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 9/19/13
INITIAL/DATE

COMMENTS:

SDG XP0008 SAF-RC-233

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

Sample Location: 600-279

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171 F 843.766.1178

www.gel.com

September 03, 2013

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

Re: RC-233 Soil
Work Order: 331858
SDG: XP0008

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 20, 2013. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Orlette Johnson
Project Manager

Purchase Order: 1510
Chain of Custody: RC-233-038
Enclosures

Table of Contents

Case Narrative.....1

Chain of Custody and Supporting Documentation.....3

Laboratory Certifications.....7

Volatile Analysis.....9

Case Narrative.....10

Sample Data Summary.....15

Quality Control Summary.....18

Miscellaneous.....26

Semi-Volatile Analysis.....28

Case Narrative.....29

Sample Data Summary.....36

Quality Control Summary.....40

Miscellaneous.....55

Pesticide Analysis.....57

Case Narrative.....58

Sample Data Summary.....62

Quality Control Summary.....64

Miscellaneous.....70

Herbicide Analysis.....72

Case Narrative.....73

Sample Data Summary.....79
Quality Control Summary.....81
Miscellaneous.....85
Metals Analysis.....87
Case Narrative.....88
Sample Data Summary.....95
Quality Control Summary.....99
General Chem Analysis.....107
Case Narrative.....108
Sample Data Summary.....124
Quality Control Summary.....128
Miscellaneous.....133

Case Narrative

Receipt Narrative
for
WC-HANFORD, INC.
SDG: XP0008
Work Orders: 331858 and 331859

August 27, 2013

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 20, 2013 for analysis.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
331858001	J1RWK4
331859001	J1RWK4

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: GC Semivolatile Herbicide, GC Semivolatile Pesticide, GC/MS Semivolatile, GC/MS Volatile, General Chemistry, Metals and Radiochemistry.

Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-233-038

Collector DUNNUM, AJ	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	**Sampling Location** 600-279		**SAF No.** RC-233
Ice Chest No. WCH-11-029	**Field Logbook No.** EL-1666-01	**COA** 06027926000	**Method of Shipment** fed EX
Shipped To Eberline - GEL	**Offsite Property No.** A120945		**Bill of Lading/Air Bill No.** See OSPC

Price Code 8B **Data Turnaround** 7 Days

POSSIBLE SAMPLE HAZARDS/REMARKS
None

Special Handling and/or Storage
Cool 4 C

331858, 331859

Preservation	Freeze	Cool 4C	None	Cool 4C	Cool 4C	None	Cool 4C	None	None	None
Type of Container	Gs*	G/P	G/P	aG	aG	aG	aGs*	aG	aG	aG
No. of Container(s)	3	1	1	1	1	1	1	1	1	1
Volume	40mL	125mL	125mL	~~125mL~~ 250	250mL	125mL	125mL	125mL	125mL	125mL
SAMPLE ANALYSIS	** VOA - 5035/8260 (TCL)	See item (1) in Special Instructions	See item (2) in Special Instructions	8-19-13 CMB Semi-VOA - 8270A (TCL)	Pesticides - 8081; Chloro-Herbicides - EPA8151	See item (3) in Special Instructions	TCLP VOA - 1311/8260A	TCLP Semi-VOA - 1311/8270A	TCLP Pesticide - 1311/8081	TCLP Herbicides - 1311/8151

Sample No.	Matrix	Sample Date	Sample Time									
J1RWK4	SOIL	8-19-13	0830	x	x	x	x	x	x			x	x
J1RWK5	SOIL											
J1RWK6	SOIL			MA Bar 8-19-13								
J1RWK7	SOIL											
J1RWK8	SOIL											

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Aaron Dunnum	8-19-13 0840	B. Fahlberg	8-19-13 0840
B. Fahlberg	8-19-13 0930	Chiara Bingham	8-19-13 0930
Chiara Bingham	8-19-13 0955	fed EX	
		Patricia Dent	8/20/13 08:50

FINAL SAMPLE DISPOSITION — Disposal Method / Disposed By / Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Client List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV) {Mercury}
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorus in Phosphate, Sulfate}; NO2/NO3 - 353.1 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}
(3) Mercury (TCLP) - 1311/7470 {Mercury}; Metals by ICP (TCLP) - 1311/6010 {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}

* 20ml vial → % moisture
** freeze upon receipt
8-19-13 CMB

REVIEWED BY K. Wood via email DATE 8-19-13

XP0008

WCH-EE-011

Generated Date/Time: 08/13/2013 11:11, PDT

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-233-038

Collector: DUNNUM, AJ	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location: 600-279		SAF No.: RC-233
Ice Chest No.: WCH-11-020	Field Logbook No.: EL-1666-01	COA: 06027926000	Method of Shipment: fed ex
Shipped To: Eberline - ~~Oak Ridge~~ GEL 8.19.13 CMWB	Offsite Property No.: A120905		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

None

Special Handling and/or Storage

Cool 4 C

331858, 331859

Preservation	Cool 4C										
Type of Container	aG										
No. of Container(s)	1										
Volume	125mL										
SAMPLE ANALYSIS	Sulfides - 9030 Total Cyanide - 9010										
Sample No.	**Matrix**	**Sample Date**	**Sample Time**								
J1RWK4	SOIL	8-19-13	0830	X							
J1RWK5	SOIL										
J1RWK6	SOIL										
J1RWK7	SOIL					MA Barfuss 8-19-13					
J1RWK8	SOIL										

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
~~Jason Dunnum~~	8-19-13 0840	B. Fahlberg B. Fahlberg	8-19-13 0840
B. Fahlberg B. Fahlberg	8-19-13 0930	Cynthia Bingham	8-19-13 0930
Cynthia Bingham CWM	8-19-13 0940	fed EX	
		P. Want Patricia Dent	8/20/13 0850

Sign/Print Names

SPECIAL INSTRUCTIONS

REVIEWED BY K. Wood via email DATE 8-19-13

FINAL SAMPLE DISPOSITION

Disposal Method | Disposed By | Date/Time

XP0008

WCH-EE-011

Generated Date/Time: 08/13/2013 11:11, PDT

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WCHN	**SDG/AR/COC/Work Order:**
Received By: P. Plant	**Date Received:** 8/20/13

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		X	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM
Classified Radioactive II or III by RSO?		X	If yes, Were swipes taken of sample contatiners < action levels?
COC/Samples marked containing PCBs?		X	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		X	If yes, samples are to be segregeated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		X	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		X	

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	X			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	X			Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius
2a	Daily check performed and passed on IR temperature gun?	X			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): 61584649
3	Chain of custody documents included with shipment?	X			
4	Sample containers intact and sealed?	X			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		X		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		X		Sample ID's and containers affected:
7	Are Encore containers present?			X	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	X			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	X			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	X			Sample ID's affected:
11	Number of containers received match number indicated on COC?	X			Sample ID's affected: 8/20/13
12	Are sample containers identifiable as GEL provided?	X		X	Clients Labels GEL's Containers
13	COC form is properly signed in relinquished/received sections?	X			
14	Carrier and tracking number.	X			Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 7964 9360 7660-3c 7969 9376 9153-2c

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials DS Date 8/21/13 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 27 August 2013

State	Certification
Alaska	UST−110
Arkansas	88−0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH−0169
Delaware	SC00012
DoD ELAP A2LA ISO 17025	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−12−00283, P330−12−00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA130005
Maryland	270
Massachusetts	M−SC012
Nevada	SC000122011−1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68−00485
Plant Material Permit	PDEP−12−00260
South Carolina Chemistry	10120001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235−13−8
Utah NELAP	SC000122013−8
Vermont	VT87156
Virginia NELAP	460202
Washington	C780−12
Wisconsin	999887790

Volatile Analysis

Case Narrative

ChemStation Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0008

Method/Analysis Information

Procedure:	**Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer**
Analytical Method:	SW846 8260B
Prep Method:	SW846 5035
Analytical Batch Number:	1325466
Prep Batch Number:	1325465

Sample Analysis

The following client and quality control samples were analyzed to complete this SDG using the methods referenced in the Analysis Information section:

Sample ID	Client ID
331858001	J1RWK4
1202934352	Method Blank (MB)
1202934353	Laboratory Control Sample (LCS)
1202934354	Laboratory Control Sample Duplicate (LCSD)

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.

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-038 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) section 19.1.2. False positive analytes are designated on the quantitation report with a ’d’ qualifier.

Calibration Information

A complete list of the initial calibration data files with the correct dates and times of analysis are shown in the Calibration History report located in the Standard Data section of the data package.

The surrogate compounds were calibrated using a minimum five-point calibration curve. The surrogates were added by the auto sampler at a concentration of 50 ug/L or 20 ug/L for low level analyses. GEL Laboratories LLC will not have surrogate recoveries reported for Dibromofluoromethane. This is due to increased regulations for this analyte and an industry shortage.

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

Continuing Calibration Verification Requirements
All associated calibration verification standard(s) (CCV) met the acceptance criteria.

Quality Control (QC) Information

Blank (MB) Statement
The blank analyzed with this SDG met the acceptance criteria.

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

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Laboratory Control Sample Duplicate (LCSD) Recovery
The LCSD spike recoveries met the acceptance limits.

LCS/LCSD Relative Percent Difference (RPD) Statement
The RPD(s) between the LCS and LCSD met the acceptance limits.

QC Sample Designation
Spike analyses were not required for this SDG.

Internal Standard (ISTD) Acceptance
The internal standard responses in all client and quality control samples met the required acceptance criteria.

Technical Information

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

Sample Preservation and Integrity
All samples met the sample preservation and integrity requirements.

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

Sample Re-extraction/Re-analysis
Sample 331858001 (J1RWK4) was re-analyzed due to unacceptable surrogate or internal standard recoveries in the initial analysis. The re-analyses were reported.

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, and samples did not require manual integrations.

TIC Comment
Tentatively identified compounds (TIC) were not required for this SDG.

Additional Comments
Additional comments were not required for this SDG.

Residual Chlorine
Residual Chlorine was not detected in any of the samples in this SDG.

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description	P & T Trap
VOAA.I	Agilent 7890/5975 GC/MS w/ OI Eclipse/Archon Autosampler	HP7890A/HP5975C	DB-624	J&W, 60m x 0.25mm x 1.4um	Trap 10

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0008 GEL Work Order: 331858 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

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: Erin Haubert **Name: Erin Haubert**

Date: 28 AUG 2013 **Title: Data Validator**

Sample Data Summary

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

Certificate of Analysis

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

Report Date: August 28, 2013
Client SDG: XP0008

Client Sample ID: J1RWK4
Sample ID: 331858001
Matrix: Soil
Collect Date: 19-AUG-13 08:30
Receive Date: 20-AUG-13
Collector: Client
Moisture: 3.09%

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Volatile Organics										
Volatiles "Dry Weight Corrected"										
1,1,1-Trichloroethane	U	0.387	0.387	1.29	ug/kg	1	CDS1 08/23/13	1356	1325466	1
1,1,2,2-Tetrachloroethane	U	0.387	0.387	1.29	ug/kg	1				
1,1,2-Trichloroethane	U	0.387	0.387	1.29	ug/kg	1				
1,1-Dichloroethane	U	0.387	0.387	1.29	ug/kg	1				
1,1-Dichloroethylene	U	0.387	0.387	1.29	ug/kg	1				
1,2-Dichloroethane	U	0.387	0.387	1.29	ug/kg	1				
1,2-Dichloroethylene (total)	U	0.387	0.387	2.58	ug/kg	1				
1,2-Dichloropropane	U	0.387	0.387	1.29	ug/kg	1				
2-Butanone	U	1.93	1.93	6.45	ug/kg	1				
2-Hexanone	U	1.93	1.93	6.45	ug/kg	1				
4-Methyl-2-pentanone	U	1.93	1.93	6.45	ug/kg	1				
Acetone	J	2.44	1.93	6.45	ug/kg	1				
Benzene	U	0.387	0.387	1.29	ug/kg	1				
Bromodichloromethane	U	0.387	0.387	1.29	ug/kg	1				
Bromoform	U	0.387	0.387	1.29	ug/kg	1				
Bromomethane	U	0.387	0.387	1.29	ug/kg	1				
Carbon disulfide	U	1.93	1.93	6.45	ug/kg	1				
Carbon tetrachloride	U	0.387	0.387	1.29	ug/kg	1				
Chlorobenzene	U	0.387	0.387	1.29	ug/kg	1				
Chloroethane	U	0.387	0.387	1.29	ug/kg	1				
Chloroform	U	0.387	0.387	1.29	ug/kg	1				
Chloromethane	U	0.387	0.387	1.29	ug/kg	1				
Dibromochloromethane	U	0.387	0.387	1.29	ug/kg	1				
Ethylbenzene	U	0.387	0.387	1.29	ug/kg	1				
Methylene chloride	U	2.58	2.58	6.45	ug/kg	1				
Styrene	U	0.387	0.387	1.29	ug/kg	1				
Tetrachloroethylene	U	0.387	0.387	1.29	ug/kg	1				
Toluene	U	0.387	0.387	1.29	ug/kg	1				
Trichloroethylene	U	0.387	0.387	1.29	ug/kg	1				
Vinyl chloride	U	0.387	0.387	1.29	ug/kg	1				
Xylenes (total)	U	0.387	0.387	3.87	ug/kg	1				
cis-1,2-Dichloroethylene	U	0.387	0.387	1.29	ug/kg	1				
cis-1,3-Dichloropropylene	U	0.387	0.387	1.29	ug/kg	1				
trans-1,2-Dichloroethylene	U	0.387	0.387	1.29	ug/kg	1				

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: August 28, 2013
Client SDG: XP0008

Client Sample ID: J1RWK4
Sample ID: 331858001

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Volatile Organics										
Volatiles "Dry Weight Corrected"										
trans-1,3-Dichloropropylene	U	0.387	0.387	1.29	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*08/23/13 13 56*
Bromofluorobenzene	64.0 ug/kg	50.0	99.2	(80%-120%)		
Toluene-d8	67.3 ug/kg	50.0	104	(80%-120%)		
1,2-Dichloroethane-d4	74.4 ug/kg	50.0	115	(76%-122%)		

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*08/23/13 13 56*
unknown		3.533	19.7 ug/kg	0	J		
Fluorobenzene	462-06-6	9.548	64.5 ug/kg	99	NJ		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 5035	5035/8260B Prep	CDS1	08/19/13	0830	1325465

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 8260B	

Quality Control Summary

QC Summary

Report Date: August 28, 2013

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

Contact: **Joan Kessner**

Workorder: **331858** **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS										
Batch 1325466										
QC1202934353 LCS										
1,1,1-Trichloroethane	50.0			58.2	ug/kg		116	(79%-125%)	CDS1	08/23/13 09:30
1,1,2,2-Tetrachloroethane	50.0			46.2	ug/kg		92.4	(77%-120%)		
1,1,2-Trichloroethane	50.0			47.3	ug/kg		94.7	(77%-120%)		
1,1-Dichloroethane	50.0			52.3	ug/kg		105	(75%-120%)		
1,1-Dichloroethylene	50.0			53.0	ug/kg		106	(77%-125%)		
1,2-Dichloroethane	50.0			46.3	ug/kg		92.6	(69%-120%)		
1,2-Dichloroethylene (total)	100			107	ug/kg		107	(77%-120%)		
1,2-Dichloropropane	50.0			47.6	ug/kg		95.1	(75%-120%)		
2-Butanone	250			268	ug/kg		107	(57%-149%)		
2-Hexanone	250			255	ug/kg		102	(69%-145%)		
4-Methyl-2-pentanone	250			252	ug/kg		101	(79%-129%)		
Acetone	250			244	ug/kg		97.5	(55%-146%)		
Benzene	50.0			51.7	ug/kg		103	(74%-120%)		
Bromodichloromethane	50.0			49.5	ug/kg		99	(77%-121%)		
Bromoform	50.0			46.1	ug/kg		92.3	(62%-132%)		
Bromomethane	50.0			46.7	ug/kg		93.4	(67%-120%)		
Carbon disulfide	250			282	ug/kg		113	(78%-136%)		
Carbon tetrachloride	50.0			56.7	ug/kg		113	(80%-127%)		
Chlorobenzene	50.0			48.4	ug/kg		96.7	(78%-120%)		
Chloroethane	50.0			47.6	ug/kg		95.2	(70%-120%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS										
Batch 1325466										
Chloroform	50.0			52.3	ug/kg		105	(75%-120%)	CDS1	08/23/13 09:30
Chloromethane	50.0			50.2	ug/kg		100	(59%-124%)		
Dibromochloromethane	50.0			48.3	ug/kg		96.6	(72%-123%)		
Ethylbenzene	50.0			50.2	ug/kg		100	(77%-120%)		
Methylene chloride	50.0			49.6	ug/kg		99.1	(73%-120%)		
Styrene	50.0			54.0	ug/kg		108	(80%-120%)		
Tetrachloroethylene	50.0			54.3	ug/kg		109	(77%-120%)		
Toluene	50.0			49.0	ug/kg		98	(75%-120%)		
Trichloroethylene	50.0			54.5	ug/kg		109	(80%-120%)		
Vinyl chloride	50.0			59.5	ug/kg		119	(58%-122%)		
Xylenes (total)	150			153	ug/kg		102	(79%-120%)		
cis-1,2-Dichloroethylene	50.0			54.1	ug/kg		108	(76%-120%)		
cis-1,3-Dichloropropylene	50.0			50.2	ug/kg		100	(79%-121%)		
trans-1,2-Dichloroethylene	50.0			53.3	ug/kg		107	(76%-120%)		
trans-1,3-Dichloropropylene	50.0			47.1	ug/kg		94.3	(75%-120%)		
**1,2-Dichloroethane-d4	50.0			51.8	ug/L		104	(76%-122%)		
**Bromofluorobenzene	50.0			45.1	ug/L		90.2	(80%-120%)		
**Toluene-d8	50.0			49.2	ug/L		98.5	(80%-120%)		
QC1202934354 LCSD										
1,1,1-Trichloroethane	50.0			54.3	ug/kg	6.88	109	(0%-20%)		08/23/13 09:55
1,1,2,2-Tetrachloroethane	50.0			42.2	ug/kg	9.00	84.5	(0%-20%)		
1,1,2-Trichloroethane	50.0			44.2	ug/kg	6.79	88.4	(0%-20%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS										
Batch 1325466										
1,1-Dichloroethane	50.0			48.9	ug/kg	6.64	97.8	(0%-20%)	CDS1	08/23/13 09:55
1,1-Dichloroethylene	50.0			49.0	ug/kg	7.80	98.1	(0%-20%)		
1,2-Dichloroethane	50.0			43.4	ug/kg	6.51	86.7	(0%-20%)		
1,2-Dichloroethylene (total)	100			101	ug/kg	6.63	101	(0%-20%)		
1,2-Dichloropropane	50.0			44.8	ug/kg	6.04	89.6	(0%-20%)		
2-Butanone	250			236	ug/kg	12.5	94.5	(0%-20%)		
2-Hexanone	250			227	ug/kg	12.0	90.6	(0%-20%)		
4-Methyl-2-pentanone	250			227	ug/kg	10.6	90.8	(0%-20%)		
Acetone	250			221	ug/kg	9.86	88.3	(0%-20%)		
Benzene	50.0			48.3	ug/kg	6.90	96.6	(0%-20%)		
Bromodichloromethane	50.0			46.6	ug/kg	6.06	93.1	(0%-20%)		
Bromoform	50.0			42.7	ug/kg	7.82	85.3	(0%-20%)		
Bromomethane	50.0			52.1	ug/kg	10.9	104	(0%-20%)		
Carbon disulfide	250			261	ug/kg	7.64	104	(0%-20%)		
Carbon tetrachloride	50.0			52.7	ug/kg	7.41	105	(0%-20%)		
Chlorobenzene	50.0			45.7	ug/kg	5.57	91.5	(0%-20%)		
Chloroethane	50.0			51.2	ug/kg	7.41	102	(0%-20%)		
Chloroform	50.0			48.9	ug/kg	6.80	97.8	(0%-20%)		
Chloromethane	50.0			48.9	ug/kg	2.69	97.7	(0%-20%)		
Dibromochloromethane	50.0			44.8	ug/kg	7.50	89.6	(0%-20%)		
Ethylbenzene	50.0			47.2	ug/kg	6.14	94.5	(0%-20%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS										
Batch 1325466										
Methylene chloride	50.0			46.2	ug/kg	6.95	92.4	(0%-20%)		
Styrene	50.0			51.5	ug/kg	4.84	103	(0%-20%)	CDS1	08/23/13 09:55
Tetrachloroethylene	50.0			51.8	ug/kg	4.70	104	(0%-20%)		
Toluene	50.0			46.0	ug/kg	6.44	91.9	(0%-20%)		
Trichloroethylene	50.0			51.0	ug/kg	6.50	102	(0%-20%)		
Vinyl chloride	50.0			57.1	ug/kg	4.13	114	(0%-20%)		
Xylenes (total)	150			145	ug/kg	5.38	96.5	(0%-20%)		
cis-1,2-Dichloroethylene	50.0			50.5	ug/kg	6.88	101	(0%-20%)		
cis-1,3-Dichloropropylene	50.0			47.2	ug/kg	6.18	94.4	(0%-20%)		
trans-1,2-Dichloroethylene	50.0			50.0	ug/kg	6.37	100	(0%-20%)		
trans-1,3-Dichloropropylene	50.0			43.9	ug/kg	7.03	87.9	(0%-20%)		
**1,2-Dichloroethane-d4	50.0			51.3	ug/L		103	(76%-122%)		
**Bromofluorobenzene	50.0			44.7	ug/L		89.4	(80%-120%)		
**Toluene-d8	50.0			49.2	ug/L		98.5	(80%-120%)		
QC1202934352 MB										
1,1,1-Trichloroethane			U	0.300	ug/kg					08/23/13 12:26
1,1,2,2-Tetrachloroethane			U	0.300	ug/kg					
1,1,2-Trichloroethane			U	0.300	ug/kg					
1,1-Dichloroethane			U	0.300	ug/kg					
1,1-Dichloroethylene			U	0.300	ug/kg					
1,2-Dichloroethane			U	0.300	ug/kg					
1,2-Dichloroethylene (total)			U	0.300	ug/kg					
1,2-Dichloropropane			U	0.300	ug/kg					

