	16.6			13.2	ug/kg		79.4	(52%-113%)			
beta-BHC	16.6			13.1	ug/kg		78.5	(54%-110%)			
delta-BHC	16.6			14.1	ug/kg		84.9	(53%-117%)			
gamma-BHC (Lindane)	16.6			13.4	ug/kg		80.7	(53%-120%)			
gamma-Chlordane	16.6			14.0	ug/kg		84.1	(52%-117%)			

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 2 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1371410										
**4cmx	33.3			30.1	ug/kg		90.6	(32%-120%)	LOF	03/10/14	19:37
**Decachlorobiphenyl	33.3			29.8	ug/kg		89.4	(37%-129%)			
QC1203047615	MB										
4,4'-DDD			U	0.329	ug/kg					03/10/14	19:22
4,4'-DDE			U	0.329	ug/kg						
4,4'-DDT			U	0.329	ug/kg						
Aldrin			U	0.165	ug/kg						
Dieldrin			U	0.329	ug/kg						
Endosulfan I			U	0.165	ug/kg						
Endosulfan II			U	0.329	ug/kg						
Endosulfan sulfate			U	0.329	ug/kg						
Endrin			U	0.329	ug/kg						
Endrin aldehyde			U	0.329	ug/kg						
Endrin ketone			U	0.329	ug/kg						
Heptachlor			U	0.165	ug/kg						
Heptachlor epoxide			U	0.165	ug/kg						
Methoxychlor			U	1.65	ug/kg						
Toxaphene			U	5.48	ug/kg						
alpha-BHC			U	0.165	ug/kg						
alpha-Chlordane			U	0.165	ug/kg						
beta-BHC			U	0.165	ug/kg						
delta-BHC			U	0.165	ug/kg						

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 3 of 5

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1371410										
gamma-BHC (Lindane)			U	0.165	ug/kg				LOF	03/10/14	19:22
gamma-Chlordane			U	0.165	ug/kg						
**4cmx	32.9			27.5	ug/kg		83.6	(32%-120%)			
**Decachlorobiphenyl	32.9			28.1	ug/kg		85.4	(37%-129%)			
QC1203047617 344133002 MS											
4,4'-DDD	47.8	U	0.383	42.3	ug/kg		88.6	(37%-134%)		03/10/14	20:07
4,4'-DDE	47.8	U	0.383	37.9	ug/kg		79.4	(33%-133%)			
4,4'-DDT	47.8	U	0.383	40.9	ug/kg		85.7	(21%-149%)			
Aldrin	19.1	U	0.191	12.5	ug/kg		65.5	(34%-134%)			
Dieldrin	47.8	U	0.383	36.1	ug/kg		75.5	(36%-132%)			
Endosulfan I	19.1	U	0.191	13.3	ug/kg		69.5	(36%-125%)			
Endosulfan II	47.8	U	0.383	35.7	ug/kg		74.7	(37%-129%)			
Endosulfan sulfate	47.8	U	0.383	38.9	ug/kg		81.5	(31%-140%)			
Endrin	47.8	U	0.383	50.8	ug/kg		106	(45%-142%)			
Endrin aldehyde	47.8	U	0.383	36.2	ug/kg		75.7	(31%-133%)			
Endrin ketone	47.8	U	0.383	34.8	ug/kg		72.9	(30%-139%)			
Heptachlor	19.1	U	0.191	13.2	ug/kg		69.3	(32%-137%)			
Heptachlor epoxide	19.1	U	0.191	12.6	ug/kg		66.2	(36%-130%)			
Methoxychlor	191	U	1.91	188	ug/kg		98.4	(28%-143%)			
alpha-BHC	19.1	U	0.191	12.4	ug/kg		64.8	(37%-129%)			
alpha-Chlordane	19.1	U	0.191	13.9	ug/kg		72.9	(29%-141%)			
beta-BHC	19.1	U	0.191	13.8	ug/kg		72.2	(33%-136%)			

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 4 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1371410										
delta-BHC	19.1	U	0.191	14.9	ug/kg		78.2	(37%-136%)	LOF	03/10/14	20:07
gamma-BHC (Lindane)	19.1	U	0.191	12.9	ug/kg		67.7	(35%-130%)			
gamma-Chlordane	19.1	U	0.191	15.1	ug/kg		79.2	(30%-139%)			
**4cmx	38.2		29.5	23.4	ug/kg		61.3	(32%-120%)			
**Decachlorobiphenyl	38.2		32.3	32.6	ug/kg		85.2	(37%-129%)			
QC1203047618	344133002 MSD										
4,4'-DDD	47.7	U	0.383	48.0	ug/kg	12.5	101	(0%-30%)		03/10/14	20:22
4,4'-DDE	47.7	U	0.383	41.6	ug/kg	9.26	87.2	(0%-30%)			
4,4'-DDT	47.7	U	0.383	45.2	ug/kg	9.95	94.8	(0%-30%)			
Aldrin	19.1	U	0.191	13.9	ug/kg	10.8	73.1	(0%-30%)			
Dieldrin	47.7	U	0.383	39.5	ug/kg	9.11	82.8	(0%-30%)			
Endosulfan I	19.1	U	0.191	14.6	ug/kg	9.79	76.8	(0%-30%)			
Endosulfan II	47.7	U	0.383	39.1	ug/kg	9.20	82	(0%-30%)			
Endosulfan sulfate	47.7	U	0.383	42.7	ug/kg	9.37	89.6	(0%-30%)			
Endrin	47.7	U	0.383	56.3	ug/kg	10.3	118	(0%-30%)			
Endrin aldehyde	47.7	U	0.383	37.1	ug/kg	2.44	77.7	(0%-30%)			
Endrin ketone	47.7	U	0.383	38.1	ug/kg	8.94	79.8	(0%-30%)			
Heptachlor	19.1	U	0.191	14.9	ug/kg	11.8	78.1	(0%-30%)			
Heptachlor epoxide	19.1	U	0.191	13.9	ug/kg	9.65	73	(0%-30%)			
Methoxychlor	191	U	1.91	209	ug/kg	10.4	109	(0%-30%)			
alpha-BHC	19.1	U	0.191	14.2	ug/kg	13.8	74.5	(0%-30%)			
alpha-Chlordane	19.1	U	0.191	15.3	ug/kg	9.21	80	(0%-30%)			

