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

COMPLETE COPY OF DATA PACKAGE TO:

Kathy Wendt H4-21 KW 9/25/13
INITIAL/DATE

COMMENTS:

SDG X0010 SAF-RC-232

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

REVISED TO INCLUDE METALS BY ICP-MS & TCLP METALS

Sample Location: 100-D-107 – Confirmatory Sampling Test Trenches

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

August 09, 2013

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

Re: RC-232 Soil
Work Order: 330229
SDG: X0010

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 25, 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-232-037
Enclosures

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Case Narrative

Receipt Narrative
for
WC-HANFORD, INC.
SDG: X0010
Work Order: 330229

August 09, 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 July 25, 2013 for analysis.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
330229001	J1RTT0
330229002	J1RTT1
330229003	J1RTT2
330229004	J1RTT3
330229005	J1RTT4
330229006	J1RTT5

Case Narrative:

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

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

Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation

330229

1 of 2

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-037

Page ~~2 of 4~~ MWB 7-23-13

Collector B. Jackson	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Price Code 8C	**Data Turnaround** 15 Days		
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	**Sampling Location** 100-D-107 - Confirmatory Sampling Test Trenches		**SAF No.** RC-232
Ice Chest No. WCH-11-009	**Field Logbook No.** EL-1667	**COA** C1D107A000	**Method of Shipment** fed EX
Shipped To Eberline - GEL	**Offsite Property No.** A120893		**Bill of Lading/Air Bill No.** See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS
None

Special Handling and/or Storage
Cool 4 C

Preservation	Cool 4C	Cool 4C	Freeze	Cool 4C	Cool 4C	Cool 4C	Cool 4C			
Type of Container	G/P	G/P	aGs*	aG	aG	aG	aG			
No. of Container(s)	1	1	5	1	1	1	1			
Volume	125mL	125mL	40mL	125mL	125mL	125mL	125mL			
SAMPLE ANALYSIS	See item (1) in Special Instructions	Chromium Hex - 7196	VOA - 5035/8260 (TCL)	TPH-Diesel Range - WTPH-D +	Semi-VOA - 8270A (TCL)	PAHs - 8310	PCBs - 8082			
Sample No.	**Matrix**	**Sample Date**	**Sample Time**							
J1RTR6	SOIL	MWB 7-23-13								
J1RTR7	SOIL				MWB 7-23-13					
J1RTR8	SOIL			MWB 7-23-13						
J1RTR9	SOIL									
J1RTT0	SOIL	7-23-13	0925	X	X					

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
W. (Bo) Jackson	7-23-13/1430	MA Bamberger	7-23-13 1430
MA Bamberger	7-23-13 1515	John Harris	7-23-13 1515
John Harris	7-23-13 1650	Fri 3A 1000 Battelle	7-23-13 1650
Fri #3A 1000 Battelle	7-24-13 1014	John Harris	7-24-13 1014
John Harris	7-24-13 1015	Fed Ex	
		Jennifer Pellegrini	7-25-13 0855

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

SPECIAL INSTRUCTIONS

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

REVIEWED BY MWB DATE 7-24-13

WCH-EE-011

Generated Date/Time: 07/18/2013 16:36, PDT

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-037

Collector: B. Jackson	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: 100-D-107 - Confirmatory Sampling Test Trenches		SAF No.: RC-232
Ice Chest No.: WCH-11-009	Field Logbook No.: EL-1667	COA: C1D107A000	Method of Shipment: fed Ex
Shipped To: Eberline - GEL	Offsite Property No.: A120893		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8C

Data Turnaround: 15 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

None

Special Handling and/or Storage

Cool 4 C

Preservation	Cool 4C	Cool 4C	Freeze	Cool 4C	Cool 4C	Cool 4C	Cool 4C			
Type of Container	G/P	G/P	aGs*	aG	aG	aG	aG			
No. of Container(s)	1	1	5	1	1	1	1			
Volume	125mL	125mL	40mL	125mL	125mL	125mL	125mL			
SAMPLE ANALYSIS	See item (1) in Special Instructions	Chromium Hex - 7196	VOA - 5035/8260 (TCL)	TPH-Diesel Range - WTPH-D +	Semi-VOA - 8270A (TCL)	PAHs - 8310	PCBs - 8082			

Sample No.	Matrix	Sample Date	Sample Time									
J1RTT1 ✓	SOIL	7-23-13	1240	X	X							
J1RTT2 ✓	SOIL	7-23-13	1256	X	X							
J1RTT3 ✓	SOIL	7-23-13	1410	X	X							
J1RTT4 ✓	SOIL	7-23-13	1425	X	X							
J1RTT5 ✓	SOIL	7-23-13	1220	X	X		X	X	X	X		

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
WCH W.(B)Jackson	7-23-13/1430	MA Bamberger	7-23-13 1430
MA Bamberger	7-23-13 1515	John Harrie	7-23-13 1515
John Harrie	7-23-13 1650	Fed Ex #3A 1060 Battelle	7-23-13 1650
Fed Ex #3A 1060 Battelle	7-24-13 1014	John Harrie	7-24-13 1014
John Harrie WCH	7-24-13 1015	Fed Ex	
		Jennifer Pellegrini	7-25-13 0845

FINAL SAMPLE DISPOSITION

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

SPECIAL INSTRUCTIONS

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

REVIEWED BY CMB DATE 7-24-13

Generated Date/Time: 07/15/2013 08:19, PDT

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WCHN	**SDG/AR/COC/Work Order:** 330229
Received By: JP	**Date Received:** 7-25-13

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?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 cpm
Classified Radioactive II or III by RSO?		✓	If yes, Were swipes taken of sample contatiners < action levels?
COC/Samples marked containing PCBs?		✓	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		✓	If yes, samples are to be segregeated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		✓	

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	✓			Preservation Method: (Ice bags) Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 5
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: 415027091 Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		✓		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
7	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			
14	Carrier and tracking number.				Circle Applicable: (FedEx Air) FedEx Ground UPS Field Services Courier Other 7963 0580 2629

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials QP Date 7-25-13 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 09 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

Semi-Volatile Analysis

Case Narrative

Semi-Volatile Case Narrative
WC-HANFORD, INC. (WCHN)
SDG X0010

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:	1317730
Prep Batch Number:	1317728

Sample Analysis

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

Sample ID	Client ID
330229006	J1RTT5
1202915867	Method Blank (MB)
1202915868	Laboratory Control Sample (LCS)
1202915869	330229006(J1RTT5) Matrix Spike (MS)
1202915870	330229006(J1RTT5) 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(1202915868) did not meet spike recovery limits for 2,4-Dinitrophenol at 21.3% (SPC limits: 22.0%-83.0%). 2,4-Dinitrophenol accounts for less than 5% of the total number of requested spiking analytes. 2,4-Dinitrophenol is known to be a poor responding analyte that is subject to erratic chromatography as stated in the Method. This may account for the low recovery of the analyte in the LCS (as well as in the zero percent recovery in MS and MSD samples, 1202915869 (J1RTT5) and 1202915870 (J1RTT5)). The data results have been reported.

QC Sample Designation
Sample 330229006 (J1RTT5) was selected for analysis as the matrix spike and matrix spike duplicate.

Matrix Spike (MS) Recovery Statement
The MS, 1202915869 (J1RTT5), recovered 2,4-Dimethylphenol at 26.5% (limits are 30-109%), 2,4-Dinitrophenol at 0% (limits are 19-101%) and 3,3'Dichlorobenzidine at 0% (limits are 28-105%). As MS(1202915869) and MSD(1202915870) displayed similar recoveries, the failures were attributed to sample matrix interference. 2,4-Dinitrophenol is known to be a poor responding analyte that is subject to erratic chromatography as stated in the Method. This may account for the zero percent recovery of the analyte in the MS and MSD (as well as in the low recovery in the LCS). The data results have been reported.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD, 1202915870 (J1RTT5), recovered 2,4-Dimethylphenol at 26.4% (limits are 30-109%), 2,4-Dinitrophenol at 0% (limits are 19-101%) and 3,3'Dichlorobenzidine at 0% (limits are 28-105%). As MS(1202915869) and MSD(1202915870) displayed similar recoveries, the failures were attributed to sample matrix interference. 2,4-Dinitrophenol is known to be a poor responding analyte that is subject to erratic chromatography as stated in the Method. This may account for the zero percent recovery of the analyte in the MS and MSD (as well as in the low recovery in the LCS). The data results have been 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 1206748 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 1202915867 (MB) and 330229006 (J1RTT5) 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
MSD4.I	Agilent 7890A/5975C GC/MS w/ 7683 Autosampler	HP6890/HP5973	DB-5MS	25m x 0.2mm, 0.33um (5% Phenylmethylpolysiloxane)

Certification Statement

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

DATA EXCEPTION REPORT

Mo.Day Yr.	Division:	Quality Criteria:	Type:
31-JUL-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
SEMIVOA GC/MS	SW846 3541/8270D	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1317730	See Below		

Potentially affected work order(s)(SDG): 330215(XP0001),330229(X0010)

Application Issues:

Failed Recovery for MS/PS

Failed Recovery for LCS/LCSD

Failed Recovery for MSD/PSD

Specification and Requirements Exception Description:	DER Disposition:
1. LCS(1202915868) did not meet spike recovery limits for 2,4-Dinitrophenol at 21.3% (SPC limits: 22.0%-83.0%).	1. 2,4-Dinitrophenol accounts for less than 5% of the total number of requested spiking analytes. 2,4-Dinitrophenol is known to be a poor responding analyte that is subject to erratic chromatography as stated in the Method. This may account for the low recovery of the analyte in the LCS (as well as in the zero percent recovery in the MS(1202915869) and MSD(1202915870)). The data results have been reported.
2. MS(1202915869) recovered 2,4-Dimethylphenol at 26.5% (limits are 30-109%), 2,4-Dinitrophenol at 0% (limits are 19-101%) and 3,3'Dichlorobenzidine at 0% (limits are 28-105%). 3. MSD(1202915870) recovered 2,4-Dimethylphenol at 26.4% (limits are 30-109%), 2,4-Dinitrophenol at 0% (limits are 19-101%) and 3,3'Dichlorobenzidine at 0% (limits are 28-105%).	2., 3. As MS(1202915869) and MSD(1202915870) displayed similar recoveries, the failures were attributed to sample matrix interference. 2,4-Dinitrophenol is known to be a poor responding analyte that is subject to erratic chromatography as stated in the Method. This may account for the zero percent recovery of the analyte in the MS and MSD (as well as in the low recovery in the LCS). The data results have been reported.

Originator's Name:

Josh Brooks 31-JUL-13

Data Validator/Group Leader:

Barbara Bailey 06-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: X0010 GEL Work Order: 330229 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

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

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

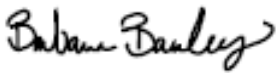
U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

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: 06 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-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RTT5
Sample ID: 330229006
Matrix: SOIL
Collect Date: 23-JUL-13 12:20
Receive Date: 25-JUL-13
Collector: Client
Moisture: 6.47%

Project: WCHN00213
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	107	107	356	UG/KG	1	JMB3 07/27/13	1651	1317730	1
1,2-Dichlorobenzene	U	107	107	356	UG/KG	1				
1,3-Dichlorobenzene	U	107	107	356	UG/KG	1				
1,4-Dichlorobenzene	U	107	107	356	UG/KG	1				
2,4,5-Trichlorophenol	U	107	107	356	UG/KG	1				
2,4,6-Trichlorophenol	U	107	107	356	UG/KG	1				
2,4-Dichlorophenol	U	107	107	356	UG/KG	1				
2,4-Dimethylphenol	TU	107	107	356	UG/KG	1				
2,4-Dinitrophenol	TU	107	107	713	UG/KG	1				
2,4-Dinitrotoluene	U	107	107	356	UG/KG	1				
2,6-Dinitrotoluene	U	107	107	356	UG/KG	1				
2-Chloronaphthalene	U	10.7	10.7	35.6	UG/KG	1				
2-Chlorophenol	U	107	107	356	UG/KG	1				
2-Methyl-4,6-dinitrophenol	U	107	107	356	UG/KG	1				
2-Methylnaphthalene	J	31.0	10.7	35.6	UG/KG	1				
2-Nitrophenol	U	107	107	356	UG/KG	1				
3,3'-Dichlorobenzidine	TU	107	107	356	UG/KG	1				
4-Bromophenylphenylether	U	107	107	356	UG/KG	1				
4-Chloro-3-methylphenol	U	143	143	356	UG/KG	1				
4-Chloroaniline	U	107	107	356	UG/KG	1				
4-Chlorophenylphenylether	U	107	107	356	UG/KG	1				
4-Nitrophenol	U	107	107	356	UG/KG	1				
Acenaphthene	U	10.7	10.7	35.6	UG/KG	1				
Acenaphthylene	U	10.7	10.7	35.6	UG/KG	1				
Anthracene	U	10.7	10.7	35.6	UG/KG	1				
Benzo(a)anthracene	U	10.7	10.7	35.6	UG/KG	1				
Benzo(a)pyrene	U	10.7	10.7	35.6	UG/KG	1				
Benzo(b)fluoranthene	U	10.7	10.7	35.6	UG/KG	1				
Benzo(ghi)perylene	U	10.7	10.7	35.6	UG/KG	1				
Benzo(k)fluoranthene	U	10.7	10.7	35.6	UG/KG	1				
Butylbenzylphthalate	U	107	107	356	UG/KG	1				
Carbazole	U	10.7	10.7	35.6	UG/KG	1				
Chrysene	U	10.7	10.7	35.6	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-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RTT5
Sample ID: 330229006

Project: WCHN00213
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	107	107	356	UG/KG	1				
Di-n-octylphthalate	U	107	107	356	UG/KG	1				
Dibenzo(a,h)anthracene	U	10.7	10.7	35.6	UG/KG	1				
Dibenzofuran	U	107	107	356	UG/KG	1				
Diethylphthalate	U	107	107	356	UG/KG	1				
Dimethylphthalate	U	107	107	356	UG/KG	1				
Diphenylamine	U	107	107	356	UG/KG	1				
Fluoranthene	J	16.4	10.7	35.6	UG/KG	1				
Fluorene	U	10.7	10.7	35.6	UG/KG	1				
Hexachlorobenzene	U	107	107	356	UG/KG	1				
Hexachlorobutadiene	U	107	107	356	UG/KG	1				
Hexachlorocyclopentadiene	U	107	107	356	UG/KG	1				
Hexachloroethane	U	107	107	356	UG/KG	1				
Indeno(1,2,3-cd)pyrene	U	10.7	10.7	35.6	UG/KG	1				
Isophorone	U	107	107	356	UG/KG	1				
N-Nitrosodipropylamine	U	107	107	356	UG/KG	1				
Naphthalene	J	24.2	10.7	35.6	UG/KG	1				
Nitrobenzene	U	107	107	356	UG/KG	1				
Pentachlorophenol	U	107	107	356	UG/KG	1				
Phenanthrene	J	21.7	10.7	35.6	UG/KG	1				
Phenol	U	107	107	356	UG/KG	1				
Pyrene	J	11.4	10.7	35.6	UG/KG	1				
bis(2-Chloroethoxy)methane	U	107	107	356	UG/KG	1				
bis(2-Chloroethyl) ether	U	107	107	356	UG/KG	1				
bis(2-Chloroisopropyl)ether	U	107	107	356	UG/KG	1				
bis(2-Ethylhexyl)phthalate	U	107	107	356	UG/KG	1				
3- and/or 4-Methylphenol	U	107	107	356	UG/KG	1				
m-Nitroaniline	U	107	107	356	UG/KG	1				
o-Cresol	U	107	107	356	UG/KG	1				
o-Nitroaniline	U	118	118	356	UG/KG	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*07/27/13 16 51*
p-Terphenyl-d14	1220 UG/KG	1780	68.4	(31%-124%)		
2-Fluorophenol	1600 UG/KG	3560	44.8	(23%-107%)		
Phenol-d5	1690 UG/KG	3560	47.5	(25%-108%)		
2,4,6-Tribromophenol	2470 UG/KG	3560	69.3	(20%-122%)		
Nitrobenzene-d5	865 UG/KG	1780	48.5	(21%-103%)		
2-Fluorobiphenyl	921 UG/KG	1780	51.7	(25%-100%)		

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Certificate of Analysis

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

Report Date: August 1, 2013

Client Sample ID: J1RTT5
Sample ID: 330229006

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	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:*	*07/27/13 16 51*
Toluene	000108-88-3	2.798	288 UG/KG	94	NJ		
Unknown Aldol Condensate		3.541	2050 UG/KG		AJ		
Naphthalene, 1,6-dimethyl-4-(1-met	000483-78-3	10.917	288 UG/KG	98	NJ		
2-Pentadecanone, 6,10,14-trimethyl	000502-69-2	11.73	150 UG/KG	99	NJ		
Nonadecane	000629-92-5	12.03	229 UG/KG	98	NJ		
n-Hexadecanoic acid	000057-10-3	12.324	269 UG/KG	99	NJ		
unknown		12.58	249 UG/KG	0	J		
unknown		12.794	260 UG/KG	0	J		
Heneicosane	000629-94-7	13.03	261 UG/KG	98	NJ		
Tricosane	000638-67-5	13.955	286 UG/KG	94	NJ		
Heptadecane	000629-78-7	15.014	753 UG/KG	97	NJ		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	MXS4	07/26/13	1745	1317728

