

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

COMPLETE COPY OF DATA PACKAGE TO:

Kathy Wendt H4-21

KW 6/9/14
INITIAL/DATE

COMMENTS:

SDG XP0096

SAF RC-189

Rad only

Chem only

Rad & Chem

Complete

Partial

Sample Location: 100-N-84:2 Verification,
North sampling unit



June 05, 2014

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

Re: RC-189 Soil
Work Order: 349578
SDG: XP0096

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 29, 2014. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Orlette Johnson
Project Manager

Purchase Order: 1510
Chain of Custody: RC-189-303
Enclosures



Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	3
Laboratory Certifications.....	6
HPLC Polynuclear Aromatic Hydrocarbon Analysis.....	8
Sample Data Summary.....	15
QC Summary.....	17
Miscellaneous Data.....	22
FID Diesel Range Organics Analysis.....	24
Case Narrative.....	25
Sample Data Summary.....	31
Quality Control Summary.....	33
Miscellaneous.....	36
GC Volatiles (GRO) Analysis.....	38
Case Narrative.....	39
Sample Data Summary.....	44
Quality Control Summary.....	46
Miscellaneous.....	49
PCB Analysis.....	51
Case Narrative.....	52
Sample Data Summary.....	57

Quality Control Summary.....	59
Miscellaneous.....	62
Metals Analysis.....	64
Case Narrative.....	65
Sample Data Summary.....	72
Quality Control Summary.....	76
Miscellaneous.....	84

Case Narrative

**Receipt Narrative
for
WC-HANFORD, INC.
SDG: XP0096
Work Order: 349578**

June 05, 2014

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 May 29, 2014 for analysis.

Sample Identification: The laboratory received the following sample:

<u>Laboratory ID</u>	<u>Client ID</u>
349578001	J1TPX2

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 Volatiles (GRO), HPLC Polynuclear Aromatic Hydrocarbon and Metals.



Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation

349578

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector: *Q Stone*
 Project Designation: 100N Field Remediation
 Telephone No.: 375-4688
 Project Coordinator: KESSNER, JH
 Price Code: RC-189-303
 Data Turnaround: 7 days
 Ice Chest No.: WCH-11-0608
 Sampling Location: 100-N-84-2, verification, North sampling unit
 SAF No.: RC-189
 Method of Shipment: Commercial Carrier / Fed Ex
 Shipped To: GEL Laboratories Charlston
 Bill of Lading/Air Bill No.: See OSPC
 Other Labs Shipped To: A131105

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Cool 4C	TPH-Diesel Range - WTPH-D +	TPH-Gasoline Range - WTPH-G					
J1TPX2	SOIL	5-27-14	0954	GP	250mL	250mL	250mL	250mL	125mL	40mL		

POSSIBLE SAMPLE HAZARDS/REMARKS
 potentially radioactive < DOT limits
 SWS 5-28-14
Special Handling and/or Storage
 Rad tie to sample J1RWS8

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Cool 4C	TPH-Diesel Range - WTPH-D +	TPH-Gasoline Range - WTPH-G					
J1TPX2	SOIL	5-27-14	0954	GP	250mL	250mL	250mL	250mL	125mL	40mL		

CHAIN OF POSSESSION

Relinquished By/Removed From: Quincy Stone	Date/Time: 5-27-14 1209	Received By/Stored In: MWShea DWSHTEA	Date/Time: 5/27/14 1209
Relinquished By/Removed From: MWShea DWSHTEA	Date/Time: 5/27/14 1516	Received By/Stored In: SM Sexton	Date/Time: 5/27/14 1516
Relinquished By/Removed From: SM Sexton	Date/Time: 5/27/14 1519	Received By/Stored In: 10100 Bettele Fridge	Date/Time: 5/27/14 1519
Relinquished By/Removed From: 10100 Bettele Fridge	Date/Time: 5/28/14 0750	Received By/Stored In: SM Sexton	Date/Time: 5/28/14 0750
Relinquished By/Removed From: SM Sexton	Date/Time: 5/28/14 0800	Received By/Stored In: Fed Ex	Date/Time: 5/28/14 0800
Relinquished By/Removed From: Fed Ex	Date/Time: 5-29-14 0905	Received By/Stored In: JEN Pellegrini	Date/Time: 5-29-14 0905

CHAIN OF CUSTODY

Company Contact: Joan Kessner	Telephone No.: 375-4688
Field Logbook No.: EL-1652-12	COA: 01N8422000
Offsite Property No.: A131105	

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)

REVIEWED BY: K. Wood
DATE: 5/28/14

XP0096

FINAL SAMPLE DISPOSITION

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



SAMPLE RECEIPT & REVIEW FORM

Client: <u>WCHN</u>		SDG/AR/COC/Work Order: <u>349578</u>
Received By: <u>JP</u>		Date Received: <u>5-29-14</u>
Suspected Hazard Information	Yes	No
*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.		
COC/Samples marked as radioactive?	<input checked="" type="checkbox"/>	
Classified Radioactive II or III by RSO?	<input checked="" type="checkbox"/>	
COC/Samples marked containing PCBs?	<input checked="" type="checkbox"/>	
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input checked="" type="checkbox"/>	
Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	
Samples identified as Foreign Soil?	<input checked="" type="checkbox"/>	
		Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0 cpm</u>
		If yes, Were swipes taken of sample containers < action levels?
		If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
		Hazard Class Shipped: UN#:

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" 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"/>			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"/>			Temperature Device Serial #: <u>130402961</u> Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
7 Are Encore containers present?	<input checked="" type="checkbox"/>			(If yes, immediately deliver to Volatiles laboratory)
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>			
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
14 Carrier and tracking number.	<input checked="" type="checkbox"/>			Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7701 2133 9873</u>

Comments (Use Continuation Form if needed):

Laboratory Certifications

List of current GEL Certifications as of 05 June 2014

State	Certification
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013-10
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA130005
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122014-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68-00485
Plant Material Permit	PDEP-12-00260
South Carolina Chemistry	10120001
South Carolina GVL	23611001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235-14-9
Utah NELAP	SC000122014-12
Vermont	VT87156
Virginia NELAP	460202
Washington	C780-12
Wisconsin	999887790

HPLC Polynuclear Aromatic Hydrocarbon Analysis

**HPLC-PAH
WC-HANFORD, INC. (WCHN)
SDG XP0096**

Method/Analysis Information

Procedure: Polynuclear Aromatic Hydrocarbons
Analytical Method: SW846 8310
Prep Method: SW846 3550B
Analytical Batch Number: 1392226
Prep Batch Number: 1392225

Sample Analysis

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

Sample ID	Client ID
349578001	J1TPX2
1203099398	Method Blank (MB)
1203099399	Laboratory Control Sample (LCS)
1203099400	349578001(J1TPX2) Matrix Spike (MS)
1203099401	349578001(J1TPX2) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP).

The data discussed in this narrative has been analyzed in accordance with GL-OA-E-030 REV# 15.

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

Calibration Information

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

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

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

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 349578001 (J1TPX2) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

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

Technical Information:

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information:

Data Exception (DER) Documentation

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

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

Manual Integrations

Some initial calibration standards, continuing calibration standards, and samples 349578001 (J1TPX2), 1203099400 (J1TPX2MS), and 1203099401 (J1TPX2MSD) 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.