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 5 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1371410										
beta-BHC	19.1	U	0.191		14.8	ug/kg	6.79	77.4	(0%-30%)	LOF	03/10/14 20:22
delta-BHC	19.1	U	0.191		16.6	ug/kg	10.4	87	(0%-30%)		
gamma-BHC (Lindane)	19.1	U	0.191		14.7	ug/kg	13.1	77.3	(0%-30%)		
gamma-Chlordane	19.1	U	0.191		16.7	ug/kg	10.1	87.7	(0%-30%)		
**4cmx	38.2		29.5		24.9	ug/kg		65.4	(32%-120%)		
**Decachlorobiphenyl	38.2		32.3		34.0	ug/kg		89.1	(37%-129%)		

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 (Organics 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: 1371409
Analyst: Sirena White
Method: SW846 3541

Verified by: _____

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

Sample ID	Run Date	Aliquot (g)	Final Volume (mL)	Prepped Factor (mL/g)
1203047615 MB	10-MAR-2014 10:27:00	30.38	5	0.16458
1203047616 LCS	10-MAR-2014 10:27:00	30.05	5	0.16639
344133002	10-MAR-2014 10:27:00	30	5	0.16667
1203047617 MS (344133002)	10-MAR-2014 10:27:00	30.05	5	0.16639
1203047618 MSD (344133002)	10-MAR-2014 10:27:00	30.09	5	0.16617

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203047616	PESTSPIKE	WE140207-05	1	mL	Final Solvent: Hexane Verified By: CR
MS	1203047617	PESTSPIKE	WE140207-05	1	mL	
MSD	1203047618	PESTSPIKE	WE140207-05	1	mL	
SURR	All	PEST SURROGATE 1000 UG/L	WE131218-08	1	mL	
REGNT	All	Acetone	2075053-B1	60	mL	
REGNT	All	Hexane	2075069-B4	60	mL	
SOURC	All	SODIUM SULFATE	2051933	30	g	

PCB Analysis

Case Narrative

**PCB Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0056**

Method/Analysis Information

Procedure: Analysis of Polychlorinated Biphenyls by ECD
Analytical Method: SW846 3541/8082A
Prep Method: SW846 3541
Analytical Batch Number: 1371277
Prep Batch Number: 1371276

Sample Analysis

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

Sample ID	Client ID
344133002	J1TFJ5
1203047277	Method Blank (MB)
1203047278	Laboratory Control Sample (LCS)
1203047279	344133002(J1TFJ5) Matrix Spike (MS)
1203047280	344133002(J1TFJ5) 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

All associated calibration verification standards (ICV or CCV) met the acceptance criteria. All analytes were within the established retention time windows for this method.

Two of the five quantified peaks did not meet the acceptance criteria in Aroclor-1016 standard analyzed for this SDG; however, the average concentration of the five quantified peaks 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 surrogate recoveries were within the established acceptance criteria for the samples in this SDG in this batch.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 344133002 (J1TFJ5) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries for this SDG were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries for this SDG were 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. 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 or re-analyses were not required in this SDG 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.

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0056 GEL Work Order: 344133 Project: RC-232 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.

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: 11 MAR 2014

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: March 11, 2014

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

Client SDG: XP0056

Client Sample ID: J1TFJ5	Project: WCHN00213
Sample ID: 344133002	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 06-MAR-14 08:10	
Receive Date: 07-MAR-14	
Collector: Client	
Moisture: 12.9%	

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	1.27	1.27	3.81	ug/kg	1	JXM	03/08/14	0849	1371277	1
Aroclor-1221	U	1.27	1.27	3.81	ug/kg	1					
Aroclor-1232	U	1.27	1.27	3.81	ug/kg	1					
Aroclor-1242	U	1.27	1.27	3.81	ug/kg	1					
Aroclor-1248	U	1.27	1.27	3.81	ug/kg	1					
Aroclor-1254	U	1.27	1.27	3.81	ug/kg	1					
Aroclor-1260	U	1.27	1.27	3.81	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	03/07/14	1715	1371276

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"	5.49 ug/kg	7.63	72.0	(35%-119%)
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.53 ug/kg	7.63	72.6	(44%-106%)

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: March 11, 2014

Page 1 of 2

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

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB											
Batch	1371277										
QC1203047278	LCS										
Aroclor-1016	33.3			22.3	ug/kg		67	(39%-120%)	JXM	03/08/14	08:37
Aroclor-1260	33.3			26.1	ug/kg		78.3	(50%-116%)			
**4cmx	6.66			5.04	ug/kg		75.8	(44%-106%)			
**Decachlorobiphenyl	6.66			5.21	ug/kg		78.3	(35%-119%)			
QC1203047277	MB										
Aroclor-1016			U	1.11	ug/kg					03/08/14	08:25
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	6.66			5.11	ug/kg		76.7	(44%-106%)			
**Decachlorobiphenyl	6.66			5.73	ug/kg		86.1	(35%-119%)			
QC1203047279	344133002	MS									
Aroclor-1016	38.2	U	1.27	23.0	ug/kg		60.3	(25%-125%)		03/08/14	09:04
Aroclor-1260	38.2	U	1.27	26.6	ug/kg		69.7	(28%-127%)			
**4cmx	7.63		5.53	5.72	ug/kg		75	(44%-106%)			
**Decachlorobiphenyl	7.63		5.49	5.73	ug/kg		75.1	(35%-119%)			
QC1203047280	344133002	MSD									
Aroclor-1016	38.0	U	1.27	21.1	ug/kg	8.74	55.5	(0%-30%)		03/08/14	09:18

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB											
Batch	1371277										
Aroclor-1260	38.0	U	1.27	23.6	ug/kg	12.1	62	(0%-30%)			
**4cmx	7.61		5.53	4.92	ug/kg		64.6	(44%-106%)	JXM	03/08/14	09:18
**Decachlorobiphenyl	7.61		5.49	4.92	ug/kg		64.7	(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 (Organics 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: 1371276 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 1 Amount 1 (mL)	Clean Up Post Clean Up Amount 1 (mL)	Final Volume (mL)	Prepped Factor (mL/g)
1203047277 MB	07-MAR-2014 17:15:00	30.03	H2SO4/KM 2 nO4	9	1	0.0333
1203047278 LCS	07-MAR-2014 17:15:00	30.05	H2SO4/KM 2 nO4	9	1	0.03328
344133002	07-MAR-2014 17:15:00	30.11	H2SO4/KM 2 nO4	9	1	0.03321
1203047279 MS (344133002)	07-MAR-2014 17:15:00	30.08	H2SO4/KM 2 nO4	9	1	0.03324
1203047280 MSD (344133002)	07-MAR-2014 17:15:00	30.19	H2SO4/KM 2 nO4	9	1	0.03312
344145002	07-MAR-2014 17:15:00	30.1	H2SO4/KM 2 nO4	9	1	0.03322
344153001	07-MAR-2014 17:15:00	30.11	H2SO4/KM 2 nO4	9	1	0.03321

