

**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 4/1/14  
INITIAL/DATE

**COMMENTS:**

**SDG X0033**

**SAF-RC-232**

Rad only

Chem only

Rad & Chem

Complete

Partial

**Sample Location: 100-B-35 (151-B primary substation)**



March 19, 2014

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

Re: RC-232 Soil  
Work Order: 343912  
SDG: X0033

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 04, 2014. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Orlette Johnson  
Project Manager

Purchase Order: 1510  
Chain of Custody: RC-232-079 and RC-232-080  
Enclosures



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# Case Narrative

**Receipt Narrative  
for  
WC-HANFORD, INC.  
SDG: X0033  
Work Order: 343912**

**March 19, 2014**

**Laboratory Identification:**

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

**Summary:**

**Sample receipt:** The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on March 04, 2014 for analysis.

**Sample Identification:** The laboratory received the following samples:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
343912001	J1TF03
343912002	J1TF04
343912003	J1TF05
343912004	J1TF06
343912005	J1TF07
343912006	J1TF08
343912007	J1TF09
343912008	J1TF10
343912009	J1TF11
343912010	J1TF33
343912011	J1TF34
343912012	J1TF35
343912013	J1TF36

**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, HPLC Polynuclear Aromatic Hydrocarbon and Metals.



Orlette Johnson  
Project Manager

# **Chain of Custody and Supporting Documentation**

**Washington Closure Hanford**  
 Collector *E. White*  
 Project Designation  
 100-IU-2 & 100-IU-6 Remaining Waste Sites  
 Ice Chest No. *WCH-11-001*  
 Shipped To  
 GEL Laboratories Charlston  
 Other Labs Shipped To  
 Eberline Services Oak Ridge  
 Radiological Counting Facility

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**  
 Company Contact  
 Joan Kessner  
 Telephone No.  
 375-4688  
 Project Coordinator  
 KESSNER, JH  
 SAF No.  
 RC-232  
 Method of Shipment  
 Commerical Carrier - *fed ex*  
 Bill of Lading/Air Bill No.  
*See OSPC*

**CHAIN OF POSSESSION**  
 Relinquished By/Removed From  
*E. White* 2-28-14 1218  
 Relinquished By/Removed From  
 DWShea 2/28/14 1315  
 Relinquished By/Removed From  
 Fridge 3A 2/28/14 1022  
 Relinquished By/Removed From  
 DWShea 2/28/14 1022  
 Relinquished By/Removed From  
 Fed Ex  
 Relinquished By/Removed From  
 DWShea 2/28/14 1022  
 Relinquished By/Removed From  
 Fed Ex  
 Relinquished By/Removed From  
 DWShea 2/28/14 1022  
 Relinquished By/Removed From  
 Fed Ex  
 Relinquished By/Removed From  
 DWShea 2/28/14 1022

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Freeze
J1TF03	SOIL	2/28/14	0941	125mL	G/P	125mL	125mL	125mL	none
J1TF04	SOIL	2/28/14	0950	125mL	125mL	125mL	125mL	125mL	aG
J1TF05	SOIL	2/28/14	1005	125mL	125mL	125mL	125mL	125mL	1
J1TF06	SOIL	2/28/14	1045	125mL	125mL	125mL	125mL	125mL	5
J1TF07	SOIL	2/28/14	1035	125mL	125mL	125mL	125mL	125mL	1

**POSSIBLE SAMPLE HAZARDS/REMARKS**  
 None

**Special Handling and/or Storage**  
 Perform leach on TCLP sample and hold for instructions from J. Kessner

**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)

*Perform leach of TCLP analysis and hold pending instructions from J. Kessner - DWShea 2/24/14*

**REVIEWED BY**  
*K. WOOD VINCENZI*  
**DATE**  
*2-3-14*  
*3/3/14 amb*





**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>WCHN</u>		SDG/AR/COC/Work Order: <u>343912 343914</u>	
Received By: <u>H. Taylor</u>		Date Received: <u>030414</u>	
<b>Suspected Hazard Information</b>		*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): <u>00cpm</u>	
Classified Radioactive II or III by RSO?		If yes, Were swipes taken of sample containers < action levels?	
COC/Samples marked containing PCBs?			
Package, COC, and/or Samples marked as beryllium or asbestos containing?		If yes, samples are to be segregated 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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: <u>Ice bags</u> Blue ice Dry ice None Other (describe) <u>4</u> *all temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>130462161</u> Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7 Are Encore containers present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7980 9187 6124</u>