One or more analytes were detected whose concentration greatly differed between the primary and confirmation analysis (greater than 40% difference or RPD) in sample 349578001 (J1TPX2). Because both detectors indicated an acceptable peak in the appropriate retention time window for these analytes, the analytes are reported as positive results. Due to the high percent difference or RPD between the two columns, it is indicated as such on the appropriate Form I/Certificate of Analysis (C of A) with a 'P' qualifier. Those analytes reported with a percent difference or RPD greater than 40% but less than 70% are qualified as presumptive evidence of the presence of the material.

Electronic Package Comment

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

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the analyst, reviewer, and report specialist names associated with the generation of the data and package. The data validator will always sign and date the case narrative.

Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

System Configuration

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

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

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

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

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

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

Chromatographic Columns

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

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

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0096 GEL Work Order: 349578 Project: RC-189 Soil

The Qualifiers in this report are defined as follows:

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

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

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: 05 JUN 2014

Title: Group Leader

Roadmap for WCHN XP0096 HPLC_PAH

This roadmap was analyzed by cww on 06-05-2014, 07:50.

This roadmap was reviewed by map on 06-05-2014, 09:15.

This roadmap was packaged by map on 06-05-2014, 11:03.

Sample

exclude	manual	datafile	smpid	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p060414.b/ph5f0406.d	349578001	04-JUN-2014	11:03	XP0096.sub	J1TPX2	1	1392226	<input type="checkbox"/>

QC Sample

exclude	manual	datafile	smpid	sampletype	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p060414.b/ph5f0404.d	1203099398	mb	04-JUN-2014	09:38	XP0096.sub	PAHBLK01	1	1392226	<input type="checkbox"/>
<input type="checkbox"/>	N	/chem/hplce.i/p060414.b/ph5f0405.d	1203099399	lcs	04-JUN-2014	10:21	XP0096.sub	PAHBLK01LCS	1	1392226	Pass
<input type="checkbox"/>	N	/chem/hplce.i/p060414.b/ph5f0407.d	1203099400	ms	04-JUN-2014	11:45	XP0096.sub	J1TPX2MS	1	1392226	Pass
<input type="checkbox"/>	N	/chem/hplce.i/p060414.b/ph5f0408.d	1203099401	msd	04-JUN-2014	12:27	XP0096.sub	J1TPX2MSD	1	1392226	Pass

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: June 5, 2014

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

Client SDG: XP0096

Client Sample ID: J1TPX2	Project: WCHN00613
Sample ID: 349578001	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 27-MAY-14 09:54	
Receive Date: 29-MAY-14	
Collector: Client	
Moisture: .696%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.02	5.02	16.7	ug/kg	1	CWW	06/04/14	1103	1392226	1
Acenaphthylene	U	5.02	5.02	16.7	ug/kg	1					
Anthracene	J	16.0	1.67	16.7	ug/kg	1					
Benzo(a)anthracene		63.2	0.536	1.67	ug/kg	1					
Benzo(a)pyrene		39.9	0.536	1.67	ug/kg	1					
Benzo(b)fluoranthene		55.7	0.536	1.67	ug/kg	1					
Benzo(ghi)perylene		22.7	0.536	1.67	ug/kg	1					
Benzo(k)fluoranthene		30.0	0.268	0.837	ug/kg	1					
Chrysene		40.9	0.536	1.67	ug/kg	1					
Dibenzo(a,h)anthracene	P	2.87	0.536	1.67	ug/kg	1					
Fluoranthene		103	0.536	1.67	ug/kg	1					
Fluorene	U	5.02	5.02	16.7	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.536	0.536	1.67	ug/kg	1					
Naphthalene	U	5.02	5.02	16.7	ug/kg	1					
Phenanthrene		64.7	5.02	16.7	ug/kg	1					
Pyrene		88.3	0.536	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	AXV1	06/02/14	1635	1392225

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"	5780 ug/kg	8370	69.1	(23%-104%)

Notes:

QC Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: June 5, 2014

Page 1 of 4

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

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1392226										
QC1203099399	LCS										
Acenaphthene	1670			1510	ug/kg		90.5	(58%-99%)	CWW	06/04/14	10:21
Acenaphthylene	1670			1380	ug/kg		82.9	(58%-98%)			
Anthracene	1670			1450	ug/kg		87.2	(63%-94%)			
Benzo(a)anthracene	167			148	ug/kg		88.9	(73%-98%)			
Benzo(a)pyrene	167			140	ug/kg		84.2	(63%-99%)			
Benzo(b)fluoranthene	167			148	ug/kg		89.1	(70%-130%)			
Benzo(ghi)perylene	167			139	ug/kg		83.3	(70%-130%)			
Benzo(k)fluoranthene	83.3			78.8	ug/kg		94.6	(70%-130%)			
Chrysene	167			161	ug/kg		96.7	(70%-130%)			
Dibenzo(a,h)anthracene	167			165	ug/kg		99.3	(70%-130%)			
Fluoranthene	167			145	ug/kg		87.2	(70%-130%)			
Fluorene	1670			1460	ug/kg		87.9	(65%-130%)			
Indeno(1,2,3-cd)pyrene	167			156	ug/kg		93.7	(70%-130%)			
Naphthalene	1670			1350	ug/kg		80.9	(57%-130%)			
Phenanthrene	1670			1470	ug/kg		88	(70%-130%)			
Pyrene	167			150	ug/kg		90.2	(70%-130%)			
**Decafluorobiphenyl	8330			6800	ug/kg		81.6	(23%-104%)			
QC1203099398	MB										
Acenaphthene			U	5.00	ug/kg					06/04/14	09:38
Acenaphthylene			U	5.00	ug/kg						

