

SAF-RC-107
100-H Remaining Sites Burial Grounds –
Soil Full Protocol
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

Kathy Wendt H4-21

KW 7/27/15
INITIAL/DATE

COMMENTS:

SDG XP0217

SAF-RC-107

Rad only

Chem only

Rad & Chem

Complete

Partial

Waste Site: 100-H-59:2 (verification)



July 25, 2015

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

Re: RC-107 Soil
Work Order: 376541
SDG: XP0217

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 08, 2015. This revised data report has been prepared and reviewed in accordance with GEL's standard operating procedures. The chain of custody was corrected to reflect XP0217.

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. 4505.

Sincerely,

Heather Shaffer
Project Manager

Purchase Order: 1510
Chain of Custody: RC-107-137
Enclosures



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Case Narrative

The chain of custody was corrected to reflect XP0217.

**Receipt Narrative
for
Eberline
SDG: XP0217
Work Order: 376541**

July 25, 2015

Laboratory Identification:

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

Summary:

Sample receipt: The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on July 08, 2015 for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following sample:

<u>Laboratory ID</u>	<u>Client ID</u>
376541001	J1V7T2

Case Narrative:

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

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Diesel Range Organics, GC Semivolatile PCB, GC Semivolatile Pesticide, General Chemistry, HPLC Polynuclear Aromatic Hydrocarbon and Metals.



Heather Shaffer
Project Manager

Chain of Custody and Supporting Documentation



SAMPLE RECEIPT & REVIEW FORM

Client: <u>WCHN</u>		SDG/AR/COC/Work Order: <u>376841</u>
Received By: <u>MK</u>		Date Received: <u>7-8-15</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>0/0</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 type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3°C Preservation Method: <u>Ice bags</u> Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius
2a	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>E5092015830</u> Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input 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 type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples (EPA 6850) have headspace as required?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7	VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
8	Are Encore containers present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
9	Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
10	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
11	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
12	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13	Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15	Carrier and tracking number.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7739 9809 3418</u>

Comments (Use Continuation Form if needed):

Laboratory Certifications

List of current GEL Certifications as of 25 July 2015

State	Certification
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California	2940 Interim
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 SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA150001
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
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-15-10
Utah NELAP	SC000122015-17
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

HPLC Polynuclear Aromatic Hydrocarbon Analysis

**HPLC Polynuclear Aromatic Hydrocarbon
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0217
Work Order #: 376541**

Method/Analysis Information

Procedure: Polynuclear Aromatic Hydrocarbons

Analytical Method: SW846 8310

Prep Method: SW846 3550B

Analytical Batch Number: 1490799

Prep Batch Number: 1490797

Sample Analysis

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

Sample ID	Client ID
376541001	J1V7T2
1203349724	Method Blank (MB)
1203349725	Laboratory Control Sample (LCS)
1203349726	376541001(J1V7T2) Matrix Spike (MS)
1203349727	376541001(J1V7T2) 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# 16.

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

Biased high spiked recoveries were observed in the LCS (1203349725). Please see the Form 3 in the package for a complete list of recoveries and acceptance ranges. The biased high recoveries were due to the vagaries of the extraction process. The data are reported since no detections were observed in sample J1V7T2.

QC Sample Designation

Client sample 376541001 (J1V7T2) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

Biased high spiked recoveries were observed in the MS (1203349726) and MSD (1203349727). Please see the Form 3 in the package for a complete list of recoveries and acceptance ranges. The biased high recoveries were due to the vagaries of the extraction process. The data are reported since no detections were observed in sample J1V7T2.

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 for this SDG.

Miscellaneous Information:

Data Exception (DER) Documentation

A data exception report (DER) 1429737 was generated for samples 1203349725 (LCS), 1203349726 (J1V7T2MS) and 1203349727 (J1V7T2MSD) in this SDG/batch.

Manual Integrations

Some initial calibration standards, continuing calibration standards, and QC samples 1203349725 (LCS), 1203349726 (J1V7T2MS) and 1203349727 (J1V7T2MSD) 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 C, or HPLC E in the raw data printouts.

Chromatographic Columns

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

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

Certification Statement

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

DATA EXCEPTION REPORT

Mo.Day Yr. 14-JUL-15	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: HPLC	Test / Method: SW846 8310	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1490799	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 376541(XP0217)			
Application Issues: Failed Recovery for LCS/LCSD Failed Recovery for MS/MSD, or PS/PSD			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. Biased high spiked recoveries were observed in the LCS (1203349725). Please see the Form 3 in the data package for a complete list of recoveries and acceptance ranges.</p> <p>2. Biased high spiked recoveries were observed in the MS (1203349726) and MSD (1203349727). Please see the Form 3 in the data package for a complete list of recoveries and acceptance ranges.</p>		<p>1. & 2. The biased high recoveries observed in the LCS, MS, and MSD were due to the vagaries of the extraction process. The data are reported since no detections were observed in sample J1V7T2.</p>	

Originator's Name:

Charles Wilson 14-JUL-15

Data Validator/Group Leader:

Michael Penny 14-JUL-15

GEL LABORATORIES LLC

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

Qualifier Definition Report for

WCHN001 Eberline

Client SDG: XP0217 GEL Work Order: 376541 Project: RC-107 Soil

The Qualifiers in this report are defined as follows:

T Spike and/or spike duplicate sample recovery is outside control limits.

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

DL Indicates that sample is diluted.

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

RE Indicates that sample is re-extracted.

Review/Validation

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

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

Signature: 

Name: Michael Penny

Date: 15 JUL 2015

Title: Group Leader

Roadmap for WCHN XP0217 HPLC_PAH

This roadmap was analyzed by cww on 07-14-2015, 15:39.

This roadmap was reviewed by map on 07-14-2015, 16:08.

This roadmap was packaged by map on 07-15-2015, 08:04.

Sample

exclude	manual	datafile	smpid	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p071315.b/ph5g1306.d	376541001	13-JUL-2015	13:17	XP0217.sub	J1V7T2	1	1490799	<input type="text"/>

QC Sample

exclude	manual	datafile	smpid	sampletype	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p071315.b/ph5g1304.d	1203349724	mb	13-JUL-2015	11:53	XP0217.sub	PAHBLK01	1	1490799	<input type="text"/>
<input type="checkbox"/>	N	/chem/hplce.i/p071315.b/ph5g1305.d	1203349725	les	13-JUL-2015	12:35	XP0217.sub	PAHBLK01LCS	1	1490799	11 high recoveries, no detection in sample.
<input type="checkbox"/>	N	/chem/hplce.i/p071315.b/ph5g1307.d	1203349726	ms	13-JUL-2015	13:59	XP0217.sub	J1V7T2MS	1	1490799	4 high recoveries
<input type="checkbox"/>	N	/chem/hplce.i/p071315.b/ph5g1308.d	1203349727	msd	13-JUL-2015	14:41	XP0217.sub	J1V7T2MSD	1	1490799	6 high recoveries

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: July 14, 2015

Company : WC-Hanford, Inc.
 Address : 2620 Fermi Avenue
 MSIN H4-21
 Richland, Washington 99354
 Contact: Joan Kessner
 Project: RC-107 Soil

Client SDG: XP0217

Client Sample ID: J1V7T2	Project: WCHN00720
Sample ID: 376541001	Client ID: WCHN001
Matrix: Soil	
Collect Date: 06-JUL-15 09:28	
Receive Date: 08-JUL-15	
Collector: Client	
Moisture: .5%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	TU	5.02	5.02	16.7	ug/kg	1	CWW	07/13/15	1317	1490799	1
Acenaphthylene	TU	5.02	5.02	16.7	ug/kg	1					
Anthracene	U	1.67	1.67	16.7	ug/kg	1					
Benzo(a)anthracene	U	0.535	0.535	1.67	ug/kg	1					
Benzo(a)pyrene	U	0.535	0.535	1.67	ug/kg	1					
Benzo(b)fluoranthene	U	0.535	0.535	1.67	ug/kg	1					
Benzo(ghi)perylene	U	0.535	0.535	1.67	ug/kg	1					
Benzo(k)fluoranthene	U	0.268	0.268	0.836	ug/kg	1					
Chrysene	U	0.535	0.535	1.67	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.535	0.535	1.67	ug/kg	1					
Fluoranthene	U	0.535	0.535	1.67	ug/kg	1					
Fluorene	TU	5.02	5.02	16.7	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.535	0.535	1.67	ug/kg	1					
Naphthalene	TU	5.02	5.02	16.7	ug/kg	1					
Phenanthrene	TU	5.02	5.02	16.7	ug/kg	1					
Pyrene	U	0.535	0.535	1.67	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	SJW1	07/09/15	1122	1490797

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"	6260 ug/kg	8360	74.9	(46%-101%)