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS										
Batch 1325466										
2-Butanone			U	1.50	ug/kg				CDS1	08/23/13 12:26
2-Hexanone			U	1.50	ug/kg					
4-Methyl-2-pentanone			U	1.50	ug/kg					
Acetone			U	1.50	ug/kg					
Benzene			U	0.300	ug/kg					
Bromodichloromethane			U	0.300	ug/kg					
Bromoform			U	0.300	ug/kg					
Bromomethane			U	0.300	ug/kg					
Carbon disulfide			U	1.50	ug/kg					
Carbon tetrachloride			U	0.300	ug/kg					
Chlorobenzene			U	0.300	ug/kg					
Chloroethane			U	0.300	ug/kg					
Chloroform			U	0.300	ug/kg					
Chloromethane			U	0.300	ug/kg					
Dibromochloromethane			U	0.300	ug/kg					
Ethylbenzene			U	0.300	ug/kg					
Methylene chloride			U	2.00	ug/kg					
Styrene			U	0.300	ug/kg					
Tetrachloroethylene			U	0.300	ug/kg					
Toluene			U	0.300	ug/kg					
Trichloroethylene			U	0.300	ug/kg					

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS										
Batch 1325466										
Vinyl chloride			U	0.300	ug/kg					
Xylenes (total)			U	0.300	ug/kg				CDS1	08/23/13 12:26
cis-1,2-Dichloroethylene			U	0.300	ug/kg					
cis-1,3-Dichloropropylene			U	0.300	ug/kg					
trans-1,2-Dichloroethylene			U	0.300	ug/kg					
trans-1,3-Dichloropropylene			U	0.300	ug/kg					
**1,2-Dichloroethane-d4	50.0			50.4	ug/L		101	(76%-122%)		
**Bromofluorobenzene	50.0			44.8	ug/L		89.7	(80%-120%)		
**Toluene-d8	50.0			49.3	ug/L		98.5	(80%-120%)		

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- o Analyte failed to recover within LCS limits (0rganics only)

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Miscellaneous

Prep Logbook

Closed-System Purge-and-Trap Collection and Extraction: Volatile Organics in Soil and Waste Samples

Batch ID: **1325465**
Analyst: Crystal Stacey
Method: SW846 5035
Lab SOP: GL-OA-E-039 REV# 9
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
331362001	11-AUG-2013 11:00:00	Soil	9.7	5	0.51546	
331858001	19-AUG-2013 08:30:00	Soil	4	5	1.25	
1202934352 MB	23-AUG-2013 08:23:00	Soil	5	5	1	
1202934353 LCS	23-AUG-2013 08:23:00	Soil	5	5	1	
1202934389 LCS	23-AUG-2013 08:23:00	Soil	5	5	1	
1202934354 LCSD	23-AUG-2013 08:23:00	Soil	5	5	1	
1202934390 LCSD	23-AUG-2013 08:23:00	Soil	5	5	1	

Reagent/Solvent Lot ID	Description	Amount

Comments:

Semi-Volatile Analysis

Case Narrative

Semi-Volatile Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0008

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:	1324342
Prep Batch Number:	1324341

Sample Analysis

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

Sample ID	Client ID
331858001	J1RWK4
1202931915	Method Blank (MB)
1202931916	Laboratory Control Sample (LCS)
1202931917	331858001(J1RWK4) Matrix Spike (MS)
1202931918	331858001(J1RWK4) 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# 30.

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 331858001 (J1RWK4) was selected for analysis as the matrix spike and matrix spike duplicate.

Matrix Spike (MS) Recovery Statement
The MS, 1202931917 (J1RWK4), recovered 3,3'-Dichlorobenzidine at 11.5% (limits are 28-105%) and 4-Chloroaniline at 15.5% (limits are 27-100%). As the MS and MSD displayed similar recoveries, the failures were attributed to sample matrix interference. The data are reported.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD, 1202931918 (J1RWK4), recovered 3,3'-Dichlorobenzidine at 17.3% (limits are 28-105%) and 4-Chloroaniline at 11.4% (limits are 27-100%). As the MS and MSD displayed similar recoveries, the failures were attributed to sample matrix interference. 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 met the specified holding time. GEL assigns holding times based on the associated methodology that 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. 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 1214397 was generated for the samples 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 1202931915 (MB) and 331858001 (J1RWK4) 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

MSD2.I	Agilent 7890A/5975C GC/MS w/7683 Autosampler	HP7890A/HP5975C	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.	**Division:**	**Quality Criteria:**	**Type:**
23-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
SEMIVOA GC/MS	SW846 3541/8270D	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1324342	See Below		

Potentially affected work order(s)(SDG): 331858(XP0008)

Application Issues:

Failed Recovery for MS/PS

Failed Recovery for MSD/PSD

Specification and Requirements Exception Description:	**DER Disposition:**
1. The MS(1202931917) recovered 3,3'-Dichlorobenzidine at 11.5% (limits are 28-105%) and 4-Chloroaniline at 15.5% (limits are 27-100%). 2. The MSD(1202931918) recovered 3,3'-Dichlorobenzidine at 17.3% (limits are 28-105%) and 4-Chloroaniline at 11.4% (limits are 27-100%).	1. & 2. As the MS and MSD displayed similar recoveries, the failures were attributed to sample matrix interference. The data are reported.

Originator's Name:

Josh Brooks 23-AUG-13

Data Validator/Group Leader:

Herbert Maier 23-AUG-13

GEL LABORATORIES LLC

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

Qualifier Definition Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0008 GEL Work Order: 331858 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.

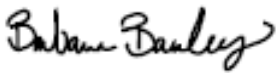
U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

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: 03 SEP 2013 **Title: Data Validator**

Sample Data Summary

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

Certificate of Analysis

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

Report Date: August 30, 2013
Client SDG: XP0008

Client Sample ID: J1RWK4
Sample ID: 331858001
Matrix: Soil
Collect Date: 19-AUG-13 08:30
Receive Date: 20-AUG-13
Collector: Client
Moisture: 3.09%

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	103	103	344	UG/KG	1	AGS1 08/22/13	2230	1324342	1
1,2-Dichlorobenzene	U	103	103	344	UG/KG	1				
1,3-Dichlorobenzene	U	103	103	344	UG/KG	1				
1,4-Dichlorobenzene	U	103	103	344	UG/KG	1				
2,4,5-Trichlorophenol	U	103	103	344	UG/KG	1				
2,4,6-Trichlorophenol	U	103	103	344	UG/KG	1				
2,4-Dichlorophenol	U	103	103	344	UG/KG	1				
2,4-Dimethylphenol	U	103	103	344	UG/KG	1				
2,4-Dinitrophenol	U	103	103	688	UG/KG	1				
2,4-Dinitrotoluene	U	103	103	344	UG/KG	1				
2,6-Dinitrotoluene	U	103	103	344	UG/KG	1				
2-Chloronaphthalene	U	10.3	10.3	34.4	UG/KG	1				
2-Chlorophenol	U	103	103	344	UG/KG	1				
2-Methyl-4,6-dinitrophenol	U	103	103	344	UG/KG	1				
2-Methylnaphthalene	U	10.3	10.3	34.4	UG/KG	1				
2-Nitrophenol	U	103	103	344	UG/KG	1				
3,3'-Dichlorobenzidine	TU	103	103	344	UG/KG	1				
4-Bromophenylphenylether	U	103	103	344	UG/KG	1				
4-Chloro-3-methylphenol	U	138	138	344	UG/KG	1				
4-Chloroaniline	TU	103	103	344	UG/KG	1				
4-Chlorophenylphenylether	U	103	103	344	UG/KG	1				
4-Nitrophenol	U	103	103	344	UG/KG	1				
Acenaphthene	U	10.3	10.3	34.4	UG/KG	1				
Acenaphthylene	U	10.3	10.3	34.4	UG/KG	1				
Anthracene	U	10.3	10.3	34.4	UG/KG	1				
Benzo(a)anthracene		76.4	10.3	34.4	UG/KG	1				
Benzo(a)pyrene		104	10.3	34.4	UG/KG	1				
Benzo(b)fluoranthene		125	10.3	34.4	UG/KG	1				
Benzo(ghi)perylene		68.1	10.3	34.4	UG/KG	1				
Benzo(k)fluoranthene		55.7	10.3	34.4	UG/KG	1				
Butylbenzylphthalate	U	103	103	344	UG/KG	1				
Carbazole	U	10.3	10.3	34.4	UG/KG	1				
Chrysene		99.7	10.3	34.4	UG/KG	1				

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Report Date: August 30, 2013
Contact: Joan Kessner
Project: **RC-233 Soil**
Client SDG: XP0008

Client Sample ID: J1RWK4
Sample ID: 331858001
Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	103	103	344	UG/KG	1				
Di-n-octylphthalate	U	103	103	344	UG/KG	1				
Dibenzo(a,h)anthracene	J	15.8	10.3	34.4	UG/KG	1				
Dibenzofuran	U	103	103	344	UG/KG	1				
Diethylphthalate	U	103	103	344	UG/KG	1				
Dimethylphthalate	U	103	103	344	UG/KG	1				
Diphenylamine	U	103	103	344	UG/KG	1				
Fluoranthene		152	10.3	34.4	UG/KG	1				
Fluorene	U	10.3	10.3	34.4	UG/KG	1				
Hexachlorobenzene	U	103	103	344	UG/KG	1				
Hexachlorobutadiene	U	103	103	344	UG/KG	1				
Hexachlorocyclopentadiene	U	103	103	344	UG/KG	1				
Hexachloroethane	U	103	103	344	UG/KG	1				
Indeno(1,2,3-cd)pyrene		61.2	10.3	34.4	UG/KG	1				
Isophorone	U	103	103	344	UG/KG	1				
N-Nitrosodipropylamine	U	103	103	344	UG/KG	1				
Naphthalene	U	10.3	10.3	34.4	UG/KG	1				
Nitrobenzene	U	103	103	344	UG/KG	1				
Pentachlorophenol	U	103	103	344	UG/KG	1				
Phenanthrene		74.6	10.3	34.4	UG/KG	1				
Phenol	U	103	103	344	UG/KG	1				
Pyrene		211	10.3	34.4	UG/KG	1				
bis(2-Chloroethoxy)methane	U	103	103	344	UG/KG	1				
bis(2-Chloroethyl) ether	U	103	103	344	UG/KG	1				
bis(2-Chloroisopropyl)ether	U	103	103	344	UG/KG	1				
bis(2-Ethylhexyl)phthalate	U	103	103	344	UG/KG	1				
3- and/or 4-Methylphenol	U	103	103	344	UG/KG	1				
m-Nitroaniline	U	103	103	344	UG/KG	1				
o-Cresol	U	103	103	344	UG/KG	1				
o-Nitroaniline	U	114	114	344	UG/KG	1				
p-Nitroaniline	U	103	103	344	UG/KG	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*08/22/13 22 30*
2-Fluorobiphenyl	1140 UG/KG	1720	66.1	(25%-100%)		
Nitrobenzene-d5	1170 UG/KG	1720	68.2	(21%-103%)		
p-Terphenyl-d14	1550 UG/KG	1720	90.1	(31%-124%)		
2-Fluorophenol	2170 UG/KG	3440	63.1	(23%-107%)		
Phenol-d5	2200 UG/KG	3440	63.9	(25%-108%)		
2,4,6-Tribromophenol	2900 UG/KG	3440	84.3	(20%-122%)		

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: August 30, 2013
Client SDG: XP0008

Client Sample ID: J1RWK4
Sample ID: 331858001

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Tentatively Identified Compound (TIC)	***CAS No.***	***RT***	***Est. Concentration***		***Fit***	***Qual***	***Date Time:***	***08/22/13 22 30***		
unknown		2.251	541	UG/KG	0	J				
unknown		2.304	229	UG/KG	0	J				
unknown		2.415	654	UG/KG	0	J				
Unknown Aldol Condensate		3.922	1180	UG/KG		AJ				
unknown		10.512	195	UG/KG	0	J				
unknown		11.814	746	UG/KG	0	J				
unknown		13.002	14600	UG/KG	0	J				

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	08/21/13	1755	1324341

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

Quality Control Summary

QC Summary

Report Date: August 30, 2013

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

Contact: **Joan Kessner**

Workorder: **331858** **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1324342											
QC1202931916 LCS											
1,2,4-Trichlorobenzene	1670			1430	UG/KG		85.7	(37%-98%)	AGS1	08/22/13	19:37
1,2-Dichlorobenzene	1670			1220	UG/KG		73.4	(39%-93%)			
1,3-Dichlorobenzene	1670			1200	UG/KG		71.9	(39%-110%)			
1,4-Dichlorobenzene	1670			1220	UG/KG		73.2	(40%-110%)			
2,4,5-Trichlorophenol	1670			1320	UG/KG		79	(41%-103%)			
2,4,6-Trichlorophenol	1670			1430	UG/KG		85.6	(36%-98%)			
2,4-Dichlorophenol	1670			1370	UG/KG		82.3	(35%-110%)			
2,4-Dimethylphenol	1670			1180	UG/KG		71.1	(35%-102%)			
2,4-Dinitrophenol	1670		J	440	UG/KG		26.4	(22%-83%)			
2,4-Dinitrotoluene	1670			1350	UG/KG		81	(43%-109%)			
2,6-Dinitrotoluene	1670			1290	UG/KG		77.7	(41%-103%)			
2-Chloronaphthalene	1670			1330	UG/KG		79.9	(39%-101%)			
2-Chlorophenol	1670			1210	UG/KG		72.5	(38%-100%)			
2-Methyl-4,6-dinitrophenol	1670			1070	UG/KG		64.1	(33%-103%)			
2-Methylnaphthalene	1670			1250	UG/KG		74.9	(36%-107%)			
2-Nitrophenol	1670			1160	UG/KG		69.9	(35%-106%)			
3,3'-Dichlorobenzidine	1670			1230	UG/KG		73.9	(32%-111%)			
3- and/or 4-Methylphenol	1670			1420	UG/KG		85.5	(39%-115%)			
4-Bromophenylphenylether	1670			1390	UG/KG		83.3	(42%-110%)			
4-Chloro-3-methylphenol	1670			1340	UG/KG		80.7	(35%-104%)			

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1324342										
4-Chloroaniline	1670			1070	UG/KG		64.1	(32%-106%)	AGS1	08/22/13 19:37
4-Chlorophenylphenylether	1670			1480	UG/KG		88.7	(41%-104%)		
4-Nitrophenol	1670			1040	UG/KG		62.3	(23%-114%)		
Acenaphthene	1670			1210	UG/KG		72.8	(36%-105%)		
Acenaphthylene	1670			1320	UG/KG		79.4	(38%-103%)		
Anthracene	1670			1250	UG/KG		74.9	(43%-104%)		
Benzo(a)anthracene	1670			1320	UG/KG		79.5	(46%-108%)		
Benzo(a)pyrene	1670			1290	UG/KG		77.6	(45%-109%)		
Benzo(b)fluoranthene	1670			1260	UG/KG		75.9	(42%-111%)		
Benzo(ghi)perylene	1670			1420	UG/KG		85.3	(43%-115%)		
Benzo(k)fluoranthene	1670			1270	UG/KG		76	(43%-103%)		
Butylbenzylphthalate	1670			1310	UG/KG		78.6	(37%-107%)		
Carbazole	1670			1430	UG/KG		85.8	(53%-118%)		
Chrysene	1670			1300	UG/KG		77.9	(47%-107%)		
Di-n-butylphthalate	1670			1400	UG/KG		84.1	(46%-112%)		
Di-n-octylphthalate	1670			1370	UG/KG		82.4	(41%-110%)		
Dibenzo(a,h)anthracene	1670			1440	UG/KG		86.2	(39%-128%)		
Dibenzofuran	1670			1560	UG/KG		93.9	(38%-104%)		
Diethylphthalate	1670			1450	UG/KG		87.3	(42%-109%)		
Dimethylphthalate	1670			1430	UG/KG		85.8	(41%-105%)		
Diphenylamine	1670			1300	UG/KG		78.3	(40%-101%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1324342											
Fluoranthene	1670			1280	UG/KG		77.1	(44%-106%)			
Fluorene	1670			1340	UG/KG		80.3	(39%-102%)	AGS1	08/22/13	19:37
Hexachlorobenzene	1670			1410	UG/KG		84.8	(41%-108%)			
Hexachlorobutadiene	1670			1600	UG/KG		96.1	(32%-104%)			
Hexachlorocyclopentadiene	1670			712	UG/KG		42.7	(24%-84%)			
Hexachloroethane	1670			1320	UG/KG		79	(34%-98%)			
Indeno(1,2,3-cd)pyrene	1670			1460	UG/KG		87.8	(45%-115%)			
Isophorone	1670			1530	UG/KG		91.7	(36%-98%)			
N-Nitrosodipropylamine	1670			1500	UG/KG		90.2	(34%-106%)			
Naphthalene	1670			1260	UG/KG		75.4	(38%-106%)			
Nitrobenzene	1670			1640	UG/KG		98.3	(35%-99%)			
Pentachlorophenol	1670			1000	UG/KG		60.2	(31%-93%)			
Phenanthrene	1670			1250	UG/KG		75	(43%-105%)			
Phenol	1670			1210	UG/KG		72.7	(38%-98%)			
Pyrene	1670			1310	UG/KG		78.6	(33%-99%)			
bis(2-Chloroethoxy)methane	1670			1380	UG/KG		82.7	(37%-98%)			
bis(2-Chloroethyl) ether	1670			1340	UG/KG		80.2	(35%-96%)			
bis(2-Chloroisopropyl)ether	1670			1190	UG/KG		71.3	(27%-109%)			
bis(2-Ethylhexyl)phthalate	1670			1320	UG/KG		79.2	(41%-104%)			
m-Nitroaniline	1670			1100	UG/KG		66.3	(32%-113%)			
o-Cresol	1670			1220	UG/KG		73	(37%-97%)			
o-Nitroaniline	1670			1550	UG/KG		93	(34%-116%)			

