

SAF-RC-233
100-IU-2 & 100-IU-6 Remaining
Waste Sites – Soil In-Process
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

Kathy Wendt

H4-21

KW 9/22/14
INITIAL/DATE

COMMENTS:

SDG X0076

SAF-RC-233

Rad only

Chem only

Rad & Chem

Complete

Partial

**Sample Location: 600-358, scattered waste near Gable Mt.,
Stockpile (drum area)**



September 09, 2014

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

Re: RC-233 Soil
Work Order: 354868
SDG: X0076

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 15, 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-233-048
Enclosures



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Case Narrative

**Receipt Narrative
for
WC-HANFORD, INC.
SDG: X0076
Work Order: 354868**

September 16, 2014

Laboratory Identification:

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

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on August 15, 2014 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage.

Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
354868001	J1TXH0
354868002	J1TXH0

Case Narrative:

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

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



Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation

SAMPLE RECEIPT & REVIEW FORM

Client: <u>WCFN</u>		SDG/AR/COC/Work Order: <u>354868</u>	
Received By: <u>K. Zurcher</u>		Date Received: <u>08/15/14</u>	
Suspected Hazard Information		Yes	No
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"/>

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) <u>4</u> *all temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: <u>1304629166</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>7708 2576 7136</u>

Comments (Use Continuation Form if needed):

Laboratory Certifications

List of current GEL Certifications as of 09 September 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	SC000122014-14
Vermont	VT87156
Virginia NELAP	460202
Washington	C780-12
Wisconsin	999887790

Semi-Volatile Analysis

Case Narrative

**Semi-Volatile Case Narrative
WC-HANFORD, INC. (WCHN)
SDG X0076**

Method/Analysis Information

Procedure: Analysis of Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry

Analytical Method: SW846 3541/8270D

Prep Method: SW846 3541

Analytical Batch Number: 1412740

Prep Batch Number: 1412739

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 3541/8270D:

Sample ID	Client ID
354868001	J1TXH0
1203151245	MB for batch 1412739
1203151246	Laboratory Control Sample (LCS)
1203151251	354868001(J1TXH0) Matrix Spike (MS)
1203151252	354868001(J1TXH0) 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-009 REV# 32.

Raw data reports are processed and reviewed by the analyst using the data analysis 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. The various calibration mixes may not be calibrated using all of the calibration levels. In addition, not all of the mixes are calibrated using the same levels.

Diphenylamine has now superseded N-Nitroso-diphenylamine on Quantitation Reports, Initial Calibration Reports, Calibration Check Standard Reports, etc. Previous versions of EPA Methodologies referenced N-Nitroso-diphenylamine. However, as stated in EPA Methodology, "N-Nitroso-diphenylamine decomposes in the gas chromatographic inlet and cannot be separated from Diphenylamine." Studies of these two compounds at

GEL, both independent of each other and together, showed that they not only co-elute, but also have similar mass spectra. N-Nitroso-diphenylamine and Diphenylamine will be reported as Diphenylamine on all reports and forms.

Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG) in this batch. A second source initial calibration verification (ICV) was included in the standard section directly behind the initial calibration.

CCV Requirements

All Calibration Verification Standards (CCV) did not meet the acceptance criteria as outlined in Method 8270D. However, the method allows for a designated number of outliers dependent on the requested analyte list. This SDG satisfied the 8270D outlier acceptance criteria. Detected concentrations of these analytes should be considered as estimated.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG in this batch met the acceptance criteria.

Surrogate Recoveries

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

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 354868001 (J1TXH0) was selected for analysis as the matrix spike and matrix spike duplicate.

Matrix Spike (MS) Recovery Statement

The MS, 1203151251 (J1TXH0), recovered 2,4-Dinitrophenol at 15.3%. The limits are 19-101%. The MS and MSD recovered 2,4-Dinitrophenol in a similar manner. The failures are attributed to matrix interference. The LCS passed recovery for 2,4-Dinitrophenol. The data are reported.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD, 1203151252 (J1TXH0), recovered 2,4-Dinitrophenol at 12.1%. The limits are 19-101%. The MS and MSD recovered 2,4-Dinitrophenol in a similar manner. The failures are attributed to matrix interference. The LCS passed recovery for 2,4-Dinitrophenol. The data are reported.

MS/MSD Relative Percent Difference (RPD) Statement

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

Internal Standard (ISTD) Acceptance

The internal standard responses used to quantitate the requested target analytes were within the required acceptance criteria for the SDG associated samples in this batch.

Technical Information:

Holding Time Specifications

All samples in this SDG in this batch met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All reported compound mass spectra met the detection specifications in the method.

Sample Dilutions

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

Sample Re-extraction/Re-analysis

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

Miscellaneous Information:

Data Exception (DER) Documentation

Data exception report 1326448 was generated for samples 1203151251 (J1TXH0) and 1203151252 (J1TXH0) in this batch for this SDG.

Manual Integrations

Some initial calibration standards, continuing calibration standards, and/or samples may require manual integrations due to software limitations. Manual integrations, if any, are included with the raw data.

TIC Comment

Tentatively identified compounds (TIC) may be requested for samples 1203151245 (MB) and 354868001 (J1TXH0) in this delivery group/work order. Please note that non-requested calibrated analytes detected in a client sample may be reported on the Form 1/Certificate of Analysis as TICs. TIC data, if requested, are included on the Sample Data Summary (Form 1) and are also included with the sample raw data.

Additional Comments

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

Due to rounding differences in the calculation, the data reported in the Surrogate Recovery Report may differ slightly from the raw data. Due to software issue, the raw data may not correctly display the updated SPC limits. Please see Sample Data Summary Report and Surrogate Recovery Report for the correct surrogate acceptance limits.

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 reviewer name associated with the generation of the data and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

System Configuration

The Semi-Volatile-GC/MS analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
MSD8.I	Agilent 6890/5973 GC/MS w/ 7683 Autosampler	HP6890/HP5973	DB-5MS	25m x 0.2mm, 0.33um (5% Phenylmethylpolysiloxane)

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. 21-AUG-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: SEMIOVA GC/MS	Test / Method: SW846 3541/8270D	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1412740	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 354868(X0076)			
Application Issues: Failed Recovery for MS/PS Failed Recovery for MSD/PSD			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. The 1203151251MS recovered 2,4-Dinitrophenol at 15.3%. The limits are 19-101%.</p> <p>2. The 1203151252MSD recovered 2,4-Dinitrophenol at 12.1%. The limits are 19-101%.</p>		<p>1. & 2. The MS and MSD recovered 2,4-Dinitrophenol in a similar manner. The failures are attributed to matrix interference. The LCS passed recovery for 2,4-Dinitrophenol. The data are reported.</p>	

Originator's Name:
Richard Bomar 21-AUG-14

Data Validator/Group Leader:
Herbert Maier 21-AUG-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: X0076 GEL Work Order: 354868 Project: RC-233 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: Barbara Bailey

Date: 16 SEP 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

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-233 Soil**

Report Date: September 16, 2014

Client SDG: X0076

Client Sample ID: J1TXH0
Sample ID: 354868001
Matrix: SOIL
Collect Date: 12-AUG-14 13:38
Receive Date: 15-AUG-14
Collector: Client
Moisture: .435%

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatile-GC/MS											
<i>8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"</i>											
1,2,4-Trichlorobenzene	U	100	100	335	ug/kg	1	RMB	08/20/14	1423	1412740	1
1,2-Dichlorobenzene	U	100	100	335	ug/kg	1					
1,3-Dichlorobenzene	U	100	100	335	ug/kg	1					
1,4-Dichlorobenzene	U	100	100	335	ug/kg	1					
2,4,5-Trichlorophenol	U	100	100	335	ug/kg	1					
2,4,6-Trichlorophenol	U	100	100	335	ug/kg	1					
2,4-Dichlorophenol	U	100	100	335	ug/kg	1					
2,4-Dimethylphenol	U	100	100	335	ug/kg	1					
2,4-Dinitrophenol	TU	100	100	669	ug/kg	1					
2,4-Dinitrotoluene	U	100	100	335	ug/kg	1					
2,6-Dinitrotoluene	U	100	100	335	ug/kg	1					
2-Chloronaphthalene	U	10.0	10.0	33.5	ug/kg	1					
2-Chlorophenol	U	100	100	335	ug/kg	1					
2-Methyl-4,6-dinitrophenol	U	100	100	335	ug/kg	1					
2-Methylnaphthalene	U	10.0	10.0	33.5	ug/kg	1					
2-Nitrophenol	U	100	100	335	ug/kg	1					
3,3'-Dichlorobenzidine	U	100	100	335	ug/kg	1					
4-Bromophenylphenylether	U	100	100	335	ug/kg	1					
4-Chloro-3-methylphenol	U	134	134	335	ug/kg	1					
4-Chloroaniline	U	100	100	335	ug/kg	1					
4-Chlorophenylphenylether	U	100	100	335	ug/kg	1					
4-Nitrophenol	U	100	100	335	ug/kg	1					
Acenaphthene	U	10.0	10.0	33.5	ug/kg	1					
Acenaphthylene	U	10.0	10.0	33.5	ug/kg	1					
Anthracene	U	10.0	10.0	33.5	ug/kg	1					
Benzo(a)anthracene	U	10.0	10.0	33.5	ug/kg	1					
Benzo(a)pyrene	U	10.0	10.0	33.5	ug/kg	1					
Benzo(b)fluoranthene	U	10.0	10.0	33.5	ug/kg	1					
Benzo(ghi)perylene	U	10.0	10.0	33.5	ug/kg	1					
Benzo(k)fluoranthene	U	10.0	10.0	33.5	ug/kg	1					
Butylbenzylphthalate	U	100	100	335	ug/kg	1					
Carbazole	U	10.0	10.0	33.5	ug/kg	1					
Chrysene	U	10.0	10.0	33.5	ug/kg	1					

GEL LABORATORIES LLC

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Certificate of Analysis

Company : WC-Hanford, Inc.
 Address : 2620 Fermi Avenue
 MSIN H4-21
 Richland, Washington 99354
 Contact: Joan Kessner
 Project: **RC-233 Soil**

Report Date: September 16, 2014

Client SDG: X0076

Client Sample ID: J1TXH0
 Sample ID: 354868001

Project: WCHN00313
 Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
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Semi-Volatile-GC/MS

8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"

Di-n-butylphthalate	U	100	100	335	ug/kg	1					
Di-n-octylphthalate	U	100	100	335	ug/kg	1					
Dibenzo(a,h)anthracene	U	10.0	10.0	33.5	ug/kg	1					
Dibenzofuran	U	100	100	335	ug/kg	1					
Diethylphthalate	U	100	100	335	ug/kg	1					
Dimethylphthalate	U	100	100	335	ug/kg	1					
Diphenylamine	U	100	100	335	ug/kg	1					
Fluoranthene	U	10.0	10.0	33.5	ug/kg	1					
Fluorene	U	10.0	10.0	33.5	ug/kg	1					
Hexachlorobenzene	U	100	100	335	ug/kg	1					
Hexachlorobutadiene	U	100	100	335	ug/kg	1					
Hexachlorocyclopentadiene	U	100	100	335	ug/kg	1					
Hexachloroethane	U	100	100	335	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	10.0	10.0	33.5	ug/kg	1					
Isophorone	U	100	100	335	ug/kg	1					
N-Nitrosodipropylamine	U	100	100	335	ug/kg	1					
Naphthalene	U	10.0	10.0	33.5	ug/kg	1					
Nitrobenzene	U	100	100	335	ug/kg	1					
Pentachlorophenol	U	100	100	335	ug/kg	1					
Phenanthrene	U	10.0	10.0	33.5	ug/kg	1					
Phenol	U	100	100	335	ug/kg	1					
Pyrene	U	10.0	10.0	33.5	ug/kg	1					
bis(2-Chloro-1-methylethyl)ether	U	100	100	335	ug/kg	1					
bis(2-Chloroethoxy)methane	U	100	100	335	ug/kg	1					
bis(2-Chloroethyl) ether	U	100	100	335	ug/kg	1					
bis(2-Ethylhexyl)phthalate	U	100	100	335	ug/kg	1					
3- and/or 4-Methylphenol	U	100	100	335	ug/kg	1					
m-Nitroaniline	U	100	100	335	ug/kg	1					
o-Cresol	U	100	100	335	ug/kg	1					
o-Nitroaniline	U	110	110	335	ug/kg	1					
p-Nitroaniline	U	100	100	335	ug/kg	1					

Surrogate/Tracer recovery

Result	Nominal	Recovery%	Acceptable Limits
2-Fluorobiphenyl	1050 ug/kg	1670	62.6 (25%-100%)
Nitrobenzene-d5	1150 ug/kg	1670	68.5 (21%-103%)
p-Terphenyl-d14	1530 ug/kg	1670	91.7 (31%-124%)
Phenol-d5	1580 ug/kg	3350	47.3 (25%-108%)
2-Fluorophenol	2420 ug/kg	3350	72.3 (23%-107%)

Date Time: 08/20/14 14 23

GEL LABORATORIES LLC

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Certificate of Analysis

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Address : 2620 Fermi Avenue
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Contact: Joan Kessner
Project: **RC-233 Soil**

Report Date: September 16, 2014

Client SDG: X0076

Client Sample ID: J1TXH0
Sample ID: 354868001
Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
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Semi-Volatile-GC/MS

8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"

2,4,6-Tribromophenol 2810 ug/kg 3350 84.0 (20%-122%)

<i>Tentatively Identified Compound (TIC)</i>	<i>CAS No.</i>	<i>RT</i>	<i>Est. Concentration</i>	<i>Fit</i>	<i>Qual</i>	<i>Date Time:</i>	<i>08/20/14 14 23</i>
Trichloromethane	000067-66-3	2.288	183 ug/kg	96	NJ		
unknown		2.443	224 ug/kg	0	J		
Unknown Aldol Condensate		4.171	3560 ug/kg		AJ		
E-15-Heptadecenal	1000130-97-9	15.633	1110 ug/kg	95	NJ		
Eicosane	000112-95-8	19.179	400 ug/kg	95	NJ		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	SXW3	08/19/14	1734	1412739