Notes:

QC Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: July 14, 2015

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

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1490799										
QC1203349725	LCS										
Acenaphthene	1660			1720	ug/kg		103 *	(66%-98%)	CWW	07/13/15	12:35
Acenaphthylene	1660			1650	ug/kg		99.1 *	(65%-95%)			
Anthracene	1660			1670	ug/kg		100	(71%-107%)			
Benzo(a)anthracene	166			171	ug/kg		103	(72%-103%)			
Benzo(a)pyrene	166			164	ug/kg		98.5 *	(68%-98%)			
Benzo(b)fluoranthene	166			171	ug/kg		103 *	(72%-99%)			
Benzo(ghi)perylene	166			175	ug/kg		105 *	(69%-98%)			
Benzo(k)fluoranthene	83.2			91.1	ug/kg		110 *	(62%-103%)			
Chrysene	166			173	ug/kg		104	(80%-113%)			
Dibenzo(a,h)anthracene	166			176	ug/kg		106	(83%-115%)			
Fluoranthene	166			167	ug/kg		100 *	(68%-98%)			
Fluorene	1660			1710	ug/kg		103 *	(68%-99%)			
Indeno(1,2,3-cd)pyrene	166			181	ug/kg		109 *	(76%-105%)			
Naphthalene	1660			1570	ug/kg		94.6 *	(62%-93%)			
Phenanthrene	1660			1660	ug/kg		100 *	(70%-98%)			
Pyrene	166			162	ug/kg		97.1	(73%-104%)			
**Decafluorobiphenyl	8320			7240	ug/kg		87	(46%-101%)			
QC1203349724	MB										
Acenaphthene			U	5.00	ug/kg					07/13/15	11:53
Acenaphthylene			U	5.00	ug/kg						

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QC Summary

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1490799										
Anthracene			U	1.67	ug/kg						
Benzo(a)anthracene			U	0.533	ug/kg				CWW	07/13/15	11:53
Benzo(a)pyrene			U	0.533	ug/kg						
Benzo(b)fluoranthene			U	0.533	ug/kg						
Benzo(ghi)perylene			U	0.533	ug/kg						
Benzo(k)fluoranthene			U	0.267	ug/kg						
Chrysene			U	0.533	ug/kg						
Dibenzo(a,h)anthracene			U	0.533	ug/kg						
Fluoranthene			U	0.533	ug/kg						
Fluorene			U	5.00	ug/kg						
Indeno(1,2,3-cd)pyrene			U	0.533	ug/kg						
Naphthalene			U	5.00	ug/kg						
Phenanthrene			U	5.00	ug/kg						
Pyrene			U	0.533	ug/kg						
**Decafluorobiphenyl	8330			7470	ug/kg		89.6	(46%-101%)			
QC1203349726 376541001 MS											
Acenaphthene	1670	TU	5.02	T	1680	ug/kg	100*	(57%-97%)		07/13/15	13:59
Acenaphthylene	1670	TU	5.02	T	1620	ug/kg	96.8*	(55%-94%)			
Anthracene	1670	U	1.67		1580	ug/kg	94.3	(65%-103%)			
Benzo(a)anthracene	167	U	0.535		154	ug/kg	92.1	(53%-110%)			
Benzo(a)pyrene	167	U	0.535		149	ug/kg	88.8	(53%-105%)			
Benzo(b)fluoranthene	167	U	0.535		151	ug/kg	90.3	(52%-110%)			
Benzo(ghi)perylene	167	U	0.535		153	ug/kg	91.3	(44%-107%)			

GEL LABORATORIES LLC

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QC Summary

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1490799										
Benzo(k)fluoranthene	83.7	U	0.268		80.9	ug/kg	96.6	(48%-116%)	CWW	07/13/15	13:59
Chrysene	167	U	0.535		153	ug/kg	91.2	(61%-118%)			
Dibenzo(a,h)anthracene	167	U	0.535		155	ug/kg	92.6	(63%-119%)			
Fluoranthene	167	U	0.535		152	ug/kg	90.8	(56%-100%)			
Fluorene	1670	TU	5.02	T	1660	ug/kg	99.2*	(59%-97%)			
Indeno(1,2,3-cd)pyrene	167	U	0.535		158	ug/kg	94.4	(53%-115%)			
Naphthalene	1670	TU	5.02	T	1520	ug/kg	91*	(54%-88%)			
Phenanthrene	1670	TU	5.02		1600	ug/kg	95.6	(60%-99%)			
Pyrene	167	U	0.535		147	ug/kg	88.1	(54%-112%)			
**Decafluorobiphenyl	8370		6260		6750	ug/kg	80.7	(46%-101%)			
QC1203349727 376541001 MSD											
Acenaphthene	1670	TU	5.02	T	1690	ug/kg	1.12	101*	(0%-30%)		07/13/15 14:41
Acenaphthylene	1670	TU	5.02	T	1640	ug/kg	1.31	98.1*	(0%-30%)		
Anthracene	1670	U	1.67		1710	ug/kg	7.86	102	(0%-30%)		
Benzo(a)anthracene	167	U	0.535		171	ug/kg	10.2	102	(0%-30%)		
Benzo(a)pyrene	167	U	0.535		166	ug/kg	10.9	99.2	(0%-30%)		
Benzo(b)fluoranthene	167	U	0.535		168	ug/kg	10.8	101	(0%-30%)		
Benzo(ghi)perylene	167	U	0.535		172	ug/kg	11.9	103	(0%-30%)		
Benzo(k)fluoranthene	83.7	U	0.268		90.7	ug/kg	11.4	108	(0%-30%)		
Chrysene	167	U	0.535		170	ug/kg	10.9	102	(0%-30%)		
Dibenzo(a,h)anthracene	167	U	0.535		174	ug/kg	11.4	104	(0%-30%)		
Fluoranthene	167	U	0.535		167	ug/kg	9.65	100	(0%-30%)		

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QC Summary

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

Page 4 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1490799										
Fluorene	1670	TU	5.02	T	1720	ug/kg	3.69	103*	(0%-30%)	CWW	07/13/15 14:41
Indeno(1,2,3-cd)pyrene	167	U	0.535		177	ug/kg	11.5	106	(0%-30%)		
Naphthalene	1670	TU	5.02	T	1510	ug/kg	0.987	90.2*	(0%-30%)		
Phenanthrene	1670	TU	5.02	T	1690	ug/kg	5.51	101*	(0%-30%)		
Pyrene	167	U	0.535		162	ug/kg	9.69	97.1	(0%-30%)		
*Decafluorobiphenyl	8370		6260		7010	ug/kg		83.8	(46%-101%)		

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 40% 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 or %RPD not applicable.
 ^ 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: 1490797 Verified by: _____
 Analyst: Sirena White
 Method: SW846 3550B

Lab SOP: GL-OA-E-010 REV# 25
 Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1203349724 MB	09-JUL-2015 11:22:00	30	1	0.03333
1203349725 LCS	09-JUL-2015 11:22:00	30.05	1	0.03328
376541001	09-JUL-2015 11:22:00	30.05	1	0.03328
1203349726 MS (376541001)	09-JUL-2015 11:22:00	30.01	1	0.03332
1203349727 MSD (376541001)	09-JUL-2015 11:22:00	30.03	1	0.0333

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203349725	8310 PAH SPIKE	UE150219-10	1	mL	Final Solvent: ACN Verified by: MD
MS	1203349726	8310 PAH SPIKE	UE150219-10	1	mL	
MSD	1203349727	8310 PAH SPIKE	UE150219-10	1	mL	Sample 376541001 (and its MS/MSD) was a powdery and light matrix.
SURR	All	Decafluorobiphenyl 250 mg/L	WE150224-35	1	mL	
REGNT	All	HPLC Grade Acetonitrile	2230048	5	mL	
REGNT	All	Methylene Chloride	2263161-D	300	mL	
SOURC	All	SODIUM SULFATE	2255681	30	g	

FID Diesel Range Organics Analysis

Case Narrative

**Diesel Range Organics
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0217
Work Order #: 376541**

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: 1490747

Prep Batch Number: 1490745

Sample Analysis

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

Sample ID	Client ID
376541001	J1V7T2
1203349643	Method Blank (MB)
1203349644	Laboratory Control Sample (LCS)
1203349645	376541001(J1V7T2) Matrix Spike (MS)
1203349646	376541001(J1V7T2) 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# 25.

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

Calibration Information

Initial Calibration

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

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

Surrogate Recoveries

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

Laboratory Control Sample (LCS/LCSD) Recovery

The LCS/LCSD spike recoveries met the acceptance limits.

QC Sample Designation

Sample 376541001 (J1V7T2) was selected for the MS and MSD analyses.