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1324342											
p-Nitroaniline	1670			1400	UG/KG		84.1	(35%-150%)			
**2,4,6-Tribromophenol	3330			3080	UG/KG		92.5	(20%-122%)	AGS1	08/22/13	19:37
**2-Fluorobiphenyl	1670			1290	UG/KG		77.7	(25%-100%)			
**2-Fluorophenol	3330			2800	UG/KG		83.9	(23%-107%)			
**Nitrobenzene-d5	1670			1440	UG/KG		86.4	(21%-103%)			
**Phenol-d5	3330			2720	UG/KG		81.7	(25%-108%)			
**p-Terphenyl-d14	1670			1350	UG/KG		81.1	(31%-124%)			
QC1202931915 MB											
1,2,4-Trichlorobenzene			U	99.8	UG/KG					08/22/13	19:08
1,2-Dichlorobenzene			U	99.8	UG/KG						
1,3-Dichlorobenzene			U	99.8	UG/KG						
1,4-Dichlorobenzene			U	99.8	UG/KG						
2,4,5-Trichlorophenol			U	99.8	UG/KG						
2,4,6-Trichlorophenol			U	99.8	UG/KG						
2,4-Dichlorophenol			U	99.8	UG/KG						
2,4-Dimethylphenol			U	99.8	UG/KG						
2,4-Dinitrophenol			U	99.8	UG/KG						
2,4-Dinitrotoluene			U	99.8	UG/KG						
2,6-Dinitrotoluene			U	99.8	UG/KG						
2-Chloronaphthalene			U	9.98	UG/KG						
2-Chlorophenol			U	99.8	UG/KG						
2-Methyl-4,6-dinitrophenol			U	99.8	UG/KG						
2-Methylnaphthalene			U	9.98	UG/KG						

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1324342											
2-Nitrophenol			U	99.8	UG/KG				AGS1	08/22/13	19:08
3,3'-Dichlorobenzidine			U	99.8	UG/KG						
3- and/or 4-Methylphenol			U	99.8	UG/KG						
4-Bromophenylphenylether			U	99.8	UG/KG						
4-Chloro-3-methylphenol			U	133	UG/KG						
4-Chloroaniline			U	99.8	UG/KG						
4-Chlorophenylphenylether			U	99.8	UG/KG						
4-Nitrophenol			U	99.8	UG/KG						
Acenaphthene			U	9.98	UG/KG						
Acenaphthylene			U	9.98	UG/KG						
Anthracene			U	9.98	UG/KG						
Benzo(a)anthracene			U	9.98	UG/KG						
Benzo(a)pyrene			U	9.98	UG/KG						
Benzo(b)fluoranthene			U	9.98	UG/KG						
Benzo(ghi)perylene			U	9.98	UG/KG						
Benzo(k)fluoranthene			U	9.98	UG/KG						
Butylbenzylphthalate			U	99.8	UG/KG						
Carbazole			U	9.98	UG/KG						
Chrysene			U	9.98	UG/KG						
Di-n-butylphthalate			U	99.8	UG/KG						
Di-n-octylphthalate			U	99.8	UG/KG						

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1324342											
Dibenzo(a,h)anthracene			U	9.98	UG/KG						
Dibenzofuran			U	99.8	UG/KG				AGS1	08/22/13	19:08
Diethylphthalate			U	99.8	UG/KG						
Dimethylphthalate			U	99.8	UG/KG						
Diphenylamine			U	99.8	UG/KG						
Fluoranthene			U	9.98	UG/KG						
Fluorene			U	9.98	UG/KG						
Hexachlorobenzene			U	99.8	UG/KG						
Hexachlorobutadiene			U	99.8	UG/KG						
Hexachlorocyclopentadiene			U	99.8	UG/KG						
Hexachloroethane			U	99.8	UG/KG						
Indeno(1,2,3-cd)pyrene			U	9.98	UG/KG						
Isophorone			U	99.8	UG/KG						
N-Nitrosodipropylamine			U	99.8	UG/KG						
Naphthalene			U	9.98	UG/KG						
Nitrobenzene			U	99.8	UG/KG						
Pentachlorophenol			U	99.8	UG/KG						
Phenanthrene			U	9.98	UG/KG						
Phenol			U	99.8	UG/KG						
Pyrene			U	9.98	UG/KG						
bis(2-Chloroethoxy)methane			U	99.8	UG/KG						
bis(2-Chloroethyl) ether			U	99.8	UG/KG						

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1324342										
bis(2-Chloroisopropyl)ether			U	99.8	UG/KG					
bis(2-Ethylhexyl)phthalate			U	99.8	UG/KG				AGS1	08/22/13 19:08
m-Nitroaniline			U	99.8	UG/KG					
o-Cresol			U	99.8	UG/KG					
o-Nitroaniline			U	110	UG/KG					
p-Nitroaniline			U	99.8	UG/KG					
**2,4,6-Tribromophenol	3330			2690	UG/KG		80.9	(20%-122%)		
**2-Fluorobiphenyl	1660			1330	UG/KG		80.3	(25%-100%)		
**2-Fluorophenol	3330			2630	UG/KG		79.1	(23%-107%)		
**Nitrobenzene-d5	1660			1410	UG/KG		84.6	(21%-103%)		
**Phenol-d5	3330			2550	UG/KG		76.7	(25%-108%)		
**p-Terphenyl-d14	1660			1350	UG/KG		81.2	(31%-124%)		
QC1202931917 331858001 MS										
1,2,4-Trichlorobenzene	1710	U	103	1280	UG/KG		74.7	(25%-102%)		08/22/13 22:59
1,2-Dichlorobenzene	1710	U	103	1060	UG/KG		62.1	(25%-99%)		
1,3-Dichlorobenzene	1710	U	103	1020	UG/KG		59.8	(24%-96%)		
1,4-Dichlorobenzene	1710	U	103	1050	UG/KG		61.7	(24%-97%)		
2,4,5-Trichlorophenol	1710	U	103	1320	UG/KG		77.5	(38%-109%)		
2,4,6-Trichlorophenol	1710	U	103	1390	UG/KG		81.4	(32%-103%)		
2,4-Dichlorophenol	1710	U	103	1290	UG/KG		75.5	(31%-103%)		
2,4-Dimethylphenol	1710	U	103	1160	UG/KG		68	(30%-109%)		
2,4-Dinitrophenol	1710	U	103	846	UG/KG		49.5	(19%-101%)		
2,4-Dinitrotoluene	1710	U	103	1310	UG/KG		76.8	(36%-115%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1324342											
2,6-Dinitrotoluene	1710	U	103		1250	UG/KG		73	(36%-107%)	AGS1	08/22/13 22:59
2-Chloronaphthalene	1710	U	10.3		1230	UG/KG		71.7	(27%-109%)		
2-Chlorophenol	1710	U	103		1100	UG/KG		64.2	(28%-108%)		
2-Methyl-4,6-dinitrophenol	1710	U	103		1170	UG/KG		68.7	(14%-116%)		
2-Methylnaphthalene	1710	U	10.3		1140	UG/KG		66.9	(23%-107%)		
2-Nitrophenol	1710	U	103		1080	UG/KG		62.9	(24%-106%)		
3,3'-Dichlorobenzidine	1710	TU	103	JT	196	UG/KG		11.5*	(28%-105%)		
3- and/or 4-Methylphenol	1710	U	103		1310	UG/KG		76.7	(32%-123%)		
4-Bromophenylphenylether	1710	U	103		1290	UG/KG		75.7	(37%-112%)		
4-Chloro-3-methylphenol	1710	U	138		1310	UG/KG		76.5	(32%-112%)		
4-Chloroaniline	1710	TU	103	JT	264	UG/KG		15.5*	(27%-100%)		
4-Chlorophenylphenylether	1710	U	103		1430	UG/KG		83.6	(37%-110%)		
4-Nitrophenol	1710	U	103		1190	UG/KG		69.7	(12%-128%)		
Acenaphthene	1710	U	10.3		1130	UG/KG		66	(28%-102%)		
Acenaphthylene	1710	U	10.3		1230	UG/KG		71.7	(32%-103%)		
Anthracene	1710	U	10.3		1190	UG/KG		69.8	(36%-104%)		
Benzo(a)anthracene	1710		76.4		1300	UG/KG		71.6	(27%-120%)		
Benzo(a)pyrene	1710		104		1340	UG/KG		72.5	(31%-116%)		
Benzo(b)fluoranthene	1710		125		1430	UG/KG		76.1	(30%-119%)		
Benzo(ghi)perylene	1710		68.1		1020	UG/KG		55.7	(30%-109%)		
Benzo(k)fluoranthene	1710		55.7		1410	UG/KG		79.1	(31%-125%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1324342											
Butylbenzylphthalate	1710	U	103		1480	UG/KG		86.4	(33%-121%)		
Carbazole	1710	U	10.3		1370	UG/KG		80.4	(40%-133%)	AGS1	08/22/13 22:59
Chrysene	1710		99.7		1280	UG/KG		69.3	(33%-114%)		
Di-n-butylphthalate	1710	U	103		1430	UG/KG		83.4	(42%-119%)		
Di-n-octylphthalate	1710	U	103		1300	UG/KG		76.2	(36%-115%)		
Dibenzo(a,h)anthracene	1710	J	15.8		1040	UG/KG		60.1	(26%-128%)		
Dibenzofuran	1710	U	103		1470	UG/KG		86.1	(28%-117%)		
Diethylphthalate	1710	U	103		1450	UG/KG		84.6	(40%-113%)		
Dimethylphthalate	1710	U	103		1370	UG/KG		80.2	(38%-110%)		
Diphenylamine	1710	U	103		1200	UG/KG		70	(34%-111%)		
Fluoranthene	1710		152		1330	UG/KG		68.8	(32%-115%)		
Fluorene	1710	U	10.3		1290	UG/KG		75.3	(30%-115%)		
Hexachlorobenzene	1710	U	103		1310	UG/KG		76.4	(34%-111%)		
Hexachlorobutadiene	1710	U	103		1440	UG/KG		84.2	(24%-105%)		
Hexachlorocyclopentadiene	1710	U	103		545	UG/KG		31.9	(12%-106%)		
Hexachloroethane	1710	U	103		1140	UG/KG		66.9	(24%-102%)		
Indeno(1,2,3-cd)pyrene	1710		61.2		1050	UG/KG		58.1	(29%-117%)		
Isophorone	1710	U	103		1420	UG/KG		83.3	(24%-108%)		
N-Nitrosodipropylamine	1710	U	103		1370	UG/KG		80.4	(23%-117%)		
Naphthalene	1710	U	10.3		1130	UG/KG		65.9	(21%-107%)		
Nitrobenzene	1710	U	103		1470	UG/KG		85.8	(25%-104%)		
Pentachlorophenol	1710	U	103		1340	UG/KG		78.2	(22%-108%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1324342											
Phenanthrene	1710		74.6		1230	UG/KG		67.7	(28%-119%)		
Phenol	1710	U	103		1120	UG/KG		65.7	(28%-108%)	AGS1	08/22/13 22:59
Pyrene	1710		211		1630	UG/KG		82.7	(25%-119%)		
bis(2-Chloroethoxy)methane	1710	U	103		1280	UG/KG		74.7	(27%-104%)		
bis(2-Chloroethyl) ether	1710	U	103		1220	UG/KG		71.2	(25%-102%)		
bis(2-Chloroisopropyl)ether	1710	U	103		1080	UG/KG		62.9	(25%-105%)		
bis(2-Ethylhexyl)phthalate	1710	U	103		1410	UG/KG		82.3	(33%-124%)		
m-Nitroaniline	1710	U	103		687	UG/KG		40.2	(31%-110%)		
o-Cresol	1710	U	103		1200	UG/KG		70	(27%-105%)		
o-Nitroaniline	1710	U	114		1510	UG/KG		88.6	(37%-114%)		
p-Nitroaniline	1710	U	103		1160	UG/KG		67.9	(36%-141%)		
**2,4,6-Tribromophenol	3420		2900		3130	UG/KG		91.5	(20%-122%)		
**2-Fluorobiphenyl	1710		1140		1190	UG/KG		69.4	(25%-100%)		
**2-Fluorophenol	3420		2170		2470	UG/KG		72.3	(23%-107%)		
**Nitrobenzene-d5	1710		1170		1280	UG/KG		75.1	(21%-103%)		
**Phenol-d5	3420		2200		2470	UG/KG		72.1	(25%-108%)		
**p-Terphenyl-d14	1710		1550		1600	UG/KG		93.5	(31%-124%)		
QC1202931918 331858001 MSD											
1,2,4-Trichlorobenzene	1720	U	103		1310	UG/KG	2.53	76.2	(0%-30%)		08/22/13 23:28
1,2-Dichlorobenzene	1720	U	103		1080	UG/KG	1.74	62.9	(0%-30%)		
1,3-Dichlorobenzene	1720	U	103		1030	UG/KG	0.465	59.8	(0%-30%)		
1,4-Dichlorobenzene	1720	U	103		1050	UG/KG	0.120	61.3	(0%-30%)		
2,4,5-Trichlorophenol	1720	U	103		1380	UG/KG	4.44	80.6	(0%-30%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1324342											
2,4,6-Trichlorophenol	1720	U	103		1440	UG/KG	3.25	83.7	(0%-30%)	AGS1	08/22/13 23:28
2,4-Dichlorophenol	1720	U	103		1340	UG/KG	3.90	78.1	(0%-30%)		
2,4-Dimethylphenol	1720	U	103		1210	UG/KG	4.30	70.7	(0%-30%)		
2,4-Dinitrophenol	1720	U	103		905	UG/KG	6.80	52.7	(0%-30%)		
2,4-Dinitrotoluene	1720	U	103		1350	UG/KG	2.88	78.7	(0%-30%)		
2,6-Dinitrotoluene	1720	U	103		1290	UG/KG	3.46	75.2	(0%-30%)		
2-Chloronaphthalene	1720	U	10.3		1280	UG/KG	4.00	74.3	(0%-30%)		
2-Chlorophenol	1720	U	103		1110	UG/KG	1.46	64.8	(0%-30%)		
2-Methyl-4,6-dinitrophenol	1720	U	103		1150	UG/KG	2.07	66.9	(0%-30%)		
2-Methylnaphthalene	1720	U	10.3		1200	UG/KG	4.85	69.9	(0%-30%)		
2-Nitrophenol	1720	U	103		1100	UG/KG	2.45	64.2	(0%-30%)		
3,3'-Dichlorobenzidine	1720	TU	103	JT	195	UG/KG	0.410	11.4*	(0%-30%)		
3- and/or 4-Methylphenol	1720	U	103		1350	UG/KG	3.14	78.8	(0%-30%)		
4-Bromophenylphenylether	1720	U	103		1320	UG/KG	1.65	76.6	(0%-30%)		
4-Chloro-3-methylphenol	1720	U	138		1360	UG/KG	3.60	79	(0%-30%)		
4-Chloroaniline	1720	TU	103	JT	297	UG/KG	11.8	17.3*	(0%-30%)		
4-Chlorophenylphenylether	1720	U	103		1450	UG/KG	1.75	84.6	(0%-30%)		
4-Nitrophenol	1720	U	103		1240	UG/KG	3.65	72	(0%-30%)		
Acenaphthene	1720	U	10.3		1180	UG/KG	4.21	68.6	(0%-30%)		
Acenaphthylene	1720	U	10.3		1270	UG/KG	3.76	74.1	(0%-30%)		
Anthracene	1720	U	10.3		1210	UG/KG	1.32	70.4	(0%-30%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1324342											
Benzo(a)anthracene	1720		76.4		1320	UG/KG	1.56	72.4	(0%-30%)		
Benzo(a)pyrene	1720		104		1330	UG/KG	0.919	71.5	(0%-30%)	AGS1	08/22/13 23:28
Benzo(b)fluoranthene	1720		125		1410	UG/KG	1.01	74.9	(0%-30%)		
Benzo(ghi)perylene	1720		68.1		1180	UG/KG	14.2	64.5	(0%-30%)		
Benzo(k)fluoranthene	1720		55.7		1360	UG/KG	3.70	75.8	(0%-30%)		
Butylbenzylphthalate	1720	U	103		1450	UG/KG	1.52	84.7	(0%-30%)		
Carbazole	1720	U	10.3		1390	UG/KG	1.16	80.9	(0%-30%)		
Chrysene	1720		99.7		1320	UG/KG	2.91	71.2	(0%-30%)		
Di-n-butylphthalate	1720	U	103		1430	UG/KG	0.393	83.4	(0%-30%)		
Di-n-octylphthalate	1720	U	103		1320	UG/KG	1.15	76.7	(0%-30%)		
Dibenzo(a,h)anthracene	1720	J	15.8		1100	UG/KG	5.51	63.2	(0%-30%)		
Dibenzofuran	1720	U	103		1510	UG/KG	2.72	88.1	(0%-30%)		
Diethylphthalate	1720	U	103		1470	UG/KG	1.80	85.7	(0%-30%)		
Dimethylphthalate	1720	U	103		1400	UG/KG	1.85	81.3	(0%-30%)		
Diphenylamine	1720	U	103		1200	UG/KG	0.608	70.1	(0%-30%)		
Fluoranthene	1720		152		1370	UG/KG	3.16	71	(0%-30%)		
Fluorene	1720	U	10.3		1320	UG/KG	2.54	76.9	(0%-30%)		
Hexachlorobenzene	1720	U	103		1320	UG/KG	0.883	76.7	(0%-30%)		
Hexachlorobutadiene	1720	U	103		1470	UG/KG	2.00	85.5	(0%-30%)		
Hexachlorocyclopentadiene	1720	U	103		484	UG/KG	11.8	28.2	(0%-30%)		
Hexachloroethane	1720	U	103		1160	UG/KG	1.80	67.8	(0%-30%)		
Indeno(1,2,3-cd)pyrene	1720		61.2		1210	UG/KG	13.6	66.8	(0%-30%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1324342											
Isophorone	1720	U	103		1490	UG/KG	4.32	86.6	(0%-30%)		
N-Nitrosodipropylamine	1720	U	103		1400	UG/KG	1.97	81.6	(0%-30%)	AGS1	08/22/13 23:28
Naphthalene	1720	U	10.3		1170	UG/KG	3.69	68.1	(0%-30%)		
Nitrobenzene	1720	U	103		1530	UG/KG	4.24	89.1	(0%-30%)		
Pentachlorophenol	1720	U	103		1330	UG/KG	0.460	77.5	(0%-30%)		
Phenanthrene	1720		74.6		1230	UG/KG	0.215	67.5	(0%-30%)		
Phenol	1720	U	103		1150	UG/KG	2.51	67.1	(0%-30%)		
Pyrene	1720		211		1590	UG/KG	2.03	80.5	(0%-30%)		
bis(2-Chloroethoxy)methane	1720	U	103		1330	UG/KG	3.99	77.3	(0%-30%)		
bis(2-Chloroethyl) ether	1720	U	103		1200	UG/KG	1.06	70.1	(0%-30%)		
bis(2-Chloroisopropyl)ether	1720	U	103		1090	UG/KG	1.22	63.4	(0%-30%)		
bis(2-Ethylhexyl)phthalate	1720	U	103		1410	UG/KG	0.0224	81.9	(0%-30%)		
m-Nitroaniline	1720	U	103		793	UG/KG	14.3	46.2	(0%-30%)		
o-Cresol	1720	U	103		1230	UG/KG	2.89	71.7	(0%-30%)		
o-Nitroaniline	1720	U	114		1550	UG/KG	2.10	90	(0%-30%)		
p-Nitroaniline	1720	U	103		1240	UG/KG	6.77	72.3	(0%-30%)		
**2,4,6-Tribromophenol	3440		2900		3160	UG/KG		92.1	(20%-122%)		
**2-Fluorobiphenyl	1720		1140		1230	UG/KG		71.6	(25%-100%)		
**2-Fluorophenol	3440		2170		2480	UG/KG		72.2	(23%-107%)		
**Nitrobenzene-d5	1720		1170		1340	UG/KG		78	(21%-103%)		
**Phenol-d5	3440		2200		2560	UG/KG		74.6	(25%-108%)		
**p-Terphenyl-d14	1720		1550		1520	UG/KG		88.7	(31%-124%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

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

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- o Analyte failed to recover within LCS limits (0rganics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Miscellaneous

Prep Logbook

Automated Soxhlet Extraction

Batch ID: 1324341 **Verified by:** _____
Analyst: Alberto Velasco
Method: SW846 3541

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

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1202931915 MB	21-AUG-2013 17:55:00	30.06	1	0.03327
1202931916 LCS	21-AUG-2013 17:55:00	30.02	1	0.03331
331858001	21-AUG-2013 17:55:00	30	1	0.03333
1202931917 MS (331858001)	21-AUG-2013 17:55:00	30.18	1	0.03313
1202931918 MSD (331858001)	21-AUG-2013 17:55:00	30.04	1	0.03329

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202931916	BNA LCS w/o Benzidine 50ppm	UE130807-25	1	mL
LCS	1202931916	BENZIDINE LCS	UE130819-08	1	mL
MS	1202931917	BNA LCS w/o Benzidine 50ppm	UE130807-25	1	mL
MS	1202931917	BENZIDINE LCS	UE130819-08	1	mL
MSD	1202931918	BNA LCS w/o Benzidine 50ppm	UE130807-25	1	mL
MSD	1202931918	BENZIDINE LCS	UE130819-08	1	mL
SURR	All	BNA for all Surrogate	UE130321-16	1	mL
REGNT	All	Methylene Chloride	1946152-D	60	mL
REGNT	All	Acetone	1949776-B1	60	mL
SOURC	All	SODIUM SULFATE	1948175	30	g

Comments:

Final Solvent: CH2Cl2
Verified By: MJS

Pesticide Analysis

Case Narrative

Pesticide Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0008

Method/Analysis Information

Procedure:	**Organochlorine Pesticides and Chlorinated Hydrocarbons**
Analytical Method:	SW846 3541/8081B
Prep Method:	SW846 3541
Analytical Batch Number:	1324364
Prep Batch Number:	1324363

Sample Analysis

Sample ID	Client ID
331858001	J1RWK4
1202931987	Method Blank (MB)
1202931988	Laboratory Control Sample (LCS)
1202931989	331858001(J1RWK4) Matrix Spike (MS)
1202931990	331858001(J1RWK4) 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# 12.