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: September 16, 2014

Page 1 of 14

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

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
QC1203151246	LCS										
1,2,4-Trichlorobenzene	1670			1160	ug/kg		69.7	(37%-98%)	RMB	08/20/14	10:40
1,2-Dichlorobenzene	1670			1080	ug/kg		64.8	(39%-93%)			
1,3-Dichlorobenzene	1670			1010	ug/kg		60.5	(39%-110%)			
1,4-Dichlorobenzene	1670			1030	ug/kg		61.7	(40%-110%)			
2,4,5-Trichlorophenol	1670			1080	ug/kg		65.1	(41%-103%)			
2,4,6-Trichlorophenol	1670			1110	ug/kg		66.6	(36%-98%)			
2,4-Dichlorophenol	1670			1220	ug/kg		73.4	(35%-110%)			
2,4-Dimethylphenol	1670			1130	ug/kg		67.6	(35%-102%)			
2,4-Dinitrophenol	1670		J	417	ug/kg		25.1	(22%-83%)			
2,4-Dinitrotoluene	1670			1170	ug/kg		70.6	(43%-109%)			
2,6-Dinitrotoluene	1670			1180	ug/kg		70.8	(41%-103%)			
2-Chloronaphthalene	1670			1130	ug/kg		67.7	(39%-101%)			
2-Chlorophenol	1670			1210	ug/kg		72.6	(38%-100%)			
2-Methyl-4,6-dinitrophenol	1670			967	ug/kg		58.1	(33%-103%)			
2-Methylnaphthalene	1670			1100	ug/kg		65.8	(36%-107%)			
2-Nitrophenol	1670			1170	ug/kg		70.4	(35%-106%)			
3,3'-Dichlorobenzidine	1670			1010	ug/kg		61	(32%-111%)			
3- and/or 4-Methylphenol	1670			1360	ug/kg		81.6	(39%-115%)			
4-Bromophenylphenylether	1670			1250	ug/kg		75	(42%-110%)			
4-Chloro-3-methylphenol	1670			1220	ug/kg		73.3	(35%-104%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
4-Chloroaniline	1670			1180	ug/kg		70.9	(32%-106%)	RMB	08/20/14	10:40
4-Chlorophenylphenylether	1670			1110	ug/kg		66.5	(41%-104%)			
4-Nitrophenol	1670			897	ug/kg		53.9	(23%-114%)			
Acenaphthene	1670			1080	ug/kg		65.1	(36%-105%)			
Acenaphthylene	1670			1150	ug/kg		68.8	(38%-103%)			
Anthracene	1670			1160	ug/kg		69.6	(43%-104%)			
Benzo(a)anthracene	1670			1300	ug/kg		78.3	(46%-108%)			
Benzo(a)pyrene	1670			1240	ug/kg		74.5	(45%-109%)			
Benzo(b)fluoranthene	1670			1220	ug/kg		73.1	(42%-111%)			
Benzo(ghi)perylene	1670			1310	ug/kg		78.4	(43%-115%)			
Benzo(k)fluoranthene	1670			1240	ug/kg		74.5	(43%-103%)			
Butylbenzylphthalate	1670			1610	ug/kg		96.9	(37%-107%)			
Carbazole	1670			1340	ug/kg		80.4	(53%-118%)			
Chrysene	1670			1160	ug/kg		69.6	(47%-107%)			
Di-n-butylphthalate	1670			1310	ug/kg		78.7	(46%-112%)			
Di-n-octylphthalate	1670			1530	ug/kg		91.6	(41%-110%)			
Dibenzo(a,h)anthracene	1670			1390	ug/kg		83.3	(39%-128%)			
Dibenzofuran	1670			1120	ug/kg		67.1	(38%-104%)			
Diethylphthalate	1670			1170	ug/kg		70.1	(42%-109%)			
Dimethylphthalate	1670			1170	ug/kg		70.5	(41%-105%)			
Diphenylamine	1670			1210	ug/kg		72.6	(40%-101%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
Fluoranthene	1670			1190	ug/kg		71.6	(44%-106%)			
Fluorene	1670			1090	ug/kg		65.7	(39%-102%)	RMB	08/20/14	10:40
Hexachlorobenzene	1670			1420	ug/kg		85.5	(41%-108%)			
Hexachlorobutadiene	1670			1080	ug/kg		64.6	(32%-104%)			
Hexachlorocyclopentadiene	1670			714	ug/kg		42.9	(24%-84%)			
Hexachloroethane	1670			1020	ug/kg		61.4	(34%-98%)			
Indeno(1,2,3-cd)pyrene	1670			1290	ug/kg		77.6	(45%-115%)			
Isophorone	1670			1260	ug/kg		75.4	(36%-98%)			
N-Nitrosodipropylamine	1670			1170	ug/kg		70.1	(34%-106%)			
Naphthalene	1670			1130	ug/kg		67.9	(38%-106%)			
Nitrobenzene	1670			1200	ug/kg		71.8	(35%-99%)			
Pentachlorophenol	1670			1030	ug/kg		62	(31%-93%)			
Phenanthrene	1670			1150	ug/kg		69	(43%-105%)			
Phenol	1670			1200	ug/kg		71.9	(38%-98%)			
Pyrene	1670			1410	ug/kg		84.8	(33%-99%)			
bis(2-Chloro-1-methylethyl)ether	1670			1060	ug/kg		64	(27%-109%)			
bis(2-Chloroethoxy)methane	1670			1180	ug/kg		71.1	(37%-98%)			
bis(2-Chloroethyl) ether	1670			1120	ug/kg		67.4	(35%-96%)			
bis(2-Ethylhexyl)phthalate	1670			1590	ug/kg		95.7	(41%-104%)			
m-Nitroaniline	1670			1150	ug/kg		69.3	(32%-113%)			
o-Cresol	1670			1210	ug/kg		72.7	(37%-97%)			
o-Nitroaniline	1670			1100	ug/kg		66	(34%-116%)			

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Semi-Volatile-GC/MS											
Batch	1412740										
p-Nitroaniline	1670			1270	ug/kg		76.4	(35%-150%)			
**2,4,6-Tribromophenol	3330			2760	ug/kg		82.9	(20%-122%)	RMB	08/20/14	10:40
**2-Fluorobiphenyl	1670			1110	ug/kg		66.6	(25%-100%)			
**2-Fluorophenol	3330			2470	ug/kg		74.1	(23%-107%)			
**Nitrobenzene-d5	1670			1190	ug/kg		71.6	(21%-103%)			
**Phenol-d5	3330			2450	ug/kg		73.5	(25%-108%)			
**p-Terphenyl-d14	1670			1440	ug/kg		86.2	(31%-124%)			
QC1203151245 MB											
1,2,4-Trichlorobenzene			U	99.9	ug/kg					08/20/14	10:08
1,2-Dichlorobenzene			U	99.9	ug/kg						
1,3-Dichlorobenzene			U	99.9	ug/kg						
1,4-Dichlorobenzene			U	99.9	ug/kg						
2,4,5-Trichlorophenol			U	99.9	ug/kg						
2,4,6-Trichlorophenol			U	99.9	ug/kg						
2,4-Dichlorophenol			U	99.9	ug/kg						
2,4-Dimethylphenol			U	99.9	ug/kg						
2,4-Dinitrophenol			U	99.9	ug/kg						
2,4-Dinitrotoluene			U	99.9	ug/kg						
2,6-Dinitrotoluene			U	99.9	ug/kg						
2-Chloronaphthalene			U	9.99	ug/kg						
2-Chlorophenol			U	99.9	ug/kg						
2-Methyl-4,6-dinitrophenol			U	99.9	ug/kg						
2-Methylnaphthalene			U	9.99	ug/kg						

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
2-Nitrophenol			U	99.9	ug/kg				RMB	08/20/14	10:08
3,3'-Dichlorobenzidine			U	99.9	ug/kg						
3- and/or 4-Methylphenol			U	99.9	ug/kg						
4-Bromophenylphenylether			U	99.9	ug/kg						
4-Chloro-3-methylphenol			U	133	ug/kg						
4-Chloroaniline			U	99.9	ug/kg						
4-Chlorophenylphenylether			U	99.9	ug/kg						
4-Nitrophenol			U	99.9	ug/kg						
Acenaphthene			U	9.99	ug/kg						
Acenaphthylene			U	9.99	ug/kg						
Anthracene			U	9.99	ug/kg						
Benzo(a)anthracene			U	9.99	ug/kg						
Benzo(a)pyrene			U	9.99	ug/kg						
Benzo(b)fluoranthene			U	9.99	ug/kg						
Benzo(ghi)perylene			U	9.99	ug/kg						
Benzo(k)fluoranthene			U	9.99	ug/kg						
Butylbenzylphthalate			U	99.9	ug/kg						
Carbazole			U	9.99	ug/kg						
Chrysene			U	9.99	ug/kg						
Di-n-butylphthalate			U	99.9	ug/kg						
Di-n-octylphthalate			U	99.9	ug/kg						

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
Dibenzo(a,h)anthracene			U	9.99	ug/kg						
Dibenzofuran			U	99.9	ug/kg				RMB	08/20/14	10:08
Diethylphthalate			U	99.9	ug/kg						
Dimethylphthalate			U	99.9	ug/kg						
Diphenylamine			U	99.9	ug/kg						
Fluoranthene			U	9.99	ug/kg						
Fluorene			U	9.99	ug/kg						
Hexachlorobenzene			U	99.9	ug/kg						
Hexachlorobutadiene			U	99.9	ug/kg						
Hexachlorocyclopentadiene			U	99.9	ug/kg						
Hexachloroethane			U	99.9	ug/kg						
Indeno(1,2,3-cd)pyrene			U	9.99	ug/kg						
Isophorone			U	99.9	ug/kg						
N-Nitrosodipropylamine			U	99.9	ug/kg						
Naphthalene			U	9.99	ug/kg						
Nitrobenzene			U	99.9	ug/kg						
Pentachlorophenol			U	99.9	ug/kg						
Phenanthrene			U	9.99	ug/kg						
Phenol			U	99.9	ug/kg						
Pyrene			U	9.99	ug/kg						
bis(2-Chloro-1-methylethyl)ether			U	99.9	ug/kg						
bis(2-Chloroethoxy)methane			U	99.9	ug/kg						

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
bis(2-Chloroethyl) ether			U	99.9	ug/kg						
bis(2-Ethylhexyl)phthalate			U	99.9	ug/kg				RMB	08/20/14	10:08
m-Nitroaniline			U	99.9	ug/kg						
o-Cresol			U	99.9	ug/kg						
o-Nitroaniline			U	110	ug/kg						
p-Nitroaniline			U	99.9	ug/kg						
**2,4,6-Tribromophenol	3330			2570	ug/kg		77.2	(20%-122%)			
**2-Fluorobiphenyl	1670			1070	ug/kg		64.4	(25%-100%)			
**2-Fluorophenol	3330			2150	ug/kg		64.4	(23%-107%)			
**Nitrobenzene-d5	1670			1220	ug/kg		73.2	(21%-103%)			
**Phenol-d5	3330			2100	ug/kg		63.1	(25%-108%)			
**p-Terphenyl-d14	1670			1220	ug/kg		73.5	(31%-124%)			
QC1203151251 354868001 MS											
1,2,4-Trichlorobenzene	1670	U	100	978	ug/kg		58.4	(25%-102%)		08/20/14	14:55
1,2-Dichlorobenzene	1670	U	100	1030	ug/kg		61.3	(25%-99%)			
1,3-Dichlorobenzene	1670	U	100	963	ug/kg		57.6	(24%-96%)			
1,4-Dichlorobenzene	1670	U	100	952	ug/kg		56.9	(24%-97%)			
2,4,5-Trichlorophenol	1670	U	100	1070	ug/kg		63.8	(38%-109%)			
2,4,6-Trichlorophenol	1670	U	100	1010	ug/kg		60.5	(32%-103%)			
2,4-Dichlorophenol	1670	U	100	1070	ug/kg		64.2	(31%-103%)			
2,4-Dimethylphenol	1670	U	100	961	ug/kg		57.4	(30%-109%)			
2,4-Dinitrophenol	1670	TU	100 JT	255	ug/kg		15.3 *	(19%-101%)			
2,4-Dinitrotoluene	1670	U	100	1120	ug/kg		67.1	(36%-115%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
2,6-Dinitrotoluene	1670	U	100	1120	ug/kg		67.2	(36%-107%)	RMB	08/20/14	14:55
2-Chloronaphthalene	1670	U	10.0	1020	ug/kg		61	(27%-109%)			
2-Chlorophenol	1670	U	100	994	ug/kg		59.4	(28%-108%)			
2-Methyl-4,6-dinitrophenol	1670	U	100	721	ug/kg		43.1	(14%-116%)			
2-Methylnaphthalene	1670	U	10.0	937	ug/kg		56	(23%-107%)			
2-Nitrophenol	1670	U	100	1010	ug/kg		60.1	(24%-106%)			
3,3'-Dichlorobenzidine	1670	U	100	1040	ug/kg		62.4	(28%-105%)			
3- and/or 4-Methylphenol	1670	U	100	1160	ug/kg		69.3	(32%-123%)			
4-Bromophenylphenylether	1670	U	100	1180	ug/kg		70.2	(37%-112%)			
4-Chloro-3-methylphenol	1670	U	134	1100	ug/kg		65.5	(32%-112%)			
4-Chloroaniline	1670	U	100	960	ug/kg		57.4	(27%-100%)			
4-Chlorophenylphenylether	1670	U	100	1050	ug/kg		62.5	(37%-110%)			
4-Nitrophenol	1670	U	100	909	ug/kg		54.3	(12%-128%)			
Acenaphthene	1670	U	10.0	970	ug/kg		57.9	(28%-102%)			
Acenaphthylene	1670	U	10.0	1060	ug/kg		63.5	(32%-103%)			
Anthracene	1670	U	10.0	1110	ug/kg		66.4	(36%-104%)			
Benzo(a)anthracene	1670	U	10.0	1220	ug/kg		72.8	(27%-120%)			
Benzo(a)pyrene	1670	U	10.0	1220	ug/kg		73.2	(31%-116%)			
Benzo(b)fluoranthene	1670	U	10.0	1180	ug/kg		70.8	(30%-119%)			
Benzo(ghi)perylene	1670	U	10.0	1080	ug/kg		64.6	(30%-109%)			
Benzo(k)fluoranthene	1670	U	10.0	1210	ug/kg		72.6	(31%-125%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
Butylbenzylphthalate	1670	U	100	1470	ug/kg		87.9	(33%-121%)			
Carbazole	1670	U	10.0	1260	ug/kg		75.1	(40%-133%)	RMB	08/20/14	14:55
Chrysene	1670	U	10.0	1150	ug/kg		68.8	(33%-114%)			
Di-n-butylphthalate	1670	U	100	1240	ug/kg		74.1	(42%-119%)			
Di-n-octylphthalate	1670	U	100	1440	ug/kg		86.2	(36%-115%)			
Dibenzo(a,h)anthracene	1670	U	10.0	1290	ug/kg		77.3	(26%-128%)			
Dibenzofuran	1670	U	100	1050	ug/kg		62.5	(28%-117%)			
Diethylphthalate	1670	U	100	1110	ug/kg		66.3	(40%-113%)			
Dimethylphthalate	1670	U	100	1080	ug/kg		64.6	(38%-110%)			
Diphenylamine	1670	U	100	1160	ug/kg		69.6	(34%-111%)			
Fluoranthene	1670	U	10.0	1020	ug/kg		61.2	(32%-115%)			
Fluorene	1670	U	10.0	1040	ug/kg		61.9	(30%-115%)			
Hexachlorobenzene	1670	U	100	1300	ug/kg		77.6	(34%-111%)			
Hexachlorobutadiene	1670	U	100	1000	ug/kg		59.9	(24%-105%)			
Hexachlorocyclopentadiene	1670	U	100	388	ug/kg		23.2	(12%-106%)			
Hexachloroethane	1670	U	100	967	ug/kg		57.8	(24%-102%)			
Indeno(1,2,3-cd)pyrene	1670	U	10.0	1170	ug/kg		69.7	(29%-117%)			
Isophorone	1670	U	100	1030	ug/kg		61.8	(24%-108%)			
N-Nitrosodipropylamine	1670	U	100	910	ug/kg		54.4	(23%-117%)			
Naphthalene	1670	U	10.0	913	ug/kg		54.6	(21%-107%)			
Nitrobenzene	1670	U	100	1010	ug/kg		60.1	(25%-104%)			
Pentachlorophenol	1670	U	100	817	ug/kg		48.8	(22%-108%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
Phenanthrene	1670	U	10.0	1080	ug/kg		64.7	(28%-119%)			
Phenol	1670	U	100	927	ug/kg		55.4	(28%-108%)	RMB	08/20/14	14:55
Pyrene	1670	U	10.0	1340	ug/kg		79.8	(25%-119%)			
bis(2-Chloro-1-methylethyl)ether	1670	U	100	911	ug/kg		54.5	(25%-105%)			
bis(2-Chloroethoxy)methane	1670	U	100	989	ug/kg		59.1	(27%-104%)			
bis(2-Chloroethyl) ether	1670	U	100	886	ug/kg		52.9	(25%-102%)			
bis(2-Ethylhexyl)phthalate	1670	U	100	1430	ug/kg		85.6	(33%-124%)			
m-Nitroaniline	1670	U	100	1060	ug/kg		63.3	(31%-110%)			
o-Cresol	1670	U	100	924	ug/kg		55.2	(27%-105%)			
o-Nitroaniline	1670	U	110	1080	ug/kg		64.3	(37%-114%)			
p-Nitroaniline	1670	U	100	1260	ug/kg		75.2	(36%-141%)			
**2,4,6-Tribromophenol	3350		2810	2490	ug/kg		74.5	(20%-122%)			
**2-Fluorobiphenyl	1670		1050	944	ug/kg		56.4	(25%-100%)			
**2-Fluorophenol	3350		2420	2200	ug/kg		65.6	(23%-107%)			
**Nitrobenzene-d5	1670		1150	938	ug/kg		56	(21%-103%)			
**Phenol-d5	3350		1580	1950	ug/kg		58.3	(25%-108%)			
**p-Terphenyl-d14	1670		1530	1340	ug/kg		80.1	(31%-124%)			
QC1203151252 354868001 MSD											
1,2,4-Trichlorobenzene	1670	U	100	1130	ug/kg	14.2	67.3	(0%-30%)		08/20/14	15:27
1,2-Dichlorobenzene	1670	U	100	1070	ug/kg	3.81	63.7	(0%-30%)			
1,3-Dichlorobenzene	1670	U	100	992	ug/kg	2.94	59.3	(0%-30%)			
1,4-Dichlorobenzene	1670	U	100	932	ug/kg	2.13	55.7	(0%-30%)			
2,4,5-Trichlorophenol	1670	U	100	1150	ug/kg	7.40	68.7	(0%-30%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
2,4,6-Trichlorophenol	1670	U	100	1090	ug/kg	7.41	65.2	(0%-30%)	RMB	08/20/14	15:27
2,4-Dichlorophenol	1670	U	100	1250	ug/kg	15.2	74.8	(0%-30%)			
2,4-Dimethylphenol	1670	U	100	1110	ug/kg	14.5	66.4	(0%-30%)			
2,4-Dinitrophenol	1670	TU	100 JT	202	ug/kg	23.3	12.1 *	(0%-30%)			
2,4-Dinitrotoluene	1670	U	100	1250	ug/kg	10.6	74.7	(0%-30%)			
2,6-Dinitrotoluene	1670	U	100	1200	ug/kg	6.62	71.8	(0%-30%)			
2-Chloronaphthalene	1670	U	10.0	1070	ug/kg	4.80	64	(0%-30%)			
2-Chlorophenol	1670	U	100	1070	ug/kg	7.49	64	(0%-30%)			
2-Methyl-4,6-dinitrophenol	1670	U	100	738	ug/kg	2.43	44.1	(0%-30%)			
2-Methylnaphthalene	1670	U	10.0	1080	ug/kg	13.9	64.4	(0%-30%)			
2-Nitrophenol	1670	U	100	1170	ug/kg	14.9	69.8	(0%-30%)			
3,3'-Dichlorobenzidine	1670	U	100	1060	ug/kg	1.34	63.2	(0%-30%)			
3- and/or 4-Methylphenol	1670	U	100	1280	ug/kg	9.53	76.3	(0%-30%)			
4-Bromophenylphenylether	1670	U	100	1310	ug/kg	10.7	78.1	(0%-30%)			
4-Chloro-3-methylphenol	1670	U	134	1290	ug/kg	16.0	76.9	(0%-30%)			
4-Chloroaniline	1670	U	100	1100	ug/kg	13.9	65.9	(0%-30%)			
4-Chlorophenylphenylether	1670	U	100	1140	ug/kg	8.25	67.9	(0%-30%)			
4-Nitrophenol	1670	U	100	944	ug/kg	3.76	56.4	(0%-30%)			
Acenaphthene	1670	U	10.0	1030	ug/kg	5.86	61.4	(0%-30%)			
Acenaphthylene	1670	U	10.0	1110	ug/kg	4.64	66.5	(0%-30%)			
Anthracene	1670	U	10.0	1190	ug/kg	7.04	71.2	(0%-30%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
Benzo(a)anthracene	1670	U	10.0	1330	ug/kg	8.54	79.3	(0%-30%)			
Benzo(a)pyrene	1670	U	10.0	1310	ug/kg	6.35	78	(0%-30%)	RMB	08/20/14	15:27
Benzo(b)fluoranthene	1670	U	10.0	1330	ug/kg	11.4	79.4	(0%-30%)			
Benzo(ghi)perylene	1670	U	10.0	925	ug/kg	15.5	55.3	(0%-30%)			
Benzo(k)fluoranthene	1670	U	10.0	1360	ug/kg	11.2	81.1	(0%-30%)			
Butylbenzylphthalate	1670	U	100	1580	ug/kg	6.96	94.3	(0%-30%)			
Carbazole	1670	U	10.0	1340	ug/kg	6.10	79.8	(0%-30%)			
Chrysene	1670	U	10.0	1240	ug/kg	7.17	73.9	(0%-30%)			
Di-n-butylphthalate	1670	U	100	1330	ug/kg	6.71	79.2	(0%-30%)			
Di-n-octylphthalate	1670	U	100	1510	ug/kg	4.49	90.1	(0%-30%)			
Dibenzo(a,h)anthracene	1670	U	10.0	1170	ug/kg	10.3	69.8	(0%-30%)			
Dibenzofuran	1670	U	100	1120	ug/kg	6.50	66.7	(0%-30%)			
Diethylphthalate	1670	U	100	1200	ug/kg	7.58	71.5	(0%-30%)			
Dimethylphthalate	1670	U	100	1170	ug/kg	7.85	69.9	(0%-30%)			
Diphenylamine	1670	U	100	1240	ug/kg	6.32	74.1	(0%-30%)			
Fluoranthene	1670	U	10.0	1080	ug/kg	5.53	64.7	(0%-30%)			
Fluorene	1670	U	10.0	1120	ug/kg	7.49	66.7	(0%-30%)			
Hexachlorobenzene	1670	U	100	1450	ug/kg	10.7	86.4	(0%-30%)			
Hexachlorobutadiene	1670	U	100	1050	ug/kg	4.63	62.7	(0%-30%)			
Hexachlorocyclopentadiene	1670	U	100	J 303	ug/kg	24.7	18.1	(0%-30%)			
Hexachloroethane	1670	U	100	905	ug/kg	6.61	54.1	(0%-30%)			
Indeno(1,2,3-cd)pyrene	1670	U	10.0	1020	ug/kg	13.5	60.9	(0%-30%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
Isophorone	1670	U	100	1180	ug/kg	13.2	70.5	(0%-30%)			
N-Nitrosodipropylamine	1670	U	100	996	ug/kg	8.96	59.5	(0%-30%)	RMB	08/20/14	15:27
Naphthalene	1670	U	10.0	1050	ug/kg	13.9	62.7	(0%-30%)			
Nitrobenzene	1670	U	100	1100	ug/kg	8.91	65.7	(0%-30%)			
Pentachlorophenol	1670	U	100	822	ug/kg	0.572	49.1	(0%-30%)			
Phenanthrene	1670	U	10.0	1160	ug/kg	6.61	69.1	(0%-30%)			
Phenol	1670	U	100	1040	ug/kg	11.1	62	(0%-30%)			
Pyrene	1670	U	10.0	1470	ug/kg	9.77	88	(0%-30%)			
bis(2-Chloro-1-methylethyl)ether	1670	U	100	899	ug/kg	1.33	53.7	(0%-30%)			
bis(2-Chloroethoxy)methane	1670	U	100	1130	ug/kg	13.4	67.6	(0%-30%)			
bis(2-Chloroethyl) ether	1670	U	100	961	ug/kg	8.12	57.4	(0%-30%)			
bis(2-Ethylhexyl)phthalate	1670	U	100	1520	ug/kg	5.89	90.8	(0%-30%)			
m-Nitroaniline	1670	U	100	1140	ug/kg	7.39	68.2	(0%-30%)			
o-Cresol	1670	U	100	1020	ug/kg	10.2	61.2	(0%-30%)			
o-Nitroaniline	1670	U	110	1080	ug/kg	0.124	64.4	(0%-30%)			
p-Nitroaniline	1670	U	100	1360	ug/kg	7.52	81.1	(0%-30%)			
**2,4,6-Tribromophenol	3350		2810	2890	ug/kg		86.4	(20%-122%)			
**2-Fluorobiphenyl	1670		1050	1020	ug/kg		61	(25%-100%)			
**2-Fluorophenol	3350		2420	2330	ug/kg		69.7	(23%-107%)			
**Nitrobenzene-d5	1670		1150	1080	ug/kg		64.3	(21%-103%)			
**Phenol-d5	3350		1580	2160	ug/kg		64.5	(25%-108%)			
**p-Terphenyl-d14	1670		1530	1490	ug/kg		89.3	(31%-124%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
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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: 1412739 Verified by: _____
 Analyst: Shannon Whitehead
 Method: SW846 3541