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203047278	PCB Laboratory Control	WE140227-06	1	mL	Final Solvent: Hexane Clean up Initials: AV Verified By: SLW Clean up SOP: GL-OA-E-037 Clean up Date: 03-07-14
MS	1203047279	PCB Laboratory Control	WE140227-06	1	mL	
MSD	1203047280	PCB Laboratory Control	WE140227-06	1	mL	
SURR	All	PEST LOW LEVEL SURROGATE 200 UG/L	WE140226-01	1	mL	
REGNT	All	5% Potassium Permanganate	2068449	5	mL	
REGNT	All	Hexane	2075069-B4	120	mL	
REGNT	All	1:1 sulfuric acid	2078359	5	mL	
SOURC	All	SODIUM SULFATE	2051933	30	g	

Herbicide Analysis

Case Narrative

**Herbicide Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0056**

Method/Analysis Information

Procedure: Analysis of Chlorophenoxy Acid Herbicides by ECD
Analytical Method: SW846 8151A
Prep Method: SW846 8151A
Analytical Batch Number: 1371297
Prep Batch Number: 1371295

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8151A:

Sample ID	Client ID
344133002	J1TFJ5
1203047312	Method Blank (MB)
1203047313	Laboratory Control Sample (LCS)
1203047316	344133002(J1TFJ5) Matrix Spike (MS)
1203047317	344133002(J1TFJ5) 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-011 REV# 21.

Raw data reports are processed and reviewed by the analyst using 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 Initial Calibration Verification (ICV) requirements have been met for this SDG. However, not all Calibration Verification Standards (CCV) requirements were met. Several target analytes failed acceptance criteria with a positive bias on one analytical column in the standards bracketing the samples in this SDG. The positive bias for the analytical data is a result of instrument response increasing after the initial calibration. Since the target analytes were not detected in the samples, the non-compliance had no adverse impact on the data. All analytes were within the established retention time windows for this method. The initial calibration verification standard

(ICV) did not meet recovery limits with a positive bias on one analytical column. These analytes were not detected in the associated samples.

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 344133002 (J1TFJ5) was selected for analysis as the matrix spike and matrix spike duplicate.

Matrix Spike (MS) Recovery Statement

The MS recoveries for this SDG were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries for this SDG were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD(s) 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. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported target analyte concentrations were confirmed on a dissimilar column.

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 in this analytical batch unless confirmations or dilutions were required.

Miscellaneous Information

Electronic Package 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 of each electronic package will indicate the reviewer

name 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.

Data Exception (DER) Documentation

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

Manual Integrations

Some initial calibration standards, continuing calibration standards, and/or 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 Herbicide 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:

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

Due to software issue, the raw data may not correctly display the updated SPC limits. Please see Sample Data Summary Report and Surrogate Recovery Report for the correct surrogate acceptance limits.

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD3A.I_1	Agilent 7890A GC with dual uECD	HP6890 Series ECD	Rtx-CLP I	30m x 0.25mm, 0.25um (Rtx-CLPesticide)
ECD3A.I_2	Agilent 7890A GC with dual uECD	HP6890 Series ECD	Rtx-CLP II	30m x 0.25mm, 0.20um (Rtx-CLPesticideII)

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. 14-MAR-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: GC/ECD	Test / Method: SW846 8151A	Matrix Type: Solid	Client Code: CBIL, WCHN, WCSO
Batch ID: 1371297	Sample Numbers: See Below		

Potentially affected work order(s)(SDG): 344133(XP0056),344145,344164

Application Issues:

- Failed Recovery for MS/PS
- Failed Recovery for LCS/LCSD
- Failed Yield for Surrogates
- Failed Recovery for MSD/PSD

Specification and Requirements Exception Description:

DER Disposition:

1. The MS(1203047314) and MSD(1203047315) did not meet spike recovery acceptance limits.
2. Sample 344164001 and the associated MS/MSD did not meet surrogate recovery acceptance limits.

1., 2. It appears that the sample and MS/MSD were not fortified with surrogate or spiking standards. The sample was re-extracted.

Originator's Name:

Lloyd O Fox 14-MAR-14

Data Validator/Group Leader:

Cameron Bearden 14-MAR-14

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0056 GEL Work Order: 344133 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

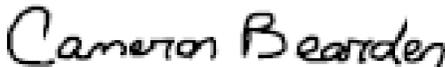
- E Concentration exceeds the calibration range of the instrument
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- 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: Cameron Bearden

Date: 14 MAR 2014

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 14, 2014

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

Client SDG: XP0056

Client Sample ID: J1TFJ5	Project: WCHN00213
Sample ID: 344133002	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 06-MAR-14 08:10	
Receive Date: 07-MAR-14	
Collector: Client	
Moisture: 12.9%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-HERB											
8151A Herbicides Soil "Dry Weight Corrected"											
2,4,5-T	U	1.90	1.90	5.74	ug/kg	1	RXE1	03/13/14	2330	1371297	1
2,4,5-TP	U	1.90	1.90	5.74	ug/kg	1					
2,4-D	U	1.90	1.90	5.74	ug/kg	1					
2,4-DB	U	1.90	1.90	5.74	ug/kg	1					
Dalapon	U	40.2	40.2	115	ug/kg	1					
Dicamba	U	2.29	2.29	5.74	ug/kg	1					
Dichlorprop	U	2.59	2.59	5.74	ug/kg	1					
Dinoseb	U	1.90	1.90	5.74	ug/kg	1					
MCPA	U	264	264	1150	ug/kg	1					
MCPP	U	229	229	1150	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8151A	8151A Herbicides Prep in Soil	AXV1	03/07/14	1925	1371295