Matrix Spike (MS/MSD) Recovery Statement

The MS/MSD recovery was within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the MS and MSD met the acceptance limits.

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. Analyte peaks eluted within the established retention time windows for this method.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Electronic Package Comment

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

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative.

Data Exception (DER) Documentation

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

Manual Integrations

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

Additional Comments

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

System Configuration

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

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

Certification Statement

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

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Qualifier Definition Report for

WCHN001 Eberline

Client SDG: XP0217 GEL Work Order: 376541 Project: RC-107 Soil

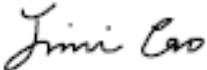
The Qualifiers in this report are defined as follows:

- B The analyte was detected in both the associated QC blank and in the sample.
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

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

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

Signature: 

Name: Jimin Cao

Date: 14 JUL 2015

Title: Data Validator

Sample Data Summary

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Certificate of Analysis

Report Date: July 13, 2015

Company : WC-Hanford, Inc.
 Address : 2620 Fermi Avenue
 MSIN H4-21
 Richland, Washington 99354
 Contact: Joan Kessner
 Project: RC-107 Soil

Client SDG: XP0217

Client Sample ID: J1V7T2 Project: WCHN00720
 Sample ID: 376541001 Client ID: WCHN001
 Matrix: Soil
 Collect Date: 06-JUL-15 09:28
 Receive Date: 08-JUL-15
 Collector: Client
 Moisture: .5%

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	2180	2180	6700	ug/kg	1	LXA1	07/10/15	1657	1490747	1
Motor Oil (C20-C36)	BJ	4820	2180	6700	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	GXC1	07/09/15	1016	1490745

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"	540 ug/kg	670	80.6	(50%-150%)

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: July 13, 2015

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

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Diesel Range Organics											
Batch	1490747										
QC1203349644	LCS										
Diesel Range Organics (C10-C20)	66600			50000	ug/kg		75	(70%-130%)	LXA1	07/10/15	16:18
Motor Oil (C20-C36)	66600		B	64800	ug/kg		97.2	(70%-130%)			
**o-Terphenyl	666			551	ug/kg		82.7	(50%-150%)			
QC1203349643	MB										
Diesel Range Organics (C10-C20)			U	2170	ug/kg					07/10/15	15:39
Motor Oil (C20-C36)			J	2360	ug/kg						
**o-Terphenyl	666			477	ug/kg		71.5	(50%-150%)			
QC1203349645	376541001 MS										
Diesel Range Organics (C10-C20)	67000	U	2180	48300	ug/kg		72.2	(70%-130%)		07/10/15	17:36
Motor Oil (C20-C36)	67000	BJ	4820	59300	ug/kg		81.3	(70%-130%)			
**o-Terphenyl	670		540	492	ug/kg		73.5	(50%-150%)			
QC1203349646	376541001 MSD										
Diesel Range Organics (C10-C20)	66900	U	2180	52200	ug/kg	7.71	78	(0%-20%)		07/10/15	18:15
Motor Oil (C20-C36)	66900	BJ	4820	65600	ug/kg	10.1	90.8	(0%-20%)			
**o-Terphenyl	669		540	539	ug/kg		80.6	(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

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QC Summary

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
P	Aroclor target analyte with greater than 40% 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 or %RPD not applicable.

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

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

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

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

Miscellaneous

Prep Logbook

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

Batch ID: 1490745 **Verified by:** _____
Analyst: Grace Cappelmann
Method: SW846 3541

Lab SOP: GL-OA-E-010 REV# 25
Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1203349643 MB	09-JUL-2015 10:16:00	30.01	1	0.03332
1203349644 LCS	09-JUL-2015 10:16:00	30.02	1	0.03331
376541001	09-JUL-2015 10:16:00	30	1	0.03333
1203349645 MS (376541001)	09-JUL-2015 10:16:00	30.01	1	0.03332
1203349646 MSD (376541001)	09-JUL-2015 10:16:00	30.03	1	0.0333

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203349644	AZDRO SPIKE LCS STD,4000ug/ml	WFI150624-62	1	mL	Final Solvent: CH2Cl2 Verified by: MD
MS	1203349645	AZDRO SPIKE LCS STD,4000ug/ml	WFI150624-62	1	mL	
MSD	1203349646	AZDRO SPIKE LCS STD,4000ug/ml	WFI150624-62	1	mL	Sample 376541001 (and its MS/MSD) was a light weight powder mixed with rocks.
SURR	All	20 ppm surrogate	WE150602-04	1	mL	
REGNT	All	Methylene Chloride	2263161-D	120	mL	
SOURC	All	SODIUM SULFATE	2255681	30	g	

Pesticide Analysis

Case Narrative

**GC Semivolatile Pesticide
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0217
Work Order #: 376541**

Method/Analysis Information

Procedure: **Organochlorine Pesticides and Chlorinated Hydrocarbons**

Analytical Method: SW846 3541/8081B

Prep Method: SW846 3541

Analytical Batch Number: 1491179

Prep Batch Number: 1491178

Sample Analysis

Sample ID	Client ID
376541001	J1V7T2
1203350464	Method Blank (MB)
1203350465	Laboratory Control Sample (LCS)
1203350466	376541001(J1V7T2) Matrix Spike (MS)
1203350467	376541001(J1V7T2) 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 associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria. All analytes were within the established retention time windows for this method.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

All surrogate recoveries were within the established acceptance criteria for this analytical batch for this SDG.

Laboratory Control Sample (LCS/LCSD) Recovery

The LCS and/or LCSD (See Below) did not meet the spike recovery acceptance limits with a positive bias. As target analytes were not detected in the associated samples, the data were not adversely impacted.

Sample	Analyte	Value
1203350465 (LCS)	Dieldrin	111%* (45%-110%)

QC Sample Designation

Sample 376541001 (J1V7T2) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS/MSD) Recovery Statement

The MS/MSD recoveries 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 report (DER) 1429473 was generated for this batch of the samples.

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 if applicable.

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.

The Toxaphene and/or Chlordane standards were analyzed for this SDG as a retention time marker and pattern reference. A five-point calibration curve and calibration verification standard forms were not submitted in the data package since Toxaphene and/or Chlordane were not detected in the client samples.

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD5A.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)
ECD5A.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.

DATA EXCEPTION REPORT

Mo.Day Yr. 13-JUL-15	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: GC/ECD	Test / Method: SW846 3541/8081B	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1491179	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 376541(XP0217)			
Application Issues: Failed Recovery for LCS/LCSD			
Specification and Requirements Exception Description:		DER Disposition:	
1. The 1203350465LCS failed spike recovery.		1. The LCS and/or LCSD (See Below) did not meet the spike recovery acceptance limits with a positive bias. As target analytes were not detected in the associated samples, the data were not adversely impacted. 1203350465 (LCS) Dieldrin [111%* (45%-110%)].	

Originator's Name:
Rebecca Enzor 13-JUL-15

Data Validator/Group Leader:
Herbert Maier 13-JUL-15

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Qualifier Definition Report for

WCHN001 Eberline

Client SDG: XP0217 GEL Work Order: 376541 Project: RC-107 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: 14 JUL 2015

Title: Data Validator

Sample Data Summary

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: July 13, 2015

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

Contact: Joan Kessner

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1491179										
QC1203350465	LCS										
4,4'-DDD	41.7			50.6	ug/kg		122	(49%-123%)	RXE1	07/10/15	19:17
4,4'-DDE	41.7			44.2	ug/kg		106	(46%-118%)			
4,4'-DDT	41.7			44.3	ug/kg		106	(48%-126%)			
Aldrin	16.7			17.7	ug/kg		106	(42%-114%)			
Dieldrin	41.7			46.1	ug/kg		111 *	(45%-110%)			
Endosulfan I	16.7			15.7	ug/kg		94.4	(38%-107%)			
Endosulfan II	41.7			43.2	ug/kg		104	(43%-110%)			
Endosulfan sulfate	41.7			49.1	ug/kg		118	(46%-121%)			
Endrin	41.7			48.7	ug/kg		117	(53%-135%)			
Endrin aldehyde	41.7			40.9	ug/kg		98.3	(42%-116%)			
Endrin ketone	41.7			44.6	ug/kg		107	(45%-111%)			
Heptachlor	16.7			18.1	ug/kg		109	(43%-120%)			
Heptachlor epoxide	16.7			17.7	ug/kg		106	(44%-116%)			
Methoxychlor	16.7			185	ug/kg		111	(45%-127%)			
alpha-BHC	16.7			17.4	ug/kg		105	(42%-124%)			
alpha-Chlordane	16.7			17.5	ug/kg		105	(43%-116%)			
beta-BHC	16.7			18.8	ug/kg		113	(44%-118%)			
delta-BHC	16.7			18.3	ug/kg		110	(43%-124%)			
gamma-BHC (Lindane)	16.7			18.1	ug/kg		109	(42%-123%)			
gamma-Chlordane	16.7			17.2	ug/kg		103	(45%-117%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1491179										
**4cmx	33.3			33.2	ug/kg		99.5	(27%-124%)	RXE1	07/10/15	19:17
**Decachlorobiphenyl	33.3			32.5	ug/kg		97.5	(31%-131%)			
QC1203350464	MB										
4,4'-DDD			U	0.333	ug/kg					07/10/15	19:02
4,4'-DDE			U	0.333	ug/kg						
4,4'-DDT			U	0.333	ug/kg						
Aldrin			U	0.167	ug/kg						
Dieldrin			U	0.333	ug/kg						
Endosulfan I			U	0.167	ug/kg						
Endosulfan II			U	0.333	ug/kg						
Endosulfan sulfate			U	0.333	ug/kg						
Endrin			U	0.333	ug/kg						
Endrin aldehyde			U	0.333	ug/kg						
Endrin ketone			U	0.333	ug/kg						
Heptachlor			U	0.167	ug/kg						
Heptachlor epoxide			U	0.167	ug/kg						
Methoxychlor			U	1.67	ug/kg						
Toxaphene			U	5.55	ug/kg						
alpha-BHC			U	0.167	ug/kg						
alpha-Chlordane			U	0.167	ug/kg						
beta-BHC			U	0.167	ug/kg						
delta-BHC			U	0.167	ug/kg						