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

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1203151245 MB	19-AUG-2014 17:34:00	30.02	1	0.03331
1203151246 LCS	19-AUG-2014 17:34:00	30.03	1	0.0333
354864001	19-AUG-2014 17:34:00	30	1	0.03333
1203151247 MS (354864001)	19-AUG-2014 17:34:00	30	1	0.03333
1203151248 MSD (354864001)	19-AUG-2014 17:34:00	30.01	1	0.03332
354866001	19-AUG-2014 17:34:00	30.01	1	0.03332
1203151249 MS (354866001)	19-AUG-2014 17:34:00	30.04	1	0.03329
1203151250 MSD (354866001)	19-AUG-2014 17:34:00	30.02	1	0.03331
354868001	19-AUG-2014 17:34:00	30.01	1	0.03332
1203151251 MS (354868001)	19-AUG-2014 17:34:00	30.01	1	0.03332
1203151252 MSD (354868001)	19-AUG-2014 17:34:00	30.01	1	0.03332

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203151246	BENZIDINE LCS	UE140804-40B	1	mL	Final Solvent: CH2Cl2 Verified By: MD
LCS	1203151246	BNA LCS w/o Benzidine 50ppm	UE140807-36	1	mL	
MS	1203151247	BENZIDINE LCS	UE140804-40B	1	mL	
MS	1203151247	BNA LCS w/o Benzidine 50ppm	UE140807-36	1	mL	
MS	1203151249	BENZIDINE LCS	UE140804-40B	1	mL	
MS	1203151249	BNA LCS w/o Benzidine 50ppm	UE140807-36	1	mL	
MS	1203151251	BENZIDINE LCS	UE140804-40B	1	mL	
MS	1203151251	BNA LCS w/o Benzidine 50ppm	UE140807-36	1	mL	
MSD	1203151248	BENZIDINE LCS	UE140804-40B	1	mL	
MSD	1203151248	BNA LCS w/o Benzidine 50ppm	UE140807-36	1	mL	
MSD	1203151250	BENZIDINE LCS	UE140804-40B	1	mL	
MSD	1203151250	BNA LCS w/o Benzidine 50ppm	UE140807-36	1	mL	
MSD	1203151252	BENZIDINE LCS	UE140804-40B	1	mL	
MSD	1203151252	BNA LCS w/o Benzidine 50ppm	UE140807-36	1	mL	
SURR	All	BNA for all Surrogate	UE140804-06	1	mL	
REGNT	All	Acetone	2126069-B1	60	mL	
REGNT	All	Methylene Chloride	2142154-D	60	mL	
SOURC	All	SODIUM SULFATE	2127169	30	g	

HPLC Polynuclear Aromatic Hydrocarbon Analysis

**HPLC-PAH
WC-HANFORD, INC. (WCHN)
SDG X0076**

Method/Analysis Information

Procedure: Polynuclear Aromatic Hydrocarbons
Analytical Method: SW846 8310
Prep Method: SW846 3550B
Analytical Batch Number: 1413006
Prep Batch Number: 1413005

Sample Analysis

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

Sample ID	Client ID
354868001	J1TXH0
1203151970	MB for batch 1413005
1203151971	Laboratory Control Sample (LCS)
1203151976	354868001(J1TXH0) Matrix Spike (MS)
1203151977	354868001(J1TXH0) 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 354868001 (J1TXH0) 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, and QC sample 1203151977 (J1TXH0) required manual integrations due to software limitations.

Please see the raw data in the Miscellaneous Section.

Additional Comments

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

Electronic Package Comment

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

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

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

System Configuration

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

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

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

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

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

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

Chromatographic Columns

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

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

Certification Statement

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

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0076 GEL Work Order: 354868 Project: RC-233 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: Michael Penny

Date: 29 AUG 2014

Title: Group Leader

Roadmap for WCHN X0076 HPLC_PAH

This roadmap was analyzed by cww on 08-28-2014, 16:19.

This roadmap was reviewed by MAP on 08-29-2014, 08:48.

This roadmap was packaged by map on 08-29-2014, 10:13.

Sample

exclude	manual	datafile	smpid	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p082114.b/ph5h2145.d	354868001	22-AUG-2014	15:32	X0076.sub	J1TXH0	1	1413006	<input type="checkbox"/>

QC Sample

exclude	manual	datafile	smpid	sampletype	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p082114.b/ph5h2137B.d	1203151970	mb	22-AUG-2014	09:54	X0076.sub	PAHBLK01	1	1413006	<input type="checkbox"/>
<input type="checkbox"/>	N	/chem/hplce.i/p082114.b/ph5h2138B.d	1203151971	lcs	22-AUG-2014	10:36	X0076.sub	PAHBLK01LCS	1	1413006	Pass
<input type="checkbox"/>	N	/chem/hplce.i/p082114.b/ph5h2149.d	1203151976	ms	22-AUG-2014	18:21	X0076.sub	J1TXH0MS	1	1413006	Pass
<input type="checkbox"/>	N	/chem/hplce.i/p082114.b/ph5h2150.d	1203151977	msd	22-AUG-2014	19:03	X0076.sub	J1TXH0MSD	1	1413006	Pass

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: August 29, 2014

Company : WC-Hanford, Inc.
 Address : 2620 Fermi Avenue
 MSIN H4-21
 Richland, Washington 99354
 Contact: Joan Kessner
 Project: RC-233 Soil

Client SDG: X0076

Client Sample ID: J1TXH0	Project: WCHN00313
Sample ID: 354868001	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 12-AUG-14 13:38	
Receive Date: 15-AUG-14	
Collector: Client	
Moisture: .435%	

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	5.01	5.01	16.7	ug/kg	1	CWW	08/22/14	1532	1413006	1
Acenaphthylene	U	5.01	5.01	16.7	ug/kg	1					
Anthracene	U	1.67	1.67	16.7	ug/kg	1					
Benzo(a)anthracene	U	0.535	0.535	1.67	ug/kg	1					
Benzo(a)pyrene	U	0.535	0.535	1.67	ug/kg	1					
Benzo(b)fluoranthene	U	0.535	0.535	1.67	ug/kg	1					
Benzo(ghi)perylene	U	0.535	0.535	1.67	ug/kg	1					
Benzo(k)fluoranthene	U	0.267	0.267	0.836	ug/kg	1					
Chrysene	U	0.535	0.535	1.67	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.535	0.535	1.67	ug/kg	1					
Fluoranthene	U	0.535	0.535	1.67	ug/kg	1					
Fluorene	U	5.01	5.01	16.7	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.535	0.535	1.67	ug/kg	1					
Naphthalene	U	5.01	5.01	16.7	ug/kg	1					
Phenanthrene	U	5.01	5.01	16.7	ug/kg	1					
Pyrene	U	0.535	0.535	1.67	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	AXV1	08/20/14	1648	1413005

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"	6420 ug/kg	8360	76.8	(23%-104%)

Notes:

QC Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: August 29, 2014

Page 1 of 4

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

Contact: Joan Kessner

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1413006										
QC1203151971	LCS										
Acenaphthene	1660			1520	ug/kg		91.2	(58%-99%)	CWW	08/22/14	10:36
Acenaphthylene	1660			1390	ug/kg		83.5	(58%-98%)			
Anthracene	1660			1540	ug/kg		92.3	(63%-94%)			
Benzo(a)anthracene	166			151	ug/kg		90.5	(73%-98%)			
Benzo(a)pyrene	166			142	ug/kg		85.4	(63%-99%)			
Benzo(b)fluoranthene	166			150	ug/kg		90.4	(70%-130%)			
Benzo(ghi)perylene	166			140	ug/kg		84.3	(70%-130%)			
Benzo(k)fluoranthene	83.2			81.0	ug/kg		97.4	(70%-130%)			
Chrysene	166			163	ug/kg		98.1	(70%-130%)			
Dibenzo(a,h)anthracene	166			175	ug/kg		105	(70%-130%)			
Fluoranthene	166			145	ug/kg		86.9	(70%-130%)			
Fluorene	1660			1480	ug/kg		88.7	(65%-130%)			
Indeno(1,2,3-cd)pyrene	166			159	ug/kg		95.6	(70%-130%)			
Naphthalene	1660			1340	ug/kg		80.6	(57%-130%)			
Phenanthrene	1660			1470	ug/kg		88.2	(70%-130%)			
Pyrene	166			151	ug/kg		90.9	(70%-130%)			
**Decafluorobiphenyl	8320			6930	ug/kg		83.3	(23%-104%)			
QC1203151970	MB										
Acenaphthene			U	5.00	ug/kg					08/22/14	09:54
Acenaphthylene			U	5.00	ug/kg						