Comments (Use Continuation Form if needed):

# **Laboratory Certifications**

**List of current GEL Certifications as of 19 March 2014**

<b>State</b>	<b>Certification</b>
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013-10
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA130005
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122014-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68-00485
Plant Material Permit	PDEP-12-00260
South Carolina Chemistry	10120001
South Carolina GVL	23611001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235-14-9
Utah NELAP	SC000122013-11
Vermont	VT87156
Virginia NELAP	460202
Washington	C780-12
Wisconsin	999887790

# **HPLC Polynuclear Aromatic Hydrocarbon Analysis**

**HPLC-PAH  
WC-HANFORD, INC. (WCHN)  
SDG X0033**

**Method/Analysis Information**

**Procedure:** Polynuclear Aromatic Hydrocarbons  
Analytical Method: SW846 8310  
Prep Method: SW846 3550B  
Analytical Batch Number: 1370872  
Prep Batch Number: 1370869

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
343912001	J1TF03
343912002	J1TF04
343912003	J1TF05
343912004	J1TF06
343912005	J1TF07
343912006	J1TF08
343912007	J1TF09
343912008	J1TF10
343912009	J1TF11
343912010	J1TF33
343912011	J1TF34
343912012	J1TF35
1203046265	Method Blank (MB)
1203046266	Laboratory Control Sample (LCS)
1203046267	343912002(J1TF04) Matrix Spike (MS)
1203046268	343912002(J1TF04) 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**

The surrogate, Decafluorobiphenyl, was not detected in sample, 343912008 (J1TF10). The recovery limits are 23-104%. The surrogate may not have been detected due to the nature of the sample matrix. It was necessary to dilute the final extract to 5 ml due to its oily nature. Prior to putting the sample on the instrument, a second dilution at 1:10 was needed. The data are reported with the appropriate DER.

#### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

#### **QC Sample Designation**

Client sample 343912002 (J1TF04) 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**

A biased high recovery for Anthracene was observed in the MSD (1203046268). The recovery was 93% with an acceptance range of 49-91%. The biased high recovery observed in the MSD may be due to vagaries in the extraction process. The target analyte was 'T' qualified in the associated samples. The data are reported with the appropriate DER.

#### **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**

Analyst received the extract for sample 343912008 (J1TF10) at a 1 ml aliquot. However, the extract was mostly oily in nature, so it was diluted up to 5 ml with additional Acetonitrile. The sample was analyzed at further dilutions, and the most concentrated dilution feasible was at an additional 1:10 dilution. Target analytes were 'D' qualified.

Due to the nature of the sample extract, sample 343912011 (J1TF34) was initially analyzed at a 1:5 dilution. Upon review of the data, that dilution was not sufficient. Most detection observed in the sample were split peaks due to detector overload. The data was not reportable. The sample was re-analyzed at dilutions of 1:50 and 1:1000. Target analytes were 'D' qualified and reported from the appropriate dilution.

Parmname	343912	
	008	011
Acenaphthene	10X	50X
Acenaphthylene	10X	50X
Anthracene	10X	50X
Benzo(a)anthracene	10X	1000X
Benzo(a)pyrene	10X	1000X
Benzo(b)fluoranthene	10X	1000X
Benzo(ghi)perylene	10X	50X
Benzo(k)fluoranthene	10X	1000X
Chrysene	10X	1000X
Decafluorobiphenyl	10X	1000X 50X
Dibenzo(a,h)anthracene	10X	50X
Fluoranthene	10X	1000X
Fluorene	10X	50X
Indeno(1,2,3-cd)pyrene	10X	50X
Naphthalene	10X	50X
Phenanthrene	10X	50X
Pyrene	10X	1000X

### **Sample Re-extraction/Re-analysis**

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

## **Miscellaneous Information:**

### **Data Exception (DER) Documentation**

Data Exception Report 1273636 was generated for this SDG.