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 2 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1392226										
Anthracene			U	1.67	ug/kg						
Benzo(a)anthracene			U	0.533	ug/kg				CWW	06/04/14	09:38
Benzo(a)pyrene			U	0.533	ug/kg						
Benzo(b)fluoranthene			U	0.533	ug/kg						
Benzo(ghi)perylene			U	0.533	ug/kg						
Benzo(k)fluoranthene			U	0.266	ug/kg						
Chrysene			U	0.533	ug/kg						
Dibenzo(a,h)anthracene			U	0.533	ug/kg						
Fluoranthene			U	0.533	ug/kg						
Fluorene			U	5.00	ug/kg						
Indeno(1,2,3-cd)pyrene			U	0.533	ug/kg						
Naphthalene			U	5.00	ug/kg						
Phenanthrene			U	5.00	ug/kg						
Pyrene			U	0.533	ug/kg						
**Decafluorobiphenyl	8330			6500	ug/kg		78.1	(23%-104%)			
QC1203099400 349578001 MS											
Acenaphthene	1680	U	5.02	1240	ug/kg		73.8	(49%-90%)		06/04/14	11:45
Acenaphthylene	1680	U	5.02	1120	ug/kg		67	(48%-97%)			
Anthracene	1680	J	16.0	1240	ug/kg		72.7	(49%-91%)			
Benzo(a)anthracene	168		63.2	142	ug/kg		47	(29%-126%)			
Benzo(a)pyrene	168		39.9	137	ug/kg		58	(26%-130%)			
Benzo(b)fluoranthene	168		55.7	147	ug/kg		54.6	(32%-135%)			
Benzo(ghi)perylene	168		22.7	122	ug/kg		59.3	(34%-125%)			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 3 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1392226										
Benzo(k)fluoranthene	83.9	30.0		83.6	ug/kg		63.9	(48%-142%)	CWW	06/04/14	11:45
Chrysene	168	40.9		144	ug/kg		61.3	(39%-127%)			
Dibenzo(a,h)anthracene	168	P	2.87	137	ug/kg		80.1	(38%-130%)			
Fluoranthene	168	103		149	ug/kg		27.1	(20%-139%)			
Fluorene	1680	U	5.02	1200	ug/kg		71.6	(51%-90%)			
Indeno(1,2,3-cd)pyrene	168	U	0.536	134	ug/kg		80.2	(41%-145%)			
Naphthalene	1680	U	5.02	1090	ug/kg		65.2	(43%-87%)			
Phenanthrene	1680		64.7	1220	ug/kg		68.9	(50%-100%)			
Pyrene	168		88.3	152	ug/kg		38	(18%-149%)			
**Decafluorobiphenyl	8390		5780	5320	ug/kg		63.4	(23%-104%)			
QC1203099401 349578001 MSD											
Acenaphthene	1680	U	5.02	1370	ug/kg	10.0	81.7	(0%-30%)		06/04/14	12:27
Acenaphthylene	1680	U	5.02	1230	ug/kg	9.30	73.7	(0%-30%)			
Anthracene	1680	J	16.0	1370	ug/kg	10.2	80.8	(0%-30%)			
Benzo(a)anthracene	168		63.2	169	ug/kg	17.4	63.2	(0%-30%)			
Benzo(a)pyrene	168		39.9	160	ug/kg	15.2	71.5	(0%-30%)			
Benzo(b)fluoranthene	168		55.7	174	ug/kg	16.6	70.6	(0%-30%)			
Benzo(ghi)perylene	168		22.7	134	ug/kg	9.59	66.7	(0%-30%)			
Benzo(k)fluoranthene	83.8		30.0	99.6	ug/kg	17.4	83.1	(0%-30%)			
Chrysene	168		40.9	165	ug/kg	13.9	74.2	(0%-30%)			
Dibenzo(a,h)anthracene	168	P	2.87	150	ug/kg	8.88	87.8	(0%-30%)			
Fluoranthene	168		103	184	ug/kg	21.3	48.3	(0%-30%)			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 4 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1392226										
Fluorene	1680	U	5.02	1330	ug/kg	10.4	79.5	(0%-30%)	CWW	06/04/14	12:27
Indeno(1,2,3-cd)pyrene	168	U	0.536	148	ug/kg	9.50	88.3	(0%-30%)			
Naphthalene	1680	U	5.02	1190	ug/kg	8.64	71.1	(0%-30%)			
Phenanthrene	1680		64.7	1350	ug/kg	10.4	76.9	(0%-30%)			
Pyrene	168		88.3	184	ug/kg	19.4	57.4	(0%-30%)			
*Decafluorobiphenyl	8380		5780	5820	ug/kg		69.5	(23%-104%)			

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- o Analyte failed to recover within LCS limits (Organics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more 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: 1392225 **Verified by:** _____
Analyst: Alberto Velasco
Method: SW846 3550B

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

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1203099398 MB	02-JUN-2014 16:35:00	30.03	1	0.0333
1203099399 LCS	02-JUN-2014 16:35:00	30.01	1	0.03332
349578001	02-JUN-2014 16:35:00	30.07	1	0.03326
1203099400 MS (349578001)	02-JUN-2014 16:35:00	30.02	1	0.03331
1203099401 MSD (349578001)	02-JUN-2014 16:35:00	30.06	1	0.03327

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203099399	8310 PAH SPIKE	UE140319-10	1	mL	Verified By: SJW
MS	1203099400	8310 PAH SPIKE	UE140319-10	1	mL	Final Solvent: Acetonitrile
MSD	1203099401	8310 PAH SPIKE	UE140319-10	1	mL	
SURR	All	Decafluorobiphenyl 250 mg/L	UE140319-25	1	mL	
REGNT	All	HiPerSolv (HPLC Grade)	2103153	5	mL	
REGNT	All	Methylene Chloride	2111332-D	300	mL	
SOURC	All	SODIUM SULFATE	2101676	30	g	

FID Diesel Range Organics Analysis

Case Narrative

**FID Diesel Range Organics
WC-HANFORD, INC. (WCHN)
SDG XP0096**

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: 1392018
Prep Batch Number: 1392015

Sample Analysis

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

Sample ID	Client ID
349578001	J1TPX2
1203098850	Method Blank (MB)
1203098851	Laboratory Control Sample (LCS)
1203098852	349578001(J1TPX2) Matrix Spike (MS)
1203098853	349578001(J1TPX2) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-003 REV# 24.

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

Calibration Information

Initial Calibration

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

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

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 349578001 (J1TPX2) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MSD recovery was within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recovery was within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the MS and MSD did not meet the acceptance limits due to relatively lower spike recovery in the MS.

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Electronic Package Comment

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

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

Data Exception (DER) Documentation

Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. DER #1299590 was generated for this SDG.

Manual Integrations

Manual integration was required for surrogates.

Additional Comments

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

System Configuration

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

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

Certification Statement

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

DATA EXCEPTION REPORT

Mo.Day Yr. 02-JUN-14	Division: Federal	Quality Criteria: Specifications	Type: Process
Instrument Type: GC/FID	Test / Method: NWTPH-Dx in Soil	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1392018	Sample Numbers: See Below		
<p>Potentially affected work order(s)(SDG): 349578(XP0096)</p> <p>Application Issues: Failed Recovery for MS/PS Failed RPD for MS/MSD, or PS/PSD</p>			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. The MS(1203098852) recovered diesel range organics and motor oil below their established acceptance limits.</p> <p>2. The MS/MSD RPD value for motor oil was 22%(SPC Limit: 20%).</p>		<p>1 & 2. The failures were possibly due to sample matrix interference as the MS, MSD and the parent sample recovered well within the acceptance range for the surrogate. The data were reported.</p>	

Originator's Name:

Benjamin Taft 02-JUN-14

Data Validator/Group Leader:

Jimin Cao 02-JUN-14

GEL LABORATORIES LLC

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

Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0096 GEL Work Order: 349578 Project: RC-189 Soil

The Qualifiers in this report are defined as follows:

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

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.

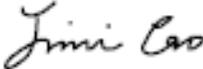
RA Indicates that sample is re-analyzed without re-extraction.

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: Jimin Cao

Date: 02 JUN 2014

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: June 2, 2014

Page 1 of 2

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

Workorder: 349578 **Client SDG: XP0096** **Project Description: RC-189 Soil**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Diesel Range Organics											
Batch	1392018										
QC1203098851	LCS										
Diesel Range Organics (C10-C20)	66200			48500	ug/kg		73.2	(70%-130%)	BYT1	06/02/14	11:20
Motor Oil (C20-C36)	66200			48200	ug/kg		72.8	(70%-130%)			
**o-Terphenyl	662			500	ug/kg		75.5	(50%-150%)			
QC1203098850	MB										
Diesel Range Organics (C10-C20)			U	2160	ug/kg					06/02/14	10:41
Motor Oil (C20-C36)			U	2160	ug/kg						
**o-Terphenyl	666			495	ug/kg		74.3	(50%-150%)			
QC1203098852	349578001 MS										
Diesel Range Organics (C10-C20)	67100	TU	2160	T	46400	ug/kg	69.2*	(70%-130%)		06/02/14	12:38
Motor Oil (C20-C36)	67100	JT	3210	T	48400	ug/kg	67.4*	(70%-130%)			
**o-Terphenyl	671		491		474	ug/kg	70.6	(50%-150%)			
QC1203098853	349578001 MSD										
Diesel Range Organics (C10-C20)	66900	TU	2160		55600	ug/kg	18.0	83.2	(0%-20%)	06/02/14	13:17
Motor Oil (C20-C36)	66900	JT	3210		60800	ug/kg	22.6*	86	(0%-20%)		
**o-Terphenyl	669		491		550	ug/kg	82.2	(50%-150%)			