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

Calibration Information

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

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

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

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG met the acceptance criteria.

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

Laboratory Control Sample (LCS) Recovery
The laboratory control sample (LCS) spike recoveries met the acceptance limits.

QC Sample Designation
Sample 331858001 (J1RWK4) was selected for the matrix spike and matrix spike duplicate analysis.

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

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

MS/MSD Relative Percent Difference (RPD) Statement
The RPD values between the MS and MSD were within the acceptance limits.

Technical Information:

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

Preparation/Analytical Method Verification
The MB and LCS were cleaned with copper one time. The sample 331858001 (J1RWK4), MS and MSD were cleaned three times with copper. The sample 331858001 (J1RWK4) and associated MS and MSD remained black. The sample, MS and MSD were diluted 1:10 and cleaned twice more with copper. The sample, MS and MSD were still grey when analyzed.

Sample Dilutions
Samples 1202931989 (J1RWK4), 1202931990 (J1RWK4) and 331858001 (J1RWK4) were diluted 1:10 due to high amounts of sulfur in the sample that copper cleaning was not able to completely remove even with multiple cleanings.

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

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

Miscellaneous Information:

Electronic Package Comment

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

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

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

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

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

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

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

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

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD5A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series ECD	Rtx-CLP I	30m x 0.25mm, 0.25um (Rtx-CLPesticide)
ECD5A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series ECD	Rtx-CLP II	30m x 0.25mm, 0.20um (Rtx-CLPesticide II)

Certification Statement

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

Sample Data Summary

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

Certificate of Analysis

Report Date: August 23, 2013

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

Client SDG: XP0008

Client Sample ID: J1RWK4
Sample ID: 331858001
Matrix: Soil
Collect Date: 19-AUG-13 08:30
Receive Date: 20-AUG-13
Collector: Client
Moisture: 3.09%

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	DU	3.43	3.43	13.7	ug/kg	10	RXE1	08/22/13	2050	1324364	1
4,4'-DDE	DU	3.43	3.43	13.7	ug/kg	10					
4,4'-DDT	DU	3.43	3.43	13.7	ug/kg	10					
Aldrin	DU	1.71	1.71	6.85	ug/kg	10					
Dieldrin	DU	3.43	3.43	13.7	ug/kg	10					
Endosulfan I	DU	1.71	1.71	6.85	ug/kg	10					
Endosulfan II	DU	3.43	3.43	13.7	ug/kg	10					
Endosulfan sulfate	DU	3.43	3.43	13.7	ug/kg	10					
Endrin	DU	3.43	3.43	13.7	ug/kg	10					
Endrin aldehyde	DU	3.43	3.43	13.7	ug/kg	10					
Endrin ketone	DU	3.43	3.43	13.7	ug/kg	10					
Heptachlor	DU	1.71	1.71	6.85	ug/kg	10					
Heptachlor epoxide	DU	1.71	1.71	6.85	ug/kg	10					
Methoxychlor	DU	17.1	17.1	68.5	ug/kg	10					
Toxaphene	DU	57.1	57.1	171	ug/kg	10					
alpha-BHC	DU	1.71	1.71	6.85	ug/kg	10					
alpha-Chlordane	DU	1.71	1.71	6.85	ug/kg	10					
beta-BHC	DU	1.71	1.71	6.85	ug/kg	10					
delta-BHC	DU	1.71	1.71	6.85	ug/kg	10					
gamma-BHC (Lindane)	DU	1.71	1.71	6.85	ug/kg	10					
gamma-Chlordane	DU	1.71	1.71	6.85	ug/kg	10					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	MXS4	08/21/13	1720	1324363

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	24.4 ug/kg	34.3	71.1	(32%-120%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	28.8 ug/kg	34.3	83.9	(37%-129%)

Notes:

Quality Control Summary

QC Summary

Report Date: August 23, 2013

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

Contact: **Joan Kessner**

Workorder: **331858** **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-Pesticide										
Batch 1324364										
QC1202931988 LCS										
4,4'-DDD	41.6			34.5	ug/kg		83.1	(51%-124%)	RXE1	08/22/13 20:35
4,4'-DDE	41.6			34.0	ug/kg		81.8	(51%-119%)		
4,4'-DDT	41.6			35.0	ug/kg		84.1	(50%-128%)		
Aldrin	16.6			14.2	ug/kg		85.3	(48%-113%)		
Dieldrin	41.6			32.6	ug/kg		78.4	(51%-112%)		
Endosulfan I	16.6			12.9	ug/kg		77.4	(43%-110%)		
Endosulfan II	41.6			32.9	ug/kg		79	(49%-111%)		
Endosulfan sulfate	41.6			34.0	ug/kg		81.8	(54%-121%)		
Endrin	41.6			38.6	ug/kg		92.9	(54%-134%)		
Endrin aldehyde	41.6			30.8	ug/kg		74.2	(49%-117%)		
Endrin ketone	41.6			31.3	ug/kg		75.2	(48%-110%)		
Heptachlor	16.6			14.1	ug/kg		84.8	(52%-117%)		
Heptachlor epoxide	16.6			14.1	ug/kg		84.9	(53%-115%)		
Methoxychlor	166			132	ug/kg		79.6	(48%-117%)		
alpha-BHC	16.6			15.1	ug/kg		90.9	(50%-122%)		
alpha-Chlordane	16.6			13.9	ug/kg		83.4	(52%-113%)		
beta-BHC	16.6			14.1	ug/kg		84.9	(54%-110%)		
delta-BHC	16.6			14.8	ug/kg		88.9	(53%-117%)		
gamma-BHC (Lindane)	16.6			14.9	ug/kg		89.4	(53%-120%)		
gamma-Chlordane	16.6			13.9	ug/kg		83.5	(52%-117%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch 1324364											
**4cmx	33.3			27.0	ug/kg		81.1	(32%-120%)	RXE1	08/22/13	20:35
**Decachlorobiphenyl	33.3			25.7	ug/kg		77.4	(37%-129%)			
QC1202931987 MB											
4,4'-DDD			U	0.332	ug/kg					08/22/13	20:20
4,4'-DDE			U	0.332	ug/kg						
4,4'-DDT			U	0.332	ug/kg						
Aldrin			U	0.166	ug/kg						
Dieldrin			U	0.332	ug/kg						
Endosulfan I			U	0.166	ug/kg						
Endosulfan II			U	0.332	ug/kg						
Endosulfan sulfate			U	0.332	ug/kg						
Endrin			U	0.332	ug/kg						
Endrin aldehyde			U	0.332	ug/kg						
Endrin ketone			U	0.332	ug/kg						
Heptachlor			U	0.166	ug/kg						
Heptachlor epoxide			U	0.166	ug/kg						
Methoxychlor			U	1.66	ug/kg						
Toxaphene			U	5.53	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						

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-Pesticide											
Batch 1324364											
gamma-BHC (Lindane)				U	0.166	ug/kg				RXE1	08/22/13 20:20
gamma-Chlordane				U	0.166	ug/kg					
**4cmx	33.2				27.6	ug/kg		82.9	(32%-120%)		
**Decachlorobiphenyl	33.2				26.6	ug/kg		79.9	(37%-129%)		
QC1202931989 331858001 MS											
4,4'-DDD	42.9	DU	3.43	D	50.1	ug/kg		117	(37%-134%)		08/22/13 21:05
4,4'-DDE	42.9	DU	3.43	D	35.4	ug/kg		82.4	(33%-133%)		
4,4'-DDT	42.9	DU	3.43	D	38.2	ug/kg		89	(21%-149%)		
Aldrin	17.2	DU	1.71	D	14.6	ug/kg		85.3	(34%-134%)		
Dieldrin	42.9	DU	3.43	D	34.9	ug/kg		81.3	(36%-132%)		
Endosulfan I	17.2	DU	1.71	D	14.2	ug/kg		82.7	(36%-125%)		
Endosulfan II	42.9	DU	3.43	D	37.3	ug/kg		86.9	(37%-129%)		
Endosulfan sulfate	42.9	DU	3.43	D	39.1	ug/kg		91	(31%-140%)		
Endrin	42.9	DU	3.43	D	42.6	ug/kg		99.2	(45%-142%)		
Endrin aldehyde	42.9	DU	3.43	D	36.4	ug/kg		84.8	(31%-133%)		
Endrin ketone	42.9	DU	3.43	D	37.5	ug/kg		87.4	(30%-139%)		
Heptachlor	17.2	DU	1.71	D	14.7	ug/kg		85.9	(32%-137%)		
Heptachlor epoxide	17.2	DU	1.71	D	14.8	ug/kg		86.3	(36%-130%)		
Methoxychlor	172	DU	17.1	D	157	ug/kg		91.7	(28%-143%)		
alpha-BHC	17.2	DU	1.71	D	14.6	ug/kg		84.9	(37%-129%)		
alpha-Chlordane	17.2	DU	1.71	D	14.4	ug/kg		83.8	(29%-141%)		
beta-BHC	17.2	DU	1.71	D	15.3	ug/kg		89.2	(33%-136%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-Pesticide											
Batch 1324364											
delta-BHC	17.2	DU	1.71	D	15.1	ug/kg		88.1	(37%-136%)	RXE1	08/22/13 21:05
gamma-BHC (Lindane)	17.2	DU	1.71	D	15.1	ug/kg		88	(35%-130%)		
gamma-Chlordane	17.2	DU	1.71	D	12.7	ug/kg		73.7	(30%-139%)		
**4cmx	34.3		24.4		27.2	ug/kg		79.3	(32%-120%)		
**Decachlorobiphenyl	34.3		28.8		34.5	ug/kg		101	(37%-129%)		
QC1202931990 331858001 MSD											
4,4'-DDD	43.0	DU	3.43	D	45.7	ug/kg	9.29	106	(0%-30%)		08/22/13 21:20
4,4'-DDE	43.0	DU	3.43	D	33.1	ug/kg	6.76	77	(0%-30%)		
4,4'-DDT	43.0	DU	3.43	D	35.1	ug/kg	8.41	81.8	(0%-30%)		
Aldrin	17.2	DU	1.71	D	13.6	ug/kg	7.22	79.3	(0%-30%)		
Dieldrin	43.0	DU	3.43	D	32.8	ug/kg	6.28	76.3	(0%-30%)		
Endosulfan I	17.2	DU	1.71	D	13.5	ug/kg	5.40	78.3	(0%-30%)		
Endosulfan II	43.0	DU	3.43	D	34.6	ug/kg	7.68	80.4	(0%-30%)		
Endosulfan sulfate	43.0	DU	3.43	D	36.2	ug/kg	7.55	84.3	(0%-30%)		
Endrin	43.0	DU	3.43	D	39.6	ug/kg	7.20	92.3	(0%-30%)		
Endrin aldehyde	43.0	DU	3.43	D	34.3	ug/kg	6.01	79.8	(0%-30%)		
Endrin ketone	43.0	DU	3.43	D	35.0	ug/kg	6.94	81.5	(0%-30%)		
Heptachlor	17.2	DU	1.71	D	13.7	ug/kg	7.55	79.6	(0%-30%)		
Heptachlor epoxide	17.2	DU	1.71	D	14.3	ug/kg	3.35	83.4	(0%-30%)		
Methoxychlor	172	DU	17.1	D	146	ug/kg	7.61	84.9	(0%-30%)		
alpha-BHC	17.2	DU	1.71	D	13.9	ug/kg	5.01	80.7	(0%-30%)		
alpha-Chlordane	17.2	DU	1.71	D	13.6	ug/kg	5.58	79.2	(0%-30%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide												
Batch 1324364												
beta-BHC	17.2	DU	1.71	D	14.5	ug/kg	5.58	84.3	(0%-30%)	RXE1	08/22/13	21:20
delta-BHC	17.2	DU	1.71	D	13.8	ug/kg	9.07	80.4	(0%-30%)			
gamma-BHC (Lindane)	17.2	DU	1.71	D	14.2	ug/kg	6.39	82.5	(0%-30%)			
gamma-Chlordane	17.2	DU	1.71	D	12.4	ug/kg	2.13	72.1	(0%-30%)			
**4cmx	34.4		24.4		26.3	ug/kg		76.6	(32%-120%)			
**Decachlorobiphenyl	34.4		28.8		32.1	ug/kg		93.4	(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 (0rganics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Miscellaneous

Prep Logbook

Automated Soxhlet Extraction

Batch ID: **1324363** **Verified by:** _____
Analyst: **Matthew Selepack**
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)
1202931987 MB	21-AUG-2013 17:20:00	30.09	5	0.16617
1202931988 LCS	21-AUG-2013 17:20:00	30.07	5	0.16628
331858001	21-AUG-2013 17:20:00	30.11	5	0.16606
1202931989 MS (331858001)	21-AUG-2013 17:20:00	30.05	5	0.16639
1202931990 MSD (331858001)	21-AUG-2013 17:20:00	30.03	5	0.1665

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202931988	PESTSPIKE	WE130805-05	1	mL
MS	1202931989	PESTSPIKE	WE130805-05	1	mL
MSD	1202931990	PESTSPIKE	WE130805-05	1	mL
SURR	All	PEST SURROGATE 1000 UG/L	WE130521-08	1	mL
REGNT	All	Acetone	1949776-B1	60	mL
REGNT	All	Hexane	1949780-B4	60	mL
SOURC	All	SODIUM SULFATE	1948175	30	g

Comments:

Final Solvent: Hexane
Verified by: AV

Herbicide Analysis

Case Narrative

Herbicide Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0008

Method/Analysis Information

Procedure:	**Analysis of Chlorophenoxy Acid Herbicides by ECD**
Analytical Method:	SW846 8151A
Prep Method:	SW846 8151A
Analytical Batch Number:	1324375
Prep Batch Number:	1324374

Sample Analysis

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

Sample ID	Client ID
331858001	J1RWK4
1202931999	Method Blank (MB)
1202932000	Laboratory Control Sample (LCS)
1202932001	331858001(J1RWK4) Matrix Spike (MS)
1202932002	331858001(J1RWK4) 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# 20.

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. 2,4-D, 2,4,5-TP and 2,4,5-T failed acceptance criteria with a positive bias on one analytical column in the standards bracketing the samples in this SDG. The positive bias for the analytical data is a result of instrument response increasing after the initial calibration. Since the target analytes were not detected in the samples, the non-compliance had no adverse impact on the data. All analytes were within the established retention time windows for this method.

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries
Surrogates recovered outside of the acceptance limit in samples 1202932001 (J1RWK4), 1202932002 (J1RWK4) and 331858001 (J1RWK4). The sample, MS and MSD were analyzed at a 1:100 dilution due to high concentrations of non-target analytes within the retention time window of interest. As a result, the surrogates were diluted out of the acceptance limits and the data results have been reported.

Laboratory Control Sample (LCS) Recovery
The LCS(1202932000) recovered 2,4-DB outside of the acceptance limits. The LCS recovered with a positive bias on one column only. The other column passed recoveries. Since there were no detects of target analytes in the associated client sample, the non-conformance had no adverse impact on the data and the results have been reported.

QC Sample Designation
Sample 331858001 (J1RWK4) was selected for analysis as the matrix spike and matrix spike duplicate.

Matrix Spike (MS) Recovery Statement
The MS(1202932001(J1RWK4)) recovered spike analytes outside of the acceptance criteria. The MS and MSD were analyzed at a 1:100 dilution, along with the associated parent sample, due to high concentrations of non-target analytes within the retention time window of interest. As a result, the spike analytes were diluted out of the acceptance limits and the data results have been reported.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD(1202932002(J1RWK4)) recovered spike analytes outside of the acceptance criteria. The MS and MSD were analyzed at a 1:100 dilution, along with the associated parent sample, due to high concentrations of non-target analytes within the retention time window of interest. As a result, the spike analytes were diluted out of the acceptance limits and the data 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 1202932001 (J1RWK4), 1202932002 (J1RWK4) and 331858001 (J1RWK4) were diluted due to high concentrations of non-target analytes within the retention time window of interest.

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

Miscellaneous Information

Electronic Package Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the reviewer name associated with the generation of the data and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation

The following DER was generated for this SDG: 1214897.

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.	**Division:**	**Quality Criteria:**	**Type:**
25-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
GC/ECD	SW846 8151A	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1324375	See Below		

Potentially affected work order(s)(SDG): 331858(XP0008)

Application Issues:

Failed Recovery for MS/PS

Failed Recovery for LCS/LCSD

Failed Yield for Surrogates

Failed Recovery for MSD/PSD

Specification and Requirements Exception Description:	**DER Disposition:**
1. Surrogates recovered outside of the acceptance limit in sample 331858001, the MS(1202932001) and MSD(1202932002).	1. The sample, MS and MSD were analyzed at a 1:100 dilution due to high concentrations of non-target analytes within the retention time window of interest. As a result, the surrogates were diluted out of the acceptance limits and the data results have been reported.
2. The LCS(1202932000) recovered 2,4-DB outside of the acceptance limits.	2. The LCS recovered with a positive bias on one column only. The other column passed recoveries. Since there were no detects of target analytes in the associated client sample, the non-conformance had no adverse impact on the data and the results have been reported.
3. The MS(1202932001) and MSD(1202932002) recovered spike analytes outside of the acceptance criteria.	3. The MS and MSD were analyzed at a 1:100 dilution, along with the associated parent sample, due to high concentrations of non-target analytes within the retention time window of interest. As a result, the spike analytes were diluted out of the acceptance limits and the data results have been reported.