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1491179										
gamma-BHC (Lindane)			U	0.167	ug/kg				RXE1	07/10/15	19:02
gamma-Chlordane			U	0.167	ug/kg						
**4cmx	33.3			22.0	ug/kg		65.9	(27%-124%)			
**Decachlorobiphenyl	33.3			22.4	ug/kg		67.1	(31%-131%)			
QC1203350466 376541001 MS											
4,4'-DDD	41.8	U	0.335	53.8	ug/kg		129	(23%-142%)		07/10/15	19:47
4,4'-DDE	41.8	U	0.335	48.2	ug/kg		115	(23%-133%)			
4,4'-DDT	41.8	U	0.335	45.7	ug/kg		109	(25%-141%)			
Aldrin	16.7	U	0.167	18.3	ug/kg		109	(21%-129%)			
Dieldrin	41.8	U	0.335	48.6	ug/kg		116	(19%-131%)			
Endosulfan I	16.7	U	0.167	16.3	ug/kg		97.2	(15%-121%)			
Endosulfan II	41.8	U	0.335	44.7	ug/kg		107	(17%-126%)			
Endosulfan sulfate	41.8	U	0.335	51.7	ug/kg		124	(20%-134%)			
Endrin	41.8	U	0.335	52.4	ug/kg		125	(24%-154%)			
Endrin aldehyde	41.8	U	0.335	39.6	ug/kg		94.7	(18%-124%)			
Endrin ketone	41.8	U	0.335	46.5	ug/kg		111	(18%-127%)			
Heptachlor	16.7	U	0.167	18.7	ug/kg		112	(19%-137%)			
Heptachlor epoxide	16.7	U	0.167	18.3	ug/kg		110	(20%-131%)			
Methoxychlor	167	U	1.67	202	ug/kg		120	(18%-147%)			
alpha-BHC	16.7	U	0.167	16.9	ug/kg		101	(21%-133%)			
alpha-Chlordane	16.7	U	0.167	18.1	ug/kg		108	(17%-133%)			
beta-BHC	16.7	U	0.167	19.2	ug/kg		115	(22%-135%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1491179										
delta-BHC	16.7	U	0.167	19.8	ug/kg		119	(20%-139%)	RXE1	07/10/15	19:47
gamma-BHC (Lindane)	16.7	U	0.167	18.6	ug/kg		111	(20%-134%)			
gamma-Chlordane	16.7	U	0.167	17.6	ug/kg		105	(20%-131%)			
**4cmx	33.5		34.4	34.8	ug/kg		104	(27%-124%)			
**Decachlorobiphenyl	33.5		32.1	32.5	ug/kg		97.2	(31%-131%)			
QC1203350467 376541001 MSD											
4,4'-DDD	41.8	U	0.335	56.4	ug/kg	4.59	135	(0%-30%)		07/10/15	20:02
4,4'-DDE	41.8	U	0.335	50.4	ug/kg	4.48	121	(0%-30%)			
4,4'-DDT	41.8	U	0.335	47.9	ug/kg	4.87	115	(0%-30%)			
Aldrin	16.7	U	0.167	19.7	ug/kg	7.41	118	(0%-30%)			
Dieldrin	41.8	U	0.335	51.5	ug/kg	5.92	123	(0%-30%)			
Endosulfan I	16.7	U	0.167	17.2	ug/kg	5.77	103	(0%-30%)			
Endosulfan II	41.8	U	0.335	46.8	ug/kg	4.73	112	(0%-30%)			
Endosulfan sulfate	41.8	U	0.335	54.5	ug/kg	5.26	130	(0%-30%)			
Endrin	41.8	U	0.335	55.3	ug/kg	5.32	132	(0%-30%)			
Endrin aldehyde	41.8	U	0.335	41.5	ug/kg	4.78	99.3	(0%-30%)			
Endrin ketone	41.8	U	0.335	48.8	ug/kg	4.96	117	(0%-30%)			
Heptachlor	16.7	U	0.167	20.1	ug/kg	7.34	120	(0%-30%)			
Heptachlor epoxide	16.7	U	0.167	19.6	ug/kg	6.56	117	(0%-30%)			
Methoxychlor	16.7	U	1.67	213	ug/kg	5.48	127	(0%-30%)			
alpha-BHC	16.7	U	0.167	19.6	ug/kg	14.9	117	(0%-30%)			
alpha-Chlordane	16.7	U	0.167	19.1	ug/kg	5.37	114	(0%-30%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1491179										
beta-BHC	16.7	U	0.167	20.3	ug/kg	5.47	121	(0%-30%)	RXE1	07/10/15	20:02
delta-BHC	16.7	U	0.167	21.1	ug/kg	6.00	126	(0%-30%)			
gamma-BHC (Lindane)	16.7	U	0.167	20.1	ug/kg	7.88	120	(0%-30%)			
gamma-Chlordane	16.7	U	0.167	18.3	ug/kg	3.93	109	(0%-30%)			
**4cmx	33.5		34.4	37.4	ug/kg		112	(27%-124%)			
**Decachlorobiphenyl	33.5		32.1	34.3	ug/kg		102	(31%-131%)			

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 40% 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 or %RPD not applicable.
 ^ 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: 1491178
Analyst: Mia DeLee
Method: SW846 3541

Verified by: _____

Lab SOP: GL-OA-E-066 REV# 6
Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Aliquot (g)	Final Volume (mL)	Prepped Factor (mL/g)
1203350464 MB	10-JUL-2015 09:54:00	30	5	0.16667
1203350465 LCS	10-JUL-2015 09:54:00	30.01	5	0.16661
376541001	10-JUL-2015 09:54:00	30.04	5	0.16644
1203350466 MS (376541001)	10-JUL-2015 09:54:00	30.03	5	0.1665
1203350467 MSD (376541001)	10-JUL-2015 09:54:00	30.03	5	0.1665

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203350465	PESTSPIKE	WE150608-10	1	mL	Final Solvent: Hexane Verified by: GC
MS	1203350466	PESTSPIKE	WE150608-10	1	mL	
MSD	1203350467	PESTSPIKE	WE150608-10	1	mL	
SURR	All	PEST SURROGATE 1000 UG/L	WE150520-08	1	mL	The sample (and the MS/MSD) was a powdery soil that contained small and large rocks.
REGNT	All	Acetone	150513-B4	60	mL	
REGNT	All	Hexane	2282169	60	mL	
SOURC	All	SODIUM SULFATE	2255681	30	g	

PCB Analysis

Case Narrative

**GC Semivolatile PCB
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0217
Work Order #: 376541**

Method/Analysis Information

Procedure: Analysis of Polychlorinated Biphenyls by ECD
Analytical Method: SW846 3541/8082A
Prep Method: SW846 3541
Analytical Batch Number: 1491320
Prep Batch Number: 1491319

Sample Analysis

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

Sample ID	Client ID
376541001	J1V7T2
1203350842	Method Blank (MB)
1203350843	Laboratory Control Sample (LCS)
1203350844	376541001(J1V7T2) Matrix Spike (MS)
1203350845	376541001(J1V7T2) 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.

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/LCSD) Recovery

The LCS/LCSD spike recoveries met the acceptance limits.