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
P	Aroclor target analyte with greater than 25% difference between column analyses.										
T	Spike and/or spike duplicate sample recovery is outside control limits.										
U	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.										
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
o	Analyte failed to recover within LCS limits (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: 1392015 Verified by: _____
 Analyst: Courtney Robinson
 Method: SW846 3541

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

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1203098850 MB	30-MAY-2014 09:45:00	30.03	1	0.0333
1203098851 LCS	30-MAY-2014 09:45:00	30.2	1	0.03311
349578001	30-MAY-2014 09:45:00	30.33	1	0.03297
1203098852 MS (349578001)	30-MAY-2014 09:45:00	30.02	1	0.03331
1203098853 MSD (349578001)	30-MAY-2014 09:45:00	30.1	1	0.03322

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203098851	AZDRO SPIKE LCS STD,4000ug/ml	WFI140523-62	1	mL	Final Solvent: CH2Cl2 Verified by: JB
MS	1203098852	AZDRO SPIKE LCS STD,4000ug/ml	WFI140523-62	1	mL	
MSD	1203098853	AZDRO SPIKE LCS STD,4000ug/ml	WFI140523-62	1	mL	Sample 349578001/MS&MSD is a RAD I sample, which was a gray dirt/powder-like substance with large rocks.
SURR	All	20 ppm surrogate	WE140520-04	1	mL	
REGNT	All	Methylene Chloride	2108173-D	120	mL	
SOURC	All	SODIUM SULFATE	2101676	30	g	

GC Volatiles (GRO) Analysis

Case Narrative

**GC Volatile Organics
WC-HANFORD, INC. (WCHN)
SDG XP0096**

Method/Analysis Information

Procedure: Volatile Total Petroleum Hydrocarbons by Flame Ionization Detector
Analytical Method: NWTPH-Gx in Soil
Prep Method: NWTPH-Gx in Soil
Analytical Batch Number: 1393255
Prep Batch Number: 1393254

Sample Analysis

The following client and quality control samples were analyzed to complete this sample delivery group/work order using the methods referenced in the Analysis Information section:

Sample ID	Client ID
349578001	J1TPX2
1203102200	Method Blank (MB)
1203102201	349578001(J1TPX2) Post Spike (PS)
1203102202	349578001(J1TPX2) Post Spike Duplicate (PSD)
1203102203	High Blank (HB)
1203102853	Laboratory Control Sample (LCS)

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

NOTE: For volatile organic analyses the matrix spike designations may be indicated as "PS" or "PSD". The "PS" designation (post spike) indicates that the matrix was fortified prior to analysis but after applying any prep factors, such as a dilution. The laboratory considers the MS/MSD and PS/PSD designations interchangeable.

Gasoline Range Organics will be designated as GRO throughout this case narrative.

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) section 19.1.2. False positive analytes are designated on the quantitation report with a 'd' qualifier.

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-004 REV# 25.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG). See the calibration history report for a list of data files that were used to generate the initial calibration curve in the Standard Data Section of this data package.

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(s) analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

Surrogate recoveries, in all samples and quality control samples, were within the acceptance limits.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 349578001 (J1TPX2) was selected for analysis as the matrix spike.

Matrix Spike (PS) Recovery Statement

The GRO recovery was within the acceptance limits.

Matrix Spike Duplicate (PSD) Recovery Statement

The GRO recovery was within the acceptance limits.

Relative Percent Difference (RPD) Statement

The RPD between the matrix spike pair 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.

Sample Dilutions

Samples were analyzed using a methanol extraction procedure at 1:50 dilutions. The samples were analyzed at the lowest dilution possible when using a methanol extraction procedure.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Electronic Packaging Comment

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

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An

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

Data Exception (DER) Documentation

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

Manual Integrations

Data files associated with the initial calibration, continuing calibration check(s), and samples may have been manually integrated to correct misidentification of peaks by the integration software.

Additional Comments

Additional comments were not required for this SDG.

System Configuration

The GRO Organics analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description	P & T Trap
VOC4A.I	Agilent 6890N GC/FID w/ OI 4560/Archon Autosampler	HP6890N GC/FID	DB-624	0.53mm x 3.0u x 15m	OI #10

GEL LABORATORIES LLC

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

Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0096 GEL Work Order: 349578 Project: RC-189 Soil

The Qualifiers in this report are defined as follows:

- D Results are reported from a diluted aliquot of sample.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- 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: Erin Haubert

Date: 05 JUN 2014

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: June 5, 2014

Page 1 of 2

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

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatiles GRO Organics											
Batch	1393255										
QC1203102203											
Gasoline Range Organics (C6 - C10)			DU	1670	UG/KG				ACJ	06/04/14	13:32
**Bromofluorobenzene				4730	UG/KG		94.5	(50%-150%)			
QC1203102853											
Gasoline Range Organics (C6 - C10)	500			423	UG/KG		84.7	(70%-130%)		06/04/14	11:09
**Bromofluorobenzene				46.0	UG/KG		92	(50%-150%)			
QC1203102200											
Gasoline Range Organics (C6 - C10)			U	16.7	UG/KG					06/04/14	11:37
**Bromofluorobenzene				44.8	UG/KG		89.6	(50%-150%)			
QC1203102201											
Gasoline Range Organics (C6 - C10)	500	DU	0.00 D	429	ug/L		85.8	(70%-130%)		06/04/14	14:29
**Bromofluorobenzene	50.0		48.8	48.8	ug/L		97.7	(50%-150%)			
QC1203102202											
Gasoline Range Organics (C6 - C10)	500	DU	0.00 D	423	ug/L	1.37	84.6	(0%-20%)		06/04/14	14:57
**Bromofluorobenzene	50.0		48.8	48.4	ug/L		96.8	(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
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
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

Volatile Total Petroleum Hydrocarbons by Flame Ionization Detector

Batch ID: 1393254

Analyst: Amy Jamison

Method: NWTPH-Gx in Soil

Lab SOP: GL-OA-E-004 REV# 25

Instrument: Sartorius Balance B-001

Type Sample Id Description Serial Number Spike Amount Spike Units

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)	pH Check
1203102853 LCS	04-JUN-2014 08:00:00	Soil	5	5	1	
1203102200 MB	04-JUN-2014 08:30:00	Soil	5	5	1	
349578001	04-JUN-2014 13:30:00	Soil	5.022	10	1.99124	
1203102201 PS (349578001)	04-JUN-2014 13:30:00	Soil	5.022	10	1.99124	
1203102202 PSD (349578001)	04-JUN-2014 13:30:00	Soil	5.022	10	1.99124	
1203102203 HB	04-JUN-2014 13:31:00	Soil	5	10	2	

Reagent/Solvent Lot ID Description Amount Comments:

PCB Analysis

Case Narrative

**PCB Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0096**

Method/Analysis Information

Procedure: Analysis of Polychlorinated Biphenyls by ECD
Analytical Method: SW846 3541/8082A
Prep Method: SW846 3541
Analytical Batch Number: 1391761
Prep Batch Number: 1391760

Sample Analysis

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

Sample ID	Client ID
349578001	J1TPX2
1203098146	Method Blank (MB)
1203098147	349578001(J1TPX2) Matrix Spike (MS)
1203098148	349578001(J1TPX2) Matrix Spike Duplicate (MSD)
1203098149	Laboratory Control Sample (LCS)

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) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 349578001 (J1TPX2) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

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

Matrix Spike Duplicate (MSD) Recovery Statement

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

MS/MSD Relative Percent Difference (RPD) Statement

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported analyte concentrations were confirmed on dissimilar columns. All sample extracts were cleaned using alumina. Additionally, copper was added to all sample extracts to remove sulfur.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Electronic Package Comment

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

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

Data Exception (DER) Documentation

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

Manual Integrations

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

Additional Comments

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The following additional comments were required:

The front column has been chosen as the primary column. The data are reported from the front column for all samples in this batch.