Originator's Name:

Lloyd O Fox 25-AUG-13

Data Validator/Group Leader:

Barbara Bailey 27-AUG-13

Sample Data Summary

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

Certificate of Analysis

Report Date: August 27, 2013

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

Client SDG: XP0008

Client Sample ID: J1RWK4
Sample ID: 331858001
Matrix: Soil
Collect Date: 19-AUG-13 08:30
Receive Date: 20-AUG-13
Collector: Client
Moisture: 3.09%

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-HERB											
8151A Herbicides Soil "Dry Weight Corrected"											
2,4,5-T	DTU	171	171	515	ug/kg	100	RXE1	08/26/13	2045	1324375	1
2,4,5-TP	DTU	171	171	515	ug/kg	100					
2,4-D	DTU	171	171	515	ug/kg	100					
2,4-DB	DTU	171	171	515	ug/kg	100					
Dalapon	DTU	3610	3610	10300	ug/kg	100					
Dicamba	DTU	206	206	515	ug/kg	100					
Dichlorprop	DTU	233	233	515	ug/kg	100					
Dinoseb	DTU	171	171	515	ug/kg	100					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8151A	8151A Herbicides Prep in Soil	AXV1	08/21/13	1835	1324374

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8151A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
2,4-Dichlorophenylacetic acid	8151A Herbicides Soil "Dry Weight Corrected"	189 ug/kg	103	184*	(38%-142%)

Notes:

Quality Control Summary

QC Summary

Report Date: August 27, 2013

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

Contact: **Joan Kessner**

Workorder: **331858** **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-HERB										
Batch 1324375										
QC1202932000 LCS										
2,4,5-T	40.0			40.1	ug/kg		100	(52%-137%)	RXE1	08/26/13 20:18
2,4,5-TP	40.0			38.8	ug/kg		97.2	(58%-133%)		
2,4-D	40.0			39.9	ug/kg		99.8	(53%-139%)		
2,4-DB	40.0			58.5	ug/kg		146*	(61%-139%)		
Dalapon	400			298	ug/kg		74.6	(39%-113%)		
Dicamba	40.0			34.2	ug/kg		85.6	(54%-118%)		
Dichlorprop	40.0			42.9	ug/kg		107	(59%-126%)		
Dinoseb	40.0			31.9	ug/kg		79.8	(39%-94%)		
**2,4-Dichlorophenylacetic acid	99.9			117	ug/kg		117	(38%-142%)		
QC1202931999 MB										
2,4,5-T			U	1.66	ug/kg					08/26/13 19:50
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	34.9	ug/kg					
Dicamba			U	2.00	ug/kg					
Dichlorprop			U	2.25	ug/kg					
Dinoseb			U	1.66	ug/kg					
**2,4-Dichlorophenylacetic acid	99.8			117	ug/kg		118	(38%-142%)		
QC1202932001 331858001 MS										
2,4,5-T	41.2 DTU		171 DTU	171	ug/kg		0*	(45%-131%)		08/26/13 21:13

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-HERB										
Batch 1324375										
2,4,5-TP	41.2 DTU	171	DTU	171	ug/kg		0*	(49%-135%)	RXE1	08/26/13 21:13
2,4-D	41.2 DTU	171	DTU	171	ug/kg		0*	(53%-135%)		
2,4-DB	41.2 DTU	171	DTU	171	ug/kg		0*	(61%-139%)		
Dalapon	412 DTU	3610	DTU	3610	ug/kg		0*	(30%-113%)		
Dicamba	41.2 DTU	206	DTU	206	ug/kg		0*	(48%-124%)		
Dichlorprop	41.2 DTU	233	DTU	233	ug/kg		0*	(46%-138%)		
Dinoseb	41.2 DTU	171	DTU	171	ug/kg		0*	(25%-130%)		
**2,4-Dichlorophenylacetic acid	103	189		181	ug/kg		175*	(38%-142%)		
QC1202932002 331858001 MSD										
2,4,5-T	41.2 DTU	171	DTU	171	ug/kg	N/A	0*	(0%-32%)		08/26/13 21:40
2,4,5-TP	41.2 DTU	171	DTU	171	ug/kg	N/A	0*	(0%-31%)		
2,4-D	41.2 DTU	171	DTU	171	ug/kg	N/A	0*	(0%-70%)		
2,4-DB	41.2 DTU	171	DTU	171	ug/kg	N/A	0*	(0%-27%)		
Dalapon	412 DTU	3610	DTU	3610	ug/kg	N/A	0*	(0%-18%)		
Dicamba	41.2 DTU	206	DTU	206	ug/kg	N/A	0*	(0%-41%)		
Dichlorprop	41.2 DTU	233	DTU	233	ug/kg	N/A	0*	(0%-40%)		
Dinoseb	41.2 DTU	171	DTU	171	ug/kg	N/A	0*	(0%-169%)		
**2,4-Dichlorophenylacetic acid	103	189		173	ug/kg		168*	(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

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

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

D Results are reported from a diluted aliquot of sample.

E Concentration exceeds the calibration range of the instrument

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

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

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

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

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

o Analyte failed to recover within LCS limits (0rganics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Miscellaneous

Prep Logbook

The Extraction of Herbicides from Soil and Sludge Samples

Batch ID: 1324374 **Verified by:** _____
Analyst: Alberto Velasco
Method: SW846 8151A

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

Sample ID	Run Date	Aliquot (g)	Initial pH	Int Ext pH	Sec Ext pH	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1202931999 MB	21-AUG-2013 18:35:00	50.12	3	2	0	10	0.19952
1202932000 LCS	21-AUG-2013 18:35:00	50.05	3	2	0	10	0.1998
331858001	21-AUG-2013 18:35:00	50.08	5	2	0	10	0.19968
1202932001 MS (331858001)	21-AUG-2013 18:35:00	50.04	5	2	0	10	0.19984
1202932002 MSD (331858001)	21-AUG-2013 18:35:00	50.07	5	2	0	10	0.19972

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202932000	HERBICIDE LCS	WE130820-04	1	mL
MS	1202932001	HERBICIDE LCS	WE130820-04	1	mL
MSD	1202932002	HERBICIDE LCS	WE130820-04	1	mL
SURR	All	HERBICIDE SURROGATE	WE130710-03	.05	mL
REGNT	All	37g KOH to 100mL DI H2O	130322A	5	mL
REGNT	All	Methanol	130710-C	.5	mL
REGNT	All	acidified sodium sulfate	1938092-C	50	g
REGNT	All	Methylene Chloride	1946152-D	280	mL
REGNT	All	Acetone	1949776-B1	20	mL
REGNT	All	Hexane	1949780-B4	54	mL
REGNT	All	Iso-octane	1950022-A	1	mL
REGNT	All	Sulfuric Acid Sol., 12N For Herbicides	1956041	17	mL
REGNT	All	N-METHYL-N-NITROSO-P-TOLUENESULFON-AMIDE	1956669A	2	mL
REGNT	All	Ethyl ether	UN130806a	80	mL
WORK	All	HERBICIDE SURROGATE	WE130710-03	.05	mL

Comments:

Clean up Date: 24-AUG-2013 11:28:22
Hydrolysis Analyst: Sharlene Robinson
Hydrolysis Date: 24-AUG-2013 11:28:22
Verified By: MJS
Final Solvent: Hexane

Metals Analysis

Case Narrative

Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0008

Sample Analysis

Sample ID	Client ID
331858001	J1RWK4
1202931704	Method Blank (MB) **ICP**
1202931705	Laboratory Control Sample (LCS)
1202931708	331858001(J1RWK4L) Serial Dilution (SD)
1202931706	331858001(J1RWK4D) Sample Duplicate (DUP)
1202931707	331858001(J1RWK4S) Matrix Spike (MS)
1202934286	331858001(J1RWK4PS) Post Spike (PS)
1202934170	Method Blank (MB) **ICP-MS**
1202934177	Laboratory Control Sample (LCS)
1202934174	331858001(J1RWK4L) Serial Dilution (SD)
1202934172	331858001(J1RWK4D) Sample Duplicate (DUP)
1202934176	331858001(J1RWK4S) Matrix Spike (MS)
1202931781	Method Blank (MB) **CVAA**
1202931782	Laboratory Control Sample (LCS)
1202931788	331858001(J1RWK4L) Serial Dilution (SD)
1202931786	331858001(J1RWK4D) Sample Duplicate (DUP)
1202931787	331858001(J1RWK4S) Matrix Spike (MS)

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

Method/Analysis Information

Analytical Batch:	1324256, 1325390 and 1324297
Prep Batch :	1324255, 1325389 and 1324295
Standard Operating Procedures:	GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 22, GL-MA-E-014 REV# 25 and GL-MA-E-010 REV# 26
Analytical Method:	SW846 3050B/6010C, SW846 3050B/6020A and SW846 7471B

Prep Method : SW846 3050B and SW846 7471B Prep

Preparation/Analytical Method Verification

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

System Configuration

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

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

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

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

Calibration Information

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

CRDL Requirements
All CRDL standards met the advisory control limits with the exception of copper and potassium. PQL01 (analyzed at 15:58 on 08/22/13) recovered high for potassium; however, the sample result was 2x greater than the PQL, therefore the data is reported. PQL03 (analyzed at 21:10 on 08/22/13) recovered high for copper; however, the sample result was 2x greater than the PQL, therefore the data is reported.

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

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

Continuing Calibration Verification (CCV) Requirements
All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement
The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement
The following sample was selected as the quality control (QC) sample for this SDG: 331858001 (J1RWK4).

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

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

Post Spike (PS) Recovery Statement
The percent recoveries (%R) obtained from the PS analyses are evaluated when the

sample concentration is less than four times (4X) the spike concentration added. The PS met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the presence of matrix interferences with the exception of silicon.

Serial Dilution % Difference Statement
The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations that are 25X the IDL/MDL for CVAA, 50X the IDL/MDL for ICP, and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria of less than 10% difference (%D).

Technical Information

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

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

Sample Dilutions
Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Sample 331858001 required dilutions in order to bring raw values of titanium within the linear range of the instrument, and for the analytes antimony, cobalt, lead, vanadium, and zinc that titanium interferes with, in order to ensure that the inter-element correction factors were valid on the ICP. Samples in this SDG were diluted the standard 2x for solids on the ICPMS.

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

Miscellaneous Information

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

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

Data Exception (DER) Documentation
Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG: 1214594. A copy is included in the Miscellaneous Data section of this package.

Additional Comments
Additional comments were not required for this SDG.

Certification Statement

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

Review Validation:

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

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

Reviewer: **Date:** 08/28/13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
23-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ICP	SW846 3050B/6010C	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1324256	See Below		

Potentially affected work order(s)(SDG): 331858(XP0008)

Application Issues:

Failed Recovery for MS/PS

Specification and Requirements Exception Description:	**DER Disposition:**
1. Failed Recovery for MS/PS: QC 1202931707MS,1202934286PS	1. The matrix spike recovery failed outside of the control limits for silicon. The post spike failed outside the required control limits for silicon but passed for all other analytes. This verifies the presence of a matrix interference for silicon and verifies the absence of a matrix interference for all the other analytes. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.

Originator's Name:

Helen Camello 23-AUG-13

Data Validator/Group Leader:

Louise Smith 27-AUG-13

Sample Data Summary

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

Qualifier Definition Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0008 GEL Work Order: 331858 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).

D Results are reported from a diluted aliquot of sample.

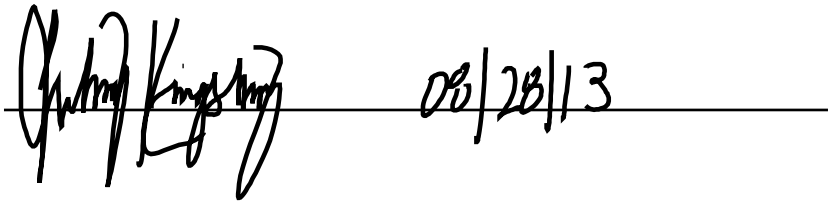
N Spike Sample recovery is outside control limits.

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  08/28/13

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

Certificate of Analysis

Report Date: August 28, 2013

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

Client SDG: XP0008

Client Sample ID: J1RWK4
Sample ID: 331858001
Matrix: Soil
Collect Date: 19-AUG-13 08:30
Receive Date: 20-AUG-13
Collector: Client
Moisture: 3.09%

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	0.00419	0.00396	0.0118	mg/kg	1	NOR1	08/22/13	1243	1324297	1
Metals Analysis-ICP											
ICP METALS 6010TR Client List "Dry Weight Corrected"											
Aluminum		7740	5.93	17.4	mg/kg	1	HSC	08/22/13	2055	1324256	2
Arsenic		20.7	0.436	2.61	mg/kg	1					
Barium		73.5	0.0872	0.436	mg/kg	1					
Beryllium		0.704	0.0872	0.436	mg/kg	1					
Boron	B	3.12	0.872	4.36	mg/kg	1					
Cadmium	B	0.392	0.0872	0.436	mg/kg	1					
Calcium		11600	6.97	21.8	mg/kg	1					
Chromium		11.3	0.131	0.436	mg/kg	1					
Copper		11.3	0.261	0.872	mg/kg	1					
Iron		17300	6.97	21.8	mg/kg	1					
Magnesium		2630	7.41	26.1	mg/kg	1					
Manganese		196	0.174	0.872	mg/kg	1					
Molybdenum	U	0.174	0.174	0.872	mg/kg	1					
Nickel		7.12	0.131	0.436	mg/kg	1					
Potassium		2110	5.58	21.8	mg/kg	1					
Silver	U	0.0872	0.0872	0.436	mg/kg	1					
Sodium		476	6.10	21.8	mg/kg	1					
Silicon	N	388	1.31	8.72	mg/kg	1	HSC	08/23/13	1037	1324256	3
Antimony	DU	1.44	1.44	4.36	mg/kg	5	HSC	08/23/13	1059	1324256	4
Cobalt	D	4.94	0.654	2.18	mg/kg	5					
Lead	D	59.5	1.44	4.36	mg/kg	5					
Vanadium	D	47.2	0.436	2.18	mg/kg	5					
Zinc	D	65.9	1.74	4.36	mg/kg	5					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.329	0.329	1.00	mg/kg	2	PRB	08/23/13	1909	1325390	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	AXG2	08/23/13	0930	1325389
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	08/22/13	0815	1324255
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	08/21/13	1538	1324295

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

Certificate of Analysis

Report Date: August 28, 2013

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0008
Project:	RC-233 Soil		

Client Sample ID:	J1RWK4	Project:	WCHN00313
Sample ID:	331858001	Client ID:	WCHN001

The following Analytical Methods were performed:

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

Notes:

Quality Control Summary

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

QC Summary

Report Date: August 28, 2013

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

Contact: **Joan Kessner**

Workorder: **331858** **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS											
Batch 1325390											
QC1202934172 331858001 DUP											
Selenium		DU	0.329	DU	0.331	mg/kg	N/A ^			PRB	08/23/13 19:13
QC1202934177 LCS											
Selenium	4.68			D	4.66	mg/kg		99.5	(80%-120%)		08/23/13 18:28
QC1202934170 MB											
Selenium				DU	0.326	mg/kg					08/23/13 18:25
QC1202934176 331858001 MS											
Selenium	4.95	DU	0.329	D	3.93	mg/kg		79.4	(75%-125%)		08/23/13 19:16
QC1202934174 331858001 SDILT											
Selenium		DU	-0.169	DU	1.64	ug/L	N/A		(0%-10%)		08/23/13 19:23
Metals Analysis-ICP											
Batch 1324256											
QC1202931706 331858001 DUP											
Aluminum			7740		7380	mg/kg	4.76		(0%-20%)	HSC	08/22/13 20:58
Antimony		DU	1.44	DU	1.63	mg/kg	N/A ^				08/23/13 11:02
Arsenic			20.7		20.3	mg/kg	2.04		(0%-20%)		08/22/13 20:58
Barium			73.5		68.4	mg/kg	7.25		(0%-20%)		
Beryllium			0.704		0.667	mg/kg	5.39 ^		(+/-0.494)		
Boron		B	3.12	B	3.00	mg/kg	3.91 ^		(+/-4.94)		
Cadmium		B	0.392	B	0.329	mg/kg	17.3 ^		(+/-0.494)		
Calcium			11600		11600	mg/kg	0.675		(0%-20%)		
Chromium			11.3		10.3	mg/kg	9.37		(0%-20%)		
Cobalt		D	4.94	D	5.09	mg/kg	3.01 ^		(+/-2.47)		08/23/13 11:02
Copper			11.3		10.9	mg/kg	3.85		(0%-20%)		08/22/13 20:58
Iron			17300		16800	mg/kg	3.08		(0%-20%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1324256										
Lead		D 59.5	D	63.0	mg/kg	5.61		(0%-20%)	HSC	08/23/13 11:02
Magnesium		2630		2530	mg/kg	3.84		(0%-20%)		08/22/13 20:58
Manganese		196		190	mg/kg	2.85		(0%-20%)		
Molybdenum		U 0.174	U	0.198	mg/kg	N/A ^				
Nickel		7.12		6.88	mg/kg	3.42		(0%-20%)		
Potassium		2110		2080	mg/kg	1.28		(0%-20%)		
Silicon		N 388		331	mg/kg	15.9		(0%-20%)		08/23/13 10:39
Silver		U 0.0872	U	0.0988	mg/kg	N/A ^				08/22/13 20:58
Sodium		476		400	mg/kg	17.5		(0%-20%)		
Vanadium		D 47.2	D	44.7	mg/kg	5.43		(0%-20%)		08/23/13 11:02
Zinc		D 65.9	D	62.0	mg/kg	6.01		(0%-20%)		
QC1202931705 LCS										
Aluminum	480			490	mg/kg		102	(80%-120%)		08/22/13 20:52
Antimony	48.0			47.0	mg/kg		97.9	(80%-120%)		08/23/13 10:34
Arsenic	48.0			47.7	mg/kg		99.3	(80%-120%)		08/22/13 20:52
Barium	48.0			47.7	mg/kg		99.4	(80%-120%)		
Beryllium	48.0			49.1	mg/kg		102	(80%-120%)		
Boron	48.0			47.1	mg/kg		98.1	(80%-120%)		
Cadmium	48.0			49.0	mg/kg		102	(80%-120%)		
Calcium	480			479	mg/kg		99.8	(80%-120%)		
Chromium	48.0			46.4	mg/kg		96.6	(80%-120%)		
Cobalt	48.0			49.0	mg/kg		102	(80%-120%)		08/23/13 10:34

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1324256										
Copper	48.0			47.7	mg/kg		99.4	(80%-120%)	HSC	08/22/13 20:52
Iron	480			466	mg/kg		97.2	(80%-120%)		
Lead	48.0			49.4	mg/kg		103	(80%-120%)		08/23/13 10:34
Magnesium	480			471	mg/kg		98.2	(80%-120%)		08/22/13 20:52
Manganese	48.0			46.1	mg/kg		96.1	(80%-120%)		
Molybdenum	48.0			45.3	mg/kg		94.5	(80%-120%)		
Nickel	48.0			47.6	mg/kg		99.3	(80%-120%)		
Potassium	480			485	mg/kg		101	(80%-120%)		
Silicon	480			438	mg/kg		91.4	(80%-120%)		08/23/13 10:34
Silver	48.0			48.2	mg/kg		100	(80%-120%)		08/22/13 20:52
Sodium	480			483	mg/kg		101	(80%-120%)		
Vanadium	48.0			48.6	mg/kg		101	(80%-120%)		08/23/13 10:34
Zinc	48.0			49.3	mg/kg		103	(80%-120%)		
QC1202931704 MB										
Aluminum			U	6.63	mg/kg					08/22/13 20:49
Antimony			U	0.322	mg/kg					08/23/13 10:30
Arsenic			U	0.487	mg/kg					08/22/13 20:49
Barium			U	0.0975	mg/kg					
Beryllium			U	0.0975	mg/kg					
Boron			U	0.975	mg/kg					
Cadmium			U	0.0975	mg/kg					
Calcium			U	7.80	mg/kg					