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8151A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
2,4-Dichlorophenylacetic acid	8151A Herbicides Soil "Dry Weight Corrected"	86.0 ug/kg	115	75.0	(38%-142%)

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: March 14, 2014

Page 1 of 3

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

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1371297										
QC1203047313	LCS										
2,4,5-T	40.0			31.4	ug/kg		78.5	(52%-137%)	RXE1	03/13/14	23:04
2,4,5-TP	40.0			35.2	ug/kg		88	(58%-133%)			
2,4-D	40.0			34.3	ug/kg		85.7	(53%-139%)			
2,4-DB	40.0			48.9	ug/kg		122	(61%-139%)			
Dalapon	400			177	ug/kg		44.2	(39%-113%)			
Dicamba	40.0			31.3	ug/kg		78.2	(54%-118%)			
Dichlorprop	40.0			32.1	ug/kg		80.2	(59%-126%)			
Dinoseb	40.0			26.0	ug/kg		64.9	(39%-94%)			
MCPA	4000			3330	ug/kg		83.3	(60%-120%)			
MCPP	4000			2760	ug/kg		69	(50%-123%)			
**2,4-Dichlorophenylacetic acid	100			102	ug/kg		102	(38%-142%)			
QC1203047312	MB										
2,4,5-T			U	1.66	ug/kg					03/13/14	22:37
2,4,5-TP			U	1.66	ug/kg						
2,4-D			U	1.66	ug/kg						
2,4-DB			U	1.66	ug/kg						
Dalapon			U	35.0	ug/kg						
Dicamba			U	2.00	ug/kg						
Dichlorprop			U	2.26	ug/kg						
Dinoseb			U	1.66	ug/kg						

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 2 of 3

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1371297										
MCPA			U	230	ug/kg						
MCPP			U	200	ug/kg				RXE1	03/13/14	22:37
**2,4-Dichlorophenylacetic acid	99.9			94.3	ug/kg		94.4	(38%-142%)			
QC1203047316 344133002 MS											
2,4,5-T	45.9	U	1.90	29.1	ug/kg		63.4	(45%-131%)		03/13/14	23:56
2,4,5-TP	45.9	U	1.90	32.2	ug/kg		70.1	(49%-135%)			
2,4-D	45.9	U	1.90	35.9	ug/kg		78.2	(53%-135%)			
2,4-DB	45.9	U	1.90	38.4	ug/kg		83.6	(61%-139%)			
Dalapon	459	U	40.2	140	ug/kg		30.5	(30%-113%)			
Dicamba	45.9	U	2.29	35.9	ug/kg		78.2	(48%-124%)			
Dichlorprop	45.9	U	2.59	32.6	ug/kg		71.1	(46%-138%)			
Dinoseb	45.9	U	1.90	28.4	ug/kg		61.8	(25%-130%)			
MCPA	4590	U	264	3320	ug/kg		72.3	(50%-133%)			
MCPP	4590	U	229	3060	ug/kg		66.6	(47%-123%)			
**2,4-Dichlorophenylacetic acid	115		86.0	102	ug/kg		88.7	(38%-142%)			
QC1203047317 344133002 MSD											
2,4,5-T	45.9	U	1.90	30.7	ug/kg	5.35	66.9	(0%-32%)		03/14/14	00:22
2,4,5-TP	45.9	U	1.90	33.6	ug/kg	4.39	73.2	(0%-31%)			
2,4-D	45.9	U	1.90	36.0	ug/kg	0.392	78.4	(0%-70%)			
2,4-DB	45.9	U	1.90	38.3	ug/kg	0.299	83.3	(0%-27%)			
Dalapon	459	U	40.2	153	ug/kg	8.83	33.3	(0%-18%)			
Dicamba	45.9	U	2.29	37.0	ug/kg	3.04	80.6	(0%-41%)			
Dichlorprop	45.9	U	2.59	34.5	ug/kg	5.56	75.2	(0%-40%)			
Dinoseb	45.9	U	1.90	29.2	ug/kg	2.93	63.7	(0%-169%)			

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 3 of 3

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1371297										
MCPA	4590	U	264	4080	ug/kg	20.7	89	(0%-38%)	RXE1	03/14/14	00:22
MCPP	4590	U	229	3260	ug/kg	6.40	71	(0%-30%)			
**2,4-Dichlorophenylacetic acid	115		86.0	102	ug/kg		88.8	(38%-142%)			

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 (Organics 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

The Extraction of Herbicides from Soil and Sludge Samples

Batch ID: 1371295 Verified by: _____
 Analyst: Alberto Velasco
 Method: SW846 8151A

Lab SOP: GL-OA-E-027 REV# 14
 Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Aliquot (g)	Initial pH	Int Ext pH	Sec Ext pH	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1203047312 MB	07-MAR-2014 19:25:00	50.04	7	2	0	10	0.19984
1203047313 LCS	07-MAR-2014 19:25:00	50.02	7	2	0	10	0.19992
344133002	07-MAR-2014 19:25:00	50.03	7	2	0	10	0.19988
1203047316 MS (344133002)	07-MAR-2014 19:25:00	50.05	7	2	0	10	0.1998
1203047317 MSD (344133002)	07-MAR-2014 19:25:00	50.02	7	2	0	10	0.19992
344145002	07-MAR-2014 19:25:00	50.08	7	2	0	10	0.19968
344164001	07-MAR-2014 19:25:00	50.17	7	2	0	10	0.19932
1203047314 MS (344164001)	07-MAR-2014 19:25:00	50.2	7	2	0	10	0.1992
1203047315 MSD (344164001)	07-MAR-2014 19:25:00	50.01	7	2	0	10	0.19996