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

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

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

System Configuration

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

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

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0096 GEL Work Order: 349578 Project: RC-189 Soil

The Qualifiers in this report are defined as follows:

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

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: 02 JUN 2014

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: June 2, 2014

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

Client SDG: XP0096

Client Sample ID: J1TPX2	Project: WCHN00613
Sample ID: 349578001	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 27-MAY-14 09:54	
Receive Date: 29-MAY-14	
Collector: Client	
Moisture: .696%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.11	1.11	3.34	ug/kg	1	JXM	05/31/14	1118	1391761	1
Aroclor-1221	U	1.11	1.11	3.34	ug/kg	1					
Aroclor-1232	U	1.11	1.11	3.34	ug/kg	1					
Aroclor-1242	U	1.11	1.11	3.34	ug/kg	1					
Aroclor-1248	U	1.11	1.11	3.34	ug/kg	1					
Aroclor-1254	U	1.11	1.11	3.34	ug/kg	1					
Aroclor-1260	U	1.11	1.11	3.34	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	CXR2	05/30/14	0900	1391760

The following Analytical Methods were performed:

Method	Description	Analyst Comments				
1	SW846 3541/8082A					
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits	
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.72 ug/kg	6.69	70.6	(44%-106%)	
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.07 ug/kg	6.69	75.8	(35%-119%)	

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: June 2, 2014

Page 1 of 2

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

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB											
Batch	1391761										
QC1203098149	LCS										
Aroclor-1016	33.0			20.9	ug/kg		63.5	(39%-120%)	JXM	05/31/14	10:37
Aroclor-1260	33.0			24.4	ug/kg		73.9	(50%-116%)			
**4cmx	6.60			4.66	ug/kg		70.6	(44%-106%)			
**Decachlorobiphenyl	6.60			5.13	ug/kg		77.7	(35%-119%)			
QC1203098146	MB										
Aroclor-1016			U	1.10	ug/kg					05/31/14	10:25
Aroclor-1221			U	1.10	ug/kg						
Aroclor-1232			U	1.10	ug/kg						
Aroclor-1242			U	1.10	ug/kg						
Aroclor-1248			U	1.10	ug/kg						
Aroclor-1254			U	1.10	ug/kg						
Aroclor-1260			U	1.10	ug/kg						
**4cmx	6.61			4.55	ug/kg		68.9	(44%-106%)			
**Decachlorobiphenyl	6.61			4.96	ug/kg		75.1	(35%-119%)			
QC1203098147	349578001	MS									
Aroclor-1016	33.1	U	1.11	21.0	ug/kg		63.6	(25%-125%)		05/31/14	11:33
Aroclor-1260	33.1	U	1.11	24.7	ug/kg		74.5	(28%-127%)			
**4cmx	6.61		4.72	4.56	ug/kg		68.9	(44%-106%)			
**Decachlorobiphenyl	6.61		5.07	4.70	ug/kg		71.1	(35%-119%)			
QC1203098148	349578001	MSD									
Aroclor-1016	33.0	U	1.11	20.9	ug/kg	0.618	63.4	(0%-30%)		05/31/14	11:47

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB											
Batch	1391761										
Aroclor-1260	33.0	U	1.11	24.2	ug/kg	2.04	73.2	(0%-30%)			
**4cmx	6.60		4.72	4.34	ug/kg		65.7	(44%-106%)	JXM	05/31/14	11:47
**Decachlorobiphenyl	6.60		5.07	4.34	ug/kg		65.7	(35%-119%)			

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- o Analyte failed to recover within LCS limits (Organics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more 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: 1391760 Verified by: _____
 Analyst: Courtney Robinson
 Method: SW846 3541

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

Sample ID	Run Date	Aliquot (g)	Clean Up 1 Amount 1 (mL)	Clean Up Post Clean Up Amount 1 (mL)	Final Volume (mL)	Prepped Factor (mL/g)
1203098146 MB	30-MAY-2014 09:00:00	30.28	H2SO4/KM 2 nO4	9	1	0.03303
1203098149 LCS	30-MAY-2014 09:00:00	30.31	H2SO4/KM 2 nO4	9	1	0.03299
348736010 - 2	30-MAY-2014 09:00:00	30.23	H2SO4/KM 2 nO4	9	1	0.03308
348736016 - 2	30-MAY-2014 09:00:00	30.42	H2SO4/KM 2 nO4	9	1	0.03287
349578001	30-MAY-2014 09:00:00	30.12	H2SO4/KM 2 nO4	9	1	0.0332
1203098147 MS (349578001)	30-MAY-2014 09:00:00	30.45	H2SO4/KM 2 nO4	9	1	0.03284
1203098148 MSD (349578001)	30-MAY-2014 09:00:00	30.5	H2SO4/KM 2 nO4	9	1	0.03279

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203098149	PCB Laboratory Control	WE140505-06	1	mL	Final Solvent: Hexane
MS	1203098147	PCB Laboratory Control	WE140505-06	1	mL	Verified By: DPF
MSD	1203098148	PCB Laboratory Control	WE140505-06	1	mL	Prior to Cleanup: 2mL
SURR	All	PEST LOW LEVEL SURROGATE 200 UG/L	WE140516-01	1	mL	Cleanup SOP: GL-OA-E-037 REV.7
REGNT	All	1:1 sulfuric acid	2091781	5	mL	Cleanup Initials: CR
REGNT	All	Hexane	2102333-B4	120	mL	Cleanup Date:5/30/14
REGNT	All	5% Potassium Permanganate	2106544	5	mL	All samples were clumped moistened clay except for 349578001/MS/MSD, which was a RAD I, gray dirt/powder-like substance with large rocks.
SOURC	All	SODIUM SULFATE	2101676	30	g	

Metals Analysis

Case Narrative

**Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0096**

Sample Analysis

Sample ID	Client ID
349578001	J1TPX2
1203098132	Method Blank (MB) ICP
1203098133	Laboratory Control Sample (LCS)
1203098136	349578001(J1TPX2L) Serial Dilution (SD)
1203098134	349578001(J1TPX2D) Sample Duplicate (DUP)
1203098135	349578001(J1TPX2S) Matrix Spike (MS)
1203099576	349578001(J1TPX2PS) Post Spike (PS)
1203098123	Method Blank (MB) ICP-MS
1203098124	Laboratory Control Sample (LCS)
1203098127	349578001(J1TPX2L) Serial Dilution (SD)
1203098125	349578001(J1TPX2D) Sample Duplicate (DUP)
1203098126	349578001(J1TPX2S) Matrix Spike (MS)
1203098834	Method Blank (MB) CVAA
1203098835	Laboratory Control Sample (LCS)
1203098841	349578001(J1TPX2L) Serial Dilution (SD)
1203098839	349578001(J1TPX2D) Sample Duplicate (DUP)
1203098840	349578001(J1TPX2S) Matrix Spike (MS)

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

Method/Analysis Information

Analytical Batch:	1391752, 1391750 and 1392014
Prep Batch :	1391751, 1391749 and 1392012
Standard Operating Procedures:	GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 23, GL-MA-E-014 REV# 25 and GL-MA-E-010 REV# 27
Analytical Method:	SW846 3050B/6010C, SW846 3050B/6020A and SW846 7471B
Prep Method :	SW846 3050B and SW846 7471B Prep

Preparation/Analytical Method Verification

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

System Configuration

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 0.4L/min, argon gas flows of 13 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 9000 inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum. Operating conditions are set at 1400W power and combined argon pressures of 360+/- 7 kPa for the plasma and auxiliary gases, and 0.85 L/min carrier gas flow, and an initial lens voltage of 5.2.