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1413006										
Anthracene			U	1.67	ug/kg						
Benzo(a)anthracene			U	0.533	ug/kg				CWW	08/22/14	09:54
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			6970	ug/kg		83.7	(23%-104%)			
QC1203151976 354868001 MS											
Acenaphthene	1670	U	5.01	1410	ug/kg		84.3	(49%-90%)		08/22/14	18:21
Acenaphthylene	1670	U	5.01	1290	ug/kg		77.2	(48%-97%)			
Anthracene	1670	U	1.67	1450	ug/kg		86.9	(49%-91%)			
Benzo(a)anthracene	167	U	0.535	140	ug/kg		84	(29%-126%)			
Benzo(a)pyrene	167	U	0.535	137	ug/kg		81.6	(26%-130%)			
Benzo(b)fluoranthene	167	U	0.535	143	ug/kg		85.3	(32%-135%)			
Benzo(ghi)perylene	167	U	0.535	133	ug/kg		79.4	(34%-125%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1413006										
Benzo(k)fluoranthene	83.6	U	0.267	76.7	ug/kg		91.8	(48%-142%)	CWW	08/22/14	18:21
Chrysene	167	U	0.535	154	ug/kg		92.1	(39%-127%)			
Dibenzo(a,h)anthracene	167	U	0.535	165	ug/kg		98.5	(38%-130%)			
Fluoranthene	167	U	0.535	136	ug/kg		81.2	(20%-139%)			
Fluorene	1670	U	5.01	1390	ug/kg		83	(51%-90%)			
Indeno(1,2,3-cd)pyrene	167	U	0.535	151	ug/kg		90	(41%-145%)			
Naphthalene	1670	U	5.01	1210	ug/kg		72.4	(43%-87%)			
Phenanthrene	1670	U	5.01	1390	ug/kg		83.3	(50%-100%)			
Pyrene	167	U	0.535	143	ug/kg		85.3	(18%-149%)			
**Decafluorobiphenyl	8360		6420	6170	ug/kg		73.8	(23%-104%)			
QC1203151977 354868001 MSD											
Acenaphthene	1670	U	5.01	1410	ug/kg	0.0839	84.2	(0%-30%)		08/22/14	19:03
Acenaphthylene	1670	U	5.01	1290	ug/kg	0.0631	77.2	(0%-30%)			
Anthracene	1670	U	1.67	1400	ug/kg	3.81	83.7	(0%-30%)			
Benzo(a)anthracene	167	U	0.535	135	ug/kg	4.09	80.7	(0%-30%)			
Benzo(a)pyrene	167	U	0.535	129	ug/kg	6.02	76.9	(0%-30%)			
Benzo(b)fluoranthene	167	U	0.535	135	ug/kg	5.47	80.8	(0%-30%)			
Benzo(ghi)perylene	167	U	0.535	125	ug/kg	5.75	74.9	(0%-30%)			
Benzo(k)fluoranthene	83.6	U	0.267	72.3	ug/kg	5.92	86.5	(0%-30%)			
Chrysene	167	U	0.535	146	ug/kg	5.00	87.6	(0%-30%)			
Dibenzo(a,h)anthracene	167	U	0.535	156	ug/kg	5.22	93.6	(0%-30%)			
Fluoranthene	167	U	0.535	130	ug/kg	4.18	77.9	(0%-30%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1413006										
Fluorene	1670	U	5.01	1360	ug/kg	2.24	81.1	(0%-30%)	CWW	08/22/14	19:03
Indeno(1,2,3-cd)pyrene	167	U	0.535	142	ug/kg	5.52	85.2	(0%-30%)			
Naphthalene	1670	U	5.01	1240	ug/kg	2.14	74	(0%-30%)			
Phenanthrene	1670	U	5.01	1340	ug/kg	3.70	80.3	(0%-30%)			
Pyrene	167	U	0.535	137	ug/kg	3.64	82.2	(0%-30%)			
*Decafluorobiphenyl	8360		6420	6260	ug/kg		74.9	(23%-104%)			

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- o Analyte failed to recover within LCS limits (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: 1413005 **Verified by:** _____
Analyst: Alberto Velasco
Method: SW846 3550B

Lab SOP: GL-OA-E-010 REV# 22
Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1203151970 MB	20-AUG-2014 16:48:00	30.02	1	0.03331
1203151971 LCS	20-AUG-2014 16:48:00	30.04	1	0.03329
354864001	20-AUG-2014 16:48:00	30.01	1	0.03332
1203151972 MS (354864001)	20-AUG-2014 16:48:00	30.05	1	0.03328
1203151973 MSD (354864001)	20-AUG-2014 16:48:00	30.02	1	0.03331
354866001	20-AUG-2014 16:48:00	30.04	1	0.03329
1203151974 MS (354866001)	20-AUG-2014 16:48:00	30.03	1	0.0333
1203151975 MSD (354866001)	20-AUG-2014 16:48:00	30.02	1	0.03331
354868001	20-AUG-2014 16:48:00	30.05	1	0.03328
1203151976 MS (354868001)	20-AUG-2014 16:48:00	30.03	1	0.0333
1203151977 MSD (354868001)	20-AUG-2014 16:48:00	30.04	1	0.03329

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203151971	8310 PAH SPIKE	UE140711-02	1	mL	Verified By: SLW
MS	1203151972	8310 PAH SPIKE	UE140711-02	1	mL	Final Solvent: ACN
MS	1203151974	8310 PAH SPIKE	UE140711-02	1	mL	
MS	1203151976	8310 PAH SPIKE	UE140711-02	1	mL	
MSD	1203151973	8310 PAH SPIKE	UE140711-02	1	mL	
MSD	1203151975	8310 PAH SPIKE	UE140711-02	1	mL	
MSD	1203151977	8310 PAH SPIKE	UE140711-02	1	mL	
SURR	All	Decafluorobiphenyl 250 mg/L	UE140725-30	1	mL	
REGNT	All	HPLC Grade Acetonitrile	2140056	5	mL	
REGNT	All	Methylene Chloride	2142154-D	300	mL	
SOURC	All	SODIUM SULFATE	2127169	30	g	

FID Diesel Range Organics Analysis

Case Narrative

**FID Diesel Range Organics
WC-HANFORD, INC. (WCHN)
SDG X0076**

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: 1412997
Prep Batch Number: 1412996

Sample Analysis

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

Sample ID	Client ID
354868001	J1TXH0
1203151940	MB for batch 1412996
1203151941	Laboratory Control Sample (LCS)
1203151946	354868001(J1TXH0) Matrix Spike (MS)
1203151947	354868001(J1TXH0) 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 354868001 (J1TXH0) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recovery was within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recovery was within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Electronic Package Comment

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

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

Data Exception (DER) Documentation

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

Manual Integrations

Certain standards and samples may have required manual integration to correctly position the baseline as set in

the calibration standard injections. If manual integration was performed, copies of all manual integration peak profiles are included in the raw data section of this fraction.

Additional Comments

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

System Configuration

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

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

Certification Statement

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

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**Qualifier Definition Report
for**

WCHN001 WC-HANFORD, INC.

Client SDG: X0076 GEL Work Order: 354868 Project: RC-233 Soil

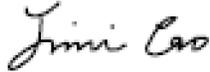
The Qualifiers in this report are defined as follows:

- 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: 25 AUG 2014

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: August 25, 2014

Company : WC–Hanford, Inc.
 Address : 2620 Fermi Avenue
 MSIN H4–21
 Richland, Washington 99354
 Contact: Joan Kessner
 Project: RC–233 Soil

Client SDG: X0076

Client Sample ID: J1TXH0	Project: WCHN00313
Sample ID: 354868001	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 12–AUG–14 13:38	
Receive Date: 15–AUG–14	
Collector: Client	
Moisture: .435%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Diesel Range Organics											
SW 3541/NWTPH–Dx in Soil "Dry Weight Corrected"											
Diesel Range Organics (C10–C20)	U	2170	2170	6690	ug/kg	1	BYT1	08/22/14	1602	1412997	1
Motor Oil (C20–C36)		19800	2170	6690	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	08/20/14	1746	1412996

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	NWTPH–Dx in Soil	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
o–Terphenyl	SW 3541/NWTPH–Dx in Soil "Dry Weight Corrected"	515 ug/kg	669	77.0	(50%–150%)

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: August 25, 2014

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

Contact: Joan Kessner

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Diesel Range Organics											
Batch	1412997										
QC1203151941	LCS										
Diesel Range Organics (C10–C20)	66600			53400	ug/kg		80.1	(70%–130%)	BYT1	08/21/14	12
Motor Oil (C20–C36)	66600			58100	ug/kg		87.2	(70%–130%)			
**o–Terphenyl	666			559	ug/kg		83.9	(50%–150%)			
QC1203151940	MB										
Diesel Range Organics (C10–C20)			U	2160	ug/kg					08/21/14	12
Motor Oil (C20–C36)			U	2160	ug/kg						
**o–Terphenyl	666			469	ug/kg		70.4	(50%–150%)			
QC1203151946	354868001 MS										
Diesel Range Organics (C10–C20)	66800	U	2170	53000	ug/kg		79.2	(70%–130%)		08/22/14	16
Motor Oil (C20–C36)	66800		19800	79400	ug/kg		89.3	(70%–130%)			
**o–Terphenyl	668		515	557	ug/kg		83.4	(50%–150%)			
QC1203151947	354868001 MSD										
Diesel Range Organics (C10–C20)	67000	U	2170	53400	ug/kg	0.860	79.8	(0%–20%)		08/22/14	17
Motor Oil (C20–C36)	67000		19800	68900	ug/kg	14.2	73.3	(0%–20%)			
**o–Terphenyl	670		515	573	ug/kg		85.6	(50%–150%)			

Notes:

The Qualifiers in this report are defined as follows:

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

GEL LABORATORIES LLC

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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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: 1412996 **Verified by:** _____
Analyst: Shannon Whitehead
Method: SW846 3541

Lab SOP: GL-OA-E-010 REV# 22
Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1203151940 MB	20-AUG-2014 17:46:00	30.03	1	0.0333
1203151941 LCS	20-AUG-2014 17:46:00	30.01	1	0.03332
354864001	20-AUG-2014 17:46:00	30.05	1	0.03328
1203151942 MS (354864001)	20-AUG-2014 17:46:00	30.02	1	0.03331
1203151943 MSD (354864001)	20-AUG-2014 17:46:00	30.04	1	0.03329
354866001	20-AUG-2014 17:46:00	30.05	1	0.03328
1203151944 MS (354866001)	20-AUG-2014 17:46:00	30.01	1	0.03332
1203151945 MSD (354866001)	20-AUG-2014 17:46:00	30.01	1	0.03332
354868001	20-AUG-2014 17:46:00	30.02	1	0.03331
1203151946 MS (354868001)	20-AUG-2014 17:46:00	30.05	1	0.03328
1203151947 MSD (354868001)	20-AUG-2014 17:46:00	30	1	0.03333

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203151941	AZDRO SPIKE LCS STD,4000ug/ml	WF1140806-62	1	mL	Verified By: AV Final Solvent: CH2Cl2
MS	1203151942	AZDRO SPIKE LCS STD,4000ug/ml	WF1140806-62	1	mL	
MS	1203151944	AZDRO SPIKE LCS STD,4000ug/ml	WF1140806-62	1	mL	
MS	1203151946	AZDRO SPIKE LCS STD,4000ug/ml	WF1140806-62	1	mL	
MSD	1203151943	AZDRO SPIKE LCS STD,4000ug/ml	WF1140806-62	1	mL	
MSD	1203151945	AZDRO SPIKE LCS STD,4000ug/ml	WF1140806-62	1	mL	
MSD	1203151947	AZDRO SPIKE LCS STD,4000ug/ml	WF1140806-62	1	mL	
SURR	All	20 ppm surrogate	WE140819-04	1	mL	
REGNT	All	Methylene Chloride	2142154-D	120	mL	
SOURC	All	SODIUM SULFATE	2127169	30	g	

GC Volatiles (GRO) Analysis

Case Narrative

**GC Volatile Organics
WC-HANFORD, INC. (WCHN)
SDG X0076**

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: 1413825

Prep Batch Number: 1413824

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
354868001	J1TXH0
1203154018	MB for batch 1413824
1203154021	Laboratory Control Sample (LCS)
1203154019	354868001(J1TXH0) Post Spike (PS)
1203154020	354868001(J1TXH0) Post Spike Duplicate (PSD)

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.

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 354868001 (J1TXH0) 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

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 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

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0076 GEL Work Order: 354868 Project: RC-233 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.

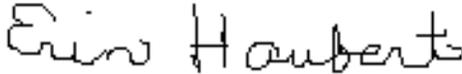
RA Indicates that sample is re-analyzed without re-extraction.

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: Erin Haubert

Date: 07 SEP 2014

Title: Data Validator

Sample Data Summary

Quality Control Summary

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QC Summary

Report Date: August 29, 2014

Page 1 of 2

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

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatiles GRO Organics											
Batch	1413825										
QC1203154021	LCS										
Gasoline Range Organics (C6 - C10)	500			386	UG/KG		77.1	(70%-130%)	RXY1	08/22/14	09:38
**Bromofluorobenzene				41.3	UG/KG		82.5	(50%-150%)			
QC1203154018	MB										
Gasoline Range Organics (C6 - C10)			U	16.7	UG/KG					08/22/14	10:33
**Bromofluorobenzene				51.4	UG/KG		103	(50%-150%)			
QC1203154019	354868001	PS									
Gasoline Range Organics (C6 - C10)	500	U	0.00	372	ug/L		74.4	(70%-130%)		08/22/14	14:35
**Bromofluorobenzene	50.0		37.5	37.2	ug/L		74.5	(50%-150%)			
QC1203154020	354868001	PSD									
Gasoline Range Organics (C6 - C10)	500	U	0.00	370	ug/L	0.469	74	(0%-20%)		08/22/14	15:04
**Bromofluorobenzene	50.0		37.5	34.6	ug/L		69.1	(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.
- 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)

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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<u>Parmname</u>	<u>NOM</u>	<u>Sample Qual</u>	<u>QC</u>	<u>Units</u>	<u>RPD%</u>	<u>REC%</u>	<u>Range</u>	<u>Anlst</u>	<u>Date</u>	<u>Time</u>
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N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more 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: 1413824
Analyst: Ramona Yarbrough
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
1203154021 LCS	22-AUG-2014 08:00:00	Soil	5	5	1	
1203154018 MB	22-AUG-2014 08:01:00	Soil	5	5	1	
354864001	22-AUG-2014 12:20:00	Soil	5	5	1	
354866001	22-AUG-2014 12:21:00	Soil	5	5	1	
354868001	22-AUG-2014 12:22:00	Soil	5	5	1	
1203154019 PS (354868001)	22-AUG-2014 12:23:00	Soil	5	5	1	
1203154020 PSD (354868001)	22-AUG-2014 12:24:00	Soil	5	5	1	

Reagent/Solvent Lot ID Description Amount Comments:

Pesticide Analysis

Case Narrative

**Pesticide Case Narrative
WC-HANFORD, INC. (WCHN)
SDG X0076**

Method/Analysis Information

Procedure: **Organochlorine Pesticides and Chlorinated Hydrocarbons**

Analytical Method: SW846 3541/8081B

Prep Method: SW846 3541

Analytical Batch Number: 1412526

Prep Batch Number: 1412525

Sample Analysis

Sample ID	Client ID
354868001	J1TXH0
1203150621	MB for batch 1412525
1203150622	Laboratory Control Sample (LCS)
1203150627	354868001(J1TXH0) Matrix Spike (MS)
1203150628	354868001(J1TXH0) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-041 REV# 13.

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

Calibration Information

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

Initial Calibration

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

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

Laboratory Control Sample (LCS) Recovery

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

QC Sample Designation

Sample 354868001 (J1TXH0) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

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

Matrix Spike Duplicate (MSD) Recovery Statement

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

MS/MSD Relative Percent Difference (RPD) Statement

The RPD values between the MS and MSD, 1203150628 (J1TXH0), were not within the required acceptance limits. The RPD values between the MS and MSD, 1203150627 (J1TXH0) and 1203150628 (J1TXH0), were not within the 0-30% limits for Endrin aldehyde due to relatively lower spike recovery in the MSD.

Technical Information:

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows. Sulfur cleanup with copper was performed on the samples in this batch.

Sample Dilutions

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

Sample Re-extraction/Re-analysis

Re-extractions were not required in this SDG in this analytical batch.

Florisil

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

Miscellaneous Information:

Electronic Package Comment

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

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

validator will always sign and date the case narrative.

Data Exception (DER) Documentation

Data exception report (DER) is for documentation of any procedural anomalies that may deviate from referenced SOP or contractual documents. DER #1327286 was generated for the MS and MSD of sample 354868001 (J1TXH0) 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 pesticide fraction.

Additional Comments

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

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

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

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

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD7A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7673 Autosampler	HP6890 Series ECD	Rtx-CLP I	30m x 0.25mm, 0.25um (Rtx-CLPesticide I)
ECD7A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7673 Autosampler	HP6890 Series ECD	Rtx-CLP II	30m x 0.25mm, 0.20um (Rtx-CLPesticide II)

Certification Statement

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

DATA EXCEPTION REPORT

Mo.Day Yr. 23-AUG-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: GC/ECD	Test / Method: SW846 3541/8081B	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1412526	Sample Numbers: See Below		

Potentially affected work order(s)(SDG): 354864(X0074),354868(X0076)

Application Issues:

Failed Recovery for MS/PS
Failed RPD for MS/MSD, or PS/PSD
Failed Recovery for MSD/PSD

Specification and Requirements Exception Description:

1. The 1203150623MS(354864) recovered Endrin at 158% on one column. The limits are 45-142%.
2. The 1203150624MSD(354864) recovered Endrin at 187% on one column (limits are 45-142%), Heptachlor epoxide at 141% on one column (limits are 36-130%) and Endosulfan I at 131% on one column (limits are 36-125%).
3. The RPD value between the 1203150627MS(354868) and 1203150628MSD(354868) were not within the 0-30% limits for Endrin aldehyde at 55.1% on one column and at 49.7% on the other column.