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

Quality Control Summary

QC Summary

Report Date: August 6, 2013

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

Contact: **Joan Kessner**

Workorder: **330229** **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
QC1202915868 LCS											
1,2,4-Trichlorobenzene	1660			1070	UG/KG		64.6	(37%-98%)	JMB3	07/27/13	11:53
1,2-Dichlorobenzene	1660			1090	UG/KG		65.5	(39%-93%)			
1,3-Dichlorobenzene	1660			1050	UG/KG		63.2	(39%-110%)			
1,4-Dichlorobenzene	1660			1080	UG/KG		64.7	(40%-110%)			
2,4,5-Trichlorophenol	1660			1210	UG/KG		73	(41%-103%)			
2,4,6-Trichlorophenol	1660			925	UG/KG		55.6	(36%-98%)			
2,4-Dichlorophenol	1660			1090	UG/KG		65.2	(35%-110%)			
2,4-Dimethylphenol	1660			1070	UG/KG		64.2	(35%-102%)			
2,4-Dinitrophenol	1660		J	354	UG/KG		21.3*	(22%-83%)			
2,4-Dinitrotoluene	1660			1440	UG/KG		86.7	(43%-109%)			
2,6-Dinitrotoluene	1660			1310	UG/KG		79	(41%-103%)			
2-Chloronaphthalene	1660			1090	UG/KG		65.6	(39%-101%)			
2-Chlorophenol	1660			1090	UG/KG		65.3	(38%-100%)			
2-Methyl-4,6-dinitrophenol	1660			940	UG/KG		56.5	(33%-103%)			
2-Methylnaphthalene	1660			1130	UG/KG		68.1	(36%-107%)			
2-Nitrophenol	1660			1050	UG/KG		63.3	(35%-106%)			
3,3'-Dichlorobenzidine	1660			1130	UG/KG		67.8	(32%-111%)			
3- and/or 4-Methylphenol	1660			1220	UG/KG		73.3	(39%-115%)			
4-Bromophenylphenylether	1660			1260	UG/KG		76	(42%-110%)			
4-Chloro-3-methylphenol	1660			1100	UG/KG		65.8	(35%-104%)			

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
4-Chloroaniline	1660			891	UG/KG		53.5	(32%-106%)	JMB3	07/27/13	11:53
4-Chlorophenylphenylether	1660			1170	UG/KG		70.6	(41%-104%)			
4-Nitrophenol	1660			929	UG/KG		55.8	(23%-114%)			
Acenaphthene	1660			1080	UG/KG		65.2	(36%-105%)			
Acenaphthylene	1660			1110	UG/KG		66.8	(38%-103%)			
Anthracene	1660			1200	UG/KG		72.2	(43%-104%)			
Benzo(a)anthracene	1660			1270	UG/KG		76.3	(46%-108%)			
Benzo(a)pyrene	1660			1270	UG/KG		76.6	(45%-109%)			
Benzo(b)fluoranthene	1660			1140	UG/KG		68.7	(42%-111%)			
Benzo(ghi)perylene	1660			1660	UG/KG		99.6	(43%-115%)			
Benzo(k)fluoranthene	1660			1150	UG/KG		69.3	(43%-103%)			
Butylbenzylphthalate	1660			1200	UG/KG		72	(37%-107%)			
Carbazole	1660			1650	UG/KG		99.1	(53%-118%)			
Chrysene	1660			1230	UG/KG		74.1	(47%-107%)			
Di-n-butylphthalate	1660			1370	UG/KG		82.5	(46%-112%)			
Di-n-octylphthalate	1660			1400	UG/KG		84.1	(41%-110%)			
Dibenzo(a,h)anthracene	1660			1750	UG/KG		105	(39%-128%)			
Dibenzofuran	1660			1220	UG/KG		73.6	(38%-104%)			
Diethylphthalate	1660			1220	UG/KG		73.6	(42%-109%)			
Dimethylphthalate	1660			1150	UG/KG		68.9	(41%-105%)			
Diphenylamine	1660			1230	UG/KG		74	(40%-101%)			

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
Fluoranthene	1660			1410	UG/KG		84.8	(44%-106%)			
Fluorene	1660			1120	UG/KG		67.4	(39%-102%)	JMB3	07/27/13	11:53
Hexachlorobenzene	1660			1280	UG/KG		76.8	(41%-108%)			
Hexachlorobutadiene	1660			1140	UG/KG		68.4	(32%-104%)			
Hexachlorocyclopentadiene	1660			805	UG/KG		48.4	(24%-84%)			
Hexachloroethane	1660			1020	UG/KG		61.5	(34%-98%)			
Indeno(1,2,3-cd)pyrene	1660			1700	UG/KG		102	(45%-115%)			
Isophorone	1660			1310	UG/KG		78.6	(36%-98%)			
N-Nitrosodipropylamine	1660			1220	UG/KG		73.5	(34%-106%)			
Naphthalene	1660			1110	UG/KG		66.8	(38%-106%)			
Nitrobenzene	1660			1180	UG/KG		70.9	(35%-99%)			
Pentachlorophenol	1660			1090	UG/KG		65.5	(31%-93%)			
Phenanthrene	1660			1200	UG/KG		72	(43%-105%)			
Phenol	1660			1080	UG/KG		65.1	(38%-98%)			
Pyrene	1660			1120	UG/KG		67.1	(33%-99%)			
bis(2-Chloroethoxy)methane	1660			1110	UG/KG		66.6	(37%-98%)			
bis(2-Chloroethyl) ether	1660			1140	UG/KG		68.3	(35%-96%)			
bis(2-Chloroisopropyl)ether	1660			1110	UG/KG		66.7	(27%-109%)			
bis(2-Ethylhexyl)phthalate	1660			1180	UG/KG		70.9	(41%-104%)			
m-Nitroaniline	1660			1050	UG/KG		62.9	(32%-113%)			
o-Cresol	1660			1080	UG/KG		64.7	(37%-97%)			
o-Nitroaniline	1660			1110	UG/KG		66.5	(34%-116%)			

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
**2,4,6-Tribromophenol	3330			2730	UG/KG		81.9	(20%-122%)			
**2-Fluorobiphenyl	1660			1040	UG/KG		62.4	(25%-100%)	JMB3	07/27/13	11:53
**2-Fluorophenol	3330			2220	UG/KG		66.8	(23%-107%)			
**Nitrobenzene-d5	1660			1050	UG/KG		63	(21%-103%)			
**Phenol-d5	3330			2300	UG/KG		69.1	(25%-108%)			
**p-Terphenyl-d14	1660			1200	UG/KG		72	(31%-124%)			
QC1202915867 MB											
1,2,4-Trichlorobenzene			U	99.9	UG/KG					07/27/13	11:24
1,2-Dichlorobenzene			U	99.9	UG/KG						
1,3-Dichlorobenzene			U	99.9	UG/KG						
1,4-Dichlorobenzene			U	99.9	UG/KG						
2,4,5-Trichlorophenol			U	99.9	UG/KG						
2,4,6-Trichlorophenol			U	99.9	UG/KG						
2,4-Dichlorophenol			U	99.9	UG/KG						
2,4-Dimethylphenol			U	99.9	UG/KG						
2,4-Dinitrophenol			U	99.9	UG/KG						
2,4-Dinitrotoluene			U	99.9	UG/KG						
2,6-Dinitrotoluene			U	99.9	UG/KG						
2-Chloronaphthalene			U	9.99	UG/KG						
2-Chlorophenol			U	99.9	UG/KG						
2-Methyl-4,6-dinitrophenol			U	99.9	UG/KG						
2-Methylnaphthalene			U	9.99	UG/KG						
2-Nitrophenol			U	99.9	UG/KG						

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
3,3'-Dichlorobenzidine			U	99.9	UG/KG				JMB3	07/27/13	11:24
3- and/or 4-Methylphenol			U	99.9	UG/KG						
4-Bromophenylphenylether			U	99.9	UG/KG						
4-Chloro-3-methylphenol			U	133	UG/KG						
4-Chloroaniline			U	99.9	UG/KG						
4-Chlorophenylphenylether			U	99.9	UG/KG						
4-Nitrophenol			U	99.9	UG/KG						
Acenaphthene			U	9.99	UG/KG						
Acenaphthylene			U	9.99	UG/KG						
Anthracene			U	9.99	UG/KG						
Benzo(a)anthracene			U	9.99	UG/KG						
Benzo(a)pyrene			U	9.99	UG/KG						
Benzo(b)fluoranthene			U	9.99	UG/KG						
Benzo(ghi)perylene			U	9.99	UG/KG						
Benzo(k)fluoranthene			U	9.99	UG/KG						
Butylbenzylphthalate			U	99.9	UG/KG						
Carbazole			U	9.99	UG/KG						
Chrysene			U	9.99	UG/KG						
Di-n-butylphthalate			U	99.9	UG/KG						
Di-n-octylphthalate			U	99.9	UG/KG						
Dibenzo(a,h)anthracene			U	9.99	UG/KG						

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
Dibenzofuran			U	99.9	UG/KG						
Diethylphthalate			U	99.9	UG/KG				JMB3	07/27/13	11:24
Dimethylphthalate			U	99.9	UG/KG						
Diphenylamine			U	99.9	UG/KG						
Fluoranthene			U	9.99	UG/KG						
Fluorene			U	9.99	UG/KG						
Hexachlorobenzene			U	99.9	UG/KG						
Hexachlorobutadiene			U	99.9	UG/KG						
Hexachlorocyclopentadiene			U	99.9	UG/KG						
Hexachloroethane			U	99.9	UG/KG						
Indeno(1,2,3-cd)pyrene			U	9.99	UG/KG						
Isophorone			U	99.9	UG/KG						
N-Nitrosodipropylamine			U	99.9	UG/KG						
Naphthalene			U	9.99	UG/KG						
Nitrobenzene			U	99.9	UG/KG						
Pentachlorophenol			U	99.9	UG/KG						
Phenanthrene			U	9.99	UG/KG						
Phenol			U	99.9	UG/KG						
Pyrene			U	9.99	UG/KG						
bis(2-Chloroethoxy)methane			U	99.9	UG/KG						
bis(2-Chloroethyl) ether			U	99.9	UG/KG						
bis(2-Chloroisopropyl)ether			U	99.9	UG/KG						

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1317730										
bis(2-Ethylhexyl)phthalate			U	99.9	UG/KG					
m-Nitroaniline			U	99.9	UG/KG				JMB3	07/27/13 11:24
o-Cresol			U	99.9	UG/KG					
o-Nitroaniline			U	110	UG/KG					
**2,4,6-Tribromophenol	3330			2430	UG/KG		72.9	(20%-122%)		
**2-Fluorobiphenyl	1670			1160	UG/KG		69.9	(25%-100%)		
**2-Fluorophenol	3330			2460	UG/KG		73.8	(23%-107%)		
**Nitrobenzene-d5	1670			1200	UG/KG		72.2	(21%-103%)		
**Phenol-d5	3330			2480	UG/KG		74.5	(25%-108%)		
**p-Terphenyl-d14	1670			1170	UG/KG		70	(31%-124%)		
QC1202915869 330229006 MS										
1,2,4-Trichlorobenzene	1780	U	107	1130	UG/KG		63.5	(25%-102%)		07/27/13 17:21
1,2-Dichlorobenzene	1780	U	107	1110	UG/KG		62.5	(25%-99%)		
1,3-Dichlorobenzene	1780	U	107	1080	UG/KG		60.6	(24%-96%)		
1,4-Dichlorobenzene	1780	U	107	1100	UG/KG		62.1	(24%-97%)		
2,4,5-Trichlorophenol	1780	U	107	1290	UG/KG		72.3	(38%-109%)		
2,4,6-Trichlorophenol	1780	U	107	1000	UG/KG		56.3	(32%-103%)		
2,4-Dichlorophenol	1780	U	107	1090	UG/KG		61.3	(31%-103%)		
2,4-Dimethylphenol	1780	TU	107	T 471	UG/KG		26.5 *	(30%-109%)		
2,4-Dinitrophenol	1780	TU	107	TU 107	UG/KG		0 *	(19%-101%)		
2,4-Dinitrotoluene	1780	U	107	1570	UG/KG		88.3	(36%-115%)		
2,6-Dinitrotoluene	1780	U	107	1490	UG/KG		83.8	(36%-107%)		
2-Chloronaphthalene	1780	U	10.7	1180	UG/KG		66	(27%-109%)		

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS												
Batch 1317730												
2-Chlorophenol	1780	U	107		1000	UG/KG		56.3	(28%-108%)	JMB3	07/27/13	17:21
2-Methyl-4,6-dinitrophenol	1780	U	107		378	UG/KG		21.3	(14%-116%)			
2-Methylnaphthalene	1780	J	31.0		1270	UG/KG		69.7	(23%-107%)			
2-Nitrophenol	1780	U	107		1090	UG/KG		61.5	(24%-106%)			
3,3'-Dichlorobenzidine	1780	TU	107	TU	107	UG/KG		0*	(28%-105%)			
3- and/or 4-Methylphenol	1780	U	107		843	UG/KG		47.4	(32%-123%)			
4-Bromophenylphenylether	1780	U	107		1440	UG/KG		81	(37%-112%)			
4-Chloro-3-methylphenol	1780	U	143		1210	UG/KG		67.8	(32%-112%)			
4-Chloroaniline	1780	U	107		840	UG/KG		47.2	(27%-100%)			
4-Chlorophenylphenylether	1780	U	107		1350	UG/KG		76	(37%-110%)			
4-Nitrophenol	1780	U	107		1170	UG/KG		65.6	(12%-128%)			
Acenaphthene	1780	U	10.7		1190	UG/KG		67.1	(28%-102%)			
Acenaphthylene	1780	U	10.7		1240	UG/KG		69.6	(32%-103%)			
Anthracene	1780	U	10.7		1320	UG/KG		74.1	(36%-104%)			
Benzo(a)anthracene	1780	U	10.7		1290	UG/KG		72.4	(27%-120%)			
Benzo(a)pyrene	1780	U	10.7		1180	UG/KG		66.5	(31%-116%)			
Benzo(b)fluoranthene	1780	U	10.7		1250	UG/KG		70.4	(30%-119%)			
Benzo(ghi)perylene	1780	U	10.7		809	UG/KG		45.4	(30%-109%)			
Benzo(k)fluoranthene	1780	U	10.7		1210	UG/KG		67.8	(31%-125%)			
Butylbenzylphthalate	1780	U	107		1430	UG/KG		80.2	(33%-121%)			
Carbazole	1780	U	10.7		1700	UG/KG		95.5	(40%-133%)			

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS												
Batch 1317730												
Chrysene	1780	U	10.7		1210	UG/KG		68.2	(33%-114%)			
Di-n-butylphthalate	1780	U	107		1500	UG/KG		84.1	(42%-119%)	JMB3	07/27/13	17:21
Di-n-octylphthalate	1780	U	107		1590	UG/KG		89.3	(36%-115%)			
Dibenzo(a,h)anthracene	1780	U	10.7		1050	UG/KG		58.8	(26%-128%)			
Dibenzofuran	1780	U	107		1400	UG/KG		78.6	(28%-117%)			
Diethylphthalate	1780	U	107		1360	UG/KG		76.5	(40%-113%)			
Dimethylphthalate	1780	U	107		1270	UG/KG		71.1	(38%-110%)			
Diphenylamine	1780	U	107		1100	UG/KG		61.7	(34%-111%)			
Fluoranthene	1780	J	16.4		1420	UG/KG		78.8	(32%-115%)			
Fluorene	1780	U	10.7		1280	UG/KG		71.7	(30%-115%)			
Hexachlorobenzene	1780	U	107		1400	UG/KG		78.8	(34%-111%)			
Hexachlorobutadiene	1780	U	107		1180	UG/KG		66.2	(24%-105%)			
Hexachlorocyclopentadiene	1780	U	107		554	UG/KG		31.1	(12%-106%)			
Hexachloroethane	1780	U	107		1020	UG/KG		57.4	(24%-102%)			
Indeno(1,2,3-cd)pyrene	1780	U	10.7		938	UG/KG		52.7	(29%-117%)			
Isophorone	1780	U	107		1390	UG/KG		78.2	(24%-108%)			
N-Nitrosodipropylamine	1780	U	107		1320	UG/KG		73.9	(23%-117%)			
Naphthalene	1780	J	24.2		1190	UG/KG		65.6	(21%-107%)			
Nitrobenzene	1780	U	107		1230	UG/KG		68.8	(25%-104%)			
Pentachlorophenol	1780	U	107		928	UG/KG		52.1	(22%-108%)			
Phenanthrene	1780	J	21.7		1340	UG/KG		74	(28%-119%)			
Phenol	1780	U	107		1020	UG/KG		57.4	(28%-108%)			

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1317730											
Pyrene	1780	J	11.4		1280	UG/KG		71.3	(25%-119%)		
bis(2-Chloroethoxy)methane	1780	U	107		1180	UG/KG		66.2	(27%-104%)	JMB3	07/27/13 17:21
bis(2-Chloroethyl) ether	1780	U	107		1180	UG/KG		66.1	(25%-102%)		
bis(2-Chloroisopropyl)ether	1780	U	107		1160	UG/KG		65.4	(25%-105%)		
bis(2-Ethylhexyl)phthalate	1780	U	107		1410	UG/KG		78.9	(33%-124%)		
m-Nitroaniline	1780	U	107		1030	UG/KG		57.8	(31%-110%)		
o-Cresol	1780	U	107		710	UG/KG		39.9	(27%-105%)		
o-Nitroaniline	1780	U	118		1220	UG/KG		68.8	(37%-114%)		
**2,4,6-Tribromophenol	3560		2470		2350	UG/KG		66	(20%-122%)		
**2-Fluorobiphenyl	1780		921		1100	UG/KG		61.6	(25%-100%)		
**2-Fluorophenol	3560		1600		1720	UG/KG		48.3	(23%-107%)		
**Nitrobenzene-d5	1780		865		1050	UG/KG		58.9	(21%-103%)		
**Phenol-d5	3560		1690		2060	UG/KG		57.9	(25%-108%)		
**p-Terphenyl-d14	1780		1220		1390	UG/KG		78.2	(31%-124%)		
QC1202915870 330229006 MSD											
1,2,4-Trichlorobenzene	1780	U	107		1180	UG/KG	4.02	66	(0%-30%)		07/27/13 17:50
1,2-Dichlorobenzene	1780	U	107		1130	UG/KG	1.72	63.5	(0%-30%)		
1,3-Dichlorobenzene	1780	U	107		1090	UG/KG	1.18	61.3	(0%-30%)		
1,4-Dichlorobenzene	1780	U	107		1110	UG/KG	0.902	62.6	(0%-30%)		
2,4,5-Trichlorophenol	1780	U	107		1320	UG/KG	2.83	74.3	(0%-30%)		
2,4,6-Trichlorophenol	1780	U	107		1010	UG/KG	1.05	56.9	(0%-30%)		
2,4-Dichlorophenol	1780	U	107		1120	UG/KG	2.87	63.1	(0%-30%)		
2,4-Dimethylphenol	1780	TU	107	T	470	UG/KG	0.127	26.4*	(0%-30%)		