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203047313	HERBICIDE LCS	WE140226-04	1	mL	Clean up Date: 11-MAR-2014 15:19:40
MS	1203047314	HERBICIDE LCS	WE140226-04	1	mL	Hydrolysis Analyst: Sharlene Robinson
MS	1203047316	HERBICIDE LCS	WE140226-04	1	mL	Hydrolysis Date: 11-MAR-2014 15:19:40
MSD	1203047315	HERBICIDE LCS	WE140226-04	1	mL	Verified By: SLW
MSD	1203047317	HERBICIDE LCS	WE140226-04	1	mL	Final Solvent: Hexane
SURR	All	HERBICIDE SURROGATE	WE140130-03	.05	mL	
REGNT	All	Iso-octane	1982538-A	1	mL	
REGNT	All	Methylene Chloride	2057826-D	280	mL	
REGNT	All	Acetone	2058011-B1	20	mL	
REGNT	All	acidified sodium sulfate	2059336	10	g	
REGNT	All	Methanol	2061313-C	.5	mL	
REGNT	All	Hexane	2067498-B4	54	mL	
REGNT	All	37g KOH to 100mL DI H2O	2072768A	5	mL	
REGNT	All	Sulfuric Acid Sol., 12N For Herbicides	2077280	17	mL	
REGNT	All	N-METHYL-N-NITROSO-P-TOLUENESULFON-AMIDE	2079609	2	mL	
REGNT	All	Ethyl ether	UN2076572a	80	mL	
SOURC	All	SODIUM SULFATE	2051933	50	g	
WORK	All	HERBICIDE SURROGATE	WE140130-03	.05	mL	

Metals Analysis

Case Narrative

**Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0056**

Sample Analysis

Sample ID	Client ID
344133002	J1TFJ5
1203046976	Method Blank (MB) ICP
1203046977	Laboratory Control Sample (LCS)
1203046980	344133002(J1TFJ5L) Serial Dilution (SD)
1203046978	344133002(J1TFJ5D) Sample Duplicate (DUP)
1203046979	344133002(J1TFJ5S) Matrix Spike (MS)
1203048589	344133002(J1TFJ5PS) Post Spike (PS)
1203046981	Method Blank (MB) ICP-MS
1203046982	Laboratory Control Sample (LCS)
1203046985	344133002(J1TFJ5L) Serial Dilution (SD)
1203046983	344133002(J1TFJ5D) Sample Duplicate (DUP)
1203046984	344133002(J1TFJ5S) Matrix Spike (MS)
1203047824	Method Blank (MB) CVAA
1203047825	Laboratory Control Sample (LCS)
1203047828	344133002(J1TFJ5L) Serial Dilution (SD)
1203047829	344133002(J1TFJ5D) Sample Duplicate (DUP)
1203047826	344133002(J1TFJ5S) Matrix Spike (MS)
1203047827	344133002(J1TFJ5SD) Matrix Spike Duplicate (MSD)

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

Method/Analysis Information

Analytical Batch:	1371154, 1371156 and 1371502
Prep Batch :	1371153, 1371155 and 1371497
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# 27
Analytical Method:	SW846 3050B/6010C, SW846 3050B/6020A and SW846 7471B

Prep Method : SW846 3050B and SW846 7471B Prep

Preparation/Analytical Method Verification

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

System Configuration

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

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

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 6100E inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole 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

The CRDL standard recoveries met the referenced advisory control limits.

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: 344133002 (J1TFJ5)-ICP, ICP-MS and CVAA.

Matrix Spike (MS) Recovery Statement

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

Duplicate Relative Percent Difference (RPD) Statement

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

Post Spike (PS) Recovery Statement

The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS did not meet the recommended quality control acceptance criteria for percent recoveries for silicon and verifies the presence of matrix interferences.

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 established acceptance criteria.

Matrix Spike Duplicate (MSD) Recovery Statement

The percent recovery (%R) obtained from the MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. All applicable elements met the acceptance criteria.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD(s) 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 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. 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 344133002 on the ICP was diluted in order to bring raw titanium values within the linear range of the instrument, and for antimony, cobalt, lead, vanadium and zinc that those elements interfere with, in order to ensure that the inter-element correction factors were valid. The samples in this SDG were diluted the standard two times for solids analyzed 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: DER ID 1274696. 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: Y. J. Cole A. Elmore Date: 3-14-14

DATA EXCEPTION REPORT

Mo.Day Yr. 14-MAR-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1371154	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 344133(XP0056)			
Application Issues: Failed Recovery for MS/PS Failed RPD for DUP			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. Failed Recovery for MS/PS: QC 1203046979MS,1203048589PS</p> <p>2. Failed RPD for DUP: QC 1203046978DUP</p>		<p>1. The matrix spike recovery failed outside of the control limits for silicon. The post spike failed outside the required control limits for silicon but passed for all other analytes. This verifies the presence of a matrix interference for silicon and verifies the absence of a matrix interference for all the other analytes. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.</p> <p>2. The sample and sample duplicate % RPD failed outside the control limits for silicon due to possible sample non-homogeneity and/or matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.</p>	

Originator's Name:

Helen Camello 14-MAR-14

Data Validator/Group Leader:

Louise Smith 14-MAR-14

Sample Data Summary

GEL LABORATORIES LLC

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0056 GEL Work Order: 344133 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

* Duplicate analysis not within control limits

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

D Results are reported from a diluted aliquot of sample.

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

Nick Cole A. Elmore 3.14.14

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 14, 2014

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

Client SDG: XP0056

Client Sample ID: J1TFJ5	Project: WCHN00213
Sample ID: 344133002	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 06-MAR-14 08:10	
Receive Date: 07-MAR-14	
Collector: Client	
Moisture: 12.9%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	0.00507	0.00452	0.0135	mg/kg	1	BCD1	03/10/14	1550	1371502	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		7590	7.64	22.5	mg/kg	1	HSC	03/11/14	1402	1371154	2
Barium		85.1	0.112	0.562	mg/kg	1					
Beryllium	B	0.463	0.112	0.562	mg/kg	1					
Boron	B	3.42	1.12	5.62	mg/kg	1					
Cadmium		0.598	0.112	0.562	mg/kg	1					
Calcium		5390	8.99	28.1	mg/kg	1					
Chromium		12.0	0.169	0.562	mg/kg	1					
Copper		16.3	0.337	1.12	mg/kg	1					
Iron		21200	8.99	28.1	mg/kg	1					
Magnesium		4580	9.55	33.7	mg/kg	1					
Manganese		337	0.225	1.12	mg/kg	1					
Molybdenum	U	0.225	0.225	1.12	mg/kg	1					
Nickel		11.7	0.169	0.562	mg/kg	1					
Potassium		2360	7.19	28.1	mg/kg	1					
Silicon	*N	926	1.69	11.2	mg/kg	1					
Silver	B	0.484	0.112	0.562	mg/kg	1					
Sodium		137	7.86	28.1	mg/kg	1					
Arsenic		4.68	0.562	3.37	mg/kg	1	HSC	03/14/14	1021	1371154	3
Antimony	DU	1.85	1.85	5.62	mg/kg	5	HSC	03/14/14	1032	1371154	4
Cobalt	D	9.51	0.843	2.81	mg/kg	5					
Lead	D	18.1	1.85	5.62	mg/kg	5					
Vanadium	D	56.4	0.562	2.81	mg/kg	5					
Zinc	D	54.5	2.25	5.62	mg/kg	5					