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1324256											
Chromium				U	0.146	mg/kg				HSC	08/22/13 20:49
Cobalt				U	0.146	mg/kg					08/23/13 10:30
Copper				U	0.292	mg/kg					08/22/13 20:49
Iron				U	7.80	mg/kg					
Lead				U	0.322	mg/kg					08/23/13 10:30
Magnesium				U	8.28	mg/kg					08/22/13 20:49
Manganese				U	0.195	mg/kg					
Molybdenum				U	0.195	mg/kg					
Nickel				U	0.146	mg/kg					
Potassium				U	6.24	mg/kg					
Silicon				U	1.46	mg/kg					08/23/13 10:30
Silver				U	0.0975	mg/kg					08/22/13 20:49
Sodium				U	6.82	mg/kg					
Vanadium				U	0.0975	mg/kg					08/23/13 10:30
Zinc				U	0.390	mg/kg					
QC1202931707 331858001 MS											
Aluminum	497		7740		8880	mg/kg		N/A	(75%-125%)		08/22/13 21:00
Antimony	49.7	DU	1.44	D	47.3	mg/kg		93.2	(75%-125%)		08/23/13 11:05
Arsenic	49.7		20.7		65.4	mg/kg		90.1	(75%-125%)		08/22/13 21:00
Barium	49.7		73.5		115	mg/kg		83.9	(75%-125%)		
Beryllium	49.7		0.704		48.4	mg/kg		95.9	(75%-125%)		
Boron	49.7	B	3.12		49.5	mg/kg		93.4	(75%-125%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1324256											
Cadmium	49.7	B	0.392		47.0	mg/kg		93.7	(75%-125%)	HSC	08/22/13 21:00
Calcium	497		11600		12000	mg/kg		N/A	(75%-125%)		
Chromium	49.7		11.3		54.4	mg/kg		86.7	(75%-125%)		
Cobalt	49.7	D	4.94	D	55.2	mg/kg		101	(75%-125%)		08/23/13 11:05
Copper	49.7		11.3		61.9	mg/kg		102	(75%-125%)		08/22/13 21:00
Iron	497		17300		17400	mg/kg		N/A	(75%-125%)		
Lead	49.7	D	59.5	D	113	mg/kg		107	(75%-125%)		08/23/13 11:05
Magnesium	497		2630		3070	mg/kg		N/A	(75%-125%)		08/22/13 21:00
Manganese	49.7		196		234	mg/kg		76	(75%-125%)		
Molybdenum	49.7	U	0.174		44.1	mg/kg		88.8	(75%-125%)		
Nickel	49.7		7.12		51.8	mg/kg		89.9	(75%-125%)		
Potassium	497		2110		2600	mg/kg		N/A	(75%-125%)		
Silicon	497	N	388	N	547	mg/kg		31.9*	(75%-125%)		08/23/13 10:41
Silver	49.7	U	0.0872		48.0	mg/kg		96.7	(75%-125%)		08/22/13 21:00
Sodium	497		476		893	mg/kg		83.8	(75%-125%)		
Vanadium	49.7	D	47.2	D	97.3	mg/kg		101	(75%-125%)		08/23/13 11:05
Zinc	49.7	D	65.9	D	115	mg/kg		99.2	(75%-125%)		
QC1202934286 331858001 PS											
Silicon	5000	N	4460		12500	ug/L		161*	(80%-120%)		08/23/13 10:57
QC1202931708 331858001 SDILT											
Aluminum			88800	D	18700	ug/L	5.11		(0%-10%)		08/22/13 21:03
Antimony		DU	2.09	DU	7.19	ug/L	N/A		(0%-10%)		08/23/13 11:11
Arsenic			237	D	48.6	ug/L	2.36		(0%-10%)		08/22/13 21:03

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1324256										
Barium		844	D	171	ug/L	1.29		(0%-10%)	HSC	08/22/13 21:03
Beryllium		8.08	D	1.81	ug/L	11.8		(0%-10%)		
Boron	B	35.8	DU	4.36	ug/L	N/A		(0%-10%)		
Cadmium	B	4.49	DU	0.436	ug/L	N/A		(0%-10%)		
Calcium		134000	D	27600	ug/L	3.32		(0%-10%)		
Chromium		130	D	25.4	ug/L	2.11		(0%-10%)		
Cobalt	D	11.3	D	2.40	ug/L	5.73		(0%-10%)		08/23/13 11:11
Copper		130	D	25.0	ug/L	3.99		(0%-10%)		08/22/13 21:03
Iron		198000	D	41900	ug/L	5.66		(0%-10%)		
Lead	D	137	D	27.0	ug/L	1.32		(0%-10%)		08/23/13 11:11
Magnesium		30200	D	6270	ug/L	3.85		(0%-10%)		08/22/13 21:03
Manganese		2250	D	459	ug/L	2.08		(0%-10%)		
Molybdenum	U	-1.66	DU	0.872	ug/L	N/A		(0%-10%)		
Nickel		81.7	D	16.0	ug/L	1.94		(0%-10%)		
Potassium		24200	D	5010	ug/L	3.49		(0%-10%)		
Silicon	N	4460	D	915	ug/L	2.63		(0%-10%)		08/23/13 10:44
Silver	U	-2.42	DU	0.436	ug/L	N/A		(0%-10%)		08/22/13 21:03
Sodium		5460	D	1170	ug/L	7.31		(0%-10%)		
Vanadium	D	108	D	21.3	ug/L	1.7		(0%-10%)		08/23/13 11:11
Zinc	D	151	D	30.7	ug/L	1.69		(0%-10%)		
Metals Analysis-Mercury										
Batch 1324297										

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-Mercury										
Batch 1324297										
QC1202931786 331858001 DUP										
Mercury	B	0.00419	U	0.00395	mg/kg	10.6 ^		(+/-0.0118)	NOR1	08/22/13 12:44
QC1202931782 LCS										
Mercury	0.120			0.123	mg/kg		103	(80%-120%)		08/22/13 11:46
QC1202931781 MB										
Mercury			U	0.00396	mg/kg					08/22/13 11:44
QC1202931787 331858001 MS										
Mercury	0.119 B	0.00419		0.135	mg/kg		110	(80%-120%)		08/22/13 12:46
QC1202931788 331858001 SDILT										
Mercury	B	0.071	DU	0.0198	ug/L	N/A		(0%-10%)		08/22/13 12:48

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

General Chem Analysis

Case Narrative

General Chemistry Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0008

Method/Analysis Information

Product: **pH**

Analytical Batch: 1324926 **Method:** SW9045D pH

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9045D:

Sample ID	Client ID
331858001	J1RWK4
1202933216	331858001(J1RWK4) Sample Duplicate (DUP)
1202933217	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-008 REV# 21.

Preparation/Analytical Method Verification

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

Calibration Information

The Electrode analysis was performed on a PerpHect pH Meter Orion 370.

Initial Calibration
All initial calibration requirements have been met for this SDG.

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

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation
The following sample was selected for QC analysis: 331858001 (J1RWK4).

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

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

Holding Times
The following samples from this sample group were received by the lab outside of the method specified holding time: 1202933216 (J1RWK4) and 331858001 (J1RWK4).

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

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

Miscellaneous Information

Data Exception (DER) Documentation
The following DER was generated for this SDG: 1214598 1202933216 (J1RWK4) and 331858001 (J1RWK4).

Additional Comments
Additional comments were not required for this SDG.

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product:	**Cyanide and Total**		
Analytical Batch:	1322873	**Method:**	SW9012B Cyanide and Total
Prep Batch :	1322872	**Method:**	SSW846 9010C Distillation

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9012B:

Sample ID	Client ID
331858001	J1RWK4
1202928450	Method Blank (MB)
1202928451	Laboratory Control Sample (LCS)
1202931506	331858001(J1RWK4) Sample Duplicate (DUP)
1202931508	331858001(J1RWK4) Matrix Spike (MS)

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

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 REV# 17.

Preparation/Analytical Method Verification

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

Calibration Information

The Flow Injection analysis was performed on a Lachat QuickChem FIA+ 8000 Series.

Initial Calibration
All initial calibration requirements have been met for this SDG.

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

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

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

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation
The following sample was selected for QC analysis: 331858001 (J1RWK4).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The MS/PS recovery for this sample set was within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement
The values for the sample and duplicate are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable. 1202931506 (J1RWK4).

Technical Information

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

Holding Times
All samples in this SDG met the specified holding time.

Sample Preservation/Integrity
All the samples from this sample group met the preservation and integrity requirements of the method.

Sample Dilutions
The following sample in this sample group was diluted due to high concentration: 1202928451 (LCS).

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

Miscellaneous Information

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

Additional Comments
Additional comments were not required for this SDG.

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an

effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product:	**Ion Chromatography**		
Analytical Batch:	1324292	**Method:**	SW846 9056A Anions
Prep Batch :	1324290	**Method:**	SW846 9056A

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9056A:

Sample ID	Client ID
331858001	J1RWK4
1202931767	Method Blank (MB)
1202931768	331858001(J1RWK4) Sample Duplicate (DUP)
1202931769	331858001(J1RWK4) Matrix Spike (MS)
1202931770	Laboratory Control Sample (LCS)

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

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-086 REV# 22.

Preparation/Analytical Method Verification

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

Calibration Information

The Ion Chromatography analysis was performed on a Dionex ICS-3000 Ion Chromatograph.

Initial Calibration
All initial calibration requirements have been met for this SDG.

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

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

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

Quality Control (QC) Information

Method Blank (MB) Statement
The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Designation
The following sample was selected for QC analysis: 331858001 (J1RWK4).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The spike recovery for Ortho-phosphate falls outside of the established acceptance limits due to matrix interference: 1202931769 (J1RWK4). The sample concentration for Sulfate is more than four times the spike nominal concentration; therefore, the spike recovery is not applicable: 1202931769 (J1RWK4).

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

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

Holding Times
All samples in this SDG met the specified holding time.

Sample Dilutions
The following samples in this sample group were diluted due to high concentration: 1202931768 (J1RWK4), 1202931769 (J1RWK4) and 331858001 (J1RWK4).

Sample Re-analysis
The following samples were re-analyzed due to CCV failure: 1202931767 (MB), 1202931768 (J1RWK4), 1202931769 (J1RWK4), 1202931770 (LCS) and 331858001 (J1RWK4).

Miscellaneous Information

Data Exception (DER) Documentation
The following DER was generated for this SDG: 1215018 1202931769 (J1RWK4).

Manual Integrations
The following samples from this sample group had to be manually integrated due to errors in the instrument software peak integration: 1202931768 (J1RWK4), 1202931769 (J1RWK4) and 331858001 (J1RWK4).

Additional Comments
Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	**Nitrate + Nitrite**		
Analytical Batch:	1322859	**Method:**	EPA 353.2 Nitrogen and Nitrate/Nitrite
Prep Batch :	1322858	**Method:**	EEPA 353.2 Modified

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 353.2 Modified:

Sample ID	Client ID
331858001	J1RWK4
1202928410	Method Blank (MB)
1202928411	Laboratory Control Sample (LCS)
1202931510	331858001(J1RWK4) Sample Duplicate (DUP)
1202931511	331858001(J1RWK4) Matrix Spike (MS)

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

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-128 REV# 8.

Preparation/Analytical Method Verification

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

Calibration Information

The Nutrient analysis was performed on a Lachat QuickChem FIA+ 8500 Series.

Calibration Verification Information
All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria.

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

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

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation
The following sample was selected for QC analysis: 331858001 (J1RWK4).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The MS/PS recovery for this sample set was within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

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

Holding Times
All samples in this SDG met the specified holding time.

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

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

Miscellaneous Information

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

Additional Comments
Additional comments were not required for this SDG.

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product:	**Sulfide and Total**		
Analytical Batch:	1324726	**Method:**	SW846 9030B/9034 Sulfide in Soil

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9030B/9034:

Sample ID	Client ID
331858001	J1RWK4
1202932686	Method Blank (MB)
1202932687	Laboratory Control Sample (LCS)
1202932688	331858001(J1RWK4) Sample Duplicate (DUP)
1202932689	331858001(J1RWK4) Matrix Spike (MS)

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

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-082 REV# 11.

Preparation/Analytical Method Verification

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

Calibration Information

The Titration analysis was performed on a manually operated buret.

Initial Calibration
All initial calibration requirements have been met for this SDG.

Initial Standardization
The titrant was properly standardized

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation
The following sample was selected for QC analysis: 331858001 (J1RWK4).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The MS/PS recovery for this sample set was within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

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

Holding Times
A holding time is not specified by the method for solid matrices.

Sample Preservation/Integrity
All the samples from this sample group met the preservation and integrity requirements of the method.

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

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

Miscellaneous Information

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

Additional Comments
Additional comments were not required for this SDG.

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

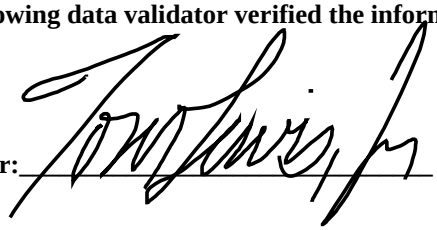
Certification Statement

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

Review Validation:

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

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

Reviewer:  **Date:** 03Sept13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
23-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ELECTRODE	SW846 9045C/9045D, SW846 9045D	Solid	LANL, WCHN
Batch ID:	**Sample Numbers:**		
1324926	See Below		

Potentially affected work order(s)(SDG): 331578(2013-1634),331679(2013-1651),331858(XP0008)

Application Issues:

Sample received out of holding

Specification and Requirements Exception Description:	**DER Disposition:**
1. Sample received out of holding: 331578 001,002,003,004,005,006,007,008,009, 010,011 331679 001,002,003,004,005,006,007,008 331858 001 QC 1202933216DUP,1202933315DUP	1. Sample received out of holding

Originator's Name:

Lisa Gregory 23-AUG-13

Data Validator/Group Leader:

Thomas Lewis 27-AUG-13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
26-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
IC	SW846 9056A	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1324292	See below.		

Potentially affected work order(s)(SDG): 331858(XP0008)

Application Issues:

Failed Recovery for MS/PS

Specification and Requirements Exception Description:	**DER Disposition:**
1. Failed Recovery for MS: QC 1202931769MS	1. The spike recovery for Ortho-phosphate falls outside of the established acceptance limits due to matrix interference.

Originator's Name:

Mary Sherwood 26-AUG-13

Data Validator/Group Leader:

Julia Hamilton 27-AUG-13

Sample Data Summary

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

Certificate of Analysis Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0008 GEL Work Order: 331858 Project: RC-233 Soil

The Qualifiers in this report are defined as follows:

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

D Results are reported from a diluted aliquot of sample.

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

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

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

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

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

Reviewed by

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

Certificate of Analysis

Report Date: August 28, 2013

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

Client SDG: XP0008

Client Sample ID: J1RWK4
Sample ID: 331858001
Matrix: Soil
Collect Date: 19-AUG-13 08:30
Receive Date: 20-AUG-13
Collector: Client
Moisture: 3.09%

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Electrode Analysis											
SW9045D pH "As Received"											
pH at Temp 20.4C	X	2.88	0.010	0.100	pH	1	LYG1	08/23/13	0823	1324926	1
Flow Injection Analysis											
SW9012B Cyanide, Total "Dry Weight Corrected"											
Cyanide, Total	B	0.106	0.0813	0.500	mg/kg	1	KLP1	08/21/13	1701	1322873	2
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.691	0.691	2.06	mg/kg	1	MAR1	08/22/13	2300	1324292	3
Chloride	B	1.23	0.691	2.06	mg/kg	1					
Fluoride		1.99	0.341	1.03	mg/kg	1					
Nitrate-N		2.73	0.341	1.03	mg/kg	1					
Nitrite-N	U	0.341	0.341	1.03	mg/kg	1					
O-Phosphate as P	B	0.820	0.691	2.06	mg/kg	1	MAR1	08/23/13	1549	1324292	4
Sulfate	D	18200	274	826	mg/kg	200	MAR1	08/23/13	1834	1324292	5
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite		2.09	0.172	0.505	mg/kg	1	KLP1	08/26/13	1231	1322859	6
Titration Analysis											
SW846 9030B/9034 Sulfide in Soil "Dry Weight Corrected"											
Sulfides (Acid Soluble)	U	8.61	8.61	25.8	mg/kg		TXT1	08/22/13	1341	1324726	7

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	KLP1	08/26/13	1145	1322858
SW846 9010C Distillation	SW846 9010C Prep	KLP1	08/21/13	1630	1322872
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/22/13	1320	1324290

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

Certificate of Analysis

Report Date: August 28, 2013

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

Client SDG: XP0008

Client Sample ID:	J1RWK4	Project:	WCHN00313
Sample ID:	331858001	Client ID:	WCHN001

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9045D	
2	SW846 9012B	
3	SW846 9056A	
4	SW846 9056A	
5	SW846 9056A	
6	EPA 353.2 Modified	
7	SW846 9030B/9034	

Notes:

Quality Control Summary

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

QC Summary

Report Date: August 28, 2013

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

Contact: **Joan Kessner**

Workorder: **331858** **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Electrode Analysis											
Batch 1324926											
QC1202933216 331858001 DUP											
pH		X	2.88	X	2.95	pH	2.40		(0%-10%)	LYG1	08/23/13 08:23
QC1202933217 LCS											
pH	7.00				7.00	pH		100	(99%-101%)		08/23/13 07:45
Flow Injection Analysis											
Batch 1322873											
QC1202931506 331858001 DUP											
Cyanide, Total		B	0.106	U	0.0937	mg/kg	N/A ^		(+/-0.500)	KLP1	08/21/13 17:02
QC1202928451 LCS											
Cyanide, Total	28.1			D	33.2	mg/kg		118	(68%-140%)		08/21/13 16:44
QC1202928450 MB											
Cyanide, Total					-0.092	mg/kg					08/21/13 16:43
QC1202931508 331858001 MS											
Cyanide, Total	5.16	B	0.106		3.34	mg/kg		62.7	(55%-125%)		08/21/13 17:03
Ion Chromatography											
Batch 1324292											
QC1202931768 331858001 DUP											
Bromide		U	0.691	U	0.691	mg/kg	N/A ^			MAR1	08/22/13 23:33
Chloride		B	1.23	B	1.27	mg/kg	3.15 ^		(+/-2.06)		
Fluoride			1.99		2.02	mg/kg	1.44 ^		(+/-1.03)		
Nitrate-N			2.73		2.70	mg/kg	0.837 ^		(+/-1.03)		
Nitrite-N		U	0.341	U	0.341	mg/kg	N/A ^				
O-Phosphate as P		B	0.820	B	0.870	mg/kg	5.86 ^		(+/-2.06)		08/23/13 16:22
Sulfate		D	18200	D	18500	mg/kg	1.53		(0%-20%)		08/23/13 18:01
QC1202931770 LCS											
Bromide	12.5				12.4	mg/kg		99.6	(90%-110%)		08/22/13 22:27
Chloride	50.0				48.0	mg/kg		96	(90%-110%)		