The surrogate, Decafluorobiphenyl, was not detected in sample, 343912008 (J1TF10). The recovery limits are 23-104%. The surrogate may not have been detected due to the nature of the sample matrix. It was necessary to dilute the final extract to 5 ml due to its oily nature. Prior to putting the sample on the instrument, a second dilution at 1:10 was needed. The data are reported with the appropriate DER.

A biased high recovery for Anthracene was observed in the MSD (1203046268). The recovery was 93% with an acceptance range of 49-91%. The biased high recovery observed in the MSD may be due to vagaries in the extraction process. The target analyte was "T" qualified in the associated samples. The data are reported with the appropriate DER.

### **Manual Integrations**

Some initial calibration standards, continuing calibration standards, and samples required manual integrations due to software limitations. Please see the raw data in the Miscellaneous Section.

Due to an unknown eluting between Benzo(b)fluoranthene and Benzo(k)fluoranthene, it was necessary to manually integrate one or both peaks for the DAD detector for samples 343912003 (J1TF05), 343912005 (J1TF07), 343912006 (J1TF08) and 343912011 (J1TF34). Analyst judgment was used to make the best integration. Please see the raw data in the Miscellaneous Section.

### **Additional Comments**

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

Due to the nature of several sample extracts, instrument blanks were analyzed between some samples to prevent possible matrix carryover.

One or more analytes were detected whose concentration greatly differed between the primary and confirmation analysis (greater than 40% difference or RPD) in samples 343912008 (J1TF10) and 343912011 (J1TF34). Because both detectors indicated an acceptable peak in the appropriate retention time window for these analytes, the analytes are reported as positive results. Due to the high percent difference or RPD between the two detectors, it is indicated as such on the appropriate Form I/Certificate of Analysis (C of A) with a 'P' qualifier. Those analytes reported with a percent difference or RPD greater than 40% but less than 70% are qualified as presumptive evidence of the presence of the material.

### **Electronic Package Comment**

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

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

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

### **System Configuration**

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

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

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

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

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

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

### **Chromatographic Columns**

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

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

### **Certification Statement**

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

**DATA EXCEPTION REPORT**

<b>Mo.Day Yr.</b> 11-MAR-14	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> HPLC	<b>Test / Method:</b> SW846 8310	<b>Matrix Type:</b> Solid	<b>Client Code:</b> WCHN
<b>Batch ID:</b> 1370872	<b>Sample Numbers:</b> See Below		

**Potentially affected work order(s)(SDG): 343912(X0033),344042(XP0055)**

**Application Issues:**

Failed Recovery for MSD/PSD  
Failed Recovery for MS/PS  
Failed Yield for Surrogates

**Specification and Requirements  
Exception Description:**

1. The surrogate, Decafluorobiphenyl, was not detected in sample, 343912008 (J1TF10). The recovery limits are 23-104%.
2. A biased high recovery for Anthracene was observed in the MSD (1203046268). The recovery was 93% with an acceptance range of 49-91%.
3. Biased high recoveries for Fluorene and Anthracene were observed in the MS (1203046269). The recovery of Fluorene was 90.1% with an acceptance range of 51-90%, and the recovery of Anthracene was 94% with an acceptance range of 49-91%.

**DER Disposition:**

1. The surrogate may not have been detected due to the nature of the sample matrix. It was necessary to dilute the final extract to 5 ml due to its oily nature. Prior to putting the sample on the instrument, a second dilution at 1:10 was needed. The data are reported with the appropriate DER, and the discrepancy is noted in the Case Narrative.
2. The biased high recovery observed in the MSD may be due to vagaries in the extraction process. The target analyte was 'T' qualified in the associated samples. The data are reported with the appropriate DER, and the discrepancy is noted in the Case Narrative.
3. The biased high recoveries observed in the MS may be due to vagaries in the extraction process. The target analytes were 'T' qualified in the associated sample. The data are reported with the appropriate DER, and the discrepancy is noted in the Case Narrative.

**Originator's Name:**

Charles Wilson 12-MAR-14

**Data Validator/Group Leader:**

Michael Penny 12-MAR-14

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0033 GEL Work Order: 343912 Project: RC-232 Soil

#### The Qualifiers in this report are defined as follows:

- D Results are reported from a diluted aliquot of sample.
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- 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.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

#### Review/Validation

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

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

Signature: 

Name: Michael Penny

Date: 13 MAR 2014

Title: Group Leader

## Roadmap for WCHN X0033 HPLC\_PAH

This roadmap was analyzed by cww on 03-12-2014, 13:17.