QC Sample Designation

Sample 376541001 (J1V7T2) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS/MSD) Recovery Statement

The MS/MSD recoveries 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 samples and QC in this batch were cleaned using alumina in order to remove oil and other high molecular weight interferences. All samples and QC in this batch were cleaned with activated copper in order to remove sulfur. 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.

Sample Dilutions

The samples in this SDG in this batch 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 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.

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.

GEL LABORATORIES LLC

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

Qualifier Definition Report for

WCHN001 Eberline

Client SDG: XP0217 GEL Work Order: 376541 Project: RC-107 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.

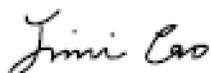
RA Indicates that sample is re-analyzed without re-extraction.

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: 14 JUL 2015

Title: Data Validator

Sample Data Summary

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: July 14, 2015

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

Workorder: 376541 **Client SDG: XP0217** **Project Description: RC-107 Soil**

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB											
Batch	1491320										
QC1203350843	LCS										
Aroclor-1016	33.3			24.8	ug/kg		74.4	(44%-97%)	JXM	07/13/15	12
Aroclor-1260	33.3			29.2	ug/kg		87.5	(49%-109%)			
**4cmx	6.67			5.85	ug/kg		87.7	(29%-106%)			
**Decachlorobiphenyl	6.67			6.82	ug/kg		102	(25%-131%)			
QC1203350842	MB										
Aroclor-1016			U	1.11	ug/kg					07/13/15	12
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						
Aroclor-1262			U	1.11	ug/kg						
Aroclor-1268			U	1.11	ug/kg						
**4cmx	6.66			5.25	ug/kg		78.8	(29%-106%)			
**Decachlorobiphenyl	6.66			5.70	ug/kg		85.5	(25%-131%)			
QC1203350844	376541001 MS										
Aroclor-1016	33.5	U	1.11	18.2	ug/kg		54.4	(22%-127%)		07/13/15	13
Aroclor-1260	33.5	U	1.11	24.5	ug/kg		73.2	(18%-130%)			
**4cmx	6.69		4.06	4.72	ug/kg		70.5	(29%-106%)			
**Decachlorobiphenyl	6.69		5.94	6.44	ug/kg		96.2	(25%-131%)			

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QC Summary

Workorder: 376541 **Client SDG:** XP0217 **Project Description:** RC-107 Soil **Page 2 of 2**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB											
Batch	1491320										
QC1203350845	376541001	MSD									
Aroclor-1016	33.5	U	1.11	18.1	ug/kg	0.365	54.2	(0%-30%)	JXM	07/13/15	13:00
Aroclor-1260	33.5	U	1.11	24.6	ug/kg	0.216	73.4	(0%-30%)			
**4cmx	6.70		4.06	5.02	ug/kg		74.9	(29%-106%)			
**Decachlorobiphenyl	6.70		5.94	6.28	ug/kg		93.7	(25%-131%)			

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 40% 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 or %RPD not applicable.

^ 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: 1491319 Verified by: _____
 Analyst: Mia DeLee
 Method: SW846 3541

Lab SOP: GL-OA-E-066 REV# 6
 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)
1203350842 MB	10-JUL-2015 09:42:00	30.02	H2SO4/KM 2 nO4	9	1	0.03331
1203350843 LCS	10-JUL-2015 09:42:00	30	H2SO4/KM 2 nO4	9	1	0.03333
376541001	10-JUL-2015 09:42:00	30.04	H2SO4/KM 2 nO4	9	1	0.03329
1203350844 MS (376541001)	10-JUL-2015 09:42:00	30.03	H2SO4/KM 2 nO4	9	1	0.0333
1203350845 MSD (376541001)	10-JUL-2015 09:42:00	30.02	H2SO4/KM 2 nO4	9	1	0.03331

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203350843	PCB Laboratory Control	WE150602-06	1	mL	Final Solvent: Hexane
MS	1203350844	PCB Laboratory Control	WE150602-06	1	mL	Verified by: GC
MSD	1203350845	PCB Laboratory Control	WE150602-06	1	mL	Clean-up: H2SO4/KMnO4
SURR	All	PEST LOW LEVEL SURROGATE 200 UG/L	WE150611-02	1	mL	Prior to clean-up: 2mL
REGNT	All	5% Potassium Permanganate	2243365	5	mL	Clean-up initials: MD
REGNT	All	1:1 sulfuric acid	2270796	5	mL	Clean-up SOP: GL-OA-E-037 Rev.7
REGNT	All	Hexane	2282169	120	mL	Clean-up date: 07-10-15
SOURC	All	SODIUM SULFATE	2255681	30	g	The sample (and the MS/MSD) was a powdery soil that contained small and large rocks

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0217
Work Order #: 376541

Sample ID	Client ID
376541001	J1V7T2
1203349861	Method Blank (MB)ICP
1203349862	Laboratory Control Sample (LCS)
1203349865	376541001(J1V7T2L) Serial Dilution (SD)
1203349863	376541001(J1V7T2D) Sample Duplicate (DUP)
1203349864	376541001(J1V7T2S) Matrix Spike (MS)
1203350439	376541001(J1V7T2PS) Post Spike (PS)
1203349832	Method Blank (MB)ICP-MS
1203349833	Laboratory Control Sample (LCS)
1203349836	376541001(J1V7T2L) Serial Dilution (SD)
1203349834	376541001(J1V7T2D) Sample Duplicate (DUP)
1203349835	376541001(J1V7T2S) Matrix Spike (MS)
1203350952	Method Blank (MB)CVAA
1203350953	Laboratory Control Sample (LCS)
1203350956	376541001(J1V7T2L) Serial Dilution (SD)
1203350954	376541001(J1V7T2D) Sample Duplicate (DUP)
1203350955	376541001(J1V7T2S) Matrix Spike (MS)

Sample Analysis

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

Method/Analysis Information

Analytical Batch:	1490858, 1490844 and 1491378
Prep Batch :	1490857, 1490843 and 1491377
Standard Operating Procedures:	GL-MA-E-013 REV# 24, GL-MA-E-009 REV# 25, GL-MA-E-014 REV# 26 and GL-MA-E-010 REV# 29
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 an ESI SC-FAST introduction, cyclonic spray

chamber, and yttrium or scandium internal standard.

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.

The Metals analysis - ICPMS was performed on a PerkinElmer NexION 350X ICPMS. The instrument is equipped with a ESI PFA-ST nebulizer, quadrupole mass spectrometer, dual mode electron multiplier detector, and Kinetic Energy Discrimination (KED) technology. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum.

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

The PQL standard recoveries for SW846 6010C met the control limits with the exception of zinc. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. ICP.

ICSA/ICSAB Statement

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

Continuing Calibration Blanks (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 method blanks (MB) analyzed with this SDG met the acceptance criteria. The potassium, silicon, and sodium concentrations were greater than the MDL in blank 1203349861 (MB)-ICP. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 376541001 (J1V7T2)-ICP, ICP-MS and CVAA.

Matrix Spike (MS/MSD) Recovery Statement

The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analytes. The post spike recoveries were within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recoveries may be attributed to possible sample matrix interference and/or non-homogeneity.

Sample	Analyte	Value
1203349864 (J1V7T2MS)	Potassium	135* (75%-125%)

	Silicon	-32.9* (75%-125%)
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Duplicate Relative Percent Difference (RPD) Statement

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203349863 (J1V7T2DUP)	Silicon	43.8* (0%-20%)

Post Spike (PS) Recovery Statement

The PS met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the absence of matrix interferences in the post-digested sample.

Serial Dilution % Difference Statement

All applicable analytes in the serial dilution (SDILT) demonstrated acceptable correlation to its associated sample and met the established acceptance percent difference criteria.

Technical Information

Holding Time Specifications

GEL assigns holding times based on the associated methodology. Holding time is measured by comparison of the date and time of sample collection to the date and time of sample preparation and analysis. 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 376541001 (J1V7T2)-ICP was diluted for silicon to ensure that the analyte concentration was within the linear calibration range of the instrument. Sample 376541001 (J1V7T2)-ICP was diluted for titanium in order to bring raw values within the linear range of the instrument and for the analytes interfered with, to ensure that the inter-element correction factors were valid for antimony, cobalt, vanadium and zinc. The ICPMS solid samples in this SDG were diluted the standard two times. ICP-MS.

Analyte	376541
	001
Antimony	5X
Cobalt	5X
Selenium	2X
Silicon	5X

Vanadium	5X
Zinc	5X

Preparation Information

The samples in this SDG were not diluted and prepared 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

A Data exception report (DER) was generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) 1429219 was generated for this SDG/batch. ICP.

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.