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS												
Batch 1317730												
2,4-Dinitrophenol	1780	TU	107	TU	107	UG/KG	N/A	0 *	(0%-30%)	JMB3	07/27/13	17:50
2,4-Dinitrotoluene	1780	U	107		1640	UG/KG	4.12	92	(0%-30%)			
2,6-Dinitrotoluene	1780	U	107		1550	UG/KG	3.57	86.8	(0%-30%)			
2-Chloronaphthalene	1780	U	10.7		1220	UG/KG	4.08	68.7	(0%-30%)			
2-Chlorophenol	1780	U	107		990	UG/KG	1.19	55.5	(0%-30%)			
2-Methyl-4,6-dinitrophenol	1780	U	107		364	UG/KG	3.93	20.4	(0%-30%)			
2-Methylnaphthalene	1780	J	31.0		1340	UG/KG	4.88	73.2	(0%-30%)			
2-Nitrophenol	1780	U	107		1140	UG/KG	3.71	63.8	(0%-30%)			
3,3'-Dichlorobenzidine	1780	TU	107	TU	107	UG/KG	N/A	0 *	(0%-30%)			
3- and/or 4-Methylphenol	1780	U	107		799	UG/KG	5.37	44.8	(0%-30%)			
4-Bromophenylphenylether	1780	U	107		1540	UG/KG	6.32	86.2	(0%-30%)			
4-Chloro-3-methylphenol	1780	U	143		1250	UG/KG	3.69	70.3	(0%-30%)			
4-Chloroaniline	1780	U	107		857	UG/KG	1.95	48.1	(0%-30%)			
4-Chlorophenylphenylether	1780	U	107		1430	UG/KG	5.28	80.1	(0%-30%)			
4-Nitrophenol	1780	U	107		1080	UG/KG	7.96	60.5	(0%-30%)			
Acenaphthene	1780	U	10.7		1260	UG/KG	5.27	70.6	(0%-30%)			
Acenaphthylene	1780	U	10.7		1290	UG/KG	4.32	72.6	(0%-30%)			
Anthracene	1780	U	10.7		1340	UG/KG	1.60	75.2	(0%-30%)			
Benzo(a)anthracene	1780	U	10.7		1280	UG/KG	1.01	71.6	(0%-30%)			
Benzo(a)pyrene	1780	U	10.7		1140	UG/KG	3.64	64.1	(0%-30%)			
Benzo(b)fluoranthene	1780	U	10.7		1280	UG/KG	1.82	71.6	(0%-30%)			

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS												
Batch 1317730												
Benzo(ghi)perylene	1780	U	10.7		696	UG/KG	15.0	39	(0%-30%)			
Benzo(k)fluoranthene	1780	U	10.7		1220	UG/KG	1.33	68.6	(0%-30%)	JMB3	07/27/13	17:50
Butylbenzylphthalate	1780	U	107		1370	UG/KG	4.00	77	(0%-30%)			
Carbazole	1780	U	10.7		1670	UG/KG	1.99	93.5	(0%-30%)			
Chrysene	1780	U	10.7		1200	UG/KG	1.50	67.2	(0%-30%)			
Di-n-butylphthalate	1780	U	107		1500	UG/KG	0.337	84.3	(0%-30%)			
Di-n-octylphthalate	1780	U	107		1610	UG/KG	1.26	90.3	(0%-30%)			
Dibenzo(a,h)anthracene	1780	U	10.7		926	UG/KG	12.3	52	(0%-30%)			
Dibenzofuran	1780	U	107		1460	UG/KG	3.97	81.7	(0%-30%)			
Diethylphthalate	1780	U	107		1410	UG/KG	3.24	79	(0%-30%)			
Dimethylphthalate	1780	U	107		1330	UG/KG	4.90	74.6	(0%-30%)			
Diphenylamine	1780	U	107		1090	UG/KG	1.07	61	(0%-30%)			
Fluoranthene	1780	J	16.4		1430	UG/KG	0.600	79.2	(0%-30%)			
Fluorene	1780	U	10.7		1340	UG/KG	4.65	75.1	(0%-30%)			
Hexachlorobenzene	1780	U	107		1480	UG/KG	5.39	83.1	(0%-30%)			
Hexachlorobutadiene	1780	U	107		1220	UG/KG	3.78	68.6	(0%-30%)			
Hexachlorocyclopentadiene	1780	U	107		629	UG/KG	12.7	35.3	(0%-30%)			
Hexachloroethane	1780	U	107		1040	UG/KG	1.79	58.4	(0%-30%)			
Indeno(1,2,3-cd)pyrene	1780	U	10.7		827	UG/KG	12.6	46.4	(0%-30%)			
Isophorone	1780	U	107		1450	UG/KG	3.94	81.2	(0%-30%)			
N-Nitrosodipropylamine	1780	U	107		1320	UG/KG	0.694	74.3	(0%-30%)			
Naphthalene	1780	J	24.2		1240	UG/KG	4.22	68.4	(0%-30%)			

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS												
Batch 1317730												
Nitrobenzene	1780	U	107		1260	UG/KG	2.48	70.5	(0%-30%)			
Pentachlorophenol	1780	U	107		886	UG/KG	4.58	49.7	(0%-30%)	JMB3	07/27/13	17:50
Phenanthrene	1780	J	21.7		1380	UG/KG	2.72	76	(0%-30%)			
Phenol	1780	U	107		1010	UG/KG	1.23	56.7	(0%-30%)			
Pyrene	1780	J	11.4		1190	UG/KG	6.92	66.4	(0%-30%)			
bis(2-Chloroethoxy)methane	1780	U	107		1220	UG/KG	3.34	68.4	(0%-30%)			
bis(2-Chloroethyl) ether	1780	U	107		1200	UG/KG	1.90	67.3	(0%-30%)			
bis(2-Chloroisopropyl)ether	1780	U	107		1180	UG/KG	0.983	66	(0%-30%)			
bis(2-Ethylhexyl)phthalate	1780	U	107		1380	UG/KG	1.46	77.7	(0%-30%)			
m-Nitroaniline	1780	U	107		1030	UG/KG	0.351	57.6	(0%-30%)			
o-Cresol	1780	U	107		649	UG/KG	8.97	36.4	(0%-30%)			
o-Nitroaniline	1780	U	118		1260	UG/KG	2.74	70.6	(0%-30%)			
**2,4,6-Tribromophenol	3560		2470		2630	UG/KG		73.7	(20%-122%)			
**2-Fluorobiphenyl	1780		921		1120	UG/KG		62.7	(25%-100%)			
**2-Fluorophenol	3560		1600		1850	UG/KG		52	(23%-107%)			
**Nitrobenzene-d5	1780		865		1080	UG/KG		60.6	(21%-103%)			
**Phenol-d5	3560		1690		2150	UG/KG		60.4	(25%-108%)			
**p-Terphenyl-d14	1780		1220		1310	UG/KG		73.5	(31%-124%)			

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: 330229 **Client SDG:** X0010 **Project Description:** RC-232 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

Automated Soxhlet Extraction

Batch ID: 1317728 **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)
1202915867 MB	26-JUL-2013 17:45:00	30.03	1	0.0333
1202915868 LCS	26-JUL-2013 17:45:00	30.06	1	0.03327
330215002	26-JUL-2013 17:45:00	30.07	1	0.03326
1202915871 MS (330215002)	26-JUL-2013 17:45:00	30.04	1	0.03329
1202915872 MSD (330215002)	26-JUL-2013 17:45:00	30.01	1	0.03332
330215003	26-JUL-2013 17:45:00	30.12	1	0.0332
330215004	26-JUL-2013 17:45:00	30.12	1	0.0332
330215005	26-JUL-2013 17:45:00	30.1	1	0.03322
330215006	26-JUL-2013 17:45:00	30.08	1	0.03324
330229006	26-JUL-2013 17:45:00	30.01	1	0.03332
1202915869 MS (330229006)	26-JUL-2013 17:45:00	30.03	1	0.0333
1202915870 MSD (330229006)	26-JUL-2013 17:45:00	30	1	0.03333

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202915868	BENZIDINE LCS	UE130522-12	1	mL
LCS	1202915868	BNA LCS w/o Benzidine 50ppm	UE130716-25	1	mL
MS	1202915869	BENZIDINE LCS	UE130522-12	1	mL
MS	1202915869	BNA LCS w/o Benzidine 50ppm	UE130716-25	1	mL
MS	1202915871	BENZIDINE LCS	UE130522-12	1	mL
MS	1202915871	BNA LCS w/o Benzidine 50ppm	UE130716-25	1	mL
MSD	1202915870	BENZIDINE LCS	UE130522-12	1	mL
MSD	1202915870	BNA LCS w/o Benzidine 50ppm	UE130716-25	1	mL
MSD	1202915872	BENZIDINE LCS	UE130522-12	1	mL
MSD	1202915872	BNA LCS w/o Benzidine 50ppm	UE130716-25	1	mL
SURR	All	BNA for all Surrogate	UE130321-16	1	mL
REGNT	All	Acetone	1925393-B1	60	mL
REGNT	All	Methylene Chloride	1935652-D	60	mL
SOURC	All	SODIUM SULFATE	1897902	30	g

Comments:

Final Solvent: CH2Cl2
Verified By: AV

HPLC Polynuclear Aromatic Hydrocarbon Analysis

HPLC-PAH
WC-HANFORD, INC. (WCHN)
SDG X0010

Method/Analysis Information

Procedure:	**Polynuclear Aromatic Hydrocarbons**
Analytical Method:	SW846 8310
Prep Method:	SW846 3550B
Analytical Batch Number:	1318151
Prep Batch Number:	1318150

Sample Analysis

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

Sample ID	Client ID
330229006	J1RTT5
1202916848	Method Blank (MB)
1202916849	Laboratory Control Sample (LCS)
1202917772	330229006(J1RTT5) Matrix Spike (MS)
1202917773	330229006(J1RTT5) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

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

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

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

Calibration Information

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

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

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

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

Quality Control (QC) Information

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

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

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

Laboratory Control Sample Duplicate (LCSD) Recovery
An LCSD was not extracted.

LCS/LCSD Relative Percent Difference (RPD) Statement
An LCSD was not extracted.

QC Sample Designation
Sample 330229006 (J1RTT5) was chosen for matrix spike and matrix spike duplicate analysis.

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

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

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

Technical Information:

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

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

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

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information:

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

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

Manual Integrations
Some initial calibration standards, continuing calibration standards, and/or samples required manual integrations due to software limitations.

Please see the raw data in the Miscellaneous Section.

Additional Comments
One or more analytes were detected on both columns or detectors that indicated an acceptable peak within the retention time window and acceptable concentration match in sample 330229006 (J1RTT5). Although method criteria have been satisfied for reporting a positive result for these analytes, the result is considered a false positive due to matrix interference and/or comparison to the DAD generated spectrum and is indicated as such on the appropriate Form I/Certificate of Analysis (C of A) with an 'X' qualifier.

One or more analytes were detected whose concentration greatly differed between the primary and confirmation analysis (greater than 40% difference or RPD) in sample 330229006 (J1RTT5). Because both columns or detectors indicated an acceptable peak in the appropriate retention time window for these analytes, the analytes are reported as positive results. Due to the high percent difference or RPD between the two columns, it is indicated as such on the appropriate Form I/Certificate of Analysis (C of A) with a 'P' qualifier. Those analytes reported with a percent difference or RPD greater than 40% but less than 70% are qualified as presumptive evidence of the presence of the material.

Electronic Package Comment

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

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

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

System Configuration

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

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

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

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

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

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

Chromatographic Columns

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

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

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: X0010 GEL Work Order: 330229 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

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

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

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

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

DL Indicates that sample is diluted.
RA Indicates that sample is re-analyzed without re-extraction.
RE Indicates that sample is re-extracted.

Review/Validation

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

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

Signature: Michael A. Penny Jr. **Name: Michael Penny**

Date: 03 AUG 2013 **Title: Group Leader**

Roadmap for WCHN X0010 HPLC_PAH

This roadmap was analyzed by cww on 08-02-2013, 10:18.
This roadmap was reviewed by map on 08-02-2013, 11:44.
This roadmap was packaged by map on 08-03-2013, 09:31.

Sample

exclude	manual	datafile	smpid	injdate	injtime	sublist	clientid	dilution	batchid	comment
■	N	/chem/hplce.i/p072913.b/ph5g2918.d	330229006	29-JUL-2013	22:40	X0010.sub	J1RTT5	1	1317520	Duse
□	N	/chem/hplce.i/p073113.b/ph5g3117.d	330229006	31-JUL-2013	18:38	X0010.sub	J1RTT5	1	1318151	

QC Sample

exclude	manual	datafile	smpid	sampletype	injdate	injtime	sublist	clientid	dilution	batchid	comment
■	N	/chem/hplce.i/p072913.b/ph5g2904B.d	1202915415	mb	29-JUL-2013	12:50	X0010.sub	PAHBLK01	1	1317520	Duse
■	N	/chem/hplce.i/p072913.b/ph5g2905B.d	1202915416	lcs	29-JUL-2013	13:32	X0010.sub	PAHBLK01LCS	1	1317520	Duse, ONE ANALYTE LOW
■	N	/chem/hplce.i/p072913.b/ph5g2919.d	1202915417	ms	29-JUL-2013	23:22	X0010.sub	J1RTT5MS	1	1317520	Duse
■	N	/chem/hplce.i/p072913.b/ph5g2920.d	1202915418	msd	30-JUL-2013	00:04	X0010.sub	J1RTT5MSD	1	1317520	Duse
□	N	/chem/hplce.i/p073113.b/ph5g3104B.d	1202916848	mb	31-JUL-2013	09:30	X0010.sub	PAHBLK01	1	1318151	
□	N	/chem/hplce.i/p073113.b/ph5g3105B.d	1202916849	lcs	31-JUL-2013	10:12	X0010.sub	PAHBLK01LCS	1	1318151	Pass
□	N	/chem/hplce.i/p073113.b/ph5g3118.d	1202917772	ms	31-JUL-2013	19:20	X0010.sub	J1RTT5MS	1	1318151	Pass
□	N	/chem/hplce.i/p073113.b/ph5g3119.d	1202917773	msd	31-JUL-2013	20:02	X0010.sub	J1RTT5MSD	1	1318151	Pass

Sample Data Summary

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

Certificate of Analysis

Report Date: August 2, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil
Client SDG: X0010

Client Sample ID: J1RTT5
Sample ID: 330229006
Matrix: SOIL
Collect Date: 23-JUL-13 12:20
Receive Date: 25-JUL-13
Collector: Client
Moisture: 6.47%
Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.33	5.33	17.8	ug/kg	1	CWW	07/31/13	1838	1318151	1
Acenaphthylene	U	5.33	5.33	17.8	ug/kg	1					
Anthracene	U	1.78	1.78	17.8	ug/kg	1					
Benzo(a)anthracene	X	4.19	0.569	1.78	ug/kg	1					
Benzo(a)pyrene	JX	1.02	0.569	1.78	ug/kg	1					
Benzo(b)fluoranthene	X	2.10	0.569	1.78	ug/kg	1					
Benzo(ghi)perylene	U	0.569	0.569	1.78	ug/kg	1					
Benzo(k)fluoranthene	U	0.284	0.284	0.889	ug/kg	1					
Chrysene	J	0.921	0.569	1.78	ug/kg	1					
Dibenzo(a,h)anthracene	PX	6.72	0.569	1.78	ug/kg	1					
Fluoranthene		5.79	0.569	1.78	ug/kg	1					
Fluorene	U	5.33	5.33	17.8	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.569	0.569	1.78	ug/kg	1					
Naphthalene	U	5.33	5.33	17.8	ug/kg	1					
Phenanthrene	J	9.59	5.33	17.8	ug/kg	1					
Pyrene	U	0.569	0.569	1.78	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	AXV1	07/29/13	1820	1318150
SW846 3550B	3550B PAH BY HPLC Prep in soil	MXS4	07/25/13	1750	1317518

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8310	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	7170 ug/kg	8890	80.7	(23%-104%)

Notes:

QC Summary

QC Summary

Report Date: August 2, 2013

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

Contact: **Joan Kessner**

Workorder: **330229** **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch 1318151											
QC1202916849 LCS											
Acenaphthene	1670			1350	ug/kg		81.1	(58%-99%)	LER	07/31/13	10:12
Acenaphthylene	1670			1350	ug/kg		81	(58%-98%)			
Anthracene	1670			1410	ug/kg		84.4	(63%-94%)			
Benzo(a)anthracene	167			137	ug/kg		82.1	(73%-98%)			
Benzo(a)pyrene	167			134	ug/kg		80.2	(63%-99%)			
Benzo(b)fluoranthene	167			136	ug/kg		81.8	(70%-130%)			
Benzo(ghi)perylene	167			133	ug/kg		80.1	(70%-130%)			
Benzo(k)fluoranthene	83.3			62.5	ug/kg		75	(70%-130%)			
Chrysene	167			155	ug/kg		93.1	(70%-130%)			
Dibenzo(a,h)anthracene	167			160	ug/kg		95.8	(70%-130%)			
Fluoranthene	167			132	ug/kg		79.4	(70%-130%)			
Fluorene	1670			1370	ug/kg		82.2	(65%-130%)			
Indeno(1,2,3-cd)pyrene	167			145	ug/kg		86.9	(70%-130%)			
Naphthalene	1670			1300	ug/kg		78.3	(57%-130%)			
Phenanthrene	1670			1360	ug/kg		81.7	(70%-130%)			
Pyrene	167			143	ug/kg		85.8	(70%-130%)			
**Decafluorobiphenyl	8330			6870	ug/kg		82.5	(23%-104%)			
QC1202916848 MB											
Acenaphthene			U	5.00	ug/kg					07/31/13	09:30
Acenaphthylene			U	5.00	ug/kg						