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 80 mL/min.

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

The PQL standard recoveries for SW846 6010C met the control limits except for sodium and antimony in file 053014-1 at 11:28 and 16:11. Sodium recovered low in the initial and closing PQL standards; however the analyte concentration in the associated client sample was greater than two times the PQL. Antimony recovered high in the closing PQL standard; however the analyte was not detected above the MDL in the associated client sample. Therefore the data were not considered adversely affected.

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 MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 349578001 (J1TPX2)-ICP, ICP-MS and CVAA.

Matrix Spike (MS) Recovery Statement

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS did not meet all the recommended quality control acceptance criteria for percent recoveries for the applicable analytes. The recovery for silicon was not within the acceptance limits in sample 1203098135 (J1TPX2)-ICP.

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 applicable analytes met these requirements. The RPD values for silicon and nickel were not within the acceptance limits in sample 1203098134 (J1TPX2)-ICP.

Post Spike (PS) Recovery Statement

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

Serial Dilution % Difference Statement

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 25x the IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. Not all applicable analytes met the established percent difference criteria. The %D value for silicon was not within the acceptance criteria in sample 1203098136 (J1TPX2)-ICP.

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Sample 349578001 (J1TPX2)-ICP was diluted because the titanium concentration exceeded the linear range which affected antimony, cobalt, lead, vanadium, and zinc. The ICPMS solid samples in this SDG were diluted the standard two times.

Preparation Information

The samples in this SDG were prepared exactly according to the cited SOP.

Miscellaneous Information

Electronic Packaging Comment

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

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. Data exception report (DER ID 1299387) was generated for this SDG and was submitted behind the case narrative in this data package.

Additional Comments

Additional comments were not required for this SDG.

Certification Statement

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

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer: Pat Steell Date: 06/05/2014

DATA EXCEPTION REPORT

Mo.Day Yr. 02-JUN-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1391752	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 349578(XP0096)			
Application Issues: Failed Recovery for MS/PS Failed RPD for DUP			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. Failed Recovery for MS/PS: QC 1203098135MS,1203099576PS</p> <p>2. Failed RPD for DUP: QC 1203098134DUP</p>		<p>1. The matrix spike recovery failed outside of the control limits for silicon. The post spike failed outside the required control limits for silicon but passed for all other analytes. This verifies the presence of a matrix interference for silicon and verifies the absence of a matrix interference for all the other analytes. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.</p> <p>2. The sample and sample duplicate % RPD failed outside the control limits for nickel and silicon due to possible sample non-homogeneity and/or matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.</p>	

Originator's Name:

Helen Camello 02-JUN-14

Data Validator/Group Leader:

Louise Smith 03-JUN-14

Sample Data Summary

GEL LABORATORIES LLC

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

Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0096 GEL Work Order: 349578 Project: RC-189 Soil

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank, and the sample concentration was ≤ 5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

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

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Orlette Johnson.

Reviewed by

Pat Steel 06/05/2014

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: June 5, 2014

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

Client SDG: XP0096

Client Sample ID: J1TPX2
Sample ID: 349578001

Project: WCHN00613
Client ID: WCHN001

The following Analytical Methods were performed:

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

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: June 5, 2014

Page 1 of 7

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

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1391750										
QC1203098125	349578001	DUP									
Selenium		DU	0.330	DU	0.327	mg/kg	N/A		BAJ	06/04/14	10:15
QC1203098124	LCS										
Selenium	4.79		D	4.11	mg/kg		85.8	(80%-120%)		06/04/14	10:11
QC1203098123	MB										
Selenium			DU	0.322	mg/kg					06/04/14	10:08
QC1203098126	349578001	MS									
Selenium	4.76	DU	0.330	D	3.71	mg/kg	77.9	(75%-125%)		06/04/14	10:17
QC1203098127	349578001	SDILT									
Selenium		DU	-1.21	DU	1.65	ug/L	N/A	(0%-10%)		06/04/14	10:20
Metals Analysis-ICP											
Batch	1391752										
QC1203098134	349578001	DUP									
Aluminum			6150		5870	mg/kg	4.63	(0%-20%)	HSC	05/30/14	15:46
Antimony		DU	1.63	DU	1.59	mg/kg	N/A			05/30/14	15:58
Arsenic			3.66		4.28	mg/kg	15.6 ^	(+/-2.90)		05/30/14	15:46
Barium			54.9		50.7	mg/kg	7.82	(0%-20%)			
Beryllium			0.695		0.697	mg/kg	0.242 ^	(+/-0.483)			
Boron		U	0.985	U	0.966	mg/kg	N/A				
Cadmium			0.534	B	0.461	mg/kg	14.8 ^	(+/-0.483)			
Calcium			8190		8480	mg/kg	3.56	(0%-20%)			
Chromium			18.9		15.7	mg/kg	18.5	(0%-20%)			
Cobalt		D	8.22	D	7.96	mg/kg	3.20 ^	(+/-2.42)		05/30/14	15:58
Copper			17.7		16.6	mg/kg	6.37	(0%-20%)		05/30/14	15:46
Iron			21900		21800	mg/kg	0.688	(0%-20%)			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 2 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1391752										
Lead	BCD	2.42	BD	3.00	mg/kg	21.5	^	(+/-4.83)	HSC	05/30/14	15:58
Magnesium		5570		4700	mg/kg	17.0		(0%-20%)		05/30/14	15:46
Manganese		347		311	mg/kg	11.2		(0%-20%)			
Molybdenum	B	0.283	B	0.242	mg/kg	15.4	^	(+/-0.966)			
Nickel	*	17.7	*	11.2	mg/kg	45.1	*	(0%-20%)			
Potassium		1060		1050	mg/kg	1.60		(0%-20%)			
Silicon	*MN	787	*	595	mg/kg	27.8	*	(0%-20%)		05/31/14	14:12
Silver	B	0.228	B	0.245	mg/kg	7.19	^	(+/-0.483)		05/30/14	15:46
Sodium		194		190	mg/kg	2.10		(0%-20%)			
Vanadium	D	59.9	D	59.9	mg/kg	0.00883		(0%-20%)		05/30/14	15:58
Zinc	D	54.4	D	53.7	mg/kg	1.22		(0%-20%)			
QC1203098133	LCS										
Aluminum		490		435	mg/kg			88.7 (80%-120%)		05/30/14	15:40
Antimony		49.0		41.4	mg/kg			84.4 (80%-120%)			
Arsenic		49.0		43.3	mg/kg			88.3 (80%-120%)			
Barium		49.0		43.2	mg/kg			88.2 (80%-120%)			
Beryllium		49.0		44.1	mg/kg			90 (80%-120%)			
Boron		49.0		42.5	mg/kg			86.8 (80%-120%)			
Cadmium		49.0		43.7	mg/kg			89.1 (80%-120%)			
Calcium		490		442	mg/kg			90.1 (80%-120%)			
Chromium		49.0		42.8	mg/kg			87.3 (80%-120%)			
Cobalt		49.0		41.7	mg/kg			85.1 (80%-120%)			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 3 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1391752										
Copper	49.0			43.5	mg/kg		88.8	(80%-120%)	HSC	05/30/14	15:40
Iron	490			438	mg/kg		89.4	(80%-120%)			
Lead	49.0			43.2	mg/kg		88	(80%-120%)			
Magnesium	490			446	mg/kg		91	(80%-120%)			
Manganese	49.0			44.1	mg/kg		89.9	(80%-120%)			
Molybdenum	49.0			41.4	mg/kg		84.5	(80%-120%)			
Nickel	49.0			42.0	mg/kg		85.7	(80%-120%)			
Potassium	490			432	mg/kg		88.1	(80%-120%)			
Silicon	490			399	mg/kg		81.4	(80%-120%)		05/31/14	14:07
Silver	49.0			43.0	mg/kg		87.8	(80%-120%)		05/30/14	15:40
Sodium	490			432	mg/kg		88.2	(80%-120%)			
Vanadium	49.0			43.6	mg/kg		89	(80%-120%)			
Zinc	49.0			44.0	mg/kg		89.8	(80%-120%)			
QC1203098132	MB										
Aluminum			U	6.69	mg/kg					05/30/14	15:37
Antimony			B	0.658	mg/kg						
Arsenic			B	0.596	mg/kg						
Barium			U	0.0984	mg/kg						
Beryllium			U	0.0984	mg/kg						
Boron			U	0.984	mg/kg						
Cadmium			U	0.0984	mg/kg						
Calcium			U	7.87	mg/kg						