DATA EXCEPTION REPORT

Mo.Day Yr. 13-JUL-15	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1490858	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 376541(XP0217)			
Application Issues: Failed Recovery for MS/MSD, or PS/PSD Failed RPD for DUP			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. Failed RPD for DUP: QC 1203349863DUP</p> <p>2. Failed Recovery for MS/MSD, or PS/PSD: QC 1203349864MS</p>		<p>1. Not all the applicable analyte RPD values were within the acceptance criteria. 1203349863 (J1V7T2DUP) Silicon [43.8* (0%-20%)].</p> <p>2. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity. 1203349864 (J1V7T2MS) Potassium [135* (75%-125%)] and Silicon [-32.9* (75%-125%)].</p>	

Originator's Name:

Helen Camello 13-JUL-15

Data Validator/Group Leader:

Louise Smith 14-JUL-15

GEL LABORATORIES LLC

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Qualifier Definition Report for

WCHN001 Eberline

Client SDG: XP0217 GEL Work Order: 376541 Project: RC-107 Soil

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is \geq EQL or is $> 5\%$ of the measured concentration and/or decision level for associated samples.
- 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.

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: Patricia Steele

Date: 16 JUL 2015

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: July 16, 2015

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0217

Client Sample ID: J1V7T2
Sample ID: 376541001

Project: WCHN00720
Client ID: WCHN001

The following Analytical Methods were performed:

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

Notes:

Quality Control Summary

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QC Summary

Report Date: July 16, 2015

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

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1490844										
QC1203349834	376541001	DUP									
Selenium		D	1.01	D	1.06	mg/kg	5.31 ^	(+/-1.00)	BAJ	07/09/15	18:11
QC1203349833	LCS										
Selenium	4.84			D	4.36	mg/kg		90 (80%-120%)		07/09/15	18:05
QC1203349832	MB										
Selenium				DU	0.321	mg/kg				07/09/15	18:02
QC1203349835	376541001	MS									
Selenium	5.00	D	1.01	D	5.07	mg/kg		81.2 (75%-125%)		07/09/15	18:14
QC1203349836	376541001	SDILT									
Selenium		D	5.18	DU	1.61	ug/L	N/A	(0%-10%)		07/09/15	18:21
Metals Analysis-ICP											
Batch	1490858										
QC1203349863	376541001	DUP									
Aluminum			6810		6900	mg/kg	1.37	(0%-20%)	HSC	07/09/15	12:23
Antimony		BD	2.02	DU	1.65	mg/kg	52.2 ^	(+/-5.00)		07/10/15	13:06
Arsenic		B	2.81	B	2.56	mg/kg	9.49 ^	(+/-3.00)		07/09/15	12:23
Barium			77.6		73.7	mg/kg	5.05	(0%-20%)			
Beryllium			0.846		0.819	mg/kg	3.27 ^	(+/-0.500)			
Boron			5.56		6.07	mg/kg	8.82 ^	(+/-5.00)			
Cadmium		B	0.179	U	0.0999	mg/kg	60.6 ^	(+/-0.500)			
Calcium			3710		3860	mg/kg	3.95	(0%-20%)			
Chromium			10.9		11.5	mg/kg	5.88	(0%-20%)			
Cobalt		D	7.85	D	7.77	mg/kg	1.06 ^	(+/-2.50)		07/10/15	13:06
Copper			13.1		13.0	mg/kg	0.155	(0%-20%)		07/09/15	12:23
Iron			19700		20000	mg/kg	1.11	(0%-20%)			

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QC Summary

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1490858										
Lead		5.64		5.23	mg/kg	7.63		(0%-20%)	HSC	07/09/15	12:23
Magnesium		4050		4060	mg/kg	0.277		(0%-20%)			
Manganese		334		318	mg/kg	4.77		(0%-20%)			
Molybdenum	B	0.384	B	0.442	mg/kg	14.1	^	(+/-0.999)			
Nickel		10.1		11.2	mg/kg	10.1		(0%-20%)			
Potassium	N	1390		1390	mg/kg	0.251		(0%-20%)			
Silicon	*DN	1530	*D	982	mg/kg	43.8*		(0%-20%)		07/10/15	13:06
Silver	U	0.0978	U	0.0999	mg/kg	N/A				07/09/15	12:23
Sodium	C	161		149	mg/kg	7.81		(0%-20%)			
Vanadium	D	48.8	D	50.3	mg/kg	3.03		(0%-20%)		07/10/15	13:06
Zinc	D	42.3	D	42.0	mg/kg	0.678		(0%-20%)			
QC1203349862	LCS										
Aluminum		479		463	mg/kg		96.7	(80%-120%)		07/09/15	12:16
Antimony		47.9		46.5	mg/kg		97.1	(80%-120%)		07/10/15	12:59
Arsenic		47.9		47.4	mg/kg		99	(80%-120%)		07/09/15	12:16
Barium		47.9		47.1	mg/kg		98.4	(80%-120%)			
Beryllium		47.9		48.7	mg/kg		102	(80%-120%)			
Boron		47.9		49.1	mg/kg		102	(80%-120%)			
Cadmium		47.9		47.7	mg/kg		99.6	(80%-120%)			
Calcium		479		474	mg/kg		99	(80%-120%)			
Chromium		47.9		46.9	mg/kg		98	(80%-120%)			
Cobalt		47.9		46.8	mg/kg		97.6	(80%-120%)		07/10/15	12:59

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QC Summary

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1490858										
Copper	47.9			47.0	mg/kg		98.2	(80%-120%)	HSC	07/09/15	12:16
Iron	479			478	mg/kg		99.8	(80%-120%)			
Lead	47.9			47.1	mg/kg		98.4	(80%-120%)			
Magnesium	479			482	mg/kg		101	(80%-120%)			
Manganese	47.9			46.4	mg/kg		96.8	(80%-120%)			
Molybdenum	47.9			46.2	mg/kg		96.4	(80%-120%)			
Nickel	47.9			48.6	mg/kg		101	(80%-120%)			
Potassium	479			475	mg/kg		99.1	(80%-120%)			
Silicon	479			426	mg/kg		88.9	(80%-120%)		07/10/15	12:59
Silver	47.9			46.5	mg/kg		97	(80%-120%)		07/09/15	12:16
Sodium	479			486	mg/kg		101	(80%-120%)			
Vanadium	47.9			48.0	mg/kg		100	(80%-120%)		07/10/15	12:59
Zinc	47.9			47.7	mg/kg		99.5	(80%-120%)			
QC1203349861	MB										
Aluminum			U	6.80	mg/kg					07/09/15	12:13
Antimony			U	0.330	mg/kg					07/10/15	12:56
Arsenic			U	0.500	mg/kg					07/09/15	12:13
Barium			U	0.100	mg/kg						
Beryllium			U	0.100	mg/kg						
Boron			U	1.00	mg/kg						
Cadmium			U	0.100	mg/kg						
Calcium			U	8.00	mg/kg						

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QC Summary

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1490858										
Chromium			U	0.150	mg/kg				HSC	07/09/15	12:13
Cobalt			U	0.150	mg/kg					07/10/15	12:56
Copper			U	0.300	mg/kg					07/09/15	12:13
Iron			U	8.00	mg/kg						
Lead			U	0.330	mg/kg						
Magnesium			U	8.50	mg/kg						
Manganese			U	0.200	mg/kg						
Molybdenum			U	0.200	mg/kg						
Nickel			U	0.150	mg/kg						
Potassium			B	7.00	mg/kg						
Silicon			B	1.71	mg/kg					07/10/15	12:56
Silver			U	0.100	mg/kg					07/09/15	12:13
Sodium			B	8.88	mg/kg						
Vanadium			U	0.100	mg/kg					07/10/15	12:56
Zinc			U	0.400	mg/kg						
QC1203349864 376541001 MS											
Aluminum	495			6810	9170	mg/kg		N/A (75%-125%)		07/09/15	12:26
Antimony	49.5	BD		2.02	D	45.3	mg/kg	87.5 (75%-125%)		07/10/15	13:09
Arsenic	49.5	B		2.81		48.3	mg/kg	91.9 (75%-125%)		07/09/15	12:26
Barium	49.5			77.6		126	mg/kg	97.3 (75%-125%)			
Beryllium	49.5			0.846		48.0	mg/kg	95.3 (75%-125%)			
Boron	49.5			5.56		49.5	mg/kg	88.9 (75%-125%)			