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH												
Batch 1318151												
Anthracene				U	1.67	ug/kg						
Benzo(a)anthracene				U	0.533	ug/kg				LER	07/31/13	09:30
Benzo(a)pyrene				U	0.533	ug/kg						
Benzo(b)fluoranthene				U	0.533	ug/kg						
Benzo(ghi)perylene				U	0.533	ug/kg						
Benzo(k)fluoranthene				U	0.267	ug/kg						
Chrysene				U	0.533	ug/kg						
Dibenzo(a,h)anthracene				U	0.533	ug/kg						
Fluoranthene				U	0.533	ug/kg						
Fluorene				U	5.00	ug/kg						
Indeno(1,2,3-cd)pyrene				U	0.533	ug/kg						
Naphthalene				U	5.00	ug/kg						
Phenanthrene				U	5.00	ug/kg						
Pyrene				U	0.533	ug/kg						
**Decafluorobiphenyl	8330				6980	ug/kg		83.8	(23%-104%)			
QC1202917772 330229006 MS												
Acenaphthene	1780	U	5.33		1390	ug/kg		78.1	(49%-90%)	CWW	07/31/13	19:20
Acenaphthylene	1780	U	5.33		1380	ug/kg		77.6	(48%-97%)			
Anthracene	1780	U	1.78		1490	ug/kg		83.7	(49%-91%)			
Benzo(a)anthracene	178	X	4.19		140	ug/kg		76.1	(29%-126%)			
Benzo(a)pyrene	178	JX	1.02		115	ug/kg		64.1	(26%-130%)			
Benzo(b)fluoranthene	178	X	2.10		131	ug/kg		72.4	(32%-135%)			
Benzo(ghi)perylene	178	U	0.569		82.5	ug/kg		46.3	(34%-125%)			

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC-PAH											
Batch 1318151											
Benzo(k)fluoranthene	89.0	U	0.284		77.6	ug/kg		87.2	(48%-142%)	CWW	07/31/13 19:20
Chrysene	178	J	0.921		152	ug/kg		84.6	(39%-127%)		
Dibenzo(a,h)anthracene	178	PX	6.72		122	ug/kg		64.8	(38%-130%)		
Fluoranthene	178		5.79		138	ug/kg		74.5	(20%-139%)		
Fluorene	1780	U	5.33		1420	ug/kg		79.7	(51%-90%)		
Indeno(1,2,3-cd)pyrene	178	U	0.569		92.8	ug/kg		52.1	(41%-145%)		
Naphthalene	1780	U	5.33		1350	ug/kg		76	(43%-87%)		
Phenanthrene	1780	J	9.59		1420	ug/kg		79.3	(50%-100%)		
Pyrene	178	U	0.569		170	ug/kg		95.2	(18%-149%)		
**Decafluorobiphenyl	8900		7170		6970	ug/kg		78.4	(23%-104%)		
QC1202917773 330229006 MSD											
Acenaphthene	1780	U	5.33		1380	ug/kg	0.879	77.4	(0%-30%)		07/31/13 20:02
Acenaphthylene	1780	U	5.33		1370	ug/kg	0.968	76.8	(0%-30%)		
Anthracene	1780	U	1.78		1510	ug/kg	1.10	84.6	(0%-30%)		
Benzo(a)anthracene	178	X	4.19		138	ug/kg	1.23	75.1	(0%-30%)		
Benzo(a)pyrene	178	JX	1.02		125	ug/kg	7.89	69.3	(0%-30%)		
Benzo(b)fluoranthene	178	X	2.10		138	ug/kg	4.89	76	(0%-30%)		
Benzo(ghi)perylene	178	U	0.569		103	ug/kg	21.8	57.7	(0%-30%)		
Benzo(k)fluoranthene	89.1	U	0.284		84.6	ug/kg	8.71	95	(0%-30%)		
Chrysene	178	J	0.921		156	ug/kg	2.84	87	(0%-30%)		
Dibenzo(a,h)anthracene	178	PX	6.72		140	ug/kg	13.8	74.9	(0%-30%)		
Fluoranthene	178		5.79		139	ug/kg	0.377	74.8	(0%-30%)		

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH												
Batch 1318151												
Fluorene	1780	U	5.33		1420	ug/kg	0.186	79.5	(0%-30%)	CWW	07/31/13	20:02
Indeno(1,2,3-cd)pyrene	178	U	0.569		112	ug/kg	18.7	62.8	(0%-30%)			
Naphthalene	1780	U	5.33		1330	ug/kg	1.98	74.4	(0%-30%)			
Phenanthrene	1780	J	9.59		1430	ug/kg	0.380	79.6	(0%-30%)			
Pyrene	178	U	0.569		175	ug/kg	3.36	98.4	(0%-30%)			
**Decafluorobiphenyl	8910		7170		6790	ug/kg		76.2	(23%-104%)			

Notes:

The Qualifiers in this report are defined as follows:

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

Prep Logbook

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

Batch ID: 1318150 **Verified by:** _____
Analyst: Alberto Velasco
Method: SW846 3550B

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

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1202916848 MB	29-JUL-2013 18:20:00	30	1	0.03333
1202916849 LCS	29-JUL-2013 18:20:00	30.02	1	0.03331
330221002 - 2	29-JUL-2013 18:20:00	30.06	1	0.03327
330221003 - 2	29-JUL-2013 18:20:00	30.05	1	0.03328
1202917766 - 2 MS (330221003)	29-JUL-2013 18:20:00	30.01	1	0.03332
1202917769 - 2 MSD (330221003)	29-JUL-2013 18:20:00	30.03	1	0.0333
330227002 - 2	29-JUL-2013 18:20:00	30.07	1	0.03326
330227003 - 2	29-JUL-2013 18:20:00	30.09	1	0.03323
1202917768 - 2 MS (330227003)	29-JUL-2013 18:20:00	30.11	1	0.03321
1202917771 - 2 MSD (330227003)	29-JUL-2013 18:20:00	30.1	1	0.03322
330229006 - 2	29-JUL-2013 18:20:00	30.07	1	0.03326
1202917772 - 2 MS (330229006)	29-JUL-2013 18:20:00	30.03	1	0.0333
1202917773 - 2 MSD (330229006)	29-JUL-2013 18:20:00	30.01	1	0.03332
330324002	29-JUL-2013 18:20:00	30.02	1	0.03331
1202916850 MS (330324002)	29-JUL-2013 18:20:00	30.11	1	0.03321
1202916851 MSD (330324002)	29-JUL-2013 18:20:00	30.1	1	0.03322
330324003	29-JUL-2013 18:20:00	30.13	1	0.03319
330324004	29-JUL-2013 18:20:00	30.16	1	0.03316
330324005	29-JUL-2013 18:20:00	30.15	1	0.03317
330324006	29-JUL-2013 18:20:00	30.12	1	0.0332
330324007	29-JUL-2013 18:20:00	30.18	1	0.03313
330324008	29-JUL-2013 18:20:00	30.16	1	0.03316
330324009	29-JUL-2013 18:20:00	30.15	1	0.03317
330324010	29-JUL-2013 18:20:00	30.17	1	0.03315
330324011	29-JUL-2013 18:20:00	30.18	1	0.03313
330324012	29-JUL-2013 18:20:00	30.09	1	0.03323
330324013	29-JUL-2013 18:20:00	30.13	1	0.03319
330324014	29-JUL-2013 18:20:00	30.1	1	0.03322
330324015	29-JUL-2013 18:20:00	30.11	1	0.03321

Prep Logbook

Batch ID: 1318150 **Verified by:** _____
Analyst: Alberto Velasco
Method: SW846 3550B

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

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202916849	8310 PAH SPIKE	UE130325-15	1	mL
MS	1202916850	8310 PAH SPIKE	UE130325-15	1	mL
MS	1202917766	8310 PAH SPIKE	UE130325-15	1	mL
MS	1202917768	8310 PAH SPIKE	UE130325-15	1	mL
MS	1202917772	8310 PAH SPIKE	UE130325-15	1	mL
MSD	1202916851	8310 PAH SPIKE	UE130325-15	1	mL
MSD	1202917769	8310 PAH SPIKE	UE130325-15	1	mL
MSD	1202917771	8310 PAH SPIKE	UE130325-15	1	mL
MSD	1202917773	8310 PAH SPIKE	UE130325-15	1	mL
SURR	All	Decafluorobiphenyl 250 mg/L	UE120907-07	1	mL
REGNT	All	HPLC Grade Acetonitrile	1929229	5	mL
REGNT	All	Methylene Chloride	1935652-D	300	mL
SOURC	All	SODIUM SULFATE	1897902	30	g

Comments:

Verified By: MJS
Final Solvent: Acetonitrile

FID Diesel Range Organics Analysis

Case Narrative

FID Case Narrative
WC-HANFORD, INC. (WCHN)
SDG X0010

Method/Analysis Information

Procedure:	**Analysis of Diesel Range Organics by Flame Ionization Detector**
Analytical Method:	NWTPH-Dx in Soil
Prep Method:	SW846 3541
Analytical Batch Number:	1317735
Prep Batch Number:	1317734

Sample Analysis

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

Sample ID	Client ID
330229006	J1RTT5
1202915877	Method Blank (MB)
1202915878	Laboratory Control Sample (LCS)
1202915879	330229006(J1RTT5) Matrix Spike (MS)
1202915880	330229006(J1RTT5) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-003 REV# 23.

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) section 23.0.

Calibration Information

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

Continuing Calibration Verification (CCV) Requirements
All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria. Analyte peaks eluted

within the established retention time windows for this method.

Quality Control (QC) Information

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

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

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

QC Sample Designation
Sample 330229006 (J1RTT5) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement
The MS recovery was within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD recovery was within the established acceptance limits.

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

Technical Information

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

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

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

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

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

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

included in the raw data section of this fraction.

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

System Configuration

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

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

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: X0010 GEL Work Order: 330229 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

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

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

DL Indicates that sample is diluted.
RA Indicates that sample is re-analyzed without re-extraction.
RE Indicates that sample is re-extracted.

Review/Validation

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

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

Signature: **Name: Cameron Bearden**

Date: 07 AUG 2013 **Title: Group Leader**

Sample Data Summary

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

Certificate of Analysis

Report Date: August 7, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil
Client SDG: X0010

Client Sample ID: J1RTT5
Sample ID: 330229006
Matrix: SOIL
Collect Date: 23-JUL-13 12:20
Receive Date: 25-JUL-13
Collector: Client
Moisture: 6.47%
Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Diesel Range Organics											
SW 3541/NWTPH-Dx in Soil "Dry Weight Corrected"											
Diesel Range Organics (C10-C20)		12200	2310	7120	UG/KG	1	BYT1	07/29/13	2349	1317735	1
Motor Oil (C20-C36)		61700	2310	7120	UG/KG	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	MXS4	07/26/13	1745	1317734

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	NWTPH-Dx in Soil	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
o-Terphenyl	SW 3541/NWTPH-Dx in Soil "Dry Weight Corrected"	640 UG/KG	712	89.9	(50%-150%)

Notes:

Quality Control Summary

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

QC Summary

Report Date: August 7, 2013

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

Contact: **Joan Kessner**

Workorder: **330229** **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Diesel Range Organics										
Batch 1317735										
QC1202915878 LCS										
Diesel Range Organics (C10-C20)	66600			59400	UG/KG		89.2	(70%-130%)	BYT1	07/29/13 17:07
Motor Oil (C20-C36)	66600			61500	UG/KG		92.3	(70%-130%)		
**o-Terphenyl	666			733	UG/KG		110	(50%-150%)		
QC1202915877 MB										
Diesel Range Organics (C10-C20)			U	2160	UG/KG					07/29/13 16:30
Motor Oil (C20-C36)			U	2160	UG/KG					
**o-Terphenyl	665			474	UG/KG		71.3	(50%-150%)		
QC1202915879 330229006 MS										
Diesel Range Organics (C10-C20)	71100	12200		79900	UG/KG		95.1	(70%-130%)		07/30/13 00:26
Motor Oil (C20-C36)	71100	61700		134000	UG/KG		101	(70%-130%)		
**o-Terphenyl	711	640		938	UG/KG		132	(50%-150%)		
QC1202915880 330229006 MSD										
Diesel Range Organics (C10-C20)	71200	12200		70700	UG/KG	12.2	82.1	(0%-20%)		07/30/13 01:03
Motor Oil (C20-C36)	71200	61700		117000	UG/KG	13.3	77.8	(0%-20%)		
**o-Terphenyl	712	640		853	UG/KG		120	(50%-150%)		

Notes:

The Qualifiers in this report are defined as follows:

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

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

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

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

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

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

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

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

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

o Analyte failed to recover within LCS limits (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

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

Batch ID: 1317734 **Verified by:** _____
Analyst: Matthew Selepack
Method: SW846 3541

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

Sample ID	Run Date	Aliquot (g)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1202915877 MB	26-JUL-2013 17:45:00	30.06	1	0.03327
1202915878 LCS	26-JUL-2013 17:45:00	30.03	1	0.0333
330221002	26-JUL-2013 17:45:00	30.05	1	0.03328
1202915881 MS (330221002)	26-JUL-2013 17:45:00	30.14	1	0.03318
1202915882 MSD (330221002)	26-JUL-2013 17:45:00	30.01	1	0.03332
330221003	26-JUL-2013 17:45:00	30.15	1	0.03317
330227002	26-JUL-2013 17:45:00	30.07	1	0.03326
1202915883 MS (330227002)	26-JUL-2013 17:45:00	30.11	1	0.03321
1202915884 MSD (330227002)	26-JUL-2013 17:45:00	30.03	1	0.0333
330227003	26-JUL-2013 17:45:00	30.07	1	0.03326
330229006	26-JUL-2013 17:45:00	30.05	1	0.03328
1202915879 MS (330229006)	26-JUL-2013 17:45:00	30.07	1	0.03326
1202915880 MSD (330229006)	26-JUL-2013 17:45:00	30.03	1	0.0333

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202915878	AZDRO SPIKE LCS STD,4000ug/ml	WFI130716-52	1	mL
MS	1202915879	AZDRO SPIKE LCS STD,4000ug/ml	WFI130716-52	1	mL
MS	1202915881	AZDRO SPIKE LCS STD,4000ug/ml	WFI130716-52	1	mL
MS	1202915883	AZDRO SPIKE LCS STD,4000ug/ml	WFI130716-52	1	mL
MSD	1202915880	AZDRO SPIKE LCS STD,4000ug/ml	WFI130716-52	1	mL
MSD	1202915882	AZDRO SPIKE LCS STD,4000ug/ml	WFI130716-52	1	mL
MSD	1202915884	AZDRO SPIKE LCS STD,4000ug/ml	WFI130716-52	1	mL
SURR	All	20 ppm surrogate	WE130618-04	1	mL
REGNT	All	Methylene Chloride	1935652-D	120	mL
SOURC	All	SODIUM SULFATE	1897902	30	g

Comments:

Final Solvent: CH2Cl2
Verified By: AV

PCB Analysis

Case Narrative

PCB Case Narrative
WC-HANFORD, INC. (WCHN)
SDG X0010

Method/Analysis Information

Procedure:	**Analysis of Polychlorinated Biphenyls by ECD**
Analytical Method:	SW846 3541/8082A
Prep Method:	SW846 3541
Analytical Batch Number:	1317567
Prep Batch Number:	1317565

Sample Analysis

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

Sample ID	Client ID
330229006	J1RTT5
1202915534	Method Blank (MB)
1202915535	Laboratory Control Sample (LCS)
1202915536	330229006(J1RTT5) Matrix Spike (MS)
1202915537	330229006(J1RTT5) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

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

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

Calibration Information

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

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

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

Quality Control (QC) Information

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

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

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

QC Sample Designation
Sample 330229006 (J1RTT5) was selected for the matrix spike and matrix spike duplicate analysis.