DER Disposition:

- 1.& 2. The MS and MSD recovered the spiked analytes in a similar manner. The analytes passed recovery on the other column. The LCS passed recovery for all analytes on both columns. The data are reported.
3. Endrin aldehyde passed recovery on both columns. The RPD failure is attributed to the large difference in the recovery values between analyte pairs in the MS and MSD. The MS and MSD passed recoveries for the analyte. The LCS passed recoveries for all the analytes. The data are reported.

Originator's Name:

Lloyd O Fox 23-AUG-14

Data Validator/Group Leader:

Herbert Maier 25-AUG-14

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0076 GEL Work Order: 354868 Project: RC-233 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: 27 AUG 2014

Title: Data Validator

Sample Data Summary

Quality Control Summary

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QC Summary

Report Date: August 25, 2014

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

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1412526										
QC1203150622	LCS										
4,4'-DDD	41.6			40.4	ug/kg		97.1	(51%-124%)	LOF	08/20/14	21:00
4,4'-DDE	41.6			40.0	ug/kg		96.2	(51%-119%)			
4,4'-DDT	41.6			39.5	ug/kg		95	(50%-128%)			
Aldrin	16.6			14.5	ug/kg		87.3	(48%-113%)			
Dieldrin	41.6			35.8	ug/kg		86.2	(51%-112%)			
Endosulfan I	16.6			11.0	ug/kg		65.9	(43%-110%)			
Endosulfan II	41.6			29.8	ug/kg		71.7	(49%-111%)			
Endosulfan sulfate	41.6			37.2	ug/kg		89.4	(54%-121%)			
Endrin	41.6			46.8	ug/kg		113	(54%-134%)			
Endrin aldehyde	41.6			33.5	ug/kg		80.6	(49%-117%)			
Endrin ketone	41.6			33.7	ug/kg		81.1	(48%-110%)			
Heptachlor	16.6			15.1	ug/kg		90.6	(52%-117%)			
Heptachlor epoxide	16.6			14.4	ug/kg		86.7	(53%-115%)			
Methoxychlor	166			155	ug/kg		93.5	(48%-117%)			
alpha-BHC	16.6			14.4	ug/kg		86.4	(50%-122%)			
alpha-Chlordane	16.6			14.6	ug/kg		88	(52%-113%)			
beta-BHC	16.6			14.0	ug/kg		84	(54%-110%)			
delta-BHC	16.6			13.7	ug/kg		82.2	(53%-117%)			
gamma-BHC (Lindane)	16.6			14.8	ug/kg		89	(53%-120%)			
gamma-Chlordane	16.6			15.4	ug/kg		92.4	(52%-117%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Page 2 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1412526										
**4cmx	33.3			29.9	ug/kg		90	(32%-120%)	LOF	08/20/14	21:00
**Decachlorobiphenyl	33.3			28.6	ug/kg		85.9	(37%-129%)			
QC1203150621	MB										
4,4'-DDD			U	0.333	ug/kg					08/20/14	20:44
4,4'-DDE			U	0.333	ug/kg						
4,4'-DDT			U	0.333	ug/kg						
Aldrin			U	0.166	ug/kg						
Dieldrin			U	0.333	ug/kg						
Endosulfan I			U	0.166	ug/kg						
Endosulfan II			U	0.333	ug/kg						
Endosulfan sulfate			U	0.333	ug/kg						
Endrin			U	0.333	ug/kg						
Endrin aldehyde			U	0.333	ug/kg						
Endrin ketone			U	0.333	ug/kg						
Heptachlor			U	0.166	ug/kg						
Heptachlor epoxide			U	0.166	ug/kg						
Methoxychlor			U	1.66	ug/kg						
Toxaphene			U	5.54	ug/kg						
alpha-BHC			U	0.166	ug/kg						
alpha-Chlordane			U	0.166	ug/kg						
beta-BHC			U	0.166	ug/kg						
delta-BHC			U	0.166	ug/kg						

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1412526										
gamma-BHC (Lindane)			U	0.166	ug/kg				LOF	08/20/14	20:44
gamma-Chlordane			U	0.166	ug/kg						
**4cmx	33.3			27.9	ug/kg		83.9	(32%-120%)			
**Decachlorobiphenyl	33.3			27.9	ug/kg		83.8	(37%-129%)			
QC1203150627 354868001 MS											
4,4'-DDD	41.8	U	0.334	36.8	ug/kg		88.2	(37%-134%)		08/20/14	23:42
4,4'-DDE	41.8	U	0.334	35.8	ug/kg		85.8	(33%-133%)			
4,4'-DDT	41.8	U	0.334	35.9	ug/kg		85.9	(21%-149%)			
Aldrin	16.7	U	0.167	12.6	ug/kg		75.4	(34%-134%)			
Dieldrin	41.8	U	0.334	31.4	ug/kg		75.3	(36%-132%)			
Endosulfan I	16.7	U	0.167	9.95	ug/kg		59.6	(36%-125%)			
Endosulfan II	41.8	U	0.334	27.8	ug/kg		66.5	(37%-129%)			
Endosulfan sulfate	41.8	U	0.334	33.2	ug/kg		79.6	(31%-140%)			
Endrin	41.8	U	0.334	43.2	ug/kg		103	(45%-142%)			
Endrin aldehyde	41.8	U	0.334	29.1	ug/kg		69.7	(31%-133%)			
Endrin ketone	41.8	U	0.334	29.8	ug/kg		71.3	(30%-139%)			
Heptachlor	16.7	U	0.167	13.1	ug/kg		78.5	(32%-137%)			
Heptachlor epoxide	16.7	U	0.167	12.3	ug/kg		73.5	(36%-130%)			
Methoxychlor	167	U	1.67	145	ug/kg		86.8	(28%-143%)			
alpha-BHC	16.7	U	0.167	11.9	ug/kg		71.1	(37%-129%)			
alpha-Chlordane	16.7	U	0.167	12.7	ug/kg		76.1	(29%-141%)			
beta-BHC	16.7	U	0.167	11.8	ug/kg		70.5	(33%-136%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1412526										
delta-BHC	16.7	U	0.167	12.2	ug/kg		73.2	(37%-136%)	LOF	08/20/14	23:42
gamma-BHC (Lindane)	16.7	U	0.167	12.7	ug/kg		75.8	(35%-130%)			
gamma-Chlordane	16.7	U	0.167	13.2	ug/kg		79.3	(30%-139%)			
**4cmx	33.4		25.8	26.5	ug/kg		79.3	(32%-120%)			
**Decachlorobiphenyl	33.4		28.1	27.6	ug/kg		82.7	(37%-129%)			
QC1203150628	354868001	MSD									
4,4'-DDD	41.8	U	0.334	37.7	ug/kg	2.25	90.2	(0%-30%)		08/20/14	23:58
4,4'-DDE	41.8	U	0.334	36.2	ug/kg	1.04	86.7	(0%-30%)			
4,4'-DDT	41.8	U	0.334	36.0	ug/kg	0.262	86.1	(0%-30%)			
Aldrin	16.7	U	0.167	12.4	ug/kg	1.43	74.2	(0%-30%)			
Dieldrin	41.8	U	0.334	31.6	ug/kg	0.507	75.6	(0%-30%)			
Endosulfan I	16.7	U	0.167	11.2	ug/kg	11.9	67.1	(0%-30%)			
Endosulfan II	41.8	U	0.334	26.1	ug/kg	6.07	62.5	(0%-30%)			
Endosulfan sulfate	41.8	U	0.334	34.0	ug/kg	2.41	81.5	(0%-30%)			
Endrin	41.8	U	0.334	40.3	ug/kg	6.85	96.5	(0%-30%)			
Endrin aldehyde	41.8	U	0.334	16.5	ug/kg	55.1*	39.6	(0%-30%)			
Endrin ketone	41.8	U	0.334	31.0	ug/kg	4.17	74.3	(0%-30%)			
Heptachlor	16.7	U	0.167	13.2	ug/kg	0.461	78.8	(0%-30%)			
Heptachlor epoxide	16.7	U	0.167	12.4	ug/kg	1.31	74.4	(0%-30%)			
Methoxychlor	16.7	U	1.67	146	ug/kg	0.665	87.3	(0%-30%)			
alpha-BHC	16.7	U	0.167	13.0	ug/kg	9.20	77.9	(0%-30%)			
alpha-Chlordane	16.7	U	0.167	12.9	ug/kg	1.62	77.3	(0%-30%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Page 5 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1412526										
beta-BHC	16.7	U	0.167	15.6	ug/kg	28.1	93.4	(0%-30%)	LOF	08/20/14	23:58
delta-BHC	16.7	U	0.167	13.9	ug/kg	13.1	83.4	(0%-30%)			
gamma-BHC (Lindane)	16.7	U	0.167	13.6	ug/kg	7.08	81.3	(0%-30%)			
gamma-Chlordane	16.7	U	0.167	13.4	ug/kg	1.52	80.5	(0%-30%)			
**4cmx	33.4		25.8	26.7	ug/kg		79.9	(32%-120%)			
**Decachlorobiphenyl	33.4		28.1	27.1	ug/kg		80.9	(37%-129%)			

Notes:

The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more 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: 1412525 Verified by: _____
 Analyst: Mia DeLee
 Method: SW846 3541

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

Sample ID	Run Date	Aliquot (g)	Final Volume (mL)	Prepped Factor (mL/g)
1203150621 MB	20-AUG-2014 09:50:00	30.05	5	0.16639
1203150622 LCS	20-AUG-2014 09:50:00	30.06	5	0.16633
354864001	20-AUG-2014 09:50:00	30.1	5	0.16611
1203150623 MS (354864001)	20-AUG-2014 09:50:00	30.06	5	0.16633
1203150624 MSD (354864001)	20-AUG-2014 09:50:00	30.11	5	0.16606
354866001	20-AUG-2014 09:50:00	30.08	5	0.16622
1203150625 MS (354866001)	20-AUG-2014 09:50:00	30.08	5	0.16622
1203150626 MSD (354866001)	20-AUG-2014 09:50:00	30.09	5	0.16617
354868001	20-AUG-2014 09:50:00	30.07	5	0.16628
1203150627 MS (354868001)	20-AUG-2014 09:50:00	30.07	5	0.16628
1203150628 MSD (354868001)	20-AUG-2014 09:50:00	30.05	5	0.16639

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203150622	PESTSPIKE	WE140613-05	1	mL	Final Solvent: Hexane Verified by: SJW
MS	1203150623	PESTSPIKE	WE140613-05	1	mL	
MS	1203150625	PESTSPIKE	WE140613-05	1	mL	Sample 354864001 (and its MS/MSD) contained rocks (large and small) Samples 354866001 (including the MS/MSD) and 354868001 (including the MS/MSD) also contained small and large rocks
MS	1203150627	PESTSPIKE	WE140613-05	1	mL	
MSD	1203150624	PESTSPIKE	WE140613-05	1	mL	
MSD	1203150626	PESTSPIKE	WE140613-05	1	mL	
MSD	1203150628	PESTSPIKE	WE140613-05	1	mL	
SURR	All	PEST SURROGATE 1000 UG/L	WE140501-08	1	mL	
REGNT	All	Acetone	2126069-B1	60	mL	
REGNT	All	Hexane	2134327-B10	60	mL	
SOURC	All	SODIUM SULFATE	2127169	30	g	

PCB Analysis

Case Narrative

**PCB Case Narrative
WC-HANFORD, INC. (WCHN)
SDG X0076**

Method/Analysis Information

Procedure: Analysis of Polychlorinated Biphenyls by ECD
Analytical Method: SW846 3541/8082A
Prep Method: SW846 3541
Analytical Batch Number: 1412528
Prep Batch Number: 1412527

Sample Analysis

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

Sample ID	Client ID
354868001	J1TXH0
1203150629	MB for batch 1412527
1203150630	Laboratory Control Sample (LCS)
1203150635	354868001(J1TXH0) Matrix Spike (MS)
1203150636	354868001(J1TXH0) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-040 REV# 20.

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

Calibration Information

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

Initial Calibration

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

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

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 354868001 (J1TXH0) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

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

Matrix Spike Duplicate (MSD) Recovery Statement

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

MS/MSD Relative Percent Difference (RPD) Statement

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Electronic Package Comment

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

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

Data Exception (DER) Documentation

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

Manual Integrations

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

Additional Comments

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

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

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

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

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

System Configuration

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

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

Certification Statement

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

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0076 GEL Work Order: 354868 Project: RC-233 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: 25 AUG 2014

Title: Data Validator

Sample Data Summary

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: August 20, 2014

Page 1 of 2

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

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB											
Batch	1412528										
QC1203150630	LCS										
Aroclor-1016	33.3			22.8	ug/kg		68.7	(39%-120%)	JXM	08/20/14	07:21
Aroclor-1260	33.3			22.9	ug/kg		68.7	(50%-116%)			
**4cmx	6.65			5.13	ug/kg		77.1	(44%-106%)			
**Decachlorobiphenyl	6.65			6.49	ug/kg		97.5	(35%-119%)			
QC1203150629	MB										
Aroclor-1016			U	1.11	ug/kg					08/20/14	07:08
Aroclor-1221			U	1.11	ug/kg						
Aroclor-1232			U	1.11	ug/kg						
Aroclor-1242			U	1.11	ug/kg						
Aroclor-1248			U	1.11	ug/kg						
Aroclor-1254			U	1.11	ug/kg						
Aroclor-1260			U	1.11	ug/kg						
Aroclor-1262			U	1.11	ug/kg						
Aroclor-1268			U	1.11	ug/kg						
**4cmx	6.65			6.55	ug/kg		98.5	(44%-106%)			
**Decachlorobiphenyl	6.65			7.58	ug/kg		114	(35%-119%)			
QC1203150635	354868001	MS									
Aroclor-1016	33.4	U	1.11	21.3	ug/kg		63.9	(25%-125%)		08/20/14	09:26
Aroclor-1260	33.4	U	1.11	25.3	ug/kg		75.8	(28%-127%)			
**4cmx	6.68		5.71	4.86	ug/kg		72.7	(44%-106%)			
**Decachlorobiphenyl	6.68		7.57	6.81	ug/kg		102	(35%-119%)			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB											
Batch	1412528										
QC1203150636	354868001	MSD									
Aroclor-1016	33.4	U	1.11	19.0	ug/kg	11.8	56.8	(0%-30%)	JXM	08/20/14	09:38
Aroclor-1260	33.4	U	1.11	21.8	ug/kg	15.1	65.2	(0%-30%)			
**4cmx	6.68		5.71	4.47	ug/kg		66.9	(44%-106%)			
**Decachlorobiphenyl	6.68		7.57	5.48	ug/kg		82	(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: 1412527 Verified by: _____
 Analyst: Mia DeLee
 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)
1203150629 MB	19-AUG-2014 10:30:00	30.07	H2SO4/KM 2 nO4	9	1	0.03326
1203150630 LCS	19-AUG-2014 10:30:00	30.06	H2SO4/KM 2 nO4	9	1	0.03327
354864001	19-AUG-2014 10:30:00	30.06	H2SO4/KM 2 nO4	9	1	0.03327
1203150631 MS (354864001)	19-AUG-2014 10:30:00	30.04	H2SO4/KM 2 nO4	9	1	0.03329
1203150632 MSD (354864001)	19-AUG-2014 10:30:00	30.05	H2SO4/KM 2 nO4	9	1	0.03328
354866001	19-AUG-2014 10:30:00	30.12	H2SO4/KM 2 nO4	9	1	0.0332
1203150633 MS (354866001)	19-AUG-2014 10:30:00	30.08	H2SO4/KM 2 nO4	9	1	0.03324
1203150634 MSD (354866001)	19-AUG-2014 10:30:00	30.07	H2SO4/KM 2 nO4	9	1	0.03326
354868001	19-AUG-2014 10:30:00	30.08	H2SO4/KM 2 nO4	9	1	0.03324
1203150635 MS (354868001)	19-AUG-2014 10:30:00	30.07	H2SO4/KM 2 nO4	9	1	0.03326
1203150636 MSD (354868001)	19-AUG-2014 10:30:00	30.08	H2SO4/KM 2 nO4	9	1	0.03324

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203150630	PCB Laboratory Control	WE140714-06	1	mL	Final Solvent: Hexane
MS	1203150631	PCB Laboratory Control	WE140714-06	1	mL	Verified by: SG
MS	1203150633	PCB Laboratory Control	WE140714-06	1	mL	Clean-up: H2SO4/KMnO4
MS	1203150635	PCB Laboratory Control	WE140714-06	1	mL	Prior to clean-up: 2mL
MSD	1203150632	PCB Laboratory Control	WE140714-06	1	mL	Clean-up initials: MD
MSD	1203150634	PCB Laboratory Control	WE140714-06	1	mL	Clean-up SOP: GL-OA-E-037 Rev.1
MSD	1203150636	PCB Laboratory Control	WE140714-06	1	mL	Clean-up date: 08-19-14
SURR	All	PEST LOW LEVEL SURROGATE 200 UG/L	WE140812-01	1	mL	Sample 354864001 contained rocks (large and small)
REGNT	All	1:1 sulfuric acid	2130267	5	mL	Samples 354866001 and 354868001 contained rocks (large and small)
REGNT	All	Hexane	2134327-B10	120	mL	
REGNT	All	5% Potassium Permanganate	2134734	5	mL	
SOURC	All	SODIUM SULFATE	2127169	30	g	

Herbicide Analysis

Case Narrative

**Herbicide Case Narrative
WC-HANFORD, INC. (WCHN)
SDG X0076**

Method/Analysis Information

Procedure: Analysis of Chlorophenoxy Acid Herbicides by ECD
Analytical Method: SW846 8151A
Prep Method: SW846 8151A
Analytical Batch Number: 1414273
Prep Batch Number: 1414271

Sample Analysis

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

Sample ID	Client ID
354868001	J1TXH0
1203155210	MB for batch 1414271
1203155213	Laboratory Control Sample (LCS)
1203155211	354864001(J1TXF8) Matrix Spike (MS)
1203155212	354864001(J1TXF8) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-011 REV# 21.