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QC Summary

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1490858										
Cadmium	49.5	B	0.179		45.7	mg/kg	92.1	(75%-125%)	HSC	07/09/15	12:26
Calcium	495		3710		4270	mg/kg	N/A	(75%-125%)			
Chromium	49.5		10.9		56.5	mg/kg	92.2	(75%-125%)			
Cobalt	49.5	D	7.85	D	55.0	mg/kg	95.3	(75%-125%)		07/10/15	13:09
Copper	49.5		13.1		66.4	mg/kg	108	(75%-125%)		07/09/15	12:26
Iron	495		19700		20800	mg/kg	N/A	(75%-125%)			
Lead	49.5		5.64		51.2	mg/kg	92.2	(75%-125%)			
Magnesium	495		4050		4610	mg/kg	N/A	(75%-125%)			
Manganese	49.5		334		377	mg/kg	N/A	(75%-125%)			
Molybdenum	49.5	B	0.384		46.0	mg/kg	92.3	(75%-125%)			
Nickel	49.5		10.1		56.4	mg/kg	93.6	(75%-125%)			
Potassium	495	N	1390	N	2060	mg/kg	135*	(75%-125%)			
Silicon	495	*DN	1530	DN	1370	mg/kg	0*	(75%-125%)		07/10/15	13:09
Silver	49.5	U	0.0978		47.6	mg/kg	96.2	(75%-125%)		07/09/15	12:26
Sodium	495	C	161		631	mg/kg	94.9	(75%-125%)			
Vanadium	49.5	D	48.8	D	98.8	mg/kg	101	(75%-125%)		07/10/15	13:09
Zinc	49.5	D	42.3	D	91.6	mg/kg	99.6	(75%-125%)			
QC1203350439 376541001 PS											
Potassium	5000	N	14200		19200	ug/L	98.8	(80%-120%)		07/09/15	12:58
Silicon	5000	*DN	3130	D	7720	ug/L	91.7	(80%-120%)		07/10/15	13:12
QC1203349865 376541001 SDILT											
Aluminum			69600	D	14300	ug/L	2.65	(0%-10%)		07/09/15	12:30
Antimony		BD	4.13	DU	8.07	ug/L	N/A	(0%-10%)		07/10/15	13:15

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QC Summary

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1490858										
Arsenic	B	28.8	D	6.73	ug/L	17		(0%-10%)	HSC	07/09/15	12:30
Barium		793	D	168	ug/L	5.79		(0%-10%)			
Beryllium		8.65	D	1.74	ug/L	.314		(0%-10%)			
Boron		56.9	D	11.5	ug/L	1.19		(0%-10%)			
Cadmium	B	1.83	DU	0.489	ug/L	N/A		(0%-10%)			
Calcium		38000	D	7730	ug/L	1.84		(0%-10%)			
Chromium		111	D	22.8	ug/L	2.8		(0%-10%)			
Cobalt	D	16.1	D	3.38	ug/L	5.23		(0%-10%)		07/10/15	13:15
Copper		134	D	27.2	ug/L	1.79		(0%-10%)		07/09/15	12:30
Iron		202000	D	42200	ug/L	4.41		(0%-10%)			
Lead		57.7	D	9.05	ug/L	21.6		(0%-10%)			
Magnesium		41400	D	8500	ug/L	2.58		(0%-10%)			
Manganese		3410	D	725	ug/L	6.14		(0%-10%)			
Molybdenum	B	3.93	DU	0.978	ug/L	N/A		(0%-10%)			
Nickel		103	D	21.5	ug/L	4.3		(0%-10%)			
Potassium	N	14200	D	2920	ug/L	2.56		(0%-10%)			
Silicon	*DN	3130	D	638	ug/L	1.78		(0%-10%)		07/10/15	13:15
Silver	U	-0.0496	DU	0.489	ug/L	N/A		(0%-10%)		07/09/15	12:30
Sodium	C	1650	D	305	ug/L	7.55		(0%-10%)			
Vanadium	D	99.8	D	20.2	ug/L	1.48		(0%-10%)		07/10/15	13:15
Zinc	D	86.6	D	18.2	ug/L	5.1		(0%-10%)			

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QC Summary

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury											
Batch 1491378											
QC1203350954	376541001	DUP									
Mercury		B	0.00356	U	0.0038	mg/kg	8.05 ^	(+/-0.0113)	MTM1	07/10/15	09:45
QC1203350953	LCS										
Mercury	0.115				0.122	mg/kg		(80%-120%)		07/10/15	09:41
QC1203350952	MB										
Mercury				U	0.00388	mg/kg				07/10/15	09:39
QC1203350955	376541001	MS									
Mercury	0.120	B	0.00356		0.131	mg/kg		(80%-120%)		07/10/15	09:46
QC1203350956	376541001	SDILT									
Mercury		B	0.067	DU	0.0178	ug/L	N/A	(0%-10%)		07/10/15	09:48

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. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
 ^ 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: 1490857	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst: James Pressley	LCS	1203349862	Metals Spike Mix I	UI2243265-01	.25	mL
Method: SW846 3050B	LCS	1203349862	Metals Spike Mix II	UI2243272-06	.25	mL
Lab SOP: GL-MA-E-009 REV# 25	MS	1203349864	Metals Spike Mix I	UI2243265-01	.25	mL
Instrument: BAL-893	MS	1203349864	Metals Spike Mix II	UI2243272-06	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203349861 MB	08-JUL-2015 16:45:00	Soil	0.5	50	100
1203349862 LCS	08-JUL-2015 16:45:00	Soil	0.522	50	95.78544
376541001	08-JUL-2015 16:45:00	Soil	0.514	50	97.27626
1203349863 DUP (376541001)	08-JUL-2015 16:45:00	Soil	0.503	50	99.40358
1203349864 MS (376541001)	08-JUL-2015 16:45:00	Soil	0.508	50	98.4252
1203349865 SDILT (376541001)	08-JUL-2015 16:45:00	Soil	0.514	50	97.27626

Reagent/Solvent Lot ID	Description	Amount	Comments:
2268273	Concentrated Nitric Acid	1.25 mL	Block Temperature: 93 C
2268277	HYDROCHLORIC ACID	10 mL	Thermometer ID: 118631 Hot Block ID: 2

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID: 1490843	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst: James Pressley	LCS	1203349833	ICP-MS spiking solution A	UI2243313-A	.25	mL
Method: SW846 3050B	LCS	1203349833	ICP-MS spiking solution B	UI2243318-B	.25	mL
Lab SOP: GL-MA-E-009 REV# 25	MS	1203349835	ICP-MS spiking solution A	UI2243313-A	.25	mL
Instrument: BAL-893	MS	1203349835	ICP-MS spiking solution B	UI2243318-B	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203349832 MB	08-JUL-2015 16:30:00	Soil	0.514	50	97.27626
1203349833 LCS	08-JUL-2015 16:30:00	Soil	0.516	50	96.89922
376541001	08-JUL-2015 16:30:00	Soil	0.516	50	96.89922
1203349834 DUP (376541001)	08-JUL-2015 16:30:00	Soil	0.52	50	96.15385
1203349835 MS (376541001)	08-JUL-2015 16:30:00	Soil	0.503	50	99.40358
1203349836 SDILT (376541001)	08-JUL-2015 16:30:00	Soil	0.516	50	96.89922

Reagent/Solvent Lot ID	Description	Amount	Comments:
2240154	Hydrogen Peroxide 30%, from Bioassay	1.5 mL	Block Temperature: 93 C
2268273	Concentrated Nitric Acid	5 mL	Thermometer ID: 61066-a1 Hot Block ID: 8

Prep Logbook

Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Batch ID: 1491377	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst: Alan Stanley	LCS	1203350953	MHGSOILMSSPIKE	WHG150709-14	.3	mL
Method: SW846 7471B Prep	MS	1203350955	MHGSOILMSSPIKE	WHG150709-14	.3	mL
Lab SOP: GL-MA-E-010 REV# 29						
Instrument: BAL 423						

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203350952 MB	09-JUL-2015 15:22:49	Soil	0.518	30	57.91506
1203350953 LCS	09-JUL-2015 15:22:49	Soil	0.52	30	57.69231
376541001	09-JUL-2015 15:22:49	Soil	0.567	30	52.91005
1203350954 DUP (376541001)	09-JUL-2015 15:22:49	Soil	0.532	30	56.39098
1203350955 MS (376541001)	09-JUL-2015 15:22:49	Soil	0.502	30	59.76096
1203350956 SDILT (376541001)	09-JUL-2015 15:22:49	Soil	0.567	30	52.91005

Reagent/Solvent Lot ID	Description	Amount	Comments:
2224214-C	5% KMnO4 solution	7.5 mL	Digestion Start Date: 09-JUL-2015 15:22
2265384-C	Hg reducing agent	3 mL	Digestion End Date: 09-JUL-2015 15:52
2282256-C	50% Aqua Regia	3 mL	Block Temperature: 94 C
WHG150709-07	Mercury Working Standard 1st Source CAL S 0.2/CRA	30 uL	Thermometer ID: 1120212857
WHG150709-08	Mercury Working Standard 1st Source CAL S 0.5	75 uL	Hot Block ID: 6
WHG150709-09	Mercury Working 1st Source CAL S 2.0	300 uL	
WHG150709-10	Mercury Working 1st Source CAL S 5.0/CCV	750 uL	
WHG150709-11	Mercury Working 1st Source CAL S 10.0	1.5 mL	
WHG150709-12	Mercury Working 2nd Source S 5.0/ICV	750 uL	

General Chem Analysis

Case Narrative

**General Chemistry
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0217
Work Order #: 376541**

Method/Analysis Information

Product:	Hexavalent Chromium		
Analytical Batch:	1490904	Method:	SW846_7196A Hexavalent Chromium
Prep Batch :	1490903	Method:	SW846 3060A

Sample Analysis

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

Sample ID	Client ID
376541001	J1V7T2
1203349956	Method Blank (MB)
1203349957	Laboratory Control Sample (LCS)
1203349960	376541001(J1V7T2) Sample Duplicate (DUP)
1203349963	376541001(J1V7T2) Matrix Spike (MS)
1203349967	376541001(J1V7T2) Matrix Spike Duplicate (MSD)
1203349958	Insoluble Lab Control Sample (ILCS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV# 21.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 376541001 (J1V7T2) was selected for QC analysis.