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

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

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

Technical Information

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

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

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

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

Miscellaneous Information

Electronic Package Comment

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

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

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

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

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

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

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

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

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

System Configuration

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

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

Certification Statement

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

Sample Data Summary

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

Certificate of Analysis

Report Date: July 31, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil
Client SDG: X0010

Client Sample ID: J1RTT5
Sample ID: 330229006
Matrix: SOIL
Collect Date: 23-JUL-13 12:20
Receive Date: 25-JUL-13
Collector: Client
Moisture: 6.47%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.18	1.18	3.54	ug/kg	1	JXM	07/29/13	1003	1317567	1
Aroclor-1221	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1232	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1242	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1248	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1254	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1260	J	1.46	1.18	3.54	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	AXV1	07/26/13	1655	1317565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.86 ug/kg	7.09	68.6	(37%-121%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.74 ug/kg	7.09	66.8	(34%-121%)

Notes:

Quality Control Summary

QC Summary

Report Date: August 7, 2013

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

Contact: **Joan Kessner**

Workorder: **330229** **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-PCB										
Batch 1317567										
QC1202915535 LCS										
Aroclor-1016	33.3			21.5	ug/kg		64.6	(43%-120%)	JXM	07/29/13 07:39
Aroclor-1260	33.3			21.3	ug/kg		63.9	(45%-127%)		
**4cmx	6.66			4.70	ug/kg		70.5	(37%-121%)		
**Decachlorobiphenyl	6.66			4.35	ug/kg		65.3	(34%-121%)		
QC1202915534 MB										
Aroclor-1016			U	1.11	ug/kg					07/29/13 07:26
Aroclor-1221			U	1.11	ug/kg					
Aroclor-1232			U	1.11	ug/kg					
Aroclor-1242			U	1.11	ug/kg					
Aroclor-1248			U	1.11	ug/kg					
Aroclor-1254			U	1.11	ug/kg					
Aroclor-1260			U	1.11	ug/kg					
**4cmx	6.65			4.53	ug/kg		68.1	(37%-121%)		
**Decachlorobiphenyl	6.65			4.55	ug/kg		68.4	(34%-121%)		
QC1202915536 330229006 MS										
Aroclor-1016	35.5	U	1.18	22.0	ug/kg		61.8	(21%-132%)		07/29/13 10:17
Aroclor-1260	35.5	J	1.46	21.1	ug/kg		55.4	(24%-126%)		
**4cmx	7.11		4.86	4.58	ug/kg		64.4	(37%-121%)		
**Decachlorobiphenyl	7.11		4.74	4.62	ug/kg		65	(34%-121%)		
QC1202915537 330229006 MSD										
Aroclor-1016	35.6	U	1.18	23.3	ug/kg	5.80	65.4	(0%-30%)		07/29/13 10:32

GEL LABORATORIES LLC

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

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB												
Batch 1317567												
Aroclor-1260	35.6	J	1.46		21.6	ug/kg	2.08	56.5	(0%-30%)			
**4cmx	7.12		4.86		4.69	ug/kg		65.9	(37%-121%)	JXM	07/29/13	10:32
**Decachlorobiphenyl	7.12		4.74		4.83	ug/kg		67.9	(34%-121%)			

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: 1317565 **Verified by:** _____
Analyst: Alberto Velasco
Method: SW846 3541

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

Sample ID	Run Date	Aliquot (g)	Clean Up	Amount 1 (mL)	Amount 2 (mL)	Amount 3 (mL)	Prepped Aliquot (mL)	Prepped Factor (mL/g)
1202915534 MB	26-JUL-2013 16:55:00	30.06	H2SO4/KMnO4	2	2	9	1	0.03327
1202915535 LCS	26-JUL-2013 16:55:00	30.02	H2SO4/KMnO4	2	2	9	1	0.03331
330221002	26-JUL-2013 16:55:00	30.03	H2SO4/KMnO4	2	2	9	1	0.0333
1202915538 MS (330221002)	26-JUL-2013 16:55:00	30.11	H2SO4/KMnO4	2	2	9	1	0.03321
1202915539 MSD (330221002)	26-JUL-2013 16:55:00	30.05	H2SO4/KMnO4	2	2	9	1	0.03328
330221003	26-JUL-2013 16:55:00	30.01	H2SO4/KMnO4	2	2	9	1	0.03332
330227002	26-JUL-2013 16:55:00	30.03	H2SO4/KMnO4	2	2	9	1	0.0333
1202915540 MS (330227002)	26-JUL-2013 16:55:00	30.16	H2SO4/KMnO4	2	2	9	1	0.03316
1202915541 MSD (330227002)	26-JUL-2013 16:55:00	30.11	H2SO4/KMnO4	2	2	9	1	0.03321
330227003	26-JUL-2013 16:55:00	30.04	H2SO4/KMnO4	2	2	9	1	0.03329
330229006	26-JUL-2013 16:55:00	30.17	H2SO4/KMnO4	2	2	9	1	0.03315
1202915536 MS (330229006)	26-JUL-2013 16:55:00	30.09	H2SO4/KMnO4	2	2	9	1	0.03323
1202915537 MSD (330229006)	26-JUL-2013 16:55:00	30.05	H2SO4/KMnO4	2	2	9	1	0.03328

Type	Sample Id	Description	Serial Number	Spike Amt	Units
LCS	1202915535	PCB Laboratory Control	WE130711-04	1	mL
MS	1202915536	PCB Laboratory Control	WE130711-04	1	mL
MS	1202915538	PCB Laboratory Control	WE130711-04	1	mL
MS	1202915540	PCB Laboratory Control	WE130711-04	1	mL
MSD	1202915537	PCB Laboratory Control	WE130711-04	1	mL
MSD	1202915539	PCB Laboratory Control	WE130711-04	1	mL
MSD	1202915541	PCB Laboratory Control	WE130711-04	1	mL
SURR	All	PEST LOW LEVEL SURROGATE 200 UG/L	WE130702-01	1	mL
REGNT	All	Hexane	130710-B4	120	mL
REGNT	All	50g KMnO4 per 1L DI H2O	1883656	5	mL
REGNT	All	1:1 sulfuric acid	1943550	5	mL
SOURC	All	SODIUM SULFATE	1897902	30	g

Comments:

Final Solvent: Hexane
Clean up Initials: AV
Verified By: MJS
Clean up SOP: GL-OA-E-037
Clean up Date: 7-26-13

Metals Analysis

Case Narrative

Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG X0010

Sample Analysis

Sample ID	Client ID
330229001	J1RTT0
330229002	J1RTT1
330229003	J1RTT2
330229004	J1RTT3
330229005	J1RTT4
330229006	J1RTT5
1202917594	Method Blank (MB) **ICP**
1202917595	Laboratory Control Sample (LCS)
1202917598	330229001(J1RTT0L) Serial Dilution (SD)
1202917596	330229001(J1RTT0D) Sample Duplicate (DUP)
1202917597	330229001(J1RTT0S) Matrix Spike (MS)
1202924616	330229001(J1RTT0PS) Post Spike (PS)
1202917945	Method Blank (MB) **CVAA**
1202917946	Laboratory Control Sample (LCS)
1202917952	330229001(J1RTT0L) Serial Dilution (SD)
1202917950	330229001(J1RTT0D) Sample Duplicate (DUP)
1202917951	330229001(J1RTT0S) Matrix Spike (MS)

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

Method/Analysis Information

Analytical Batch:	1318398 and 1318566
Prep Batch :	1318397 and 1318565
Standard Operating Procedures:	GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 22 and GL-MA-E-010 REV# 26
Analytical Method:	SW846 3050B/6010C 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-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 potassium and sodium. PQL01 (analyzed at 14:05 on 08/07/13) recovered low for sodium and high for potassium; however, the sample results were 2x greater than the PQL, therefore the data is reported. PQL03 (analyzed at 19:55 on 08/07/13) and PQL04 (analyzed at 20:17 on 08/07/13) recovered low for potassium; however, the sample results were 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: 330229001 (J1RTT0).

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 silicon.

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

Post Spike (PS) Recovery Statement
The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS 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) with the exception of silicon.

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 instruments. Samples 330229001, 330229002, 330229003, 330229004, and 330229005 required dilutions for selenium in order to minimize suppression due to matrix interferences. Samples in this SDG required dilutions in order to bring raw values of titanium within the linear range of the instrument, and for the analytes antimony, cobalt, vanadium, and zinc that titanium interferes with, in order to ensure that the inter-element correction factors were valid on the ICP.

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: 1210155. 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:** 08/07/13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
09-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ICP	SW846 3050B/6010C	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1318398	See Below		

Potentially affected work order(s)(SDG): 330229(X0010)

Application Issues:

Failed Recovery for MS/PS

Failed RPD for DUP

Specification and Requirements Exception Description:	**DER Disposition:**
1. Failed Recovery for MS/PS: QC 1202917597MS 2. Failed RPD for DUP: QC 1202917596DUP	1. The matrix spike recovery failed outside of the control limits for barium and silicon. 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. 2. The sample and sample duplicate % RPD failed outside the control limits for chromium and silicon due to possible sample non-homogeneity and/or matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.

Originator's Name:

Helen Camello 09-AUG-13

Data Validator/Group Leader:

Jamie Johnson 09-AUG-13

Sample Data Summary

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Qualifier Definition Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: X0010 GEL Work Order: 330229 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

* Duplicate analysis not within control limits

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

C Target analyte was detected in the sample and the associated blank, and the sample concentration was <= 5 times the blank concentration.

D Results are reported from a diluted aliquot of sample.

E Reported value is estimated due to interferences. See comment in narrative.

M Duplicate precision not met.

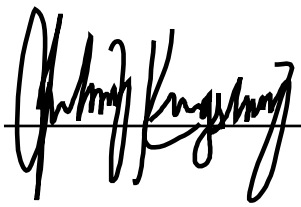
N Spike Sample recovery is outside control limits.

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

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

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

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

Reviewed by  08/01/13

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Certificate of Analysis

Report Date: August 9, 2013

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

Client SDG: X0010

Client Sample ID: J1RTT0
Sample ID: 330229001
Matrix: SOIL
Collect Date: 23-JUL-13 09:25
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.85%

Project: WCHN00213
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	U	3.94	3.94	11.8	ug/kg	1	NOR1	07/31/13	1501	1318566	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic	U	506	506	3030	ug/kg	1	HSC	08/07/13	1941	1318398	2
Beryllium		1030	101	506	ug/kg	1					
Boron	B	2160	1010	5060	ug/kg	1					
Cadmium	B	424	101	506	ug/kg	1					
Calcium		6650000	8090	25300	ug/kg	1					
Chromium	*	4280	152	506	ug/kg	1					
Copper		16600	303	1010	ug/kg	1					
Iron		27300000	8090	25300	ug/kg	1					
Magnesium		4230000	8590	30300	ug/kg	1					
Manganese		334000	202	1010	ug/kg	1					
Molybdenum	U	202	202	1010	ug/kg	1					
Nickel		7320	152	506	ug/kg	1					
Potassium		712000	6470	25300	ug/kg	1					
Silver	U	101	101	506	ug/kg	1					
Sodium		289000	7080	25300	ug/kg	1					
Antimony	DU	3340	3340	10100	ug/kg	10	HSC	08/09/13	1007	1318398	3
Cobalt	D	10900	1520	5060	ug/kg	10					
Vanadium	D	87700	1010	5060	ug/kg	10					
Zinc	D	51600	4040	10100	ug/kg	10					
Aluminum		4990000	6880	20200	ug/kg	1	JWJ	08/09/13	1326	1318398	4
Barium	N	85000	101	506	ug/kg	1					
Lead		2040	334	1010	ug/kg	1					
Silicon	*MN	1340000	1520	10100	ug/kg	1					
Selenium	DU	2530	2530	15200	ug/kg	5	JWJ	08/09/13	1410	1318398	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	08/05/13	0750	1318397
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/30/13	1657	1318565

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Certificate of Analysis

Report Date: August 9, 2013

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

Client SDG: X0010

Client Sample ID:	J1RTT0	Project:	WCHN00213
Sample ID:	330229001	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/6010C	

Notes:

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Certificate of Analysis

Report Date: August 9, 2013

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

Client SDG: X0010

Client Sample ID: J1RTT1
Sample ID: 330229002
Matrix: SOIL
Collect Date: 23-JUL-13 12:40
Receive Date: 25-JUL-13
Collector: Client
Moisture: 1.75%

Project: WCHN00213
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	U	3.94	3.94	11.8	ug/kg	1	NOR1	07/31/13	1508	1318566	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic	U	497	497	2980	ug/kg	1	HSC	08/07/13	2001	1318398	2
Beryllium		718	99.4	497	ug/kg	1					
Boron	U	994	994	4970	ug/kg	1					
Cadmium	B	287	99.4	497	ug/kg	1					
Calcium		4760000	7950	24900	ug/kg	1					
Chromium	*	2510	149	497	ug/kg	1					
Copper		13200	298	994	ug/kg	1					
Iron		21100000	7950	24900	ug/kg	1					
Magnesium		3460000	8450	29800	ug/kg	1					
Manganese		251000	199	994	ug/kg	1					
Molybdenum	U	199	199	994	ug/kg	1					
Nickel		5320	149	497	ug/kg	1					
Potassium		481000	6360	24900	ug/kg	1					
Silver	U	99.4	99.4	497	ug/kg	1					
Sodium		186000	6960	24900	ug/kg	1					
Antimony	BD	4670	3280	9940	ug/kg	10	HSC	08/09/13	1032	1318398	3
Cobalt	D	9570	1490	4970	ug/kg	10					
Vanadium	D	61600	994	4970	ug/kg	10					
Zinc	D	38300	3980	9940	ug/kg	10					
Aluminum		3300000	6760	19900	ug/kg	1	JWJ	08/09/13	1346	1318398	4
Barium	N	37400	99.4	497	ug/kg	1					
Lead		1420	328	994	ug/kg	1					
Silicon	*MN	943000	1490	9940	ug/kg	1					
Selenium	DU	2490	2490	14900	ug/kg	5	JWJ	08/09/13	1425	1318398	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	08/05/13	0750	1318397
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/30/13	1657	1318565

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Certificate of Analysis

Report Date: August 9, 2013

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

Client SDG: X0010

Client Sample ID:	J1RTT1	Project:	WCHN00213
Sample ID:	330229002	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/6010C	

Notes:

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Certificate of Analysis

Report Date: August 9, 2013

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

Client SDG: X0010

Client Sample ID: J1RTT2
Sample ID: 330229003
Matrix: SOIL
Collect Date: 23-JUL-13 12:56
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.11%

Project: WCHN00213
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	U	4.07	4.07	12.1	ug/kg	1	NOR1	07/31/13	1509	1318566	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic	U	510	510	3060	ug/kg	1	HSC	08/07/13	2004	1318398	2
Beryllium		887	102	510	ug/kg	1					
Boron	B	1130	1020	5100	ug/kg	1					
Cadmium	B	334	102	510	ug/kg	1					
Calcium		4860000	8160	25500	ug/kg	1					
Chromium	*	3640	153	510	ug/kg	1					
Copper		15100	306	1020	ug/kg	1					
Iron		22000000	8160	25500	ug/kg	1					
Magnesium		3920000	8670	30600	ug/kg	1					
Manganese		288000	204	1020	ug/kg	1					
Molybdenum	U	204	204	1020	ug/kg	1					
Nickel		7960	153	510	ug/kg	1					
Potassium		532000	6520	25500	ug/kg	1					
Silver	U	102	102	510	ug/kg	1					
Sodium		187000	7140	25500	ug/kg	1					
Antimony	DU	3360	3360	10200	ug/kg	10	HSC	08/09/13	1035	1318398	3
Cobalt	D	8880	1530	5100	ug/kg	10					
Vanadium	D	60900	1020	5100	ug/kg	10					
Zinc	D	44600	4080	10200	ug/kg	10					
Aluminum		4120000	6930	20400	ug/kg	1	JWJ	08/09/13	1348	1318398	4
Barium	N	60600	102	510	ug/kg	1					
Lead		1400	336	1020	ug/kg	1					
Silicon	*MN	1070000	1530	10200	ug/kg	1					
Selenium	DU	2550	2550	15300	ug/kg	5	JWJ	08/09/13	1428	1318398	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	08/05/13	0750	1318397
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/30/13	1657	1318565

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Certificate of Analysis

Report Date: August 9, 2013

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

Client SDG: X0010

Client Sample ID:	J1RTT2	Project:	WCHN00213
Sample ID:	330229003	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/6010C	

Notes:

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Certificate of Analysis

Report Date: August 9, 2013

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

Client SDG: X0010

Client Sample ID: J1RTT3
Sample ID: 330229004
Matrix: SOIL
Collect Date: 23-JUL-13 14:10
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.96%

Project: WCHN00213
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		17.8	3.53	10.6	ug/kg	1	NOR1	07/31/13	1511	1318566	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic	B	2560	515	3090	ug/kg	1	HSC	08/07/13	2006	1318398	2
Beryllium		907	103	515	ug/kg	1					
Boron	B	4570	1030	5150	ug/kg	1					
Cadmium	B	327	103	515	ug/kg	1					
Calcium		10500000	8240	25800	ug/kg	1					
Chromium	*	9090	155	515	ug/kg	1					
Copper		18200	309	1030	ug/kg	1					
Iron		24200000	8240	25800	ug/kg	1					
Magnesium		4480000	8760	30900	ug/kg	1					
Manganese		305000	206	1030	ug/kg	1					
Molybdenum	U	206	206	1030	ug/kg	1					
Nickel		9640	155	515	ug/kg	1					
Potassium		946000	6600	25800	ug/kg	1					
Silver	B	122	103	515	ug/kg	1					
Sodium		210000	7210	25800	ug/kg	1					
Antimony	DU	3400	3400	10300	ug/kg	10	HSC	08/09/13	1038	1318398	3
Cobalt	D	9540	1550	5150	ug/kg	10					
Vanadium	D	72400	1030	5150	ug/kg	10					
Zinc	D	47800	4120	10300	ug/kg	10					
Aluminum		6040000	7010	20600	ug/kg	1	JWJ	08/09/13	1350	1318398	4
Barium	N	148000	103	515	ug/kg	1					
Lead		4300	340	1030	ug/kg	1					
Silicon	*MN	1470000	1550	10300	ug/kg	1					
Selenium	DU	2580	2580	15500	ug/kg	5	JWJ	08/09/13	1431	1318398	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	08/05/13	0750	1318397
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/30/13	1657	1318565

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Certificate of Analysis

Report Date: August 9, 2013

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-232 Soil
Client SDG:	X0010

Client Sample ID:	J1RTT3	Project:	WCHN00213
Sample ID:	330229004	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/6010C	

Notes:

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Certificate of Analysis

Report Date: August 9, 2013

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

Client SDG: X0010

Client Sample ID: J1RTT4
Sample ID: 330229005
Matrix: SOIL
Collect Date: 23-JUL-13 14:25
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.29%