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

Calibration Information

Initial Calibration

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

Continuing Calibration Verification (CCV) Requirements

All Initial Calibration Verification (ICV) requirements have been met for this SDG. However, not all Calibration Verification Standards (CCV) requirements were met. Several target analytes failed acceptance criteria with a negative bias on one analytical column in the standards bracketing the samples in this SDG. The negative bias for the analytical data is a result of instrument response decreasing after the initial calibration. The instrument response never decreased to a point where the target analytes would not be detected. Since these target analytes were not detected in the samples, the non-compliance had no adverse impact on the data. All analytes were

within the established retention time windows for this method.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

The MS and MSD, 1203155211 (J1TXF8) and 1203155212 (J1TXF8), did not meet surrogate recovery acceptance criteria. Since there were target analytes detected above the reporting limits in the associated parent sample, the biased high surrogate recoveries had no adverse impact on the data and the results have been reported.

Laboratory Control Sample (LCS) Recovery

The LCS (1203155213) did not meet spike recovery acceptance criteria for Dinoseb. The batch was re-extracted out of holding in batch 1415555. Since the re-extraction batch met the LCS acceptance criteria, both sets of data results have been reported.

QC Sample Designation

Sample 354864001 (J1TXF8) was selected for analysis as the matrix spike and matrix spike duplicate.

Matrix Spike (MS) Recovery Statement

The MS, 1203155211 (J1TXF8), did not meet spike recovery acceptance criteria for 2,4-DB. Since 2,4-DB was not detected above the reporting limits in the associated parent sample, the biased high spike recoveries had no adverse impact on the data and the results have been reported.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD, 1203155212 (J1TXF8), did not meet spike recovery acceptance criteria for 2,4-DB. Since 2,4-DB was not detected above the reporting limits in the associated parent sample, the biased high spike recoveries had no adverse impact on the data and the results have been reported.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD(s) between the MS and MSD met the acceptance limits.

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported target analyte concentrations were confirmed on a dissimilar column.

Sample Dilutions

Samples 1203155211 (J1TXF8) and 1203155212 (J1TXF8) were diluted due to high concentrations of non-target analytes within the retention time window of interest.

Sample Re-extraction/Re-analysis

Sample 354868001 (J1TXH0) was re-extracted out of holding in batch 1415555 due to LCS failure.

Miscellaneous Information

Electronic Package Comment

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

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

Data Exception (DER) Documentation

The following DER was generated for this SDG: 1331280.

Manual Integrations

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

Additional Comments

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

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

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

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

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD6A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series GC/ECD	Rtx-CLP I	30m x 0.32mm, 0.50um (Rtx-CLPesticide)
ECD6A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series GC/ECD	Rtx-CLP II	30m x 0.32mm, 0.50um (Rtx-CLPesticide II)

Method/Analysis Information

Procedure: Analysis of Chlorophenoxy Acid Herbicides by ECD
Analytical Method: SW846 8151A
Prep Method: SW846 8151A
Analytical Batch Number: 1415555
Prep Batch Number: 1415552

Sample Analysis

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

Sample ID	Client ID
354868001	J1TXH0
1203158366	MB for batch 1415552
1203158367	Laboratory Control Sample (LCS)
1203158372	354868001(J1TXH0) Matrix Spike (MS)
1203158373	354868001(J1TXH0) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-011 REV# 21.

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

Calibration Information

Initial Calibration

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

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

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 354868001 (J1TXH0) was selected for analysis as the matrix spike and matrix spike duplicate.

Matrix Spike (MS) Recovery Statement

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

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD, 1203158373 (J1TXH0), did not meet spike recovery acceptance criteria. Since the MSD displayed spike similar recoveries to the MS, the failures were attributed to sample matrix interference and the data results have been reported.

MS/MSD Relative Percent Difference (RPD) Statement

The RPDs 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. Sample 354868001 (J1TXH0) was re-extracted out of holding from batch 1414273 due to batch QC failure. Since the LCS met the acceptance criteria in the re-extraction, both sets of data results have been reported.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported target analyte concentrations were confirmed on a dissimilar column.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Sample 354868001 (J1TXH0) was re-extracted out of holding from batch 1414273 due to batch QC failure. Since the LCS met the acceptance criteria in the re-extraction, both sets of data results have been reported.

Miscellaneous Information

Electronic Package Comment

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

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

Data Exception (DER) Documentation

The following DER was generated for this SDG: 1331116.

Manual Integrations

Some initial calibration standards, continuing calibration standards, and/or samples may have required manual integration to correctly position the baseline as set in the calibration standard injections. If manual integration

was performed, copies of all manual integration peak profiles are included in the raw data section of this Herbicide fraction.

Additional Comments

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

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

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

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

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD6A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series GC/ECD	Rtx-CLP I	30m x 0.32mm, 0.50um (Rtx-CLPesticide)
ECD6A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series GC/ECD	Rtx-CLP II	30m x 0.32mm, 0.50um (Rtx-CLPesticide II)

Certification Statement

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

DATA EXCEPTION REPORT

Mo.Day Yr. 05-SEP-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: GC/ECD	Test / Method: SW846 8151A	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1415555	Sample Numbers: See Below		

Potentially affected work order(s)(SDG): 354864(X0074),354866(X0075),354868(X0076)

Application Issues:

- Failed Recovery for MS/PS
- Failed RPD for MS/MSD, or PS/PSD
- Sample Prepped out of Holding
- Sample Logged out of Holding
- Failed Recovery for MSD/PSD

**Specification and Requirements
Exception Description:**

DER Disposition:

1. The MS(1203158368) and MSD(1203158369) did not meet spike recovery acceptance criteria.
2. The MS(1203158370) and MSD(1203158371) did not meet spike recovery acceptance criteria.
3. The MS(1203158372) and MSD(1203158373) did not meet spike recovery acceptance criteria.
4. The MS(1203158368)/MSD(1203158369) pair did not meet RPD acceptance criteria.
5. Samples 354864001, 354866001, and 354868001 were re-extracted out of holding from batch 1414273 due to batch QC failure.

- 1., 2., 3. Since the MSD displayed spike similar recoveries to the MS, the failures were attributed to sample matrix interference and the data results have been reported.
4. The RPD failure was attributed to sample matrix interference and the data results have been reported.
5. Since the LCS met the acceptance criteria in the re-extraction, both sets of data results have been reported.

Originator's Name:

Lindsey Jensen 05-SEP-14

Data Validator/Group Leader:

Barbara Bailey 05-SEP-14

DATA EXCEPTION REPORT

Mo.Day Yr. 05-SEP-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: GC/ECD	Test / Method: SW846 8151A	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1414273	Sample Numbers: See Below		

Potentially affected work order(s)(SDG): 354864(X0074),354866(X0075),354868(X0076)

Application Issues:

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

Specification and Requirements Exception Description:

1. The LCS(1203155213) did not meet spike recovery acceptance criteria for Dinoseb.
2. The MS(1203155211) and MSD(1203155212) did not meet surrogate recovery acceptance criteria.
3. The MS(1203155211) and MSD(1203155212) did not meet spike recovery acceptance criteria for 2,4-DB.

DER Disposition:

1. The batch was re-extracted out of holding in batch 1415555. Since the re-extraction batch met the LCS acceptance criteria, both sets of data results have been reported.
2. Since there were target analytes detected above the reporting limits in the associated parent sample, the biased high surrogate recoveries had no adverse impact on the data and the results have been reported.
3. Since 2,4-DB was not detected above the reporting limits in the associated parent sample, the biased high spike recoveries had no adverse impact on the data and the results have been reported.

Originator's Name:

Barbara Bailey 05-SEP-14

Data Validator/Group Leader:

Jimin Cao 05-SEP-14

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0076 GEL Work Order: 354868 Project: RC-233 Soil

The Qualifiers in this report are defined as follows:

- 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
- 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: Barbara Bailey

Date: 15 SEP 2014

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: September 5, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-233 Soil

Client SDG: X0076

Client Sample ID: J1TXH0
Sample ID: 354868001

Project: WCHN00313
Client ID: WCHN001

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: September 5, 2014

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

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1414273										
QC1203155213	LCS										
2,4,5-T	40.0			39.2	ug/kg		98.2	(52%-137%)	LXA1	08/28/14	16:29
2,4,5-TP	40.0			36.8	ug/kg		92	(58%-133%)			
2,4-D	40.0			40.2	ug/kg		101	(53%-139%)			
2,4-DB	40.0			40.1	ug/kg		100	(61%-139%)			
Dalapon	400			445	ug/kg		111	(39%-113%)			
Dicamba	40.0			35.4	ug/kg		88.6	(54%-118%)			
Dichlorprop	40.0			35.4	ug/kg		88.6	(59%-126%)			
Dinoseb	40.0			13.1	ug/kg		32.8*	(39%-94%)			
MCPA	4000			3440	ug/kg		86.2	(60%-120%)			
MCPP	4000			3400	ug/kg		85	(50%-123%)			
**2,4-Dichlorophenylacetic acid	99.9			95.3	ug/kg		95.4	(38%-142%)			
 QC1203155210 MB											
2,4,5-T			U	1.66	ug/kg					08/28/14	16:07
2,4,5-TP			U	1.66	ug/kg						
2,4-D			U	1.66	ug/kg						
2,4-DB			U	1.66	ug/kg						
Dalapon			U	35.0	ug/kg						
Dicamba			U	2.00	ug/kg						
Dichlorprop			U	2.26	ug/kg						
Dinoseb			U	1.66	ug/kg						

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1414273										
MCPA			U	230	ug/kg						
MCPP			U	200	ug/kg				LXA1	08/28/14	16:07
**2,4-Dichlorophenylacetic acid	99.9			89.6	ug/kg		89.7	(38%-142%)			
QC1203155211 354864001 MS											
2,4,5-T	40.2	DU	3.33	D	38.9	ug/kg	96.9	(45%-131%)		08/28/14	17:13
2,4,5-TP	40.2	DU	3.33	D	39.3	ug/kg	97.9	(49%-135%)			
2,4-D	40.2	DJ	5.58	D	44.1	ug/kg	95.8	(53%-135%)			
2,4-DB	40.2	DTU	3.33	DPT	66.9	ug/kg	167 *	(61%-139%)			
Dalapon	402	DU	70.3	D	302	ug/kg	75.2	(30%-113%)			
Dicamba	40.2	DU	4.02	D	34.3	ug/kg	85.4	(48%-124%)			
Dichlorprop	40.2	DU	4.54	D	37.1	ug/kg	92.5	(46%-138%)			
Dinoseb	40.2	DU	3.33	D	27.1	ug/kg	67.5	(25%-130%)			
MCPA	4020	DU	462	D	3440	ug/kg	85.7	(50%-133%)			
MCPP	4020	DU	402	D	3290	ug/kg	81.8	(47%-123%)			
**2,4-Dichlorophenylacetic acid	100		106		144	ug/kg	144 *	(38%-142%)			
QC1203155212 354864001 MSD											
2,4,5-T	40.2	DU	3.33	D	40.7	ug/kg	4.58	101	(0%-32%)	08/28/14	17:36
2,4,5-TP	40.2	DU	3.33	D	41.2	ug/kg	4.72	103	(0%-31%)		
2,4-D	40.2	DJ	5.58	D	45.3	ug/kg	2.85	98.9	(0%-70%)		
2,4-DB	40.2	DTU	3.33	DT	70.2	ug/kg	4.84	175 *	(0%-27%)		
Dalapon	402	DU	70.3	D	310	ug/kg	2.57	77.1	(0%-18%)		
Dicamba	40.2	DU	4.02	D	36.7	ug/kg	6.75	91.3	(0%-41%)		
Dichlorprop	40.2	DU	4.54	D	37.9	ug/kg	1.93	94.2	(0%-40%)		
Dinoseb	40.2	DU	3.33	D	28.9	ug/kg	6.20	71.8	(0%-169%)		

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1414273										
MCPA	4020	DU	462	D	3680	ug/kg	6.63	91.5	(0%-38%)	LXA1	08/28/14 17:36
MCPP	4020	DU	402	D	3550	ug/kg	7.64	88.2	(0%-30%)		
**2,4-Dichlorophenylacetic acid	100		106		146	ug/kg		146*	(38%-142%)		
Batch	1415555										
QC1203158367	LCS										
2,4,5-T	40.0				44.7	ug/kg		112	(52%-137%)	LXA1	09/04/14 18:56
2,4,5-TP	40.0				39.6	ug/kg		98.9	(58%-133%)		
2,4-D	40.0				42.6	ug/kg		107	(53%-139%)		
2,4-DB	40.0				50.2	ug/kg		125	(61%-139%)		
Dalapon	400				329	ug/kg		82.3	(39%-113%)		
Dicamba	40.0				38.0	ug/kg		95	(54%-118%)		
Dichlorprop	40.0				37.2	ug/kg		93.1	(59%-126%)		
Dinoseb	40.0				18.5	ug/kg		46.3	(39%-94%)		
MCPA	4000				3920	ug/kg		98.1	(60%-120%)		
MCPP	4000				3740	ug/kg		93.5	(50%-123%)		
**2,4-Dichlorophenylacetic acid	100				101	ug/kg		101	(38%-142%)		
QC1203158366	MB										
2,4,5-T				U	1.66	ug/kg					09/04/14 18:33
2,4,5-TP				U	1.66	ug/kg					
2,4-D				U	1.66	ug/kg					
2,4-DB				U	1.66	ug/kg					
Dalapon				U	35.0	ug/kg					
Dicamba				U	2.00	ug/kg					