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography											
Batch 1324292											
Fluoride	25.0				24.9	mg/kg		99.5	(90%-110%)	MAR1	08/22/13 22:27
Nitrate-N	25.0				24.5	mg/kg		98.1	(90%-110%)		
Nitrite-N	25.0				24.8	mg/kg		99.1	(90%-110%)		
O-Phosphate as P	12.5				12.7	mg/kg		101	(90%-110%)		08/23/13 15:17
Sulfate	100				99.1	mg/kg		99.1	(90%-110%)		08/22/13 22:27
QC1202931767 MB											
Bromide				U	0.670	mg/kg					08/22/13 21:54
Chloride				U	0.670	mg/kg					
Fluoride				U	0.330	mg/kg					
Nitrate-N				U	0.330	mg/kg					
Nitrite-N				U	0.330	mg/kg					
O-Phosphate as P				U	0.670	mg/kg					08/23/13 14:44
Sulfate				U	1.33	mg/kg					08/22/13 21:54
QC1202931769 331858001 MS											
Bromide	12.9	U	0.691		13.3	mg/kg		103	(70%-134%)		08/23/13 00:05
Chloride	51.6	B	1.23		50.9	mg/kg		96.2	(46%-150%)		
Fluoride	25.8		1.99		14.9	mg/kg		50.2	(34%-134%)		
Nitrate-N	25.8		2.73		29.1	mg/kg		102	(68%-129%)		
Nitrite-N	25.8	U	0.341		22.9	mg/kg		88.9	(68%-130%)		
O-Phosphate as P	12.9	B	0.820	B	0.948	mg/kg		.992*	(26%-124%)		08/23/13 16:55
Sulfate	103	D	18200	D	25800	mg/kg		N/A	(50%-151%)		08/23/13 17:28
Nutrient Analysis											
Batch 1322859											
QC1202931510 331858001 DUP											

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis												
Batch 1322859												
Nitrogen, Nitrate/Nitrite			2.09		1.93	mg/kg	8.07 ^		(+/-0.507)	KLP1	08/26/13	12:32
QC1202928411 LCS												
Nitrogen, Nitrate/Nitrite	10.0				10.3	mg/kg		103	(90%-110%)		08/26/13	12:26
QC1202928410 MB												
Nitrogen, Nitrate/Nitrite				U	0.170	mg/kg					08/26/13	12:25
QC1202931511 331858001 MS												
Nitrogen, Nitrate/Nitrite	10.2		2.09		12.0	mg/kg		96.6	(75%-125%)		08/26/13	12:34
Titration Analysis												
Batch 1324726												
QC1202932688 331858001 DUP												
Sulfides (Acid Soluble)		U	8.61	U	8.60	mg/kg	N/A ^			TXT1	08/22/13	13:59
QC1202932687 LCS												
Sulfides (Acid Soluble)	100				89.5	mg/kg		89.5	(75%-102%)		08/22/13	13:37
QC1202932686 MB												
Sulfides (Acid Soluble)				U	8.35	mg/kg					08/22/13	13:33
QC1202932689 331858001 MS												
Sulfides (Acid Soluble)	103	U	8.61		69.5	mg/kg		67.5	(57%-117%)		08/22/13	14:02

Notes:

The Qualifiers in this report are defined as follows:

- > Result greater than quantifiable range or greater than upper limit of the analysis range
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank, and the sample concentration was <= 5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- 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

QC Summary

Workorder: 331858 **Client SDG:** XP0008 **Project Description:** RC-233 Soil

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Miscellaneous

Moisture LogBook

Batch: 1324158
Analyst: CXC1
Date/Time: 20-AUG-2013
Procedure Code DRY WEIGHT
Procedure Description Dry Weight-Percent Moisture
Lab Sop: GL-OA-E-020

Sample St	Sample Id	Rpd(%)
DUP	1202931504	**7.708**

Sample Id	Sample Type	Original Hsn	Instrument	Run Time	Container Wt	Initial Wt	Final Wt (g)	Net Initial Wt (g)	Net Final Wt (g)	Moisture (%)
331858001	SAMPLE		BALHD2000D	17:13	7.278	36.654	35.746	29.376	28.468	3.09
1202931504	DUP	331858001	BALHD2000D	17:13	7.289	32.59	31.866	25.301	24.577	2.86

Comments:

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

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

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171 F 843.766.1178

www.gel.com

September 03, 2013

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

Re: RC-233 Soil
Work Order: 331859
SDG: XP0008A

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 20, 2013. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Orlette Johnson
Project Manager

Purchase Order: 1510
Chain of Custody: RC-233-038
Enclosures

Table of Contents

Case Narrative.....1

Chain of Custody and Supporting Documentation.....3

Laboratory Certifications.....7

Pesticide Analysis.....9

- Case Narrative.....10
- Sample Data Summary.....14
- Quality Control Summary.....16
- Miscellaneous.....20

Herbicide Analysis.....23

- Case Narrative.....24
- Sample Data Summary.....29
- Quality Control Summary.....31
- Miscellaneous.....34

Metals Analysis.....37

- Case Narrative.....38
- Sample Data Summary.....45
- Quality Control Summary.....48

Case Narrative

Receipt Narrative
for
WC-HANFORD, INC.
SDG: XP0008A
Work Orders: 331859 and 331858

August 26, 2013

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 20, 2013 for analysis.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
331858001	J1RWK4
331859001	J1RWK4

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: GC Semivolatile Herbicide, GC Semivolatile Pesticide, GC/MS Semivolatile, GC/MS Volatile, General Chemistry, Metals and Radiochemistry.

Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-233-038

Collector DUNNUM, AJ	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	**Sampling Location** 600-279		**SAF No.** RC-233
Ice Chest No. WCH-11-029	**Field Logbook No.** EL-1666-01	**COA** 06027926000	**Method of Shipment** fed EX
Shipped To Eberline - GEL	**Offsite Property No.** A120945		**Bill of Lading/Air Bill No.** See OSPC

Price Code 8B **Data Turnaround** 7 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

None

Special Handling and/or Storage

Cool 4 C

331858, 331859

Preservation	Freeze	Cool 4C	None	Cool 4C	Cool 4C	None	Cool 4C	None	None	None
Type of Container	Gs*	G/P	G/P	aG	aG	aG	aGs*	aG	aG	aG
No. of Container(s)	3	1	1	1	1	1	1	1	1	1
Volume	40mL	125mL	125mL	~~125mL~~ 250	250mL	125mL	125mL	125mL	125mL	125mL
SAMPLE ANALYSIS	** VOA - 5035/8260 (TCL)	See item (1) in Special Instructions	See item (2) in Special Instructions	8-19-13 cmb Semi-VOA - 8270A (TCL)	Pesticides - 8081; Chloro-Herbicides - EPA8151	See item (3) in Special Instructions	TCLP VOA - 1311/8260A	TCLP Semi-VOA - 1311/8270A	TCLP Pesticide - 1311/8081	TCLP Herbicides - 1311/8151

Sample No.	Matrix	Sample Date	Sample Time									
J1RWK4	SOIL	8-19-13	0830	x	x	x	x	x	x			x	x
J1RWK5	SOIL											
J1RWK6	SOIL			MA Bar								
J1RWK7	SOIL						E-19-13					
J1RWK8	SOIL											

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

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Aaron Dunnum	8-19-13 0840	B. Fahlberg B. Fahlberg	0840 8-19-13
B. Fahlberg B. Fahlberg	0930 8-19-13	Chiara Bingham	8-19-13 0930
Chiara Bingham Chiara Bingham WCH	8-19-13 0955	fed EX	
		P. Mant Patricia Dent	8/20/13 08:50

FINAL SAMPLE DISPOSITION — Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Client List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV) {Mercury}
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorus in Phosphate, Sulfate}; NO2/NO3 - 353.1 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}
(3) Mercury (TCLP) - 1311/7470 {Mercury}; Metals by ICP (TCLP) - 1311/6010 {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}

* 20ml vial → % moisture
** freeze upon receipt
8-19-13 cmb

REVIEWED BY K.Wood via email DATE 8-19-13

XP0008

Generated Date/Time: 08/13/2013 11:11, PDT

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-233-038

Collector DUNNUM, AJ	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	**Sampling Location** 600-279		**SAF No.** RC-233
Ice Chest No. WCH-11-020	**Field Logbook No.** EL-1666-01	**COA** 06027926000	**Method of Shipment** fed ex
Shipped To Eberline - ~~Oak Ridge~~ GEL 8.19.13 cmw	**Offsite Property No.** A120905		**Bill of Lading/Air Bill No.** See OSPC

Price Code 8B **Data Turnaround** 7 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

None

Special Handling and/or Storage

Cool 4 C

331858, 331859

Preservation	Cool 4C										
Type of Container	aG										
No. of Container(s)	1										
Volume	125mL										
SAMPLE ANALYSIS	Sulfides - 9030 Total Cyanide - 9010										
Sample No.	**Matrix**	**Sample Date**	**Sample Time**								
J1RWK4	SOIL	8-19-13	0830	X							
J1RWK5	SOIL										
J1RWK6	SOIL										
J1RWK7	SOIL					MA Burton 8-19-13					
J1RWK8	SOIL										

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
~~Jason Dunnum~~	8-19-13 0840	B. Fahlberg B. Fahlberg	8-19-13 0840
B. Fahlberg B. Fahlberg	8-19-13 0930	Cynthia Bingham	8-19-13 0930
Cynthia Bingham CWH	8-19-13 0940	fed EX	
		P. Want Patricia Dent	8/20/13 0850

Sign/Print Names

SPECIAL INSTRUCTIONS

REVIEWED BY K. Wood via email DATE 8-19-13

FINAL SAMPLE DISPOSITION Disposal Method | Disposed By | Date/Time

XP0008

WCH-EE-011

Generated Date/Time: 08/13/2013 11:11, PDT

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WCHN	**SDG/AR/COC/Work Order:**
Received By: P. Plant	**Date Received:** 8/20/13

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		X	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM
Classified Radioactive II or III by RSO?		X	If yes, Were swipes taken of sample contatiners < action levels?
COC/Samples marked containing PCBs?		X	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		X	If yes, samples are to be segregeated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		X	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		X	

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	X			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	X			Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius
2a	Daily check performed and passed on IR temperature gun?	X			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): 61584649
3	Chain of custody documents included with shipment?	X			
4	Sample containers intact and sealed?	X			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		X		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		X		Sample ID's and containers affected:
7	Are Encore containers present?			X	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	X			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	X			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	X			Sample ID's affected:
11	Number of containers received match number indicated on COC?	X			Sample ID's affected: 8/20/13
12	Are sample containers identifiable as GEL provided?	X		X	Clients Labels GEL's Containers
13	COC form is properly signed in relinquished/received sections?	X			
14	Carrier and tracking number.	X			Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 7964 9260 7660-3c 7969 9376 9153-2c

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials DS Date 8/21/13 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 26 August 2013

State	Certification
Alaska	UST−110
Arkansas	88−0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH−0169
Delaware	SC00012
DoD ELAP A2LA ISO 17025	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−12−00283, P330−12−00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA130005
Maryland	270
Massachusetts	M−SC012
Nevada	SC000122011−1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68−00485
Plant Material Permit	PDEP−12−00260
South Carolina Chemistry	10120001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235−13−8
Utah NELAP	SC000122013−8
Vermont	VT87156
Virginia NELAP	460202
Washington	C780−12
Wisconsin	999887790

Pesticide Analysis

Case Narrative

Pesticide Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0008A

Method/Analysis Information

Procedure:	**Organochlorine Pesticides and Chlorinated Hydrocarbons**
Analytical Method:	SW846 3535A/8081B
Prep Method:	SW846 3535A
TCLP Prep Method :	SW846 1311
Analytical Batch Number:	1324356
Prep Batch Number:	1324355
TCLP Prep Batch Number:	1324112

Sample Analysis

Sample ID	Client ID
331859001	J1RWK4
1202931413	TCLP Blank (TB)
1202931969	Method Blank (MB)
1202931970	Laboratory Control Sample (LCS)
1202931971	331859001(J1RWK4) Matrix Spike (MS)
1202931972	331859001(J1RWK4) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" 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# 12.

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 TCLP Blank, (TB), is a TCLP Blank that is tumbled and extracted with the batch. The Method Blank, (MB), is a method blank and was extracted only. There were no target analytes detected in the TB or MB associated with this batch. 1202931413 (TB) and 1202931969 (MB).

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 331859001 (J1RWK4) was selected for the matrix spike and matrix spike duplicate analysis.

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

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

MS/MSD Relative Percent Difference (RPD) Statement
The RPD values between the MS and MSD were within the acceptance limits.

Technical Information:

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

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows.

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

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

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

Miscellaneous Information:

Electronic Package Comment

This package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative.

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

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

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

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.

Sample Data Summary

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

Certificate of Analysis

Report Date: August 26, 2013

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

Client SDG: XP0008A

Client Sample ID: J1RWK4
Sample ID: 331859001
Matrix: Soil
Collect Date: 19-AUG-13 08:30
Receive Date: 20-AUG-13
Collector: Client

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
SW 1311/3535A/8081B TCLP PEST Solid "As Received"											
Chlordane	U	0.765	0.765	2.50	1	1	LOF	08/22/13	2325	1324356	1
Endrin	U	0.100	0.100	0.400	1	1					
Heptachlor	U	0.0665	0.0665	0.200	1	1					
Heptachlor epoxide	U	0.0665	0.0665	0.200	1	1					
Methoxychlor	U	0.500	0.500	2.00	1	1					
Toxaphene	U	1.50	1.50	5.00	1	1					
gamma-BHC (Lindane)	U	0.0665	0.0665	0.200	1	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	08/20/13	1525	1324112
SW846 3535A	SW3535A TCLP Pesticides SPE Extraction	AXW1	08/22/13	1100	1324355

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3535A/8081B	
2	SW846 3535A/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW 1311/3535A/8081B TCLP PEST Solid "As Received"	7.09 1	10.0	70.9	(36%-106%)
Decachlorobiphenyl	SW 1311/3535A/8081B TCLP PEST Solid "As Received"	8.44 1	10.0	84.4	(41%-124%)

Notes:

Quality Control Summary

QC Summary

Report Date: August 26, 2013

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

Contact: **Joan Kessner**

Workorder: **331859** **Client SDG:** XP0008A **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-Pesticide										
Batch 1324356										
QC1202931970 LCS										
Endrin	0.250			0.213	1		85.3	(53%-140%)	LOF	08/22/13 22:57
Heptachlor	0.100			0.0786	1		78.6	(60%-127%)		
Heptachlor epoxide	0.100			0.0773	1		77.3	(60%-129%)		
Methoxychlor	1.00			0.813	1		81.3	(57%-129%)		
gamma-BHC (Lindane)	0.100			0.0814	1		81.4	(63%-135%)		
**4cmx	0.200			0.127	1		63.5	(36%-106%)		
**Decachlorobiphenyl	0.200			0.160	1		80.1	(41%-124%)		
QC1202931969 MB										
Chlordane			U	0.0153	1					08/22/13 22:15
Endrin			U	0.002	1					
Heptachlor			U	0.00133	1					
Heptachlor epoxide			U	0.00133	1					
Methoxychlor			U	0.010	1					
Toxaphene			U	0.030	1					
gamma-BHC (Lindane)			U	0.00133	1					
**4cmx	0.200			0.155	1		77.6	(36%-106%)		
**Decachlorobiphenyl	0.200			0.181	1		90.3	(41%-124%)		
QC1202931971 331859001 MS										
Endrin	12.5	U	0.100	11.7	1		93.9	(36%-136%)		08/22/13 23:40
Heptachlor	5.00	U	0.0665	4.27	1		85.5	(37%-138%)		
Heptachlor epoxide	5.00	U	0.0665	4.17	1		83.4	(42%-135%)		

QC Summary

Workorder: 331859 **Client SDG:** XP0008A **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-Pesticide											
Batch 1324356											
Methoxychlor	50.0	U	0.500		44.6	1		89.1	(42%-126%)	LOF	08/22/13 23:40
gamma-BHC (Lindane)	5.00	U	0.0665		4.44	1		88.8	(38%-145%)		
**4cmx	10.0		7.09		7.57	1		75.7	(36%-106%)		
**Decachlorobiphenyl	10.0		8.44		9.21	1		92.1	(41%-124%)		
QC1202931972 331859001 MSD											
Endrin	12.5	U	0.100		11.0	1	6.52	88	(0%-30%)		08/22/13 23:54
Heptachlor	5.00	U	0.0665		3.84	1	10.6	76.8	(0%-30%)		
Heptachlor epoxide	5.00	U	0.0665		3.85	1	7.97	77	(0%-30%)		
Methoxychlor	50.0	U	0.500		38.3	1	15.2	76.5	(0%-30%)		
gamma-BHC (Lindane)	5.00	U	0.0665		4.09	1	8.06	81.9	(0%-30%)		
**4cmx	10.0		7.09		6.12	1		61.2	(36%-106%)		
**Decachlorobiphenyl	10.0		8.44		7.93	1		79.3	(41%-124%)		
QC1202931413 TB											
Chlordane				U	0.765	1					08/22/13 22:43
Endrin				U	0.100	1					
Heptachlor				U	0.0665	1					
Heptachlor epoxide				U	0.0665	1					
Methoxychlor				U	0.500	1					
Toxaphene				U	1.50	1					
gamma-BHC (Lindane)				U	0.0665	1					
**4cmx	10.0				7.53	1		75.3	(36%-106%)		
**Decachlorobiphenyl	10.0				8.92	1		89.2	(41%-124%)		

GEL LABORATORIES LLC

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

QC Summary

Workorder: 331859 **Client SDG:** XP0008A **Project Description:** RC-233 Soil

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

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- o Analyte failed to recover within LCS limits (0rganics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Miscellaneous

Prep Logbook

Toxicity Characteristic Leaching Procedure Preparation

Batch ID: 1324112 **Verified by:** _____
Analyst: Edmund Frampton
Method: SW846 1311

Lab SOP: GL-LB-E-006 REV# 19
Instrument: TCLP Tumbler # 101

Sample ID	**1202931413 TB**	**331859001**
Analysis Start Date	**20-AUG-2013 15:25:58**	**20-AUG-2013 15:25:58**
100% Solid Y/N		y
(I) Sub Sample Aliquot I=G-H (g)		100
Initial pH (su)	4.93	3.89
Filtrate pH (su)		5
Tumbler Speed	28	28
Sample Properties <>/= Water	TCLP 1	Solid
(J) 10X Wet Solid Weight 20XI (g)	2000	2000
Filtrate Volume (mL)	1000	1000

Type	Sample Id	Description	Serial Number	Spike Amt	Units
RGNT	All	TCLP EXTRACTION FLUID 1	T130814-1-2	2000	mL

Comments:

Extration End Date: 21-AUG-2013 08:00:00
Filtration End Date: 21-AUG-2013 09:26:14
Bottle Lot Number: 23061300
Filter Lot Number: 9458611
Extration Start Temperature: 23 C
Extration End Temperature: 23 C
Filtration End Temperature: 23 C

Prep Logbook

Solid-Phase Extraction

Batch ID: 1324355 **Verified by:** _____
Analyst: Alton Willis
Method: SW846 3535A

Lab SOP: GL-OA-E-070 REV# 7
Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Initial Volume (mL)	Ph 1	Ph 2	Final Volume (mL)	Prepped Factor (mL/mL)
1202931969 MB	22-AUG-2013 11:00:00	1000	7	1	1	0.001
1202927606 TB	22-AUG-2013 11:00:00	20	3	1	1	0.05
1202931413 TB	22-AUG-2013 11:00:00	20	5	1	1	0.05
1202931970 LCS	22-AUG-2013 11:00:00	1000	7	1	1	0.001
331510001	22-AUG-2013 11:00:00	20	5	1	1	0.05
331859001	22-AUG-2013 11:00:00	20	5	1	1	0.05
1202931971 MS (331859001)	22-AUG-2013 11:00:00	20	5	1	1	0.05
1202931972 MSD (331859001)	22-AUG-2013 11:00:00	20	5	1	1	0.05

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202931970	PESTSPIKE	WE130805-05	.2	mL
MS	1202931971	PESTSPIKE	WE130805-05	.2	mL
MSD	1202931972	PESTSPIKE	WE130805-05	.2	mL
SURR	All	PEST LOW LEVEL SURROGATE 200 UG/L	WE130807-01	1	mL
REGNT	All	Acetone	1949774-B1	5	mL
REGNT	All	Hexane	1949780-B4	10	mL
REGNT	All	Methylene Chloride	1952037-D	180	mL
REGNT	All	Sulfuric Acid Sol., 1:1	1952938	20	mL
SOURC	All	SODIUM SULFATE	1941469	20	g

Comments:

Final Solvent:Hexane
Verified By:AAW
Analyst:sss

Herbicide Analysis

Case Narrative

Herbicide Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0008A

Method/Analysis Information

Procedure:	**Analysis of Chlorophenoxy Acid Herbicides by ECD**
Analytical Method:	SW846 8151A
Prep Method:	SW846 8151A Prep
TCLP Prep Method :	SW846 1311
Analytical Batch Number:	1324368
Prep Batch Number:	1324367
TCLP Prep Batch Number:	1324112

Sample Analysis

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

Sample ID	Client ID
331859001	J1RWK4
1202931413	TCLP Blank (TB)
1202931991	Method Blank (MB)
1202931992	Laboratory Control Sample (LCS)
1202931993	331859001(J1RWK4) Matrix Spike (MS)
1202931994	331859001(J1RWK4) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" 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# 20.