This roadmap was reviewed by map on 03-12-2014, 13:55.

This roadmap was packaged by map on 03-13-2014, 09:49.

Sample											
exclude	manual	datafile	smplid	injdate	injtime	sublist	clientid	dilution	batchid	comment	
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0706.d	343912001	07-MAR-2014	12:57	X0033.sub	JITF03	1	1370872		
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0708.d	343912002	07-MAR-2014	14:22	X0033.sub	JITF04	1	1370872		
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0711.d	343912003	07-MAR-2014	16:28	X0033.sub	JITF05	1	1370872		
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0712.d	343912004	07-MAR-2014	17:11	X0033.sub	JITF06	1	1370872		
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0716.d	343912005	07-MAR-2014	19:59	X0033.sub	JITF07	1	1370872		
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0717.d	343912006	07-MAR-2014	20:41	X0033.sub	JITF08	1	1370872		
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0718.d	343912007	07-MAR-2014	21:23	X0033.sub	JITF09	1	1370872		
<input checked="" type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0719.d	343912008	07-MAR-2014	22:06	X0033.sub	JITF10	200	1370872	Duse, too dilute. See ph5c0743	
<input checked="" type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0740.d	343912008	08-MAR-2014	12:50	X0033.sub	JITF10DL	20	1370872	Duse, too dilute. See ph5c0743	
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0743.d	343912008	08-MAR-2014	14:57	X0033.sub	JITF10	10	1370872		
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0722.d	343912009	08-MAR-2014	00:12	X0033.sub	JITF11	1	1370872		
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0723.d	343912010	08-MAR-2014	00:54	X0033.sub	JITF33	1	1370872		
<input checked="" type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0724.d	343912011	08-MAR-2014	01:36	X0033.sub	JITF34	5	1370872	Duse, not dilute enough, split peaks. See ph5c0733 & ph5c0735	
<input checked="" type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0736.d	343912011	08-MAR-2014	10:02	X0033.sub	JITF34DL	250	1370872	Duse, not needed. Report from ph5c0735	
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0733.d	343912011	08-MAR-2014	07:55	X0033.sub	JITF34	50	1370872	Report w/ ph5c0735	
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0735.d	343912011	08-MAR-2014	09:20	X0033.sub	JITF34DL2	1000	1370872	(DL)	
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0728.d	343912012	08-MAR-2014	04:25	X0033.sub	JITF35	1	1370872		

QC Sample											
exclude	manual	datafile	smplid	sampletype	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0704.d	1203046265	mb	07-MAR-2014	11:33	X0033.sub	PAHBLK01	1	1370872	
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0705.d	1203046266	lcs	07-MAR-2014	12:15	X0033.sub	PAHBLK01LCS	1	1370872	Pass
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0709.d	1203046267	ms	07-MAR-2014	15:04	X0033.sub	JITF04MS	1	1370872	Pass
<input type="checkbox"/>	N	/chem/hplce.i/p030714.b/ph5c0710.d	1203046268	msd	07-MAR-2014	15:46	X0033.sub	JITF04MSD	1	1370872	Anthracene high

# **Sample Data Summary**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: X0033

Client Sample ID: J1TF03	Project: WCHN00213
Sample ID: 343912001	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28-FEB-14 09:41	
Receive Date: 04-MAR-14	
Collector: Client	
Moisture: 5.41%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	U	5.28	5.28	17.6	ug/kg	1	CWW	03/07/14	1257	1370872	1
Acenaphthylene	U	5.28	5.28	17.6	ug/kg	1					
Anthracene	JT	6.16	1.76	17.6	ug/kg	1					
Benzo(a)anthracene		44.6	0.563	1.76	ug/kg	1					
Benzo(a)pyrene		43.0	0.563	1.76	ug/kg	1					
Benzo(b)fluoranthene		57.7	0.563	1.76	ug/kg	1					
Benzo(ghi)perylene		40.7	0.563	1.76	ug/kg	1					
Benzo(k)fluoranthene	U	0.281	0.281	0.879	ug/kg	1					
Chrysene		40.0	0.563	1.76	ug/kg	1					
Dibenzo(a,h)anthracene		4.18	0.563	1.76	ug/kg	1					
Fluoranthene		56.7	0.563	1.76	ug/kg	1					
Fluorene	U	5.28	5.28	17.6	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.563	0.563	1.76	ug/kg	1					
Naphthalene	U	5.28	5.28	17.6	ug/kg	1					
Phenanthrene		23.2	5.28	17.6	ug/kg	1					
Pyrene		51.7	0.563	1.76	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	03/06/14	1755	1370869