Project: WCHN00213
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	9.37	4.05	12.1	ug/kg	1	NOR1	07/31/13	1513	1318566	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic	BC	1240	489	2940	ug/kg	1	HSC	08/07/13	2009	1318398	2
Beryllium		824	97.8	489	ug/kg	1					
Boron	B	2480	978	4890	ug/kg	1					
Cadmium	B	232	97.8	489	ug/kg	1					
Calcium		9020000	7830	24500	ug/kg	1					
Chromium	*	5880	147	489	ug/kg	1					
Copper		16800	294	978	ug/kg	1					
Iron		23200000	7830	24500	ug/kg	1					
Magnesium		4420000	8320	29400	ug/kg	1					
Manganese		278000	196	978	ug/kg	1					
Molybdenum	U	196	196	978	ug/kg	1					
Nickel		10200	147	489	ug/kg	1					
Potassium		608000	6260	24500	ug/kg	1					
Silver	B	323	97.8	489	ug/kg	1					
Sodium		197000	6850	24500	ug/kg	1					
Antimony	DU	3230	3230	9780	ug/kg	10	HSC	08/09/13	1041	1318398	3
Cobalt	D	9920	1470	4890	ug/kg	10					
Vanadium	D	72600	978	4890	ug/kg	10					
Zinc	D	45400	3910	9780	ug/kg	10					
Aluminum		4910000	6650	19600	ug/kg	1	JWJ	08/09/13	1352	1318398	4
Barium	N	69700	97.8	489	ug/kg	1					
Lead		2870	323	978	ug/kg	1					
Silicon	*MN	1090000	1470	9780	ug/kg	1					
Selenium	DU	2450	2450	14700	ug/kg	5	JWJ	08/09/13	1434	1318398	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	08/05/13	0750	1318397
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/30/13	1657	1318565

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Certificate of Analysis

Report Date: August 9, 2013

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-232 Soil
Client SDG:	X0010

Client Sample ID:	J1RTT4	Project:	WCHN00213
Sample ID:	330229005	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/6010C	

Notes:

GEL LABORATORIES LLC
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Certificate of Analysis

Report Date: August 9, 2013

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

Client SDG: X0010

Client Sample ID: J1RTT5
Sample ID: 330229006
Matrix: SOIL
Collect Date: 23-JUL-13 12:20
Receive Date: 25-JUL-13
Collector: Client
Moisture: 6.47%

Project: WCHN00213
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		34.4	4.12	12.3	ug/kg	1	NOR1	07/31/13	1515	1318566	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic		7600	521	3130	ug/kg	1	HSC	08/07/13	2011	1318398	2
Beryllium		2050	104	521	ug/kg	1					
Boron		65100	1040	5210	ug/kg	1					
Cadmium	B	269	104	521	ug/kg	1					
Calcium		27000000	8340	26100	ug/kg	1					
Chromium	*	6830	156	521	ug/kg	1					
Copper		25500	313	1040	ug/kg	1					
Iron		17700000	8340	26100	ug/kg	1					
Magnesium		3880000	8860	31300	ug/kg	1					
Manganese		531000	208	1040	ug/kg	1					
Molybdenum		1140	208	1040	ug/kg	1					
Nickel		9680	156	521	ug/kg	1					
Potassium		1360000	6670	26100	ug/kg	1					
Silver	B	218	104	521	ug/kg	1					
Sodium		1040000	7290	26100	ug/kg	1					
Antimony	DU	3440	3440	10400	ug/kg	10	HSC	08/09/13	1045	1318398	3
Cobalt	BD	4910	1560	5210	ug/kg	10					
Vanadium	D	36100	1040	5210	ug/kg	10					
Zinc	D	52200	4170	10400	ug/kg	10					
Aluminum		15700000	7090	20800	ug/kg	1	JWJ	08/09/13	1354	1318398	4
Barium	N	2380000	104	521	ug/kg	1					
Lead		6410	344	1040	ug/kg	1					
Selenium	U	521	521	3130	ug/kg	1					
Silicon	*MN	1330000	1560	10400	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	08/05/13	0750	1318397
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/30/13	1657	1318565

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

Certificate of Analysis

Report Date: August 9, 2013

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

Client SDG: X0010

Client Sample ID:	J1RTT5	Project:	WCHN00213
Sample ID:	330229006	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	

Notes:

Quality Control Summary

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

QC Summary

Report Date: August 9, 2013

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

Contact: **Joan Kessner**

Workorder: **330229** **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1318398										
QC1202917596 330229001 DUP										
Aluminum		4990000		5230000	ug/kg	4.63		(0%-20%)	JWJ	08/09/13 13:28
Antimony	DU	3340	DU	3340	ug/kg	N/A ^			HSC	08/09/13 10:11
Arsenic	U	506	BC	518	ug/kg	779 ^		(+/-3030)		08/07/13 19:43
Barium	N	85000		82700	ug/kg	2.81		(0%-20%)	JWJ	08/09/13 13:28
Beryllium		1030		967	ug/kg	6.34 ^		(+/-506)	HSC	08/07/13 19:43
Boron	B	2160	B	1950	ug/kg	10.1 ^		(+/-5060)		
Cadmium	B	424	B	426	ug/kg	0.469 ^		(+/-506)		
Calcium		6650000		7640000	ug/kg	13.8		(0%-20%)		
Chromium	*	4280	*	6910	ug/kg	47.1*		(0%-20%)		
Cobalt	D	10900	D	10700	ug/kg	1.75 ^		(+/-5060)		08/09/13 10:11
Copper		16600		18000	ug/kg	7.82		(0%-20%)		08/07/13 19:43
Iron		27300000		26000000	ug/kg	5.05		(0%-20%)		
Lead		2040		2180	ug/kg	6.56 ^		(+/-1010)	JWJ	08/09/13 13:28
Magnesium		4230000		4240000	ug/kg	0.234		(0%-20%)	HSC	08/07/13 19:43
Manganese		334000		294000	ug/kg	12.8		(0%-20%)		
Molybdenum	U	202	U	202	ug/kg	N/A ^				
Nickel		7320		7200	ug/kg	1.72		(0%-20%)		
Potassium		712000		629000	ug/kg	12.3		(0%-20%)		
Selenium	DU	2530	DU	2530	ug/kg	N/A ^			JWJ	08/09/13 14:13
Silicon	*MN	1340000	*	1050000	ug/kg	24.2*		(0%-20%)		08/09/13 13:28

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1318398										
Silver		U 101	U	101	ug/kg	N/A ^			HSC	08/07/13 19:43
Sodium		289000		245000	ug/kg	16.6		(0%-20%)		
Vanadium		D 87700	D	82400	ug/kg	6.26		(0%-20%)		08/09/13 10:11
Zinc		D 51600	D	50600	ug/kg	1.93		(0%-20%)		
QC1202917595 LCS										
Aluminum	477000			486000	ug/kg		102	(80%-120%)	JWJ	08/09/13 13:23
Antimony	47700			49700	ug/kg		104	(80%-120%)	HSC	08/09/13 10:04
Arsenic	47700			47600	ug/kg		99.7	(80%-120%)		08/07/13 19:37
Barium	47700			47900	ug/kg		100	(80%-120%)	JWJ	08/09/13 13:23
Beryllium	47700			49600	ug/kg		104	(80%-120%)	HSC	08/07/13 19:37
Boron	47700			47600	ug/kg		99.7	(80%-120%)		
Cadmium	47700			49700	ug/kg		104	(80%-120%)		
Calcium	477000			495000	ug/kg		104	(80%-120%)		
Chromium	47700			47300	ug/kg		99.2	(80%-120%)		
Cobalt	47700			48600	ug/kg		102	(80%-120%)		08/09/13 10:04
Copper	47700			49400	ug/kg		103	(80%-120%)		08/07/13 19:37
Iron	477000			498000	ug/kg		104	(80%-120%)		
Lead	47700			49500	ug/kg		104	(80%-120%)	JWJ	08/09/13 13:23
Magnesium	477000			497000	ug/kg		104	(80%-120%)	HSC	08/07/13 19:37
Manganese	47700			48500	ug/kg		102	(80%-120%)		
Molybdenum	47700			47000	ug/kg		98.6	(80%-120%)		
Nickel	47700			47200	ug/kg		99	(80%-120%)		

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1318398										
Potassium	477000			490000	ug/kg		103	(80%-120%)	HSC	08/07/13 19:37
Selenium	47700			50900	ug/kg		107	(80%-120%)	JWJ	08/09/13 13:23
Silicon	477000			439000	ug/kg		92.1	(80%-120%)		
Silver	47700			48800	ug/kg		102	(80%-120%)	HSC	08/07/13 19:37
Sodium	477000			506000	ug/kg		106	(80%-120%)		
Vanadium	47700			48600	ug/kg		102	(80%-120%)		08/09/13 10:04
Zinc	47700			49300	ug/kg		103	(80%-120%)		
QC1202917594 MB										
Aluminum			B	6650	ug/kg				JWJ	08/09/13 13:20
Antimony			B	522	ug/kg				HSC	08/09/13 10:01
Arsenic			B	493	ug/kg					08/07/13 19:34
Barium			U	96.0	ug/kg				JWJ	08/09/13 13:20
Beryllium			U	96.0	ug/kg				HSC	08/07/13 19:34
Boron			U	960	ug/kg					
Cadmium			U	96.0	ug/kg					
Calcium			U	7680	ug/kg					
Chromium			U	144	ug/kg					
Cobalt			U	144	ug/kg					08/09/13 10:01
Copper			U	288	ug/kg					08/07/13 19:34
Iron			U	7680	ug/kg					
Lead			U	317	ug/kg				JWJ	08/09/13 13:20
Magnesium			U	8160	ug/kg				HSC	08/07/13 19:34

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1318398											
Manganese				U	192	ug/kg				HSC	08/07/13 19:34
Molybdenum				U	192	ug/kg					
Nickel				B	317	ug/kg					
Potassium				U	6140	ug/kg					
Selenium				U	480	ug/kg				JWJ	08/09/13 13:20
Silicon				B	2050	ug/kg					
Silver				U	96.0	ug/kg				HSC	08/07/13 19:34
Sodium				B	7520	ug/kg					
Vanadium				U	96.0	ug/kg					08/09/13 10:01
Zinc				B	704	ug/kg					
QC1202917597 330229001 MS											
Aluminum	509000		4990000		5780000	ug/kg		N/A	(75%-125%)	JWJ	08/09/13 13:30
Antimony	50900	DU	3340	D	49900	ug/kg		95.7	(75%-125%)	HSC	08/09/13 10:14
Arsenic	50900	U	506		50300	ug/kg		98.9	(75%-125%)		08/07/13 19:46
Barium	50900	N	85000	N	111000	ug/kg		50.6 *	(75%-125%)	JWJ	08/09/13 13:30
Beryllium	50900		1030		51200	ug/kg		98.6	(75%-125%)	HSC	08/07/13 19:46
Boron	50900	B	2160		51300	ug/kg		96.5	(75%-125%)		
Cadmium	50900	B	424		51000	ug/kg		99.5	(75%-125%)		
Calcium	509000		6650000		7950000	ug/kg		N/A	(75%-125%)		
Chromium	50900	*	4280		53200	ug/kg		96.2	(75%-125%)		
Cobalt	50900	D	10900	D	61800	ug/kg		100	(75%-125%)		08/09/13 10:14
Copper	50900		16600		72200	ug/kg		109	(75%-125%)		08/07/13 19:46

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1318398											
Iron	509000		27300000		25400000	ug/kg		N/A	(75%-125%)	HSC	08/07/13 19:46
Lead	50900		2040		51200	ug/kg		96.7	(75%-125%)	JWJ	08/09/13 13:30
Magnesium	509000		4230000		4520000	ug/kg		N/A	(75%-125%)	HSC	08/07/13 19:46
Manganese	50900		334000		328000	ug/kg		N/A	(75%-125%)		
Molybdenum	50900	U	202		48800	ug/kg		95.9	(75%-125%)		
Nickel	50900		7320		55800	ug/kg		95.4	(75%-125%)		
Potassium	509000		712000		1180000	ug/kg		92.3	(75%-125%)		
Selenium	50900	DU	2530	D	41700	ug/kg		81.9	(75%-125%)	JWJ	08/09/13 14:16
Silicon	509000	*MN	1340000	N	1460000	ug/kg		24.4*	(75%-125%)		08/09/13 13:30
Silver	50900	U	101		51500	ug/kg		101	(75%-125%)	HSC	08/07/13 19:46
Sodium	509000		289000		760000	ug/kg		92.6	(75%-125%)		
Vanadium	50900	D	87700	D	127000	ug/kg		76.6	(75%-125%)		08/09/13 10:14
Zinc	50900	D	51600	D	98100	ug/kg		91.5	(75%-125%)		
QC1202924616 330229001 PS											
Barium	500	N	841		1310	ug/L		94.3	(80%-120%)	JWJ	08/09/13 13:32
Silicon	5000	*MN	13200		18600	ug/L		107	(80%-120%)		
QC1202917598 330229001 SDILT											
Aluminum			49400	CD	9320	ug/L	5.57		(0%-10%)		08/09/13 13:34
Antimony		DU	1.19	DU	16700	ug/L	N/A		(0%-10%)	HSC	08/09/13 10:17
Arsenic		U	-3.03	DU	2530	ug/L	N/A		(0%-10%)		08/07/13 19:48
Barium		N	841	D	155	ug/L	7.99		(0%-10%)	JWJ	08/09/13 13:34
Beryllium			10.2	D	2.51	ug/L	23.2		(0%-10%)	HSC	08/07/13 19:48
Boron		B	21.4	DU	5060	ug/L	N/A		(0%-10%)		

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1318398										
Cadmium	B	4.19	DU	506	ug/L	N/A		(0%-10%)	HSC	08/07/13 19:48
Calcium		65800	D	13900	ug/L	5.54		(0%-10%)		
Chromium	*	42.3	D	9.31	ug/L	10.1		(0%-10%)		
Cobalt	D	10.7	D	2.11	ug/L	1.79		(0%-10%)		08/09/13 10:17
Copper		164	D	30.4	ug/L	7.44		(0%-10%)		08/07/13 19:48
Iron		270000	D	57900	ug/L	7.16		(0%-10%)		
Lead		20.2	DU	1670	ug/L	N/A		(0%-10%)	JWJ	08/09/13 13:34
Magnesium		41800	D	8880	ug/L	6.26		(0%-10%)	HSC	08/07/13 19:48
Manganese		3300	D	704	ug/L	6.68		(0%-10%)		
Molybdenum	U	-1.64	DU	1010	ug/L	N/A		(0%-10%)		
Nickel		72.4	CD	15.7	ug/L	8.21		(0%-10%)		
Potassium		7040	D	1350	ug/L	4.05		(0%-10%)		
Selenium	DU	-22.1	DU	12600	ug/L	N/A		(0%-10%)	JWJ	08/09/13 14:22
Silicon	*MN	13200	CDM	1500	ug/L	43.2*		(0%-10%)		08/09/13 13:34
Silver	U	0.632	DU	506	ug/L	N/A		(0%-10%)	HSC	08/07/13 19:48
Sodium		2860	CD	633	ug/L	10.7		(0%-10%)		
Vanadium	D	86.8	D	16.9	ug/L	2.5		(0%-10%)		08/09/13 10:17
Zinc	D	51.0	CD	10.0	ug/L	1.68		(0%-10%)		
Metals Analysis-Mercury										
Batch 1318566										
QC1202917950 330229001 DUP										
Mercury	U	3.94	U	4.05	ug/kg	N/A ^			NOR1	07/31/13 15:03
QC1202917946 LCS										

QC Summary

Workorder: 330229 **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-Mercury										
Batch 1318566										
Mercury	118			120	ug/kg		102	(80%-120%)		07/31/13 14:41
QC1202917945 MB										
Mercury			U	3.91	ug/kg				NOR1	07/31/13 14:39
QC1202917951 330229001 MS										
Mercury	124	U 3.94		130	ug/kg		104	(80%-120%)		07/31/13 15:04
QC1202917952 330229001 SDILT										
Mercury		U 0.024	DU	19.7	ug/L	N/A		(0%-10%)		07/31/13 15:06

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.

Miscellaneous

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID: **1318397**
Analyst: Anthony Green
Method: SW846 3050B
Lab SOP: GL-MA-E-009 REV# 22
Instrument: BAL-001

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1202917595	Metals Spike Mix I	UI1936136-01	.25	mL
LCS	1202917595	Metals Spike Mix II	UI1936138-06	.25	mL
MS	1202917597	Metals Spike Mix I	UI1936136-01	.25	mL
MS	1202917597	Metals Spike Mix II	UI1936138-06	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1202917594 MB	05-AUG-2013 07:50:02	Soil	0.521	50	95.96929
1202917595 LCS	05-AUG-2013 07:50:02	Soil	0.524	50	95.41985
330229001	05-AUG-2013 07:50:02	Soil	0.509	50	98.23183
1202917596 DUP (330229001)	05-AUG-2013 07:50:02	Soil	0.509	50	98.23183
1202917597 MS (330229001)	05-AUG-2013 07:50:02	Soil	0.506	50	98.81423
1202917598 SDILT (330229001)	05-AUG-2013 07:50:02	Soil	0.509	50	98.23183
330229002	05-AUG-2013 07:50:02	Soil	0.512	50	97.65625
330229003	05-AUG-2013 07:50:02	Soil	0.501	50	99.8004
330229004	05-AUG-2013 07:50:02	Soil	0.5	50	100
330229005	05-AUG-2013 07:50:02	Soil	0.523	50	95.60229
330229006	05-AUG-2013 07:50:02	Soil	0.513	50	97.46589

Reagent/Solvent Lot ID	Description	Amount
1924940	Concentrated Nitric Acid	1.25 mL
1933859	HYDROCHLORIC ACID	10 mL

Comments:

Block Temperature: 92 C

Thermometer ID: 61066-A1

Hot Block ID: 8

Sample 330229001 consist of dark brown and black granular solid with rocks.