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 4 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1391752										
Chromium			U	0.148	mg/kg				HSC	05/30/14	15:37
Cobalt			U	0.148	mg/kg						
Copper			U	0.295	mg/kg						
Iron			U	7.87	mg/kg						
Lead			B	0.587	mg/kg						
Magnesium			U	8.37	mg/kg						
Manganese			U	0.197	mg/kg						
Molybdenum			U	0.197	mg/kg						
Nickel			U	0.148	mg/kg						
Potassium			U	6.30	mg/kg						
Silicon			U	1.48	mg/kg					05/31/14	14:04
Silver			U	0.0984	mg/kg					05/30/14	15:37
Sodium			U	6.89	mg/kg						
Vanadium			U	0.0984	mg/kg						
Zinc			U	0.394	mg/kg						
QC1203098135 349578001 MS											
Aluminum	494	6150		7640	mg/kg		N/A	(75%-125%)		05/30/14	15:49
Antimony	49.4	DU	1.63	D	48.1	mg/kg	95.2	(75%-125%)		05/30/14	16:01
Arsenic	49.4		3.66		52.4	mg/kg	98.7	(75%-125%)		05/30/14	15:49
Barium	49.4		54.9		99.2	mg/kg	89.7	(75%-125%)			
Beryllium	49.4		0.695		50.0	mg/kg	99.9	(75%-125%)			
Boron	49.4	U	0.985		48.4	mg/kg	96.9	(75%-125%)			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 5 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1391752										
Cadmium	49.4	0.534		48.3	mg/kg		96.7	(75%-125%)	HSC	05/30/14	15:49
Calcium	494	8190		9020	mg/kg		N/A	(75%-125%)			
Chromium	49.4	18.9		69.4	mg/kg		102	(75%-125%)			
Cobalt	49.4	D	8.22	D	58.1	mg/kg	101	(75%-125%)		05/30/14	16:01
Copper	49.4	17.7		70.3	mg/kg		107	(75%-125%)		05/30/14	15:49
Iron	494	21900		23300	mg/kg		N/A	(75%-125%)			
Lead	49.4	BCD	2.42	D	53.0	mg/kg	102	(75%-125%)		05/30/14	16:01
Magnesium	494	5570		5790	mg/kg		N/A	(75%-125%)		05/30/14	15:49
Manganese	49.4	347		376	mg/kg		N/A	(75%-125%)			
Molybdenum	49.4	B	0.283		47.8	mg/kg	96.3	(75%-125%)			
Nickel	49.4	*	17.7		57.3	mg/kg	80.3	(75%-125%)			
Potassium	494	1060		1590	mg/kg		106	(75%-125%)			
Silicon	494	*MN	787	N	885	mg/kg	19.8*	(75%-125%)		05/31/14	14:15
Silver	49.4	B	0.228		49.9	mg/kg	101	(75%-125%)		05/30/14	15:49
Sodium	494	194		730	mg/kg		108	(75%-125%)			
Vanadium	49.4	D	59.9	D	115	mg/kg	111	(75%-125%)		05/30/14	16:01
Zinc	49.4	D	54.4	D	104	mg/kg	100	(75%-125%)			
QC1203099576 349578001 PS											
Silicon	5000	*MN	7990		11800	ug/L	75.7*	(80%-120%)		05/31/14	14:18
QC1203098136 349578001 SDILT											
Aluminum			62400	D	13000	ug/L	4.16	(0%-10%)		05/30/14	15:51
Antimony		DU	2.26	DU	8.13	ug/L	N/A	(0%-10%)		05/30/14	16:04
Arsenic			37.1	D	13.9	ug/L	87.8	(0%-10%)		05/30/14	15:51

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 6 of 7

Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1391752										
Barium		557	D	114	ug/L	2.08		(0%-10%)	HSC	05/30/14	15:51
Beryllium		7.05	D	1.47	ug/L	4.44		(0%-10%)			
Boron	U	5.49	DU	4.93	ug/L	N/A		(0%-10%)			
Cadmium		5.42	DU	0.493	ug/L	N/A		(0%-10%)			
Calcium		83100	D	17000	ug/L	2.45		(0%-10%)			
Chromium		192	D	40.4	ug/L	5.19		(0%-10%)			
Cobalt	D	16.7	D	3.56	ug/L	6.82		(0%-10%)		05/30/14	16:04
Copper		180	D	33.9	ug/L	5.55		(0%-10%)		05/30/14	15:51
Iron		223000	D	46600	ug/L	4.61		(0%-10%)			
Lead	BCD	4.91	DU	8.13	ug/L	N/A		(0%-10%)		05/30/14	16:04
Magnesium		56600	D	11700	ug/L	3.77		(0%-10%)		05/30/14	15:51
Manganese		3530	D	735	ug/L	4.18		(0%-10%)			
Molybdenum	B	2.87	DU	0.985	ug/L	N/A		(0%-10%)			
Nickel	*	180	D	36.8	ug/L	2.38		(0%-10%)			
Potassium		10800	D	2190	ug/L	1.39		(0%-10%)			
Silicon	*MN	7990	DM	2050	ug/L	28.2*		(0%-10%)		05/31/14	14:21
Silver	B	2.31	DU	0.493	ug/L	N/A		(0%-10%)		05/30/14	15:51
Sodium		1970	D	294	ug/L	25.2		(0%-10%)			
Vanadium	D	122	D	24.8	ug/L	2.01		(0%-10%)		05/30/14	16:04
Zinc	D	110	D	23.3	ug/L	5.53		(0%-10%)			