Metals Analysis-ICP-MS

SW846 3050B/6020A Selenium "Dry Weight Corrected"

Selenium	DU	0.376	0.376	1.14	mg/kg	2	SKJ	03/13/14	0939	1371156	5
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	AXG2	03/11/14	0800	1371155
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	03/11/14	0800	1371153
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	03/10/14	1205	1371497

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 14, 2014

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

Client SDG: XP0056

Client Sample ID: J1TFJ5
Sample ID: 344133002

Project: WCHN00213
Client ID: WCHN001

The following Analytical Methods were performed:

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

Notes:

Quality Control Summary

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QC Summary

Report Date: March 14, 2014

Page 1 of 8

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

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1371156										
QC1203046983	344133002	DUP									
Selenium		DU	0.376	DU	0.363	mg/kg	N/A ^		SKJ	03/13/14	09:41
QC1203046982	LCS										
Selenium	4.93			D	4.73	mg/kg		96 (80%-120%)		03/13/14	09:36
QC1203046981	MB										
Selenium				DU	0.325	mg/kg				03/13/14	09:33
QC1203046984	344133002	MS									
Selenium	5.67	DU	0.376	D	4.95	mg/kg		87.2 (75%-125%)		03/13/14	09:44
QC1203046985	344133002	SDILT									
Selenium		DU	-0.495	DU	1.88	ug/L	N/A	(0%-10%)		03/13/14	09:50
Metals Analysis-ICP											
Batch	1371154										
QC1203046978	344133002	DUP									
Aluminum			7590		7600	mg/kg	0.129	(0%-20%)	HSC	03/11/14	14:04
Antimony		DU	1.85	DU	1.82	mg/kg	N/A ^			03/14/14	10:36
Arsenic			4.68		5.48	mg/kg	15.6 ^	(+/-3.31)		03/14/14	10:24
Barium			85.1		85.3	mg/kg	0.280	(0%-20%)		03/11/14	14:04
Beryllium		B	0.463	B	0.469	mg/kg	1.28 ^	(+/-0.551)			
Boron		B	3.42	B	2.29	mg/kg	39.5 ^	(+/-5.51)			
Cadmium			0.598	B	0.528	mg/kg	12.3 ^	(+/-0.551)			
Calcium			5390		5190	mg/kg	3.73	(0%-20%)			
Chromium			12.0		11.8	mg/kg	1.77	(0%-20%)			
Cobalt		D	9.51	D	8.84	mg/kg	7.23 ^	(+/-2.75)		03/14/14	10:36
Copper			16.3		16.3	mg/kg	0.0252	(0%-20%)		03/11/14	14:04
Iron			21200		21000	mg/kg	0.588	(0%-20%)			

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 2 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1371154										
Lead	D	18.1	D	17.1	mg/kg	6.13	^	(+/-5.51)	HSC	03/14/14	10:36
Magnesium		4580		4490	mg/kg	1.90		(0%-20%)		03/11/14	14:04
Manganese		337		349	mg/kg	3.58		(0%-20%)			
Molybdenum	U	0.225	U	0.220	mg/kg	N/A	^				
Nickel		11.7		11.7	mg/kg	0.364		(0%-20%)			
Potassium		2360		2380	mg/kg	0.766		(0%-20%)			
Silicon	*N	926	*	650	mg/kg	35.0*		(0%-20%)			
Silver	B	0.484	B	0.530	mg/kg	9.03	^	(+/-0.551)			
Sodium		137		132	mg/kg	4.17	^	(+/-27.5)			
Vanadium	D	56.4	D	52.5	mg/kg	7.14		(0%-20%)		03/14/14	10:36
Zinc	D	54.5	D	50.7	mg/kg	7.26		(0%-20%)			
QC1203046977	LCS										
Aluminum		496		483	mg/kg			97.4 (80%-120%)		03/11/14	13:59
Antimony		49.6		50.5	mg/kg			102 (80%-120%)		03/14/14	10:29
Arsenic		49.6		53.8	mg/kg			108 (80%-120%)		03/14/14	10:16
Barium		49.6		49.5	mg/kg			99.7 (80%-120%)		03/11/14	13:59
Beryllium		49.6		53.1	mg/kg			107 (80%-120%)			
Boron		49.6		48.9	mg/kg			98.5 (80%-120%)			
Cadmium		49.6		50.4	mg/kg			102 (80%-120%)			
Calcium		496		474	mg/kg			95.5 (80%-120%)			
Chromium		49.6		48.7	mg/kg			98.1 (80%-120%)			
Cobalt		49.6		50.6	mg/kg			102 (80%-120%)		03/14/14	10:29

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 3 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1371154										
Copper	49.6			50.5	mg/kg		102	(80%-120%)	HSC	03/11/14	13:59
Iron	496			490	mg/kg		98.8	(80%-120%)			
Lead	49.6			51.4	mg/kg		104	(80%-120%)		03/14/14	10:29
Magnesium	496			486	mg/kg		98	(80%-120%)		03/11/14	13:59
Manganese	49.6			48.2	mg/kg		97.2	(80%-120%)			
Molybdenum	49.6			47.5	mg/kg		95.8	(80%-120%)			
Nickel	49.6			49.2	mg/kg		99.2	(80%-120%)			
Potassium	496			503	mg/kg		101	(80%-120%)			
Silicon	496			443	mg/kg		89.2	(80%-120%)			
Silver	49.6			49.4	mg/kg		99.6	(80%-120%)			
Sodium	496			495	mg/kg		99.9	(80%-120%)			
Vanadium	49.6			50.9	mg/kg		103	(80%-120%)		03/14/14	10:29
Zinc	49.6			51.1	mg/kg		103	(80%-120%)			
QC1203046976	MB										
Aluminum			U	6.65	mg/kg					03/11/14	13:55
Antimony			U	0.323	mg/kg					03/14/14	10:25
Arsenic			B	-1.43	mg/kg					03/14/14	10:13
Barium			U	0.0978	mg/kg					03/11/14	13:55
Beryllium			U	0.0978	mg/kg						
Boron			U	0.978	mg/kg						
Cadmium			U	0.0978	mg/kg						
Calcium			U	7.83	mg/kg						