Prep Logbook

Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Batch ID: **1318565**
Analyst: Alan Stanley
Method: SW846 7471B Prep
Lab SOP: GL-MA-E-010 REV# 26
Instrument: Metals Manual Instrument

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1202917946	MHGSOILMSSPIKE	WHG130730-14	.3	mL
MS	1202917948	MHGSOILMSSPIKE	WHG130730-14	.3	mL
MS	1202917951	MHGSOILMSSPIKE	WHG130730-14	.3	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)	pH Check
1202917945 MB	30-JUL-2013 16:57:42	Soil	0.514	30	58.36576	<2
1202917946 LCS	30-JUL-2013 16:57:42	Soil	0.51	30	58.82353	<2
330029001	30-JUL-2013 16:57:42	Soil	0.515	30	58.25243	<2
1202917947 DUP (330029001)	30-JUL-2013 16:57:42	Soil	0.505	30	59.40594	<2
1202917948 MS (330029001)	30-JUL-2013 16:57:42	Soil	0.506	30	59.28854	<2
1202917949 SDILT (330029001)	30-JUL-2013 16:57:42	Soil	0.515	30	58.25243	<2
330029002	30-JUL-2013 16:57:42	Soil	0.5	30	60	<2
330029003	30-JUL-2013 16:57:42	Soil	0.519	30	57.80347	<2
330029004	30-JUL-2013 16:57:42	Soil	0.526	30	57.03422	<2
330029005	30-JUL-2013 16:57:42	Soil	0.587	30	51.10733	<2
330029006	30-JUL-2013 16:57:42	Soil	0.501	30	59.88024	<2
330229001	30-JUL-2013 16:57:42	Soil	0.525	30	57.14286	<2
1202917950 DUP (330229001)	30-JUL-2013 16:57:42	Soil	0.511	30	58.70841	<2
1202917951 MS (330229001)	30-JUL-2013 16:57:42	Soil	0.5	30	60	<2
1202917952 SDILT (330229001)	30-JUL-2013 16:57:42	Soil	0.525	30	57.14286	<2
330229002	30-JUL-2013 16:57:42	Soil	0.519	30	57.80347	<2
330229003	30-JUL-2013 16:57:42	Soil	0.505	30	59.40594	<2
330229004	30-JUL-2013 16:57:42	Soil	0.586	30	51.19454	<2
330229005	30-JUL-2013 16:57:42	Soil	0.508	30	59.05512	<2
330229006	30-JUL-2013 16:57:42	Soil	0.521	30	57.58157	<2

Reagent/Solvent Lot ID	Description	Amount
130712-A	Hydrochloric Acid Conc.	1.125 mL
130717-1	NITRIC ACID	.375 mL
1881600-C	5% KMnO4 solution	7.5 mL
1895265-C	Hg reducing agent	2 mL

Comments:

Digestion Start Date: 30-JUL-2013 16:28
Digestion End Date: 30-JUL-2013 16:58
Block Temperature: 95 C
Thermometer ID: 118533
Hot Block ID: 12
Both QC's were a sandy soil like material with pebbles.

Prep Logbook

Batch ID: **1318565**
Analyst: Alan Stanley
Method: SW846 7471B Prep
Lab SOP: GL-MA-E-010 REV# 26
Instrument: Metals Manual Instrument

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1202917946	MHGSOILMSSPIKE	WHG130730-14	.3	mL
MS	1202917948	MHGSOILMSSPIKE	WHG130730-14	.3	mL
MS	1202917951	MHGSOILMSSPIKE	WHG130730-14	.3	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)	pH Check

Reagent/Solvent Lot ID	Description	Amount
WHG130730-07	Mercury Working Standard 1st Source CAL S 0.2/CRA	30 uL
WHG130730-08	Mercury Working Standard 1st Source CAL S 0.5	75 uL
WHG130730-09	Mercury Working 1st Source CAL S 2.0	300 uL
WHG130730-10	Mercury Working 1st Source CAL S 5.0/CCV	750 uL
WHG130730-11	Mercury Working 1st Source CAL S 10.0	1500 uL
WHG130730-12	Mercury Working 2nd Source S 5.0/ICV	750 uL

Comments:

General Chem Analysis

Case Narrative

General Chemistry Narrative
WC-HANFORD, INC. (WCHN)
SDG X0010

Method/Analysis Information

Product:	**Hexavalent Chromium**		
Analytical Batch:	1319557	**Method:**	SW846_7196A Hexavalent Chromium
Prep Batch :	1319556	**Method:**	SW846 3060A

Sample Analysis

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

Sample ID	Client ID
330229001	J1RTT0
330229002	J1RTT1
330229003	J1RTT2
330229004	J1RTT3
330229005	J1RTT4
330229006	J1RTT5
1202920390	Method Blank (MB)
1202920391	Laboratory Control Sample (LCS)
1202920395	330229001(J1RTT0) Sample Duplicate (DUP)
1202920396	330229001(J1RTT0) Matrix Spike (MS)
1202920397	330229001(J1RTT0) Matrix Spike Duplicate (MSD)
1202920404	Insoluble Lab Control Sample (ILCS)

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

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV# 18.

Preparation/Analytical Method Verification

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

Calibration Information

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

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

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

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

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

Quality Control (QC) Information

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

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

Quality Control (QC) Designation
The following sample was selected for QC analysis: 330229001 (J1RTT0).

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

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD recovery for this sample set was within the required acceptance limits.

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

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

Technical Information

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

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

Sample Dilutions
The following sample in this sample group was diluted due to matrix interference: 330229006 (J1RTT5).

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.

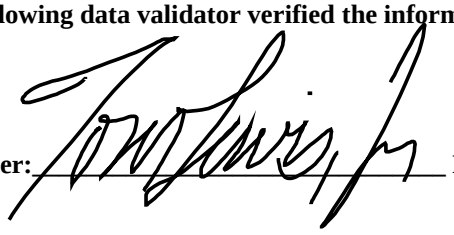
Certification Statement

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:** 08Aug13

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: X0010 GEL Work Order: 330229 Project: RC-232 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).

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.

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 6, 2013

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-232 Soil
Client SDG:	X0010

Client Sample ID:	J1RTT0	Project:	WCHN00213
Sample ID:	330229001	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	23-JUL-13 09:25		
Receive Date:	25-JUL-13		
Collector:	Client		
Moisture:	2.85%		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	BC	0.176	0.164	0.409	mg/kg	1	LXA1	08/06/13	1211	1319557	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	LXA1	08/02/13	1125	1319556

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7196A	

Notes:

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

Certificate of Analysis

Report Date: August 6, 2013

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-232 Soil
Client SDG:	X0010

Client Sample ID:	J1RTT1	Project:	WCHN00213
Sample ID:	330229002	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	23-JUL-13 12:40		
Receive Date:	25-JUL-13		
Collector:	Client		
Moisture:	1.75%		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	BC	0.166	0.154	0.386	mg/kg	1	LXA1	08/06/13	1226	1319557	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	LXA1	08/02/13	1125	1319556

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7196A	

Notes:

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

Certificate of Analysis

Report Date: August 6, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil
Client SDG: X0010

Client Sample ID: J1RTT2
Sample ID: 330229003
Matrix: SOIL
Collect Date: 23-JUL-13 12:56
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.11%
Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.160	0.160	0.401	mg/kg	1	LXA1	08/06/13	1226	1319557	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	LXA1	08/02/13	1125	1319556

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7196A	

Notes:

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

Certificate of Analysis

Report Date: August 6, 2013

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-232 Soil
Client SDG:	X0010

Client Sample ID:	J1RTT3	Project:	WCHN00213
Sample ID:	330229004	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	23-JUL-13 14:10		
Receive Date:	25-JUL-13		
Collector:	Client		
Moisture:	2.96%		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.158	0.158	0.394	mg/kg	1	LXA1	08/06/13	1226	1319557	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	LXA1	08/02/13	1125	1319556

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7196A	

Notes:

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

Certificate of Analysis

Report Date: August 6, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil
Client SDG: X0010

Client Sample ID: J1RTT4
Sample ID: 330229005
Matrix: SOIL
Collect Date: 23-JUL-13 14:25
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.29%
Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.150	0.150	0.375	mg/kg	1	LXA1	08/06/13	1226	1319557	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	LXA1	08/02/13	1125	1319556

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7196A	

Notes:

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

Certificate of Analysis

Report Date: August 6, 2013

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-232 Soil
Client SDG:	X0010

Client Sample ID:	J1RTT5	Project:	WCHN00213
Sample ID:	330229006	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	23-JUL-13 12:20		
Receive Date:	25-JUL-13		
Collector:	Client		
Moisture:	6.47%		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	DU	0.677	0.677	1.69	mg/kg	4	LXA1	08/06/13	1226	1319557	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	LXA1	08/02/13	1125	1319556

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7196A	

Notes:

Quality Control Summary

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

QC Summary

Report Date: August 6, 2013

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

Contact: **Joan Kessner**

Workorder: **330229** **Client SDG:** X0010 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Spectrometric Analysis												
Batch 1319557												
QC1202920395 330229001 DUP												
Hexavalent Chromium		BC	0.176	BC	0.169	mg/kg	4.02 ^		(+/-0.393)	LXA1	08/06/13	12:11
QC1202920404 ILCS												
Hexavalent Chromium	7.98				8.23	mg/kg		103	(80%-120%)		08/06/13	11:44
QC1202920391 LCS												
Hexavalent Chromium	3.99				4.18	mg/kg		105	(80%-120%)		08/06/13	11:44
QC1202920390 MB												
Hexavalent Chromium				B	0.172	mg/kg					08/06/13	11:44
QC1202920396 330229001 MS												
Hexavalent Chromium	3.98	BC	0.176		3.29	mg/kg		78.1	(75%-125%)		08/06/13	12:11
QC1202920397 330229001 MSD												
Hexavalent Chromium	4.09	BC	0.176		3.31	mg/kg	0.694	76.7	(0%-30%)		08/06/13	12:11

Notes:

The Qualifiers in this report are defined as follows:

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ 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: 1317464
Analyst: CXC1
Date/Time: 25-JUL-2013
Procedure Code DRY WEIGHT
Procedure Description Dry Weight-Percent Moisture
Lab Sop: GL-OA-E-020

Sample St	Sample Id	Rpd(%)
DUP	1202915287	**200**

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 (%)
330215001	SAMPLE		BALHD2000D	13:15	7.213	25.65	25.648	18.437	18.435	.011
330215002	SAMPLE		BALHD2000D	13:15	7.329	33.334	32.572	26.005	25.243	2.93
330215003	SAMPLE		BALHD2000D	13:15	7.273	29.517	28.784	22.244	21.511	3.3
330215004	SAMPLE		BALHD2000D	13:15	7.101	31.165	30.495	24.064	23.394	2.78
330215005	SAMPLE		BALHD2000D	13:15	7.204	29.965	29.422	22.761	22.218	2.39
330215006	SAMPLE		BALHD2000D	13:15	7.336	30.635	30.365	23.299	23.029	1.16
330221001	SAMPLE		BALHD2000D	13:15	7.214	30.423	30.421	23.209	23.207	.00862
330221002	SAMPLE		BALHD2000D	13:15	7.279	37.026	36.566	29.747	29.287	1.55
330221003	SAMPLE		BALHD2000D	13:15	7.124	29.924	29.61	22.8	22.486	1.38
330227001	SAMPLE		BALHD2000D	13:15	7.221	33.796	33.793	26.575	26.572	.011
330227002	SAMPLE		BALHD2000D	13:15	7.298	26.534	25.83	19.236	18.532	3.66
330227003	SAMPLE		BALHD2000D	13:15	7.282	28.46	27.643	21.178	20.361	3.86
330229001	SAMPLE		BALHD2000D	13:15	7.205	39.015	38.109	31.81	30.904	2.85
330229002	SAMPLE		BALHD2000D	13:15	7.1	34.965	34.476	27.865	27.376	1.76
330229003	SAMPLE		BALHD2000D	13:15	7.262	35.011	34.426	27.749	27.164	2.11
330229004	SAMPLE		BALHD2000D	13:15	7.203	43.646	42.568	36.443	35.365	2.96
330229005	SAMPLE		BALHD2000D	13:15	7.279	43.105	42.283	35.826	35.004	2.29
330229006	SAMPLE		BALHD2000D	13:15	7.305	25.209	24.05	17.904	16.745	6.47
1202915287	DUP	330215001	BALHD2000D	13:15	7.031	25.928	25.928	18.897	18.897	0

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 18, 2013

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

Re: RC-232 Soil
Work Order: 333337
SDG: X0010A

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 25, 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-232-037
Enclosures

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Case Narrative

Receipt Narrative
for
WC-HANFORD, INC.
SDG: X0010A
Work Order: 333337

September 18, 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 July 25, 2013 for analysis.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
333337001	J1RTT0
333337002	J1RTT1
333337003	J1RTT2
333337004	J1RTT3
333337005	J1RTT4
333337006	J1RTT5

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: Metals.

Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation

330229

1 of 2

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-037

Page ~~2 of 4~~ MMB 7-23-13

Collector: B. Jackson	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: 100-D-107 - Confirmatory Sampling Test Trenches		SAF No.: RC-232
Ice Chest No.: WCH-11-009	Field Logbook No.: EL-1667	COA: C1D107A000	Method of Shipment: fed EX
Shipped To: Eberline - GEL	Offsite Property No.: A120893		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8C

Data Turnaround: 15 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

None

Special Handling and/or Storage

Cool 4 C

Preservation	Cool 4C	Cool 4C	Freeze	Cool 4C	Cool 4C	Cool 4C	Cool 4C			
Type of Container	G/P	G/P	aGs*	aG	aG	aG	aG			
No. of Container(s)	1	1	5	1	1	1	1			
Volume	125mL	125mL	40mL	125mL	125mL	125mL	125mL			
SAMPLE ANALYSIS	See item (1) in Special Instructions	Chromium Hex - 7196	VOA - 5035/8260 (TCL)	TPH-Diesel Range - WTPH-D +	Semi-VOA - 8270A (TCL)	PAHs - 8310	PCBs - 8082			

Sample No.	Matrix	Sample Date	Sample Time									
J1RTR6	SOIL											
J1RTR7	SOIL											
J1RTR8	SOIL											
J1RTR9	SOIL											
J1RTT0	SOIL	7-23-13	0925	X	X							

MMB 7-23-13

MMB 7-23-13

MMB 7-23-13

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
W. (Bo) Jackson	7-23-13/1430	MA Bamberger	7-23-13 1430
MA Bamberger	7-23-13 1515	John Harris	7-23-13 1515
John Harris	7-23-13 1650	Fri 3A 1000 Battelle	7-23-13 1650
Fri #3A 1000 Battelle	7-24-13 1014	John Harris	7-24-13 1014
John Harris	7-24-13 1015	Fed Ex	
		Jennifer Pellegrini	7-25-13 0855

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

SPECIAL INSTRUCTIONS

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

REVIEWED BY CMMB DATE 7-24-13

Generated Date/Time: 07/18/2013 16:36, PDT

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-037

Collector: B. Jackson	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: 100-D-107 - Confirmatory Sampling Test Trenches		SAF No.: RC-232
Ice Chest No.: WCH-11-009	Field Logbook No.: EL-1667	COA: C1D107A000	Method of Shipment: fed Ex
Shipped To: Eberline - GEL	Offsite Property No.: A120893		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8C

Data Turnaround: 15 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

None

Special Handling and/or Storage

Cool 4 C

Preservation	Cool 4C	Cool 4C	Freeze	Cool 4C	Cool 4C	Cool 4C	Cool 4C				
Type of Container	G/P	G/P	aGs*	aG	aG	aG	aG				
No. of Container(s)	1	1	5	1	1	1	1				
Volume	125mL	125mL	40mL	125mL	125mL	125mL	125mL				
SAMPLE ANALYSIS	See item (1) in Special Instructions	Chromium Hex - 7196	VOA - 5035/8260 (TCL)	TPH-Diesel Range - WTPH-D +	Semi-VOA - 8270A (TCL)	PAHs - 8310	PCBs - 8082				
Sample No.	**Matrix**	**Sample Date**	**Sample Time**								
J1RTT1 ✓	SOIL	7-23-13	1240	X	X						
J1RTT2 ✓	SOIL	7-23-13	1256	X	X						
J1RTT3 ✓	SOIL	7-23-13	1410	X	X						
J1RTT4 ✓	SOIL	7-23-13	1425	X	X						
J1RTT5 ✓	SOIL	7-23-13	1220	X	X		X	X	X	X	

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
WCH	W.(B)Jackson 7-23-13/1430	MA Bamberger	7-23-13 1430
MA Bamberger	MA Bamberger 7-23-13 1515	John Harrie	7-23-13 1515
John Harrie	7-23-13 1650	Frig #3A 1060 Battelle	7-23-13 1650
Frig #3A 1060 Battelle	7-24-13 1014	John Harrie	7-24-13 1014
WCH John Harrie	7-24-13 1015	Fed Ex	
		Jennifer Pellegrini	7-25-13 0845

FINAL SAMPLE DISPOSITION

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

SPECIAL INSTRUCTIONS

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

REVIEWED BY CMB DATE 7-24-13

Generated Date/Time: 07/15/2013 08:19, PDT

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WCHN	**SDG/AR/COC/Work Order:** 330229
Received By: JP	**Date Received:** 7-25-13

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?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 cpm
Classified Radioactive II or III by RSO?		✓	If yes, Were swipes taken of sample contatiners < action levels?
COC/Samples marked containing PCBs?		✓	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		✓	If yes, samples are to be segregeated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		✓	

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	✓			Preservation Method: (Ice bags) Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 5
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: 415027091 Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		✓		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
7	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			
14	Carrier and tracking number.				Circle Applicable: (FedEx Air) FedEx Ground UPS Field Services Courier Other 7963 0580 2629

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials QP Date 7-25-13 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 18 September 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

Metals Analysis

Case Narrative

Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG X0010A

Sample Analysis

Sample ID	Client ID
333337001	J1RTT0
333337002	J1RTT1
333337003	J1RTT2
333337004	J1RTT3
333337005	J1RTT4
333337006	J1RTT5
1202947383	Tumbling Blank (TB)
1202948696	Method Blank (MB) **ICP**
1202948697	Laboratory Control Sample (LCS)
1202948700	333337006(J1RTT5L) Serial Dilution (SD)
1202948698	333337006(J1RTT5D) Sample Duplicate (DUP)
1202947382	333337006(J1RTT5S) Matrix Spike (MS)
1202947409	Method Blank (MB) **ICP-MS**
1202947410	Laboratory Control Sample (LCS)
1202947413	333337001(J1RTT0L) Serial Dilution (SD)
1202947411	333337001(J1RTT0D) Sample Duplicate (DUP)
1202947412	333337001(J1RTT0S) Matrix Spike (MS)

Samples 333337 001, 002, 003, 004, 005 and 006 in this SDG were analyzed on a "dry weight" basis. Samples 333337 006 in this SDG were analyzed on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1331520 and 1330995
Prep Batch :	1331519 and 1330994
TCLP Prep Batch :	1330986
Standard Operating Procedures:	GL-MA-E-013 REV# 22, GL-MA-E-008 REV# 14, GL-LB-E-006 REV# 19, GL-MA-E-014 REV# 25 and GL-MA-E-009 REV# 22

Analytical Method:	SW846 3010A/6010C and SW846 3050B/6020A
Prep Method :	SW846 3010A and SW846 3050B
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 - ICPMS was performed on a Perkin Elmer ELAN 6100E inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, 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.