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 for the

requested target analytes. However, the surrogate was slightly below the acceptance criteria on one analytical column in the ICV. Since the bracketing checks associated with the client samples were well within the acceptance criteria for the surrogate, the data results have been reported. All analytes were within the established retention time windows for this method.

Quality Control (QC) Information

Method Blank (MB) Statement
The Tumble Blank (TB) is a TCLP Blank that is tumbled and extracted with the batch. Method Blank (MB) is a method blank and was extracted only. The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries
The LCS(1202931992) did not meet surrogate recovery acceptance criteria. The spike analytes for the LCS were well within the acceptance criteria. Since all other QC and surrogate recoveries were within the acceptance criteria, the non-conformance did not adversely impact the data and the results have been reported.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

QC Sample Designation
A matrix spike/matrix spike duplicate pair was not extracted and analyzed with this batch.

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

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

MS/MSD Relative Percent Difference (RPD) Statement
The RPD(s) between the MS and MSD met the acceptance limits.

Technical Information

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

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

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

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

Miscellaneous Information

Electronic Package Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the reviewer name associated with the generation of the data and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation
The following DER was generated for this SDG: 1214855.

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
ECD3A.I_1	Agilent 7890A GC with duel uECD	HP6890 Series ECD	Rtx-CLP I	30m x 0.25mm, 0.25um (Rtx-CLPesticide)
ECD3A.I_2	Agilent 7890A GC with duel uECD	HP6890 Series ECD	Rtx-CLP II	30m x 0.25mm, 0.20um (Rtx-CLPesticideII)

Certification Statement

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

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
24-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
GC/ECD	SW846 8151A	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1324368	See Below		

Potentially affected work order(s)(SDG): 331859(XP0008A)

Application Issues:

Failed Yield for Surrogates

Specification and Requirements Exception Description:	**DER Disposition:**
1. The LCS(1202931992) did not meet surrogate recovery acceptance criteria.	1. The spike analytes for the LCS were well within the acceptance criteria. Since all other QC and surrogate recoveries were within the acceptance criteria, the non-conformance did not adversely impact the data and the results have been reported.

Originator's Name:

Barbara Bailey 26-AUG-13

Data Validator/Group Leader:

Jimin Cao 26-AUG-13

Sample Data Summary

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

Certificate of Analysis

Report Date: August 26, 2013

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

Client SDG: XP0008A

Client Sample ID: J1RWK4
Sample ID: 331859001
Matrix: Soil
Collect Date: 19-AUG-13 08:30
Receive Date: 20-AUG-13
Collector: Client

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-HERB											
8151A TCLP Herbicides Soil "As Received"											
2,4,5-TP	U	0.0166	0.0166	0.100	mg/L	1	RXE1	08/23/13	1939	1324368	1
2,4-D	U	0.0166	0.0166	1.00	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	08/20/13	1525	1324112
SW846 8151A Prep	8151A Herbicide TCLP Prep in Liquid	AXW1	08/23/13	0900	1324367

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8151A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
2,4-Dichlorophenylacetic acid	8151A TCLP Herbicides Soil "As Received"	0.673 mg/L	1.00	67.3	(43%-137%)

Notes:

Quality Control Summary

QC Summary

Report Date: August 26, 2013

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

Contact: **Joan Kessner**

Workorder: **331859** **Client SDG:** XP0008A **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-HERB											
Batch 1324368											
QC1202931992 LCS											
2,4,5-TP	0.002			J	0.0015	mg/L		75.1	(56%-129%)	RXE1	08/23/13 19:13
2,4-D	0.002			J	0.00148	mg/L		74.2	(52%-132%)		
**2,4-Dichlorophenylacetic acid	0.005				0.00183	mg/L		36.6*	(43%-137%)		
QC1202931991 MB											
2,4,5-TP				U	0.000083	mg/L					08/23/13 18:20
2,4-D				U	0.000083	mg/L					
**2,4-Dichlorophenylacetic acid	0.005				0.00304	mg/L		60.9	(43%-137%)		
QC1202931993 331859001 MS											
2,4,5-TP	0.400	U	0.0166		0.309	mg/L		77.2	(44%-133%)		08/23/13 20:05
2,4-D	0.400	U	0.0166	J	0.282	mg/L		70.6	(43%-138%)		
**2,4-Dichlorophenylacetic acid	1.00		0.673		0.569	mg/L		56.9	(43%-137%)		
QC1202931994 331859001 MSD											
2,4,5-TP	0.400	U	0.0166		0.290	mg/L	6.35	72.5	(0%-30%)		08/23/13 20:32
2,4-D	0.400	U	0.0166	J	0.276	mg/L	2.20	69.1	(0%-30%)		
**2,4-Dichlorophenylacetic acid	1.00		0.673		0.591	mg/L		59.1	(43%-137%)		
QC1202931413 TB											
2,4,5-TP				U	0.0166	mg/L					08/23/13 18:46
2,4-D				U	0.0166	mg/L					
**2,4-Dichlorophenylacetic acid	1.00				0.538	mg/L		53.8	(43%-137%)		

Notes:

The Qualifiers in this report are defined as follows:

A The TIC is a suspected aldol-condensation product

QC Summary

Workorder: 331859 **Client SDG:** XP0008A **Project Description:** RC-233 Soil

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

B The analyte was detected in both the associated QC blank and in the sample.

C Analyte has been confirmed by GC/MS analysis

D Results are reported from a diluted aliquot of sample.

E Concentration exceeds the calibration range of the instrument

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

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

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

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

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

o Analyte failed to recover within LCS limits (0rganics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Miscellaneous

Prep Logbook

Toxicity Characteristic Leaching Procedure Preparation

Batch ID: 1324112 **Verified by:** _____
Analyst: Edmund Frampton
Method: SW846 1311

Lab SOP: GL-LB-E-006 REV# 19
Instrument: TCLP Tumbler # 101

Sample ID	**1202931413 TB**	**331859001**
Analysis Start Date	**20-AUG-2013 15:25:58**	**20-AUG-2013 15:25:58**
100% Solid Y/N		y
(I) Sub Sample Aliquot I=G-H (g)		100
Initial pH (su)	4.93	3.89
Filtrate pH (su)		5
Tumbler Speed	28	28
Sample Properties <>/= Water	TCLP 1	Solid
(J) 10X Wet Solid Weight 20XI (g)	2000	2000
Filtrate Volume (mL)	1000	1000

Type	Sample Id	Description	Serial Number	Spike Amt	Units
RGNT	All	TCLP EXTRACTION FLUID 1	T130814-1-2	2000	mL

Comments:

Extration End Date: 21-AUG-2013 08:00:00
Filtration End Date: 21-AUG-2013 09:26:14
Bottle Lot Number: 23061300
Filter Lot Number: 9458611
Extration Start Temperature: 23 C
Extration End Temperature: 23 C
Filtration End Temperature: 23 C

Prep Logbook

The Extraction of Herbicides from Groundwater, Wastewater and Other Aqueous Samples

Batch ID: 1324367 **Verified by:** _____
Analyst: Alton Willis
Method: SW846 8151A Prep

Lab SOP: GL-OA-E-015 REV# 15
Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Initial Volume (mL)	Initial pH	Int Ext pH	Sec Ext pH	Final Volume (mL)	Prepped Factor (mL/mL)
1202931991 MB	23-AUG-2013 09:00:00	1000	7	13	1	10	0.01
1202931413 TB	23-AUG-2013 09:00:00	5	6	13	1	10	2
1202931992 LCS	23-AUG-2013 09:00:00	1000	7	13	1	10	0.01
331859001	23-AUG-2013 09:00:00	5	6	13	1	10	2
1202931993 MS (331859001)	23-AUG-2013 09:00:00	5	6	13	1	10	2
1202931994 MSD (331859001)	23-AUG-2013 09:00:00	5	6	13	1	10	2

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202931992	HERBICIDE LCS	WE130820-04	1	mL
MS	1202931993	HERBICIDE LCS	WE130820-04	1	mL
MSD	1202931994	HERBICIDE LCS	WE130820-04	1	mL
SURR	All	HERBICIDE SURROGATE	WE130710-03	.05	mL
REGNT	All	Methanol	130710-C	.5	mL
REGNT	All	Hexane	1949780-B4	4	mL
REGNT	All	Iso-octane	1950022-A	1	mL
REGNT	All	Methylene Chloride	1952037-D	180	mL
REGNT	All	Sodium hydroxide sol., 6N	1954889	17	mL
REGNT	All	Sulfuric Acid Sol., 12N For Herbicides	1956041	17	mL
REGNT	All	N-METHYL-N-NITROSO-P-TOLUENESULFON-AMIDE	1956669A	2	mL
REGNT	All	Ethyl ether	UN1950018a	240	mL

Comments:

Verified By: SSS
Final Solvent: Hexane

Metals Analysis

Case Narrative

Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0008A

Sample Analysis

Sample ID	Client ID
331859001	J1RWK4
1202931412	Tumbling Blank (TB)
1202932061	Method Blank (MB) **ICP**
1202932062	Laboratory Control Sample (LCS)
1202932065	331859001(J1RWK4L) Serial Dilution (SD)
1202932063	331859001(J1RWK4D) Sample Duplicate (DUP)
1202931411	331859001(J1RWK4S) Matrix Spike (MS)
1202934287	331859001(J1RWK4PS) Post Spike (PS)
1202931412	Tumbling Blank (TB)
1202931789	Method Blank (MB) **CVAA**
1202931790	Laboratory Control Sample (LCS)
1202931793	331859001(J1RWK4L) Serial Dilution (SD)
1202931791	331859001(J1RWK4D) Sample Duplicate (DUP)
1202931411	331859001(J1RWK4S) Matrix Spike (MS)

The samples in this SDG were analyzed on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1324419 and 1324301
Prep Batch :	1324418 and 1324299
TCLP Prep Batch :	1324111
Standard Operating Procedures:	GL-MA-E-013 REV# 22, GL-MA-E-008 REV# 14, GL-LB-E-006 REV# 19 and GL-MA-E-010 REV# 26
Analytical Method:	SW846 3010A/6010C and SW846 7470A
Prep Method :	SW846 3010A and SW846 7470A Prep
TCLP Prep Method :	SW846 1311

Preparation/Analytical Method Verification

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

System Configuration

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

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

Calibration Information

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

CRDL Requirements
All CRDL standard(s) met the referenced advisory control limits.

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

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

Continuing Calibration Verification (CCV) Requirements
All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement
The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement
The following sample was selected as the quality control (QC) sample for this SDG: 331859001 (J1RWK4).

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

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

Post Spike (PS) Recovery Statement
The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the absence of matrix interferences.

Serial Dilution % Difference Statement
The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations that are 25X the IDL/MDL for CVAA, 50X the IDL/MDL for ICP, and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria of less than 10% difference (%D).

Technical Information

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

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

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. The samples in this SDG did not require dilutions.

Preparation Information
The samples and associated matrix QC were prepared at a 10x factor for ICP/ICPMS to minimize potential interferences arising from the high sodium content in the TCLP leaching solution. The samples and associated matrix QC were prepared at a 10x factor for CVAA analysis due to matrix interferences associated with TCLP extracts.

Miscellaneous Information

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

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

Data Exception (DER) Documentation
Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG: 1214581 A copy is included in the Miscellaneous Data section of this package.

Additional Comments
Additional comments were not required for this SDG.

Certification Statement

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

Review Validation:

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

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

Reviewer: **Date:** 09/03/13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
23-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ICP	SW846 3010A/6010C	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1324419	See Below		

Potentially affected work order(s)(SDG): 331859(XP0008A)

Application Issues:

Failed Recovery for MS/PS

Specification and Requirements Exception Description:	**DER Disposition:**
1. Failed Recovery for MS/PS: QC 1202931411MS	1. The matrix spike recovery failed outside of the control limits for barium and lead. The post spike passed the required control limits for all analytes. This verifies the absence of a matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.

Originator's Name:

Helen Camello 23-AUG-13

Data Validator/Group Leader:

Jerry Wigfall 26-AUG-13

Sample Data Summary

GEL LABORATORIES LLC

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

Qualifier Definition Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0008A GEL Work Order: 331859 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, and the sample concentration was <= 5 times the blank concentration.

D Results are reported from a diluted aliquot of sample.

N Spike Sample recovery is outside control limits.

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

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

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

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

Reviewed by 09/03/13

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

Certificate of Analysis

Report Date: August 28, 2013

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

Client SDG: XP0008A

Client Sample ID: J1RWK4
Sample ID: 331859001
Matrix: Soil
Collect Date: 19-AUG-13 08:30
Receive Date: 20-AUG-13
Collector: Client

Project: WCHN00313
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
TCLP Hg in Solid "As Received"											
Mercury	U	0.00067	0.00067	0.002	mg/L	1	NOR1	08/22/13	1315	1324301	1
Metals Analysis-ICP											
TCLP ICP Metals - 1311/3010A/6010C "As Received"											
Arsenic	B	0.0605	0.050	0.300	mg/L	1	HSC	08/23/13	1140	1324419	2
Barium	CN	0.0563	0.010	0.050	mg/L	1					
Cadmium	U	0.010	0.010	0.050	mg/L	1					
Chromium	B	0.0312	0.010	0.050	mg/L	1					
Lead	NU	0.033	0.033	0.100	mg/L	1					
Selenium	U	0.060	0.060	0.300	mg/L	1					
Silver	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	08/20/13	1523	1324111
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	AXG2	08/22/13	0815	1324418
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	08/21/13	1340	1324299

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7470A	
2	SW846 3010A/6010C	

Notes:

Quality Control Summary

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

QC Summary

Report Date: August 28, 2013

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

Workorder: **331859** **Client SDG:** XP0008A **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch 1324419											
QC1202932063 331859001 DUP											
Arsenic	B	0.0605	U	0.050	mg/L	594 ^		(+/-0.300)	HSC	08/23/13	11:43
Barium	CN	0.0563	BC	0.0488	mg/L	14.3 ^		(+/-0.050)			
Cadmium	U	0.010	U	0.010	mg/L	N/A ^					
Chromium	B	0.0312	B	0.0292	mg/L	6.76 ^		(+/-0.050)			
Lead	NU	0.033	U	0.033	mg/L	N/A ^					
Selenium	U	0.060	U	0.060	mg/L	N/A ^					
Silver	U	0.010	U	0.010	mg/L	N/A ^					
QC1202932062 LCS											
Arsenic	5.00			5.09	mg/L		102	(80%-120%)		08/23/13	11:36
Barium	5.00			5.24	mg/L		105	(80%-120%)			
Cadmium	5.00			5.27	mg/L		105	(80%-120%)			
Chromium	5.00			4.94	mg/L		98.8	(80%-120%)			
Lead	5.00			5.20	mg/L		104	(80%-120%)			
Selenium	5.00			4.77	mg/L		95.4	(80%-120%)			
Silver	5.00			5.04	mg/L		101	(80%-120%)			
QC1202932061 MB											
Arsenic			U	0.050	mg/L					08/23/13	11:30
Barium			B	0.0254	mg/L						
Cadmium			U	0.010	mg/L						
Chromium			U	0.010	mg/L						
Lead			U	0.033	mg/L						

QC Summary

Workorder: 331859 **Client SDG:** XP0008A **Project Description:** RC-233 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1324419											
Selenium				U	0.060	mg/L				HSC	08/23/13 11:30
Silver				U	0.010	mg/L					
QC1202931411 331859001 MS											
Arsenic	5.00	B	0.0605		5.16	mg/L		102	(75%-125%)		08/23/13 11:46
Barium	10.0	CN	0.0563	N	4.38	mg/L		43.2*	(75%-125%)		
Cadmium	1.00	U	0.010		0.989	mg/L		98.9	(75%-125%)		
Chromium	5.00	B	0.0312		4.88	mg/L		96.9	(75%-125%)		
Lead	5.00	NU	0.033	N	2.91	mg/L		57.6*	(75%-125%)		
Selenium	1.00	U	0.060		1.01	mg/L		98.1	(75%-125%)		
Silver	0.503	U	0.010		0.491	mg/L		96.3	(75%-125%)		
QC1202934287 331859001 PS											
Barium	500	CN	5.63		505	ug/L		99.9	(80%-120%)		08/23/13 11:49
Lead	500	NU	2.58		508	ug/L		101	(80%-120%)		
QC1202932065 331859001 SDILT											
Arsenic		B	6.05	DU	0.250	ug/L	N/A		(0%-10%)		08/23/13 11:52
Barium		CN	5.63	CD	1.21	ug/L	7.6		(0%-10%)		
Cadmium		U	-0.165	DU	0.050	ug/L	N/A		(0%-10%)		
Chromium		B	3.12	DU	0.050	ug/L	N/A		(0%-10%)		
Lead		NU	2.58	DU	0.165	ug/L	N/A		(0%-10%)		
Selenium		U	2.94	DU	0.300	ug/L	N/A		(0%-10%)		
Silver		U	0.669	DU	0.050	ug/L	N/A		(0%-10%)		
QC1202931412 TB											
Arsenic				U	0.050	mg/L					08/23/13 11:33
Barium				BC	0.0475	mg/L					

QC Summary

Workorder: 331859 **Client SDG:** XP0008A **Project Description:** RC-233 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1324419										
Cadmium			U	0.010	mg/L				HSC	08/23/13 11:33
Chromium			B	0.0139	mg/L					
Lead			U	0.033	mg/L					
Selenium			U	0.060	mg/L					
Silver			U	0.010	mg/L					
Metals Analysis-Mercury										
Batch 1324301										
QC1202931791 331859001 DUP										
Mercury		U 0.00067	U	0.00067	mg/L	N/A ^			NOR1	08/22/13 13:18
QC1202931790 LCS										
Mercury	0.020			0.0202	mg/L		101	(80%-120%)		08/22/13 13:13
QC1202931789 MB										
Mercury			B	-0.00111	mg/L					08/22/13 13:10
QC1202931411 331859001 MS										
Mercury	0.020	U 0.00067		0.0181	mg/L		90.7	(75%-125%)		08/22/13 13:16
QC1202931793 331859001 SDILT										
Mercury		U -0.098	DU	0.00335	ug/L	N/A		(0%-10%)		08/22/13 13:23
QC1202931412 TB										
Mercury			B	-0.00115	mg/L					08/22/13 13:12

Notes:

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank, and the sample concentration was <= 5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.

QC Summary

Workorder: 331859 **Client SDG:** XP0008A **Project Description:** RC-233 Soil

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

S Reported value determined by the Method of Standard Additions (MSA)

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

W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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