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 4 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1371154										
Chromium			U	0.147	mg/kg				HSC	03/11/14	13:55
Cobalt			U	0.147	mg/kg					03/14/14	10:25
Copper			U	0.294	mg/kg					03/11/14	13:55
Iron			U	7.83	mg/kg						
Lead			U	0.323	mg/kg					03/14/14	10:25
Magnesium			U	8.32	mg/kg					03/11/14	13:55
Manganese			U	0.196	mg/kg						
Molybdenum			U	0.196	mg/kg						
Nickel			B	0.147	mg/kg						
Potassium			U	6.26	mg/kg						
Silicon			U	1.47	mg/kg						
Silver			U	0.0978	mg/kg						
Sodium			U	6.85	mg/kg						
Vanadium			U	0.0978	mg/kg					03/14/14	10:25
Zinc			U	0.391	mg/kg						
QC1203046979 344133002 MS											
Aluminum	556			7590	10200	mg/kg		N/A (75%-125%)		03/11/14	14:06
Antimony	55.6	DU		1.85	D	48.8	mg/kg	86.3 (75%-125%)		03/14/14	10:40
Arsenic	55.6			4.68		62.2	mg/kg	103 (75%-125%)		03/14/14	10:26
Barium	55.6			85.1		140	mg/kg	98 (75%-125%)		03/11/14	14:06
Beryllium	55.6	B		0.463		53.0	mg/kg	94.4 (75%-125%)			
Boron	55.6	B		3.42		52.2	mg/kg	87.7 (75%-125%)			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 5 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1371154										
Cadmium	55.6	0.598		49.9	mg/kg		88.6	(75%-125%)	HSC	03/11/14	14:06
Calcium	556	5390		6060	mg/kg		N/A	(75%-125%)			
Chromium	55.6	12.0		63.3	mg/kg		92.1	(75%-125%)			
Cobalt	55.6	D 9.51	D	63.5	mg/kg		97.1	(75%-125%)		03/14/14	10:40
Copper	55.6	16.3		75.1	mg/kg		106	(75%-125%)		03/11/14	14:06
Iron	556	21200		22800	mg/kg		N/A	(75%-125%)			
Lead	55.6	D 18.1	D	74.1	mg/kg		101	(75%-125%)		03/14/14	10:40
Magnesium	556	4580		5420	mg/kg		N/A	(75%-125%)		03/11/14	14:06
Manganese	55.6	337		396	mg/kg		N/A	(75%-125%)			
Molybdenum	55.6	U 0.225		48.9	mg/kg		88	(75%-125%)			
Nickel	55.6	11.7		61.5	mg/kg		89.6	(75%-125%)			
Potassium	556	2360		3160	mg/kg		N/A	(75%-125%)			
Silicon	556	*N 926	N	898	mg/kg		0*	(75%-125%)			
Silver	55.6	B 0.484		53.2	mg/kg		94.8	(75%-125%)			
Sodium	556	137		682	mg/kg		97.9	(75%-125%)			
Vanadium	55.6	D 56.4	D	111	mg/kg		98.9	(75%-125%)		03/14/14	10:40
Zinc	55.6	D 54.5	D	110	mg/kg		100	(75%-125%)			
QC1203048589 344133002 PS											
Silicon	5000	*N 8240		9090	ug/L		16.9*	(80%-120%)		03/11/14	14:19
QC1203046980 344133002 SDILT											
Aluminum		67600	D	13800	ug/L	2.25		(0%-10%)		03/11/14	14:08
Antimony		DU 1.47	DU	9.27	ug/L	N/A		(0%-10%)		03/14/14	10:46
Arsenic		41.7	DU	2.81	ug/L	N/A		(0%-10%)		03/14/14	10:29

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 6 of 8

Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1371154										
Barium		758	D	156	ug/L	3.11		(0%-10%)	HSC	03/11/14	14:08
Beryllium	B	4.12	DU	0.562	ug/L	N/A		(0%-10%)			
Boron	B	30.5	D	11.2	ug/L	84		(0%-10%)			
Cadmium		5.32	DU	0.562	ug/L	N/A		(0%-10%)			
Calcium		47900	D	9770	ug/L	1.9		(0%-10%)			
Chromium		107	D	21.5	ug/L	.429		(0%-10%)			
Cobalt	D	16.9	D	3.45	ug/L	1.87		(0%-10%)		03/14/14	10:46
Copper		145	D	28.5	ug/L	1.89		(0%-10%)		03/11/14	14:08
Iron		188000	D	39600	ug/L	5.07		(0%-10%)			
Lead	D	32.3	D	5.81	ug/L	10		(0%-10%)		03/14/14	10:46
Magnesium		40700	D	8300	ug/L	1.9		(0%-10%)		03/11/14	14:08
Manganese		3000	D	633	ug/L	5.47		(0%-10%)			
Molybdenum	U	-5.65	DU	1.12	ug/L	N/A		(0%-10%)			
Nickel		104	D	21.7	ug/L	4.39		(0%-10%)			
Potassium		21000	D	4250	ug/L	1.07		(0%-10%)			
Silicon	*N	8240	D	1580	ug/L	3.97		(0%-10%)			
Silver	B	4.31	D	1.72	ug/L	99		(0%-10%)			
Sodium		1220	D	254	ug/L	3.98		(0%-10%)			
Vanadium	D	100	D	19.5	ug/L	2.64		(0%-10%)		03/14/14	10:46
Zinc	D	97.1	D	18.9	ug/L	2.85		(0%-10%)			