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"	5340 ug/kg	8790	60.8	(23%-104%)

**Notes:**

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## Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: X0033

Client Sample ID: J1TF04  
 Sample ID: 343912002  
 Matrix: SOIL  
 Collect Date: 28-FEB-14 09:50  
 Receive Date: 04-MAR-14  
 Collector: Client  
 Moisture: 10%

Project: WCHN00213  
 Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	U	5.54	5.54	18.5	ug/kg	1	CWW	03/07/14	1422	1370872	1
Acenaphthylene	U	5.54	5.54	18.5	ug/kg	1					
Anthracene	TU	1.85	1.85	18.5	ug/kg	1					
Benzo(a)anthracene		5.53	0.591	1.85	ug/kg	1					
Benzo(a)pyrene		4.74	0.591	1.85	ug/kg	1					
Benzo(b)fluoranthene		9.06	0.591	1.85	ug/kg	1					
Benzo(ghi)perylene		3.72	0.591	1.85	ug/kg	1					
Benzo(k)fluoranthene	U	0.296	0.296	0.924	ug/kg	1					
Chrysene		6.49	0.591	1.85	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.591	0.591	1.85	ug/kg	1					
Fluoranthene		14.6	0.591	1.85	ug/kg	1					
Fluorene	U	5.54	5.54	18.5	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.591	0.591	1.85	ug/kg	1					
Naphthalene	U	5.54	5.54	18.5	ug/kg	1					
Phenanthrene	J	6.16	5.54	18.5	ug/kg	1					
Pyrene		12.6	0.591	1.85	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	03/06/14	1755	1370869

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"	6030 ug/kg	9240	65.3	(23%-104%)

Notes:

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## Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: X0033

Client Sample ID: J1TF05	Project: WCHN00213
Sample ID: 343912003	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28-FEB-14 10:05	
Receive Date: 04-MAR-14	
Collector: Client	
Moisture: 6.81%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	U	5.36	5.36	17.9	ug/kg	1	CWW	03/07/14	1628	1370872	1
Acenaphthylene	U	5.36	5.36	17.9	ug/kg	1					
Anthracene	T	34.0	1.79	17.9	ug/kg	1					
Benzo(a)anthracene		81.7	0.571	1.79	ug/kg	1					
Benzo(a)pyrene		44.2	0.571	1.79	ug/kg	1					
Benzo(b)fluoranthene		74.7	0.571	1.79	ug/kg	1					
Benzo(ghi)perylene		24.3	0.571	1.79	ug/kg	1					
Benzo(k)fluoranthene		30.8	0.286	0.893	ug/kg	1					
Chrysene		71.9	0.571	1.79	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.571	0.571	1.79	ug/kg	1					
Fluoranthene		198	0.571	1.79	ug/kg	1					
Fluorene	J	10.0	5.36	17.9	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.571	0.571	1.79	ug/kg	1					
Naphthalene	U	5.36	5.36	17.9	ug/kg	1					
Phenanthrene		101	5.36	17.9	ug/kg	1					
Pyrene		177	0.571	1.79	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	03/06/14	1755	1370869

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"	5910 ug/kg	8930	66.2	(23%-104%)

**Notes:**

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## Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: X0033