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 samples were selected as the quality control (QC) samples for this SDG: 333337006 (J1RTT5)-ICP and 333337001 (J1RTT0)-ICP-MS.

Matrix Spike (MS) Recovery Statement
The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. All applicable elements met the acceptance criteria.

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.

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. Samples in this SDG were diluted the standard 2x for solids on the ICPMS.

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.

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. The following DER was generated for this SDG: 1221930. 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:** 09/18/13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
16-SEP-13		SOP	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
TCLP TUMBLER	SW846 1311	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1330986	333337006, 333342001, 1202947382, 1202947384		

Potentially affected work order(s)(SDG): 333337(X0010A),333342(XP0003A)

Application Issues:

<100 grams for TCLP tumbling

Specification and Requirements Exception Description:	**DER Disposition:**
1. <100 grams for TCLP tumbling	1. <100 grams for TCLP tumbling due to limited sample volume

Originator's Name:

Edmund Frampton 16-SEP-13

Data Validator/Group Leader:

Richard Dollinger 16-SEP-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: X0010A GEL Work Order: 333337 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

* Duplicate analysis not within control limits

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

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.

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 09/18/13

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

Certificate of Analysis

Report Date: September 18, 2013

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

Client SDG: X0010A

Client Sample ID:	J1RTT0	Project:	WCHN00213
Sample ID:	333337001	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	23-JUL-13 09:25		
Receive Date:	25-JUL-13		
Collector:	Client		
Moisture:	2.85%		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.296	0.296	1.00	mg/kg	2	SKJ	09/17/13	2221	1330995	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	AXG2	09/17/13	0820	1330994

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3050B/6020A	

Notes:

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

Certificate of Analysis

Report Date: September 18, 2013

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

Client SDG: X0010A

Client Sample ID: J1RTT1
Sample ID: 333337002
Matrix: SOIL
Collect Date: 23-JUL-13 12:40
Receive Date: 25-JUL-13
Collector: Client
Moisture: 1.75%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.310	0.310	1.00	mg/kg	2	SKJ	09/17/13	2309	1330995	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	AXG2	09/17/13	0820	1330994

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3050B/6020A	

Notes:

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

Certificate of Analysis

Report Date: September 18, 2013

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

Client SDG: X0010A

Client Sample ID:	J1RTT2	Project:	WCHN00213
Sample ID:	333337003	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	23-JUL-13 12:56		
Receive Date:	25-JUL-13		
Collector:	Client		
Moisture:	2.11%		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.336	0.336	1.02	mg/kg	2	SKJ	09/17/13	2315	1330995	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	AXG2	09/17/13	0820	1330994

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3050B/6020A	

Notes:

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

Certificate of Analysis

Report Date: September 18, 2013

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

Client SDG: X0010A

Client Sample ID:	J1RTT3	Project:	WCHN00213
Sample ID:	333337004	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	23-JUL-13 14:10		
Receive Date:	25-JUL-13		
Collector:	Client		
Moisture:	2.96%		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.328	0.328	1.00	mg/kg	2	SKJ	09/17/13	2321	1330995	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	AXG2	09/17/13	0820	1330994

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3050B/6020A	

Notes:

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

Certificate of Analysis

Report Date: September 18, 2013

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

Client SDG: X0010A

Client Sample ID: J1RTT4
Sample ID: 333337005
Matrix: SOIL
Collect Date: 23-JUL-13 14:25
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.29%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.321	0.321	1.00	mg/kg	2	SKJ	09/17/13	2327	1330995	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	AXG2	09/17/13	0820	1330994

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3050B/6020A	

Notes:

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

Certificate of Analysis

Report Date: September 18, 2013

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

Client SDG: X0010A

Client Sample ID: J1RTT5
Sample ID: 333337006
Matrix: SOIL
Collect Date: 23-JUL-13 12:20
Receive Date: 25-JUL-13
Collector: Client
Moisture: 6.47%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP											
TCLP ICP Metals - 1311/3010A/6010C "As Received"											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	09/17/13	1637	1331520	1
Barium		1.59	0.010	0.050	mg/L	1					
Cadmium	U	0.010	0.010	0.050	mg/L	1					
Chromium	U	0.010	0.010	0.050	mg/L	1					
Lead	U	0.033	0.033	0.100	mg/L	1					
Selenium	U	0.060	0.060	0.300	mg/L	1					
Silver	B	0.0166	0.010	0.050	mg/L	1					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.324	0.324	1.00	mg/kg	2	SKJ	09/17/13	2333	1330995	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	09/16/13	1600	1330986
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	AXG2	09/17/13	0900	1331519
SW846 3050B	ICP-MS 3050BS PREP	AXG2	09/17/13	0820	1330994

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3010A/6010C	
2	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: September 18, 2013

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

Contact: **Joan Kessner**

Workorder: **333337** **Client SDG:** X0010A **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS											
Batch 1330995											
QC1202947411 333337001 DUP											
Selenium		DU	0.296	DU	0.317	mg/kg	N/A ^			SKJ	09/17/13 22:27
QC1202947410 LCS											
Selenium	4.61			D	4.84	mg/kg		105	(80%-120%)		09/17/13 22:03
QC1202947409 MB											
Selenium				DU	0.324	mg/kg					09/17/13 21:57
QC1202947412 333337001 MS											
Selenium	4.85	DU	0.296	D	4.43	mg/kg		91.3	(75%-125%)		09/17/13 22:33
QC1202947413 333337001 SDILT											
Selenium		DU	-0.038	DU	1.48	ug/L	N/A		(0%-10%)		09/17/13 22:45
Metals Analysis-ICP											
Batch 1331520											
QC1202948698 333337006 DUP											
Arsenic		U	0.050	U	0.050	mg/L	N/A ^			HSC	09/17/13 16:40
Barium			1.59		1.58	mg/L	1.21		(0%-20%)		
Cadmium		U	0.010	U	0.010	mg/L	N/A ^				
Chromium		U	0.010	U	0.010	mg/L	N/A ^				
Lead		U	0.033	U	0.033	mg/L	N/A ^				
Selenium		U	0.060	U	0.060	mg/L	N/A ^				
Silver		B	0.0166	U	0.010	mg/L	97.9 ^		(+/-0.050)		
QC1202948697 LCS											
Arsenic	5.00				4.95	mg/L		99	(80%-120%)		09/17/13 16:28
Barium	5.00				4.99	mg/L		99.7	(80%-120%)		
Cadmium	5.00				5.08	mg/L		102	(80%-120%)		
Chromium	5.00				4.90	mg/L		97.9	(80%-120%)		

QC Summary

Workorder: 333337 **Client SDG:** X0010A **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1331520											
Lead	5.00				5.19	mg/L		104	(80%-120%)		
Selenium	5.00				4.76	mg/L		95.2	(80%-120%)	HSC	09/17/13 16:28
Silver	5.00				4.90	mg/L		98.1	(80%-120%)		
QC1202948696 MB											
Arsenic				U	0.050	mg/L					09/17/13 16:22
Barium				B	0.0143	mg/L					
Cadmium				U	0.010	mg/L					
Chromium				U	0.010	mg/L					
Lead				U	0.033	mg/L					
Selenium				U	0.060	mg/L					
Silver				U	0.010	mg/L					
QC1202947382 333337006 MS											
Arsenic	5.00	U	0.050		5.13	mg/L		103	(75%-125%)		09/17/13 16:43
Barium	10.0		1.59		11.2	mg/L		95.6	(75%-125%)		
Cadmium	1.00	U	0.010		1.02	mg/L		102	(75%-125%)		
Chromium	5.00	U	0.010		5.02	mg/L		100	(75%-125%)		
Lead	5.00	U	0.033		5.20	mg/L		104	(75%-125%)		
Selenium	1.00	U	0.060		1.02	mg/L		99.2	(75%-125%)		
Silver	0.503	B	0.0166		0.524	mg/L		101	(75%-125%)		
QC1202948700 333337006 SDILT											
Arsenic		U	-2.64	DU	0.250	ug/L	N/A		(0%-10%)		09/17/13 16:47
Barium			159	CD	32.3	ug/L	1.33		(0%-10%)		
Cadmium		U	-0.0778	DU	0.050	ug/L	N/A		(0%-10%)		
Chromium		U	-0.273	DU	0.050	ug/L	N/A		(0%-10%)		

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QC Summary

Workorder: 333337 **Client SDG:** X0010A **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1331520										
Lead	U	0.723	DU	0.165	ug/L	N/A		(0%-10%)		
Selenium	U	2.84	DU	0.300	ug/L	N/A		(0%-10%)	HSC	09/17/13 16:47
Silver	B	1.66	DU	0.050	ug/L	N/A		(0%-10%)		
QC1202947383 TB										
Arsenic			U	0.050	mg/L					09/17/13 16:25
Barium			BC	0.0183	mg/L					
Cadmium			U	0.010	mg/L					
Chromium			U	0.010	mg/L					
Lead			U	0.033	mg/L					
Selenium			U	0.060	mg/L					
Silver			U	0.010	mg/L					

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

QC Summary

Workorder: 333337 **Client SDG:** X0010A **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	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

Acid Digestion of Total Metals in Aqueous Samples and Extracts for Analysis by ICP and ICP-MS

Batch ID: **1331519.0**
Analyst: Anthony Green
Method: SW846 3010A
Lab SOP: GL-MA-E-008 REV# 14
Instrument: Metals Manual Instrument

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1202948697	Metals Spike Mix I	UI1943364-01	.25	mL
LCS	1202948697	Metals Spike Mix II	UI1943367-06	.25	mL

Sample ID	Run Date	Matrix	Initial Volume (mL)	Final Volume (mL)	Prep Factor (mL/mL)	pH Check
1202948696 MB	17-SEP-2013 09:00:50	Soil	5	50	10	<2
1202947383 TB	17-SEP-2013 09:00:50	Soil	5	50	10	<2
1202948697 LCS	17-SEP-2013 09:00:50	Soil	5	50	10	<2
333337006	17-SEP-2013 09:00:50	Soil	5	50	10	<2
1202947382 MS (333337006)	17-SEP-2013 09:00:50	Soil	5	50	10	<2
1202948698 DUP (333337006)	17-SEP-2013 09:00:50	Soil	5	50	10	<2
1202948700 SDILT (333337006)	17-SEP-2013 09:00:50	Soil	5	50	10	<2
333342001	17-SEP-2013 09:00:50	Soil	5	50	10	<2
1202947384 MS (333342001)	17-SEP-2013 09:00:50	Soil	5	50	10	<2
1202948702 DUP (333342001)	17-SEP-2013 09:00:50	Soil	5	50	10	<2
1202948704 SDILT (333342001)	17-SEP-2013 09:00:50	Soil	5	50	10	<2

Reagent/Solvent Lot ID	Description	Amount
1924940	Concentrated Nitric Acid	3 mL
1961852	HYDROCHLORIC ACID	2.5 mL

Comments:

Block Temperature: 93 C
Thermometer ID: 119015
Hot Block ID: 13

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID: **1330994.0**
Analyst: Anthony Green
Method: SW846 3050B
Lab SOP: GL-MA-E-009 REV# 22
Instrument: BAL-001

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1202947410	ICP-MS spiking soluiton A	UI1960544-A	.25	mL
LCS	1202947410	ICP-MS spiking solution B	UI1960549-B	.25	mL
MS	1202947412	ICP-MS spiking soluiton A	UI1960544-A	.25	mL
MS	1202947412	ICP-MS spiking solution B	UI1960549-B	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1202947409 MB	17-SEP-2013 08:20:19	Soil	0.51	50	98.03922
1202947410 LCS	17-SEP-2013 08:20:19	Soil	0.542	50	92.25092
333337001	17-SEP-2013 08:20:19	Soil	0.574	50	87.10801
1202947411 DUP (333337001)	17-SEP-2013 08:20:19	Soil	0.535	50	93.45794
1202947412 MS (333337001)	17-SEP-2013 08:20:19	Soil	0.531	50	94.16196
1202947413 SDILT (333337001)	17-SEP-2013 08:20:19	Soil	0.574	50	87.10801
333337002	17-SEP-2013 08:20:19	Soil	0.542	50	92.25092
333337003	17-SEP-2013 08:20:19	Soil	0.502	50	99.60159
333337004	17-SEP-2013 08:20:19	Soil	0.518	50	96.5251
333337005	17-SEP-2013 08:20:19	Soil	0.526	50	95.05703
333337006	17-SEP-2013 08:20:19	Soil	0.544	50	91.91176

Reagent/Solvent Lot ID	Description	Amount
1904936-02	Hydrogen Peroxide 30%	1.5 mL
1924940	Concentrated Nitric Acid	5 mL

Comments:

Sample 333337001 consist of multicolored soil with rocks.

Prep Logbook

Toxicity Characteristic Leaching Procedure Preparation

Batch ID: 1330986.0 **Verified by:** _____
Analyst: Edmund Frampton
Method: SW846 1311

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

Sample ID Analysis Start Date	1202947383 TB 16-SEP-2013 16:00:00	333337006 16-SEP-2013 16:00:00	1202947382 MS (333337006) 16-SEP-2013 16:00:00	333342001 16-SEP-2013 16:00:00
100% Solid Y/N		y	y	y
(I) Sub Sample Aliquot I=G-H (g)		40	40	95
Initial pH (su)	4.89	9.85	9.85	8.87
pH Temperature (celsius)		50	50	50
Filtrate pH (su)		6	6	4
Final pH (su)		2.46	2.46	1.48
Tumbler Speed	28	28	28	28
Sample Properties <>/= Water	TCLP 1	Solid	Solid	Solid
(J) 10X Wet Solid Weight 20XI (g)	2000	800	800	1900
Filtrate Volume (mL)	500	100	100	100

Type	Sample Id	Description		Spike Amt	Units
MS	1202947382	TCLP Spiking Solution A/B	UI130117	.25	mL
MS	1202947382	TCLP Spiking Solution Hg	UI1870161	.25	mL
MS	1202947384	TCLP Spiking Solution A/B	UI130117	.25	mL
MS	1202947384	TCLP Spiking Solution Hg	UI1870161	.25	mL
RGNT	All	1N HCl for pH testing	130814	3.5	mL
RGNT	All	TCLP EXTRACTION FLUID 1	T130913-1-1	2000	mL
REGNT	All	Concentrated Nitric Acid	130814-tclp	2	mL

Comments:

Extration End Date: 17-SEP-2013 08:00:00
Filtration End Date: 17-SEP-2013 08:30:13
Bottle Lot Number: 41061300
Filter Lot Number: 400043-3224
Extration Start Temperature: 23 C
Extration End Temperature: 23 C
Filtration End Temperature: 23 C

Prep Logbook

Toxicity Characteristic Leaching Procedure Preparation

Batch ID: **1330986.0** **Verified by:** _____
Analyst: **Edmund Frampton**
Method: **SW846 1311**

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

Sample ID	**1202947384 MS (333342001)**
Analysis Start Date	**16-SEP-2013 16:00:00**

100% Solid Y/N	y
(I) Sub Sample Aliquot I=G-H (g)	95
Initial pH (su)	8.87
pH Temperature (celsius)	50
Filtrate pH (su)	4
Final pH (su)	1.48
Tumbler Speed	28
Sample Properties <>/= Water	Solid
(J) 10X Wet Solid Weight 20XI (g)	1900
Filtrate Volume (mL)	100

Type	Sample Id	Description	Serial Number	Spike Amt	Units
MS	1202947382	TCLP Spiking Solution A/B	UI130117	.25	mL
MS	1202947382	TCLP Spiking Solution Hg	UI1870161	.25	mL
MS	1202947384	TCLP Spiking Solution A/B	UI130117	.25	mL
MS	1202947384	TCLP Spiking Solution Hg	UI1870161	.25	mL
RGNT	All	1N HCl for pH testing	130814	3.5	mL
RGNT	All	TCLP EXTRACTION FLUID 1	T130913-1-1	2000	mL
REGNT	All	Concentrated Nitric Acid	130814-tclp	2	mL

Comments:

Extration End Date: 17-SEP-2013 08:00:00
Filtration End Date: 17-SEP-2013 08:30:13
Bottle Lot Number: 41061300
Filter Lot Number: 400043-3224
Extration Start Temperature: 23 C
Extration End Temperature: 23 C
Filtration End Temperature: 23 C