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

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

MS/MSD Relative Percent Difference (RPD) Statement

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

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

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

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 Eberline

Client SDG: XP0217 GEL Work Order: 376541 Project: RC-107 Soil

The Qualifiers in this report are defined as follows:

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

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

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: Thomas Lewis

Date: 17 JUL 2015

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: July 17, 2015

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0217

Client Sample ID: J1V7T2
Sample ID: 376541001
Matrix: Soil
Collect Date: 06-JUL-15 09:28
Receive Date: 08-JUL-15
Collector: Client
Moisture: .5%

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium		0.404	0.120	0.400	mg/kg	1	SXC5	07/10/15	1043	1490904	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	SXC5	07/09/15	1436	1490903

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7196A	

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: July 17, 2015

Page 1 of 1

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

Workorder: 376541

Client SDG: XP0217

Project Description: RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Spectrometric Analysis											
Batch	1490904										
QC1203349960	376541001	DUP									
Hexavalent Chromium		0.404	B	0.343	mg/kg	16.3	^	(+/-0.402)	SXC5	07/10/15	10:44
QC1203349958	ILCS										
Hexavalent Chromium	7.94			8.42	mg/kg			(80%-120%)		07/10/15	10:19
QC1203349957	LCS										
Hexavalent Chromium	3.97			4.14	mg/kg			(80%-120%)		07/10/15	10:18
QC1203349956	MB										
Hexavalent Chromium			U	0.120	mg/kg					07/10/15	10:18
QC1203349963	376541001	MS									
Hexavalent Chromium	3.98	0.404		4.21	mg/kg			(75%-125%)		07/10/15	10:44
QC1203349967	376541001	MSD									
Hexavalent Chromium	3.99	0.404		4.15	mg/kg	1.36	93.9	(0%-30%)		07/10/15	10:45

Notes:

The Qualifiers in this report are defined as follows:

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
 ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

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

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

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

Miscellaneous

Moisture LogBook

Batch: 1490764

Analyst: CXC1

Date/Time: 08-JUL-2015

Procedure Code DRY WEIGHT

Procedure Description Dry Weight-Percent Moisture

Lab Sop: GL-OA-E-020

Sample St	Sample Id	Rpd(%)
DUP	1203349675	9.846

Sample Id	Sample Type	Original Hsn	Instrument	Run Time	Container Wt	Initial Wt	Final Wt (g)	Net Initial Wt (g)	Net Final Wt (g)	Moisture (%)
376541001	SAMPLE		SP-39020004	14:18	7.187	26.993	26.894	19.806	19.707	.5
1203349675	DUP	376541001	SP-39020004	14:18	7.1	33.024	32.881	25.924	25.781	.552

Comments:

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

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

Evaporative Loss LogBook

GEL Laboratories LLC

Prep Logbook

Colorimetric Determination of Hexavalent Chromium

Batch ID:	1490903	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	Sarah Carson	ILCS	1203349958	100mg/kg for cr6	IMM150501-HVC	.08	g
Method:	SW846 3060A	LCS	1203349957	Cr6 LCS 10mg/L	WD150706-1	.4	mL
Lab SOP:	GL-GC-E-044 REV# 21	MS	1203349961	Cr6 Intermediate Spike 10mg/L	150706-Cr6	.4	mL
Instrument:	OHAUS Balance BAL-032	MS	1203349962	Cr6 Intermediate Spike 10mg/L	150706-Cr6	.4	mL
		MS	1203349963	Cr6 Intermediate Spike 10mg/L	150706-Cr6	.4	mL
		MS	1203349964	Cr6 Intermediate Spike 10mg/L	150706-Cr6	.4	mL
		MSD	1203349965	Cr6 Intermediate Spike 10mg/L	150706-Cr6	.4	mL
		MSD	1203349966	Cr6 Intermediate Spike 10mg/L	150706-Cr6	.4	mL
		MSD	1203349967	Cr6 Intermediate Spike 10mg/L	150706-Cr6	.4	mL
		MSD	1203349968	Cr6 Intermediate Spike 10mg/L	150706-Cr6	.4	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)	pH Check
1203349956 MB	09-JUL-2015 14:27:41	Soil	1.0021	40	39.91618	7.5
1203349957 LCS	09-JUL-2015 14:28:04	Soil	1.0064	40	39.74563	7.5
1203349958 ILCS	09-JUL-2015 14:28:27	Soil	1.0071	40	39.718	7.5
375841010	09-JUL-2015 14:28:35	Soil	1.0065	40	39.74168	7.5
1203349959 DUP (375841010)	09-JUL-2015 14:28:44	Soil	1.0108	40	39.57262	7.5
1203349961 MS (375841010)	09-JUL-2015 14:28:49	Soil	1.0097	40	39.61573	7.5
1203349965 MSD (375841010)	09-JUL-2015 14:32:00	Soil	1.0041	40	39.83667	7.5
1203349962 MS (375841010)	09-JUL-2015 14:32:05	Soil	1.0032	40	39.87241	7.5
1203349966 MSD (375841010)	09-JUL-2015 14:32:10	Soil	1.0013	40	39.94807	7.5
375841011	09-JUL-2015 14:32:26	Soil	1.0044	40	39.82477	7.5
375841012	09-JUL-2015 14:32:35	Soil	1.0021	40	39.91618	7.5
375841013	09-JUL-2015 14:32:42	Soil	1.0086	40	39.65893	7.5
375896001	09-JUL-2015 14:33:06	Soil	1.0027	40	39.89229	7.5
375896002	09-JUL-2015 14:33:27	Soil	1.0032	40	39.87241	7.5
375896003	09-JUL-2015 14:33:48	Soil	1.0103	40	39.5922	7.5
375896004	09-JUL-2015 14:33:54	Soil	1.0049	40	39.80496	7.5
375896005	09-JUL-2015 14:34:01	Soil	1.0052	40	39.79308	7.5
375896006	09-JUL-2015 14:34:13	Soil	1.0056	40	39.77725	7.5
375896007	09-JUL-2015 14:34:18	Soil	1.0274	40	38.93323	7.5
375896008	09-JUL-2015 14:34:24	Soil	1.0081	40	39.6786	7.5

Prep Logbook

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)	pH Check
375896009	09-JUL-2015 14:34:33	Soil	1.0056	40	39.77725	7.5
376541001	09-JUL-2015 14:36:12	Soil	1.0056	40	39.77725	7.5
1203349960 DUP (376541001)	09-JUL-2015 14:36:24	Soil	1.0009	40	39.96403	7.5
1203349963 MS (376541001)	09-JUL-2015 14:36:30	Soil	1.0089	40	39.64714	7.5
1203349967 MSD (376541001)	09-JUL-2015 14:36:40	Soil	1.0076	40	39.69829	7.5
1203349964 MS (376541001)	09-JUL-2015 14:37:12	Soil	1.0095	40	39.62358	7.5
1203349968 MSD (376541001)	09-JUL-2015 14:37:23	Soil	1.0066	40	39.73773	7.5

Reagent/Solvent Lot ID	Description	Amount	Comments:
150508-C	MAGNESIUM CHLORIDE SOLUTION FOR CR+6	1 mL	Digestion Start Date: 09-JUL-2015 10:46
IMM150508-HVCS	PHOSPHATE BUFFER SOLUTION FOR CR+6	.5 mL	Digestion End Date: 09-JUL-2015 11:46
IMM150707-HVC	5M Nitric Acid Solution for Cr+6	2 mL	Block Temperature: 95 C
IMM150709b-HVCS	DIGESTION SOLUTION FOR CR+6	20 mL	Thermometer ID: 119015
			Hot Block ID: 13