Client Sample ID: J1TF06	Project: WCHN00213
Sample ID: 343912004	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28-FEB-14 10:45	
Receive Date: 04-MAR-14	
Collector: Client	
Moisture: 7.02%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	U	5.37	5.37	17.9	ug/kg	1	CWW	03/07/14	1711	1370872	1
Acenaphthylene	U	5.37	5.37	17.9	ug/kg	1					
Anthracene	TU	1.79	1.79	17.9	ug/kg	1					
Benzo(a)anthracene	J	1.34	0.572	1.79	ug/kg	1					
Benzo(a)pyrene	J	1.63	0.572	1.79	ug/kg	1					
Benzo(b)fluoranthene		1.84	0.572	1.79	ug/kg	1					
Benzo(ghi)perylene	U	0.572	0.572	1.79	ug/kg	1					
Benzo(k)fluoranthene	U	0.286	0.286	0.894	ug/kg	1					
Chrysene	J	0.918	0.572	1.79	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.572	0.572	1.79	ug/kg	1					
Fluoranthene		2.35	0.572	1.79	ug/kg	1					
Fluorene	U	5.37	5.37	17.9	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.572	0.572	1.79	ug/kg	1					
Naphthalene	U	5.37	5.37	17.9	ug/kg	1					
Phenanthrene	U	5.37	5.37	17.9	ug/kg	1					
Pyrene		2.30	0.572	1.79	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	03/06/14	1755	1370869

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"	5040 ug/kg	8940	56.3	(23%-104%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: X0033

Client Sample ID: J1TF07	Project: WCHN00213
Sample ID: 343912005	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28-FEB-14 10:35	
Receive Date: 04-MAR-14	
Collector: Client	
Moisture: 6.38%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	U	5.34	5.34	17.8	ug/kg	1	CWW	03/07/14	1959	1370872	1
Acenaphthylene	U	5.34	5.34	17.8	ug/kg	1					
Anthracene	TU	1.78	1.78	17.8	ug/kg	1					
Benzo(a)anthracene		3.17	0.570	1.78	ug/kg	1					
Benzo(a)pyrene		2.32	0.570	1.78	ug/kg	1					
Benzo(b)fluoranthene		3.60	0.570	1.78	ug/kg	1					
Benzo(ghi)perylene	U	0.570	0.570	1.78	ug/kg	1					
Benzo(k)fluoranthene	U	0.285	0.285	0.890	ug/kg	1					
Chrysene		2.21	0.570	1.78	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.570	0.570	1.78	ug/kg	1					
Fluoranthene		4.39	0.570	1.78	ug/kg	1					
Fluorene	U	5.34	5.34	17.8	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.570	0.570	1.78	ug/kg	1					
Naphthalene	U	5.34	5.34	17.8	ug/kg	1					
Phenanthrene	U	5.34	5.34	17.8	ug/kg	1					
Pyrene		4.64	0.570	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	03/06/14	1755	1370869

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"	6310 ug/kg	8900	70.9	(23%-104%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: X0033

Client Sample ID: J1TF08	Project: WCHN00213
Sample ID: 343912006	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28-FEB-14 10:23	
Receive Date: 04-MAR-14	
Collector: Client	
Moisture: 6.44%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	U	5.34	5.34	17.8	ug/kg	1	CWW	03/07/14	2041	1370872	1
Acenaphthylene	U	5.34	5.34	17.8	ug/kg	1					
Anthracene	JT	3.02	1.78	17.8	ug/kg	1					
Benzo(a)anthracene		22.0	0.569	1.78	ug/kg	1					
Benzo(a)pyrene		16.1	0.569	1.78	ug/kg	1					
Benzo(b)fluoranthene		18.6	0.569	1.78	ug/kg	1					
Benzo(ghi)perylene		13.3	0.569	1.78	ug/kg	1					
Benzo(k)fluoranthene		10.1	0.285	0.890	ug/kg	1					
Chrysene		13.0	0.569	1.78	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.569	0.569	1.78	ug/kg	1					
Fluoranthene		31.0	0.569	1.78	ug/kg	1					
Fluorene	U	5.34	5.34	17.8	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.569	0.569	1.78	ug/kg	1					
Naphthalene	U	5.34	5.34	17.8	ug/kg	1					
Phenanthrene	J	9.44	5.34	17.8	ug/kg	1					
Pyrene		30.5	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	03/06/14	1755	1370869

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"	6060 ug/kg	8900	68.1	(23%-104%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: X0033

Client Sample ID: J1TF09	Project: WCHN00213
Sample ID: 343912007	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28-FEB-14 09:18	
Receive Date: 04-MAR-14	
Collector: Client	
Moisture: 6.82%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	U	5.36	5.36	17.9	ug/kg	1	CWW	03/07/14	2123	1370872	1
Acenaphthylene	U	5.36	5.36	17.9	ug/kg	1					
Anthracene	TU	1.79	1.79	17.9	ug/kg	1					
Benzo(a)anthracene		15.2	0.571	1.79	ug/kg	1					
Benzo(a)pyrene		15.0	0.571	1.79	ug/kg	1					
Benzo(b)fluoranthene		35.1	0.571	1.79	ug/kg	1					
Benzo(ghi)perylene		21.2	0.571	1.79	ug/kg	1					
Benzo(k)fluoranthene	U	0.286	0.286	0.893	ug/kg	1					
Chrysene		14.9	0.571	1.79	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.571	0.571	1.79	ug/kg	1					
Fluoranthene		24.1	0.571	1.79	ug/kg	1					
Fluorene	U	5.36	5.36	17.9	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.571	0.571	1.79	ug/kg	1					
Naphthalene	U	5.36	5.36	17.9	ug/kg	1					
Phenanthrene	J	9.49	5.36	17.9	ug/kg	1					
Pyrene		26.2	0.571	1.79	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	03/06/14	1755	1370869

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"	4710 ug/kg	8930	52.8	(23%-104%)

**Notes:**



# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: X0033

Client Sample ID: J1TF11	Project: WCHN00213
Sample ID: 343912009	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28-FEB-14 10:52	
Receive Date: 04-MAR-14	
Collector: Client	
Moisture: 5.2%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	U	5.26	5.26	17.5	ug/kg	1	CWW	03/08/14	0012	1370872	1
Acenaphthylene	U	5.26	5.26	17.5	ug/kg	1					
Anthracene	TU	1.75	1.75	17.5	ug/kg	1					
Benzo(a)anthracene		6.83	0.561	1.75	ug/kg	1					
Benzo(a)pyrene		3.73	0.561	1.75	ug/kg	1					
Benzo(b)fluoranthene		5.99	0.561	1.75	ug/kg	1					
Benzo(ghi)perylene		3.10	0.561	1.75	ug/kg	1					
Benzo(k)fluoranthene	U	0.280	0.280	0.876	ug/kg	1					
Chrysene		4.95	0.561	1.75	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.561	0.561	1.75	ug/kg	1					
Fluoranthene		13.1	0.561	1.75	ug/kg	1					
Fluorene	U	5.26	5.26	17.5	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.561	0.561	1.75	ug/kg	1					
Naphthalene	U	5.26	5.26	17.5	ug/kg	1					
Phenanthrene	J	5.87	5.26	17.5	ug/kg	1					
Pyrene		11.7	0.561	1.75	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	03/06/14	1755	1370869

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"	5490 ug/kg	8760	62.6	(23%-104%)

**Notes:**



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## Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: X0033

Client Sample ID: J1TF34      Project: WCHN00213  
 Sample ID: 343912011      Client ID: WCHN001  
 Matrix: SOIL  
 Collect Date: 28-FEB-14 08:52  
 Receive Date: 04-MAR-14  
 Collector: Client  
 Moisture: 12.1%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	DU	284	284	947	ug/kg	50	CWW	03/08/14	0755	1370872	1
Acenaphthylene	DU	284	284	947	ug/kg	50					
Anthracene	DT	42100	94.7	947	ug/kg	50					
Benzo(ghi)perylene	D	11800	30.3	94.7	ug/kg	50					
Dibenzo(a,h)anthracene	D	2310	30.3	94.7	ug/kg	50					
Fluorene	DP	7040	284	947	ug/kg	50					
Indeno(1,2,3-cd)pyrene	DU	30.3	30.3	94.7	ug/kg	50					
Naphthalene	DU	284	284	947	ug/kg	50					
Phenanthrene	D	94600	284	947	ug/kg	50					
Benzo(a)anthracene	D	133000	606	1890	ug/kg	1000	CWW	03/08/14	0920	1370872	2
Benzo(a)pyrene	D	48200	606	1890	ug/kg	1000					
Benzo(b)fluoranthene	D	79500	606	1890	ug/kg	1000					
Benzo(k)fluoranthene	D	38600	303	947	ug/kg	1000					
Chrysene	D	83900	606	1890	ug/kg	1000					
Fluoranthene	D	254000	606	1890	ug/kg	1000					
Pyrene	D	228000	606	1890	ug/kg	1