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1415555										
Dichlorprop			U	2.26	ug/kg				LXA1	09/04/14	18:33
Dinoseb			U	1.66	ug/kg						
MCPA			U	230	ug/kg						
MCPP			U	200	ug/kg						
**2,4-Dichlorophenylacetic acid	99.9			94.7	ug/kg		94.8	(38%-142%)			
QC1203158372 354868001 MS											
2,4,5-T	40.2	UX	1.67	X	46.4	ug/kg	116	(45%-131%)		09/04/14	23:11
2,4,5-TP	40.2	UX	1.67	X	39.5	ug/kg	98.4	(49%-135%)			
2,4-D	40.2	UX	1.67	X	48.0	ug/kg	120	(53%-135%)			
2,4-DB	40.2	TUX	1.67	TX	57.4	ug/kg	143 *	(61%-139%)			
Dalapon	402	UX	35.1	X	219	ug/kg	54.6	(30%-113%)			
Dicamba	40.2	UX	2.01	X	39.5	ug/kg	98.3	(48%-124%)			
Dichlorprop	40.2	TUX	2.27	X	53.5	ug/kg	133	(46%-138%)			
Dinoseb	40.2	TUX	1.67	TX	9.01	ug/kg	22.4 *	(25%-130%)			
MCPA	4020	UX	231	X	4190	ug/kg	104	(50%-133%)			
MCPP	4020	TUX	201	ETX	8120	ug/kg	202 *	(47%-123%)			
**2,4-Dichlorophenylacetic acid	100		94.3		105	ug/kg	104	(38%-142%)			
QC1203158373 354868001 MSD											
2,4,5-T	40.1	UX	1.67	X	46.6	ug/kg	0.398	116	(0%-32%)	09/04/14	23:39
2,4,5-TP	40.1	UX	1.67	X	39.4	ug/kg	0.196	98.3	(0%-31%)		
2,4-D	40.1	UX	1.67	X	47.9	ug/kg	0.321	119	(0%-70%)		
2,4-DB	40.1	TUX	1.67	X	54.9	ug/kg	4.41	137	(0%-27%)		
Dalapon	401	UX	35.1	X	248	ug/kg	12.1	61.7	(0%-18%)		

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1415555										
Dicamba	40.1	UX	2.01	X	40.3	ug/kg	2.06	101	(0%-41%)	LXA1	09/04/14 23:39
Dichlorprop	40.1	TUX	2.27	PTX	63.9	ug/kg	17.6	159*	(0%-40%)		
Dinoseb	40.1	TUX	1.67	PX	11.1	ug/kg	21.0	27.7	(0%-169%)		
MCPA	4010	UX	231	X	4820	ug/kg	13.8	120	(0%-38%)		
MCPP	4010	TUX	201	ETX	9710	ug/kg	17.9	242*	(0%-30%)		
*2,4-Dichlorophenylacetic acid	100		94.3		96.5	ug/kg		96.2	(38%-142%)		

Notes:

The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more 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

The Extraction of Herbicides from Soil and Sludge Samples

Batch ID: 1414271
Analyst: Alberto Velasco
Method: SW846 8151A

Verified by: _____

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

Sample ID	Run Date	Aliquot (g)	Initial pH	Int Ext pH	Sec Ext pH	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1203155210 MB	26-AUG-2014 18:35:00	50.06	7	2	0	10	0.19976
1203155213 LCS	26-AUG-2014 18:35:00	50.05	7	2	0	10	0.1998
354864001	26-AUG-2014 18:35:00	50.07	7	2	0	10	0.19972
1203155211 MS (354864001)	26-AUG-2014 18:35:00	50.06	7	2	0	10	0.19976
1203155212 MSD (354864001)	26-AUG-2014 18:35:00	50.03	7	2	0	10	0.19988
354866001	26-AUG-2014 18:35:00	50.05	7	2	0	10	0.1998
354868001	26-AUG-2014 18:35:00	50.02	7	2	0	10	0.19992

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203155213	HERBICIDE LCS	WE140721-10	1	mL	Hydrolysis Analyst: Sharlene Robinson Hydrolysis Date: 28-AUG-2014 12:35:12 Verified By: SLW Final Solvent: Hexane
MS	1203155211	HERBICIDE LCS	WE140721-10	1	mL	
MSD	1203155212	HERBICIDE LCS	WE140721-10	1	mL	
SURR	All	HERBICIDE SURROGATE	WE140818-03	.05	mL	
REGNT	All	Hexane	140606-B4	54	mL	
REGNT	All	N-METHYL-N-NITROSO-P-TOLUENESULFON-AMIDE	140828B	2	mL	
REGNT	All	acidified sodium sulfate	2083402	10	g	
REGNT	All	37g KOH to 100mL DI H2O	2084217A	5	mL	
REGNT	All	Iso-octane	2105147-A	1	mL	
REGNT	All	Methanol	2134323-C	.5	mL	
REGNT	All	Acetone	2134325-B1	20	mL	
REGNT	All	Methylene Chloride	2145353-D	280	mL	
REGNT	All	Sulfuric Acid Sol., 12N For Herbicides	2146427	17	mL	
REGNT	All	Ethyl ether	UN2135813a	80	mL	

Prep Logbook

The Extraction of Herbicides from Soil and Sludge Samples

Batch ID: 1415552
Analyst: Sirena White
Method: SW846 8151A

Verified by: _____

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

Sample ID	Run Date	Aliquot (g)	Initial pH	Int Ext pH	Sec Ext pH	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1203158366 MB	02-SEP-2014 11:20:00	50.04	7	2	0	10	0.19984
1203158367 LCS	02-SEP-2014 11:20:00	50.01	7	2	0	10	0.19996
354864001 - 2	02-SEP-2014 11:20:00	50.01	7	2	0	10	0.19996
1203158368 - 2 MS (354864001)	02-SEP-2014 11:20:00	50.05	7	2	0	10	0.1998
1203158369 - 2 MSD (354864001)	02-SEP-2014 11:20:00	50.12	7	2	0	10	0.19952
354866001 - 2	02-SEP-2014 11:20:00	50.03	7	2	0	10	0.19988
1203158370 - 2 MS (354866001)	02-SEP-2014 11:20:00	50.05	7	2	0	10	0.1998
1203158371 - 2 MSD (354866001)	02-SEP-2014 11:20:00	50.04	7	2	0	10	0.19984
354868001 - 2	02-SEP-2014 11:20:00	50.01	7	2	0	10	0.19996
1203158372 - 2 MS (354868001)	02-SEP-2014 11:20:00	50	7	2	0	10	0.2
1203158373 - 2 MSD (354868001)	02-SEP-2014 11:20:00	50.06	7	2	0	10	0.19976

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203158367	HERBICIDE LCS	WE140721-10	1	mL	Clean up Date: 04-SEP-2014 13:27:59
MS	1203158368	HERBICIDE LCS	WE140721-10	1	mL	Hydrolysis Analyst: Sharlene Robinson
MS	1203158370	HERBICIDE LCS	WE140721-10	1	mL	Hydrolysis Date: 04-SEP-2014 13:27:59
MS	1203158372	HERBICIDE LCS	WE140721-10	1	mL	Verified By: SR
MSD	1203158369	HERBICIDE LCS	WE140721-10	1	mL	Final Solvent: Hexane
MSD	1203158371	HERBICIDE LCS	WE140721-10	1	mL	
MSD	1203158373	HERBICIDE LCS	WE140721-10	1	mL	
SURR	All	HERBICIDE SURROGATE	WE140818-03	.05	mL	
REGNT	All	N-METHYL-N-NITROSO-P-TOLUENESULFON-AMIDE	140903B	2	mL	
REGNT	All	37g KOH to 100mL DI H2O	2084217A	5	mL	
REGNT	All	Iso-octane	2105147-A	1	mL	
REGNT	All	acidified sodium sulfate	2129904	10	g	
REGNT	All	Methanol	2134323-C	.5	mL	
REGNT	All	Hexane	2134327-B10	54	mL	
REGNT	All	Methylene Chloride	2145353-D	280	mL	
REGNT	All	Sulfuric Acid Sol., 12N For Herbicides	2148819	17	mL	
REGNT	All	Acetone	2148836-B1	20	mL	
REGNT	All	Ethyl ether	UN214962a	80	mL	

Prep Logbook

Batch ID: 1415552
Analyst: Sirena White
Method: SW846 8151A

Verified by: _____

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

Sample ID	Run Date	Aliquot (g)	Initial pH	Int Ext pH	Sec Ext pH	Prepped Aliquot (mL)	Prepped Factor (mL/g)
SOURC All	SODIUM SULFATE			2127169		50	g
WORK All	HERBICIDE SURROGATE			WE140818-03		.05	mL

Metals Analysis

Case Narrative

**Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG X0076**

Sample Analysis

Sample ID	Client ID
354868001	J1TXH0
1203149606	Method Blank (MB) ICP
1203149607	Laboratory Control Sample (LCS)
1203149616	354868001(J1TXH0L) Serial Dilution (SD)
1203149614	354868001(J1TXH0D) Sample Duplicate (DUP)
1203149615	354868001(J1TXH0S) Matrix Spike (MS)
1203155165	354868001(J1TXH0PS) Post Spike (PS)
1203149585	Method Blank (MB) ICP-MS
1203149586	Laboratory Control Sample (LCS)
1203149595	354868001(J1TXH0L) Serial Dilution (SD)
1203149593	354868001(J1TXH0D) Sample Duplicate (DUP)
1203149594	354868001(J1TXH0S) Matrix Spike (MS)
1203150020	Method Blank (MB) CVAA
1203150021	Laboratory Control Sample (LCS)
1203150031	354868001(J1TXH0L) Serial Dilution (SD)
1203150029	354868001(J1TXH0D) Sample Duplicate (DUP)
1203150030	354868001(J1TXH0S) Matrix Spike (MS)

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

Method/Analysis Information

Analytical Batch:	1412088, 1412079 and 1412249
Prep Batch :	1412087, 1412078 and 1412248
Standard Operating Procedures:	GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 24, GL-MA-E-014 REV# 25 and GL-MA-E-010 REV# 28
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-ICP was performed on a PE 7300 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 CRDL/PQL standard recoveries met the referenced advisory control limits.

ICSA/ICSAB Statement

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

Continuing Calibration Blanks (CCB) Requirements

All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria.

Continuing Calibration Verification (CCV) Requirements

All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement

The method blank analyzed with this SDG did not contain analytes of interest above the CRDL, with the exception of zinc: The samples in this SDG contained the above noted analytes at concentrations more than ten times the amount present in the method blank (MB), therefore the data was not adversely affected. 1203149606 (MB)-ICP.

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: 354868001 (J1TXH0)-ICP, CVAA and ICP-MS.

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 the recommended quality control acceptance criteria for percent recoveries for barium, potassium and silicon. 1203149615 (J1TXH0)-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. All applicable analytes met these requirements.

Post Spike (PS) Recovery Statement

The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS did not meet the recommended quality control acceptance criteria for percent recoveries for silicon and verifies the presence of matrix interferences. See DER report #1327750. 1203155165 (J1TXH0)-ICP.

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. All applicable analytes met the established acceptance percent difference criteria.

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 was diluted for titanium in order to bring raw values within the linear range of the instrument, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for antimony. Sample required dilution for silver in order to minimize suppression due to matrix interferences. 354868001 (J1TXH0)-ICP. The ICPMS solid samples in this SDG were diluted the standard two times. ICP-MS.

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 reports were included behind the Case Narrative or in the Miscellaneous Data section of this data package. The following DER was generated for this SDG: 1327750, 1203149615 (J1TXH0) and 1203155165 (J1TXH0)-ICP.

Additional Comments

Additional comments were not required for this SDG.

Certification Statement

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

Review Validation:

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

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

Reviewer: Y. Nik-Cole A. Elmore Date: 9.15.14

DATA EXCEPTION REPORT

Mo.Day Yr. 26-AUG-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1412088	Sample Numbers: See Below		

Potentially affected work order(s)(SDG): 354864(X0074),354866(X0075),354868(X0076)

Application Issues:

- Failed Recovery for MS/PS
- Method Blank contamination
- Failed RPD for DUP
- Other

Specification and Requirements Exception Description:

DER Disposition:

1. Failed Recovery for MS/PS:
 - QC 1203149609MS,1203149612MS,
 - 1203149615MS,
 - 1203155163PS,
 - 1203155164PS,
 - 1203155165PS
2. Failed RPD for DUP:
 - QC 1203149611DUP
3. Method Blank contamination:
 - QC 1203149606MB
4. High range standard recovered less than 90% for silicon.

1. The matrix spike recovery failed outside of the control limits for barium,potassium and 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.
2. The sample and sample duplicate % RPD failed outside the control limits for lead due to possible sample non-homogeneity and/or matrix interference.
3. The method blank was slightly contaminated for zinc the samples in this SDG contained the above noted analytes at concentrations more than ten times the amount present in the method blank (MB), therefore the data was not adversely affected.
4. The post spike that was analyzed recovered high for silicon, there was no data that was affected and therefore data is being reported per Group Leader.

Originator's Name:

Helen Camello 02-SEP-14

Data Validator/Group Leader:

Louise Smith 02-SEP-14

Sample Data Summary

GEL LABORATORIES LLC

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Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0076 GEL Work Order: 354868 Project: RC-233 Soil

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is \geq EQL or is $> 5\%$ of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- N Spike Sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

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

Nikole A. Elmore 9.15.14

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: September 15, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-233 Soil

Client SDG: X0076

Client Sample ID: J1TXH0
Sample ID: 354868001

Project: WCHN00313
Client ID: WCHN001

The following Analytical Methods were performed:

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

Notes:

Quality Control Summary

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QC Summary

Report Date: September 15, 2014

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

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1412079										
QC1203149593	354868001	DUP									
Selenium		DU	0.321	DU	0.323	mg/kg	N/A		BAJ	08/28/14	06:15
QC1203149586	LCS										
Selenium	4.97		D		4.54	mg/kg	91.4	(80%-120%)		08/28/14	04:22
QC1203149585	MB										
Selenium			DU		0.308	mg/kg				08/28/14	04:15
QC1203149594	354868001	MS									
Selenium	4.85	DU	0.321	D	4.01	mg/kg	82.6	(75%-125%)		08/28/14	06:22
QC1203149595	354868001	SDILT									
Selenium		DU	-0.917	DU	1.60	ug/L	N/A	(0%-10%)		08/28/14	06:29
Metals Analysis-ICP											
Batch	1412088										
QC1203149614	354868001	DUP									
Aluminum			5360		5770	mg/kg	7.26	(0%-20%)	HSC	08/19/14	10:11
Antimony		DU	1.63	DU	1.63	mg/kg	N/A			08/21/14	09:38
Arsenic		B	2.03	B	2.83	mg/kg	32.6 ^	(+/-2.96)		08/19/14	10:11
Barium		N	72.6		80.4	mg/kg	10.1	(0%-20%)			
Beryllium			1.16		1.14	mg/kg	2.49 ^	(+/-0.493)			
Boron		U	0.990	B	1.40	mg/kg	42.9 ^	(+/-4.93)			
Cadmium		B	0.385	B	0.380	mg/kg	1.36 ^	(+/-0.493)			
Calcium			4950		5260	mg/kg	6.13	(0%-20%)			
Chromium			7.13		8.14	mg/kg	13.2	(0%-20%)			
Cobalt			12.0		11.9	mg/kg	1.14	(0%-20%)			
Copper			11.0		11.9	mg/kg	7.94	(0%-20%)			
Iron			21900		22100	mg/kg	0.985	(0%-20%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1412088										
Lead		B	0.773		1.30	mg/kg	50.9 ^	(+/-0.987)	HSC	08/19/14	10:11
Magnesium			4230		4400	mg/kg	3.87	(0%-20%)			
Manganese			303		337	mg/kg	10.6	(0%-20%)			
Molybdenum		B	0.258	U	0.197	mg/kg	80.1 ^	(+/-0.987)			
Nickel			8.28		9.30	mg/kg	11.7	(0%-20%)			
Potassium		N	1330		1380	mg/kg	3.31	(0%-20%)			
Silicon		N	719		758	mg/kg	5.25	(0%-20%)			
Silver		BD	0.689	BD	0.828	mg/kg	18.3 ^	(+/-2.47)		08/21/14	09:38
Sodium			122		122	mg/kg	0.143 ^	(+/-24.7)		08/19/14	10:11
Vanadium			63.5		61.2	mg/kg	3.69	(0%-20%)			
Zinc		C	32.4		32.3	mg/kg	0.415	(0%-20%)			
QC1203149607	LCS										
Aluminum			483		488	mg/kg		101 (80%-120%)		08/19/14	09:32
Antimony			48.3		48.2	mg/kg		99.9 (80%-120%)		08/21/14	08:52
Arsenic			48.3		47.5	mg/kg		98.4 (80%-120%)		08/19/14	09:32
Barium			48.3		47.5	mg/kg		98.5 (80%-120%)			
Beryllium			48.3		48.8	mg/kg		101 (80%-120%)			
Boron			48.3		48.0	mg/kg		99.5 (80%-120%)			
Cadmium			48.3		47.9	mg/kg		99.2 (80%-120%)			
Calcium			483		487	mg/kg		101 (80%-120%)			
Chromium			48.3		46.7	mg/kg		96.8 (80%-120%)			
Cobalt			48.3		47.5	mg/kg		98.5 (80%-120%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1412088										
Copper	48.3			47.0	mg/kg		97.5	(80%-120%)	HSC	08/19/14	09:32
Iron	483			491	mg/kg		102	(80%-120%)			
Lead	48.3			47.2	mg/kg		97.7	(80%-120%)			
Magnesium	483			511	mg/kg		106	(80%-120%)			
Manganese	48.3			47.8	mg/kg		99	(80%-120%)			
Molybdenum	48.3			46.0	mg/kg		95.4	(80%-120%)			
Nickel	48.3			46.7	mg/kg		96.8	(80%-120%)			
Potassium	483			466	mg/kg		96.5	(80%-120%)			
Silicon	483			414	mg/kg		85.7	(80%-120%)			
Silver	48.3			47.9	mg/kg		99.3	(80%-120%)		08/21/14	08:52
Sodium	483			491	mg/kg		102	(80%-120%)		08/19/14	09:32
Vanadium	48.3			47.6	mg/kg		98.6	(80%-120%)			
Zinc	48.3			49.6	mg/kg		103	(80%-120%)			
QC1203149606	MB										
Aluminum			U	6.58	mg/kg					08/19/14	09:30
Antimony			U	0.319	mg/kg					08/21/14	08:47
Arsenic			U	0.484	mg/kg					08/19/14	09:30
Barium			U	0.0967	mg/kg						
Beryllium			U	0.0967	mg/kg						
Boron			B	1.01	mg/kg						
Cadmium			U	0.0967	mg/kg						
Calcium			U	7.74	mg/kg						