Metals Analysis-Mercury
Batch 1371502

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QC Summary

Workorder: **344133**

Client SDG: XP0056

Project Description: RC-232 Soil

Page 7 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury											
Batch	1371502										
QC1203047829	344133002	DUP									
Mercury		B	0.00507	B	0.00539	mg/kg	6.14 ^	(+/-0.0133)	BCD1	03/10/14	15:55
QC1203047825	LCS										
Mercury	0.115				0.0996	mg/kg		86.4 (80%-120%)		03/10/14	15:48
QC1203047824	MB										
Mercury				U	0.00388	mg/kg				03/10/14	15:47
QC1203047826	344133002	MS									
Mercury	0.138	B	0.00507		0.122	mg/kg		84.5 (80%-120%)		03/10/14	15:52
QC1203047827	344133002	MSD									
Mercury	0.136	B	0.00507		0.126	mg/kg	3.93	88.9 (0%-20%)		03/10/14	15:54
QC1203047828	344133002	SDILT									
Mercury		B	0.075	DU	0.0226	ug/L	N/A	(0%-10%)		03/10/14	15:57

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

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QC Summary

Workorder: 344133

Client SDG: XP0056

Project Description: RC-232 Soil

Page 8 of 8

<u>Parmname</u>	<u>NOM</u>	<u>Sample Qual</u>	<u>QC</u>	<u>Units</u>	<u>RPD/D%</u>	<u>REC%</u>	<u>Range</u>	<u>Anlst</u>	<u>Date</u>	<u>Time</u>
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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: 1371153	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst: Anthony Green	LCS	1203046977	Metals Spike Mix I	UI2047539-01	.25	mL
Method: SW846 3050B	LCS	1203046977	Metals Spike Mix II	UI2047551-06	.25	mL
Lab SOP: GL-MA-E-009 REV# 22	MS	1203046979	Metals Spike Mix I	UI2047539-01	.25	mL
Instrument: BAL-001	MS	1203046979	Metals Spike Mix II	UI2047551-06	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203046976 MB	11-MAR-2014 08:00:35	Soil	0.511	50	97.84736
1203046977 LCS	11-MAR-2014 08:00:35	Soil	0.504	50	99.20635
344133002	11-MAR-2014 08:00:35	Soil	0.511	50	97.84736
1203046978 DUP (344133002)	11-MAR-2014 08:00:35	Soil	0.521	50	95.96929
1203046979 MS (344133002)	11-MAR-2014 08:00:35	Soil	0.516	50	96.89922
1203046980 SDILT (344133002)	11-MAR-2014 08:00:35	Soil	0.511	50	97.84736

Reagent/Solvent Lot ID	Description	Amount	Comments:
2059610	Concentrated Nitric Acid	1.25 mL	Block Temperature: 91 C
2078654	HYDROCHLORIC ACID	10 mL	Thermometer ID: 119585 Hot Block ID: 10 Sample 344133002 consist of brown, clumpy substance.

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID:	1371155	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	Anthony Green	LCS	1203046982	ICP-MS spiking solution A	UI2065986-A	.25	mL
Method:	SW846 3050B	LCS	1203046982	ICP-MS spiking solution B	UI2065988-B	.25	mL
Lab SOP:	GL-MA-E-009 REV# 22	MS	1203046984	ICP-MS spiking solution A	UI2065986-A	.25	mL
Instrument:	BAL-001	MS	1203046984	ICP-MS spiking solution B	UI2065988-B	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203046981 MB	11-MAR-2014 08:00:38	Soil	0.507	50	98.61933
1203046982 LCS	11-MAR-2014 08:00:38	Soil	0.507	50	98.61933
344133002	11-MAR-2014 08:00:38	Soil	0.504	50	99.20635
1203046983 DUP (344133002)	11-MAR-2014 08:00:38	Soil	0.522	50	95.78544
1203046984 MS (344133002)	11-MAR-2014 08:00:38	Soil	0.506	50	98.81423
1203046985 SDILT (344133002)	11-MAR-2014 08:00:38	Soil	0.504	50	99.20635

Reagent/Solvent Lot ID	Description	Amount	Comments:
1976094-02	Hydrogen Peroxide 30%	1.5 mL	Block Temperature: 91 C
2059610	Concentrated Nitric Acid	5 mL	Thermometer ID: 118631
			Hot Block ID: 2
			Sample 344133002 consist of brown, clumpy substance.

Prep Logbook

Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Batch ID:	1371497	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	Alan Stanley	LCS	1203047825	MHGSOILMSSPIKE	WHG140310-14	.3	mL
Method:	SW846 7471B Prep	MS	1203047826	MHGSOILMSSPIKE	WHG140310-14	.3	mL
Lab SOP:	GL-MA-E-010 REV# 27	MSD	1203047827	MHGSOILMSSPIKE	WHG140310-14	.3	mL
Instrument:	Metals Manual Instrument						

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203047824 MB	10-MAR-2014 12:05:32	Soil	0.518	30	57.91506
1203047825 LCS	10-MAR-2014 12:05:32	Soil	0.52	30	57.69231
344133002	10-MAR-2014 12:05:32	Soil	0.51	30	58.82353
1203047826 MS (344133002)	10-MAR-2014 12:05:32	Soil	0.5	30	60
1203047827 MSD (344133002)	10-MAR-2014 12:05:32	Soil	0.505	30	59.40594
1203047828 SDILT (344133002)	10-MAR-2014 12:05:32	Soil	0.51	30	58.82353
1203047829 DUP (344133002)	10-MAR-2014 12:05:32	Soil	0.518	30	57.91506
344148001	10-MAR-2014 12:05:32	Soil	0.564	30	53.19149
344148002	10-MAR-2014 12:05:32	Soil	0.531	30	56.49718

Reagent/Solvent Lot ID	Description	Amount	Comments:
2071784-C	5% KMnO4 solution	7.5 mL	Digestion Start Date: 10-MAR-2014 12:05
2072331-C	Hg reducing agent	2 mL	Digestion End Date: 10-MAR-2014 12:35
2077152-1	NITRIC ACID	.375 mL	Block Temperature: 95 C
2079494-A	Hydrochloric Acid Conc.	1.125 mL	Thermometer ID: 118533
WHG140307-09	Mercury Working 1st Source CAL S 2.0	300 uL	Hot Block ID: 12
WHG140310-07	Mercury Working Standard 1st Source CAL S 0.2/CRA	30 uL	The QC was a brown mud like material.
WHG140310-08	Mercury Working Standard 1st Source CAL S 0.5	75 uL	
WHG140310-10	Mercury Working 1st Source CAL S 5.0/CCV	750 uL	
WHG140310-11	Mercury Working 1st Source CAL S 10.0	1500 uL	
WHG140310-12	Mercury Working 2nd Source S 5.0/ICV	750 uL	