Metals Analysis-Mercury

Batch 1392014

GEL LABORATORIES LLC

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

QC Summary

Workorder: 349578

Client SDG: XP0096

Project Description: RC-189 Soil

Page 7 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury											
Batch 1392014											
QC1203098839	349578001	DUP									
Mercury		B	0.0055	B	0.00443	mg/kg	21.5 ^	(+/-0.0118)	NOR1	06/05/14	13:37
QC1203098835	LCS										
Mercury	0.117				0.116	mg/kg		99.2 (80%-120%)		06/05/14	13:05
QC1203098834	MB										
Mercury				U	0.0039	mg/kg				06/05/14	13:04
QC1203098840	349578001	MS									
Mercury	0.121	B	0.0055		0.132	mg/kg		105 (80%-120%)		06/05/14	13:38
QC1203098841	349578001	SDILT									
Mercury		B	0.092	DU	0.020	ug/L	N/A	(0%-10%)		06/05/14	13:40

Notes:

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank, and the sample concentration was <= 5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more 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: 1391751	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst: Jack Mabry	LCS	1203098133	Metals Spike Mix I	UI2087791-01	.25	mL
Method: SW846 3050B	LCS	1203098133	Metals Spike Mix II	UI2087793-06	.25	mL
Lab SOP: GL-MA-E-009 REV# 23	MS	1203098135	Metals Spike Mix I	UI2087791-01	.25	mL
Instrument: BAL-892	MS	1203098135	Metals Spike Mix II	UI2087793-06	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203098132 MB	29-MAY-2014 13:00:29	Soil	0.508	50	98.4252
1203098133 LCS	29-MAY-2014 13:00:29	Soil	0.51	50	98.03922
349578001	29-MAY-2014 13:00:29	Soil	0.511	50	97.84736
1203098134 DUP (349578001)	29-MAY-2014 13:00:29	Soil	0.521	50	95.96929
1203098135 MS (349578001)	29-MAY-2014 13:00:29	Soil	0.51	50	98.03922
1203098136 SDILT (349578001)	29-MAY-2014 13:00:29	Soil	0.511	50	97.84736

Reagent/Solvent Lot ID	Description	Amount	Comments:
2098278	Concentrated Nitric Acid	1.25 mL	Block Temperature: 94 C
2108818	HYDROCHLORIC ACID	10 mL	Thermometer ID: 118840 Hot Block ID: 9

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID:	1391749	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	Jack Mabry	LCS	1203098124	ICP-MS spiking solution A	UI2087809-A	.25	mL
Method:	SW846 3050B	LCS	1203098124	ICP-MS spiking solution B	UI2091844-B	.25	mL
Lab SOP:	GL-MA-E-009 REV# 23	MS	1203098126	ICP-MS spiking solution A	UI2087809-A	.25	mL
Instrument:	BAL-892	MS	1203098126	ICP-MS spiking solution B	UI2091844-B	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203098123 MB	30-MAY-2014 07:30:19	Soil	0.513	50	97.46589
1203098124 LCS	30-MAY-2014 07:30:19	Soil	0.522	50	95.78544
349578001	30-MAY-2014 07:30:19	Soil	0.504	50	99.20635
1203098125 DUP (349578001)	30-MAY-2014 07:30:19	Soil	0.508	50	98.4252
1203098126 MS (349578001)	30-MAY-2014 07:30:19	Soil	0.529	50	94.51796
1203098127 SDILT (349578001)	30-MAY-2014 07:30:19	Soil	0.504	50	99.20635

Reagent/Solvent Lot ID	Description	Amount	Comments:
1976094-02	Hydrogen Peroxide 30%	1.5 mL	Block Temperature: 95 C
2098278	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:	1392012	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	Alan Stanley	LCS	1203098835	MHGSOILMSSPIKE	WHG140605-14	.3	mL
Method:	SW846 7471B Prep	MS	1203098836	MHGSOILMSSPIKE	WHG140605-14	.3	mL
Lab SOP:	GL-MA-E-010 REV# 27	MS	1203098840	MHGSOILMSSPIKE	WHG140605-14	.3	mL
Instrument:	Satorius	MS	1203099228	MHGSOILMSSPIKE	WHG140605-14	.3	mL
		MSD	1203098837	MHGSOILMSSPIKE	WHG140605-14	.3	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203098834 MB	05-JUN-2014 11:07:54	Solid	0.516	30	58.13953
1203098835 LCS	05-JUN-2014 11:07:54	Solid	0.512	30	58.59375
348664003	05-JUN-2014 11:07:54	Tissue	0.53	30	56.60377
349394001	05-JUN-2014 11:07:54	Solid	0.522	30	57.47126
349395001	05-JUN-2014 11:07:54	Solid	0.502	30	59.76096
1203098836 MS (349395001)	05-JUN-2014 11:07:54	Solid	0.501	30	59.88024
1203098837 MSD (349395001)	05-JUN-2014 11:07:54	Solid	0.512	30	58.59375
1203098838 SDILT (349395001)	05-JUN-2014 11:07:54	Solid	0.502	30	59.76096
349578001	05-JUN-2014 11:07:54	Soil	0.505	30	59.40594
1203098839 DUP (349578001)	05-JUN-2014 11:07:54	Soil	0.511	30	58.70841
1203098840 MS (349578001)	05-JUN-2014 11:07:54	Soil	0.5	30	60
1203098841 SDILT (349578001)	05-JUN-2014 11:07:54	Soil	0.505	30	59.40594
349604003	05-JUN-2014 11:07:54	Soil	0.562	30	53.38078
349604004	05-JUN-2014 11:07:54	Soil	0.548	30	54.74453
349604008	05-JUN-2014 11:07:54	Soil	0.513	30	58.47953
349727001	05-JUN-2014 11:07:54	Oil	0.118	30	254.23729
1203099226 DUP (349727001)	05-JUN-2014 11:07:54	Oil	0.106	30	283.01887
1203099229 TRI (349727001)	05-JUN-2014 11:07:54	Oil	0.112	30	267.85714
1203099227 SDILT (349727001)	05-JUN-2014 11:07:54	Oil	0.118	30	254.23729
1203099228 MS (349727001)	05-JUN-2014 11:07:54	Oil	0.1	30	300

Reagent/Solvent Lot ID	Description	Amount	Comments:
140401-C	5% KMnO4 solution	7.5 mL	Digestion Start Date: 05-JUN-2014 11:07
140522-1	NITRIC ACID	.375 mL	Digestion End Date: 05-JUN-2014 11:37
2072331-C	Hg reducing agent	2 mL	Block Temperature: 95 C
			Thermometer ID: 118533

Prep Logbook

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
Reagent/Solvent Lot ID	Description	Amount	Comments:		
2108387-A	Hydrochloric Acid Conc.	1.125 mL	Hot Block ID: 12		
WHG140605-07	Mercury Working Standard 1st Source CAL S 0.2/CRA	30 uL	Less sample used due to the potassium permanganate falling out. The first QC was a grey powder like material.		
WHG140605-08	Mercury Working Standard 1st Source CAL S 0.5	75 uL			
WHG140605-09	Mercury Working 1st Source CAL S 2.0	300 uL			
WHG140605-10	Mercury Working 1st Source CAL S 5.0/CCV	750 uL			
WHG140605-11	Mercury Working 1st Source CAL S 10.0	1500 uL			
WHG140605-12	Mercury Working 2nd Source S 5.0/ICV	750 uL			