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1412088										
Chromium			B	0.190	mg/kg				HSC	08/19/14	09:30
Cobalt			U	0.145	mg/kg						
Copper			U	0.290	mg/kg						
Iron			B	14.8	mg/kg						
Lead			U	0.319	mg/kg						
Magnesium			U	8.22	mg/kg						
Manganese			B	0.830	mg/kg						
Molybdenum			U	0.193	mg/kg						
Nickel			U	0.145	mg/kg						
Potassium			B	14.2	mg/kg						
Silicon			U	1.45	mg/kg						
Silver			U	0.0967	mg/kg					08/21/14	08:47
Sodium			U	6.77	mg/kg					08/19/14	09:30
Vanadium			U	0.0967	mg/kg						
Zinc				1.16	mg/kg						
QC1203149615 354868001 MS											
Aluminum	478			5360	7390	mg/kg		N/A (75%-125%)		08/19/14	10:14
Antimony	47.8	DU		1.63	D	47.8	mg/kg	98.9 (75%-125%)		08/21/14	09:42
Arsenic	47.8	B		2.03		48.4	mg/kg	97 (75%-125%)		08/19/14	10:14
Barium	47.8	N		72.6	N	135	mg/kg	130* (75%-125%)			
Beryllium	47.8			1.16		46.9	mg/kg	95.6 (75%-125%)			
Boron	47.8	U		0.990		46.6	mg/kg	95.5 (75%-125%)			

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1412088										
Cadmium	47.8	B	0.385		44.7	mg/kg	92.7	(75%-125%)	HSC	08/19/14	10:14
Calcium	478		4950		5870	mg/kg	N/A	(75%-125%)			
Chromium	47.8		7.13		52.8	mg/kg	95.6	(75%-125%)			
Cobalt	47.8		12.0		56.7	mg/kg	93.5	(75%-125%)			
Copper	47.8		11.0		59.9	mg/kg	102	(75%-125%)			
Iron	478		21900		22800	mg/kg	N/A	(75%-125%)			
Lead	47.8	B	0.773		45.2	mg/kg	92.9	(75%-125%)			
Magnesium	478		4230		5170	mg/kg	N/A	(75%-125%)			
Manganese	47.8		303		406	mg/kg	N/A	(75%-125%)			
Molybdenum	47.8	B	0.258		44.2	mg/kg	91.8	(75%-125%)			
Nickel	47.8		8.28		52.9	mg/kg	93.3	(75%-125%)			
Potassium	478	N	1330	N	1960	mg/kg	131 *	(75%-125%)			
Silicon	478	N	719	N	915	mg/kg	41 *	(75%-125%)			
Silver	47.8	BD	0.689	D	49.7	mg/kg	102	(75%-125%)		08/21/14	09:42
Sodium	478		122		636	mg/kg	107	(75%-125%)		08/19/14	10:14
Vanadium	47.8		63.5		105	mg/kg	86.7	(75%-125%)			
Zinc	47.8	C	32.4		77.8	mg/kg	94.9	(75%-125%)			
QC1203155165 354868001 PS											
Barium	500	N	733		1220	ug/L	96.6	(80%-120%)	JWJ	08/25/14	14:32
Potassium	5000	N	13400		18700	ug/L	105	(80%-120%)			
Silicon	5000	N	7260		21300	ug/L	280 *	(80%-120%)			
QC1203149616 354868001 SDILT											
Aluminum			54100	D	11300	ug/L	4.69	(0%-10%)	HSC	08/19/14	10:17

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QC Summary

Workorder: 354868

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1412088										
Antimony	DU	1.04	DU	8.17	ug/L	N/A		(0%-10%)	HSC	08/21/14	09:45
Arsenic	B	20.5	DU	2.48	ug/L	N/A		(0%-10%)		08/19/14	10:17
Barium	N	733	D	147	ug/L	.217		(0%-10%)			
Beryllium		11.8	D	2.42	ug/L	3.07		(0%-10%)			
Boron	U	9.16	DU	4.95	ug/L	N/A		(0%-10%)			
Cadmium	B	3.89	DU	0.495	ug/L	N/A		(0%-10%)			
Calcium		49900	D	10300	ug/L	2.79		(0%-10%)			
Chromium		72.0	D	14.7	ug/L	2.29		(0%-10%)			
Cobalt		121	D	24.1	ug/L	.955		(0%-10%)			
Copper		111	D	21.0	ug/L	5.08		(0%-10%)			
Iron		221000	D	45600	ug/L	3.01		(0%-10%)			
Lead	B	7.81	D	4.47	ug/L	186		(0%-10%)			
Magnesium		42700	D	8920	ug/L	4.31		(0%-10%)			
Manganese		3060	D	621	ug/L	1.36		(0%-10%)			
Molybdenum	B	2.60	DU	0.990	ug/L	N/A		(0%-10%)			
Nickel		83.6	D	17.0	ug/L	1.45		(0%-10%)			
Potassium	N	13400	D	2710	ug/L	.804		(0%-10%)			
Silicon	N	7260	D	1400	ug/L	3.93		(0%-10%)			
Silver	BD	1.39	DU	2.48	ug/L	N/A		(0%-10%)		08/21/14	09:45
Sodium		1240	D	242	ug/L	2.29		(0%-10%)		08/19/14	10:17
Vanadium		641	D	127	ug/L	1.16		(0%-10%)			

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QC Summary

Workorder: **354868**

Client SDG: X0076

Project Description: RC-233 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1412088										
Zinc	C	327	D	64.6	ug/L	1.32		(0%-10%)			
Metals Analysis-Mercury											
Batch	1412249										
QC1203150029	354868001	DUP									
Mercury	B	0.00412	U	0.00392	mg/kg	17.6	^	(+/-0.0117)	MTM1	08/19/14	11:44
QC1203150021	LCS										
Mercury		0.117		0.114	mg/kg		97.4	(80%-120%)		08/19/14	11:21
QC1203150020	MB										
Mercury			U	0.00369	mg/kg					08/19/14	11:20
QC1203150030	354868001	MS									
Mercury		0.107	B	0.00412	mg/kg		102	(80%-120%)		08/19/14	11:46
QC1203150031	354868001	SDILT									
Mercury	B	0.073	DU	0.0189	ug/L	N/A		(0%-10%)		08/19/14	11:48

Notes:

The Qualifiers in this report are defined as follows:

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

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QC Summary

Workorder: 354868

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<u>Parmname</u>	<u>NOM</u>	<u>Sample Qual</u>	<u>QC</u>	<u>Units</u>	<u>RPD/D%</u>	<u>REC%</u>	<u>Range</u>	<u>Anlst</u>	<u>Date</u>	<u>Time</u>
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N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more 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: 1412087	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst: Jack Mabry	LCS	1203149607	Metals Spike Mix I	UI140703-01	.25	mL
Method: SW846 3050B	LCS	1203149607	Metals Spike Mix II	UI2127130-06	.25	mL
Lab SOP: GL-MA-E-009 REV# 24	MS	1203149609	Metals Spike Mix I	UI140703-01	.25	mL
Instrument: BAL-893	MS	1203149609	Metals Spike Mix II	UI2127130-06	.25	mL
	MS	1203149612	Metals Spike Mix I	UI140703-01	.25	mL
	MS	1203149612	Metals Spike Mix II	UI2127130-06	.25	mL
	MS	1203149615	Metals Spike Mix I	UI140703-01	.25	mL
	MS	1203149615	Metals Spike Mix II	UI2127130-06	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203149606 MB	18-AUG-2014 10:00:24	Soil	0.517	50	96.7118
1203149607 LCS	18-AUG-2014 10:00:24	Soil	0.518	50	96.5251
354864001	18-AUG-2014 10:00:24	Soil	0.512	50	97.65625
1203149608 DUP (354864001)	18-AUG-2014 10:00:24	Soil	0.502	50	99.60159
1203149609 MS (354864001)	18-AUG-2014 10:00:24	Soil	0.532	50	93.98496
1203149610 SDILT (354864001)	18-AUG-2014 10:00:24	Soil	0.512	50	97.65625
354866001	18-AUG-2014 10:00:24	Soil	0.531	50	94.16196
1203149611 DUP (354866001)	18-AUG-2014 10:00:24	Soil	0.505	50	99.0099
1203149612 MS (354866001)	18-AUG-2014 10:00:24	Soil	0.508	50	98.4252
1203149613 SDILT (354866001)	18-AUG-2014 10:00:24	Soil	0.531	50	94.16196
354868001	18-AUG-2014 10:00:24	Soil	0.507	50	98.61933
1203149614 DUP (354868001)	18-AUG-2014 10:00:24	Soil	0.509	50	98.23183
1203149615 MS (354868001)	18-AUG-2014 10:00:24	Soil	0.525	50	95.2381
1203149616 SDILT (354868001)	18-AUG-2014 10:00:24	Soil	0.507	50	98.61933

Reagent/Solvent Lot ID	Description	Amount	Comments:
2120890	Concentrated Nitric Acid	1.25 mL	Block Temperature: 95 C
2131546	HYDROCHLORIC ACID	10 mL	Thermometer ID: 118840 Hot Block ID: 9

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID: 1412078	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst: Jack Mabry	LCS	1203149586	ICP-MS spiking solution A	UI2127120-A	.25	mL
Method: SW846 3050B	LCS	1203149586	ICP-MS spiking solution B	UI2127123-B	.25	mL
Lab SOP: GL-MA-E-009 REV# 24	MS	1203149588	ICP-MS spiking solution A	UI2127120-A	.25	mL
Instrument: BAL-893	MS	1203149588	ICP-MS spiking solution B	UI2127123-B	.25	mL
	MS	1203149591	ICP-MS spiking solution A	UI2127120-A	.25	mL
	MS	1203149591	ICP-MS spiking solution B	UI2127123-B	.25	mL
	MS	1203149594	ICP-MS spiking solution A	UI2127120-A	.25	mL
	MS	1203149594	ICP-MS spiking solution B	UI2127123-B	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203149585 MB	18-AUG-2014 10:00:25	Soil	0.535	50	93.45794
1203149586 LCS	18-AUG-2014 10:00:25	Soil	0.503	50	99.40358
354864001	18-AUG-2014 10:00:25	Soil	0.514	50	97.27626
1203149587 DUP (354864001)	18-AUG-2014 10:00:25	Soil	0.533	50	93.80863
1203149588 MS (354864001)	18-AUG-2014 10:00:25	Soil	0.509	50	98.23183
1203149589 SDILT (354864001)	18-AUG-2014 10:00:25	Soil	0.514	50	97.27626
354866001	18-AUG-2014 10:00:25	Soil	0.508	50	98.4252
1203149590 DUP (354866001)	18-AUG-2014 10:00:25	Soil	0.522	50	95.78544
1203149591 MS (354866001)	18-AUG-2014 10:00:25	Soil	0.525	50	95.2381
1203149592 SDILT (354866001)	18-AUG-2014 10:00:25	Soil	0.508	50	98.4252
354868001	18-AUG-2014 10:00:25	Soil	0.517	50	96.7118
1203149593 DUP (354868001)	18-AUG-2014 10:00:25	Soil	0.513	50	97.46589
1203149594 MS (354868001)	18-AUG-2014 10:00:25	Soil	0.518	50	96.5251
1203149595 SDILT (354868001)	18-AUG-2014 10:00:25	Soil	0.517	50	96.7118

Reagent/Solvent Lot ID	Description	Amount	Comments:
1976094-02	Hydrogen Peroxide 30%	1.5 mL	Block Temperature: 93 C
2120890	Concentrated Nitric Acid	5 mL	Thermometer ID: 1120213992 Hot Block ID: 4

Prep Logbook

Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Batch ID:	1412248	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	Alan Stanley	LCS	1203150021	MHGSOILMSSPIKE	WHG140818-14	.3	mL
Method:	SW846 7471B Prep	MS	1203150023	MHGSOILMSSPIKE	WHG140818-14	.3	mL
Lab SOP:	GL-MA-E-010 REV# 28	MS	1203150027	MHGSOILMSSPIKE	WHG140818-14	.3	mL
Instrument:	Metals Manual Instrument	MS	1203150030	MHGSOILMSSPIKE	WHG140818-14	.3	mL
		MS	1203150033	MHGSOILMSSPIKE	WHG140818-14	.3	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203150020 MB	18-AUG-2014 16:24:19	Soil	0.545	30	55.04587
1203150021 LCS	18-AUG-2014 16:24:19	Soil	0.511	30	58.70841
354864001	18-AUG-2014 16:24:19	Soil	0.503	30	59.64215
1203150022 DUP (354864001)	18-AUG-2014 16:24:19	Soil	0.5	30	60
1203150023 MS (354864001)	18-AUG-2014 16:24:19	Soil	0.536	30	55.97015
1203150025 SDILT (354864001)	18-AUG-2014 16:24:19	Soil	0.503	30	59.64215
354866001	18-AUG-2014 16:24:19	Soil	0.505	30	59.40594
1203150026 DUP (354866001)	18-AUG-2014 16:24:19	Soil	0.51	30	58.82353
1203150027 MS (354866001)	18-AUG-2014 16:24:19	Soil	0.574	30	52.26481
1203150028 SDILT (354866001)	18-AUG-2014 16:24:19	Soil	0.505	30	59.40594
354868001	18-AUG-2014 16:24:19	Soil	0.534	30	56.17978
1203150029 DUP (354868001)	18-AUG-2014 16:24:19	Soil	0.515	30	58.25243
1203150030 MS (354868001)	18-AUG-2014 16:24:19	Soil	0.565	30	53.09735
1203150031 SDILT (354868001)	18-AUG-2014 16:24:19	Soil	0.534	30	56.17978
354923001	18-AUG-2014 16:24:19	Oil	0.169	30	177.51479
1203150032 DUP (354923001)	18-AUG-2014 16:24:19	Oil	0.121	30	247.93388
1203150034 TRI (354923001)	18-AUG-2014 16:24:19	Oil	0.123	30	243.90244
1203150033 MS (354923001)	18-AUG-2014 16:24:19	Oil	0.191	30	157.06806
1203150035 SDILT (354923001)	18-AUG-2014 16:24:19	Oil	0.169	30	177.51479

Reagent/Solvent Lot ID	Description	Amount	Comments:
2072331-C	Hg reducing agent	3 mL	Digestion Start Date: 18-AUG-2014 16:25
2108387-A	Hydrochloric Acid Conc.	1.125 mL	Digestion End Date: 18-AUG-2014 16:55
2117950-C	5% KMnO4 solution	7.5 mL	Block Temperature: 95 C
2127229-1	NITRIC ACID	.375 mL	Thermometer ID: 119131
			Hot Block ID: 6

Prep Logbook

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
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Reagent/Solvent Lot ID	Description	Amount	Comments:
WHG140818-07	Mercury Working Standard 1st Source CAL S 0.2/CRA	30 uL	Less sample used due the potassium permanganate falling out.
WHG140818-08	Mercury Working Standard 1st Source CAL S 0.5	75 uL	
WHG140818-09	Mercury Working 1st Source CAL S 2.0	300 uL	
WHG140818-10	Mercury Working 1st Source CAL S 5.0/CCV	750 uL	
WHG140818-11	Mercury Working 1st Source CAL S 10.0	1500 uL	
WHG140818-12	Mercury Working 2nd Source S 5.0/ICV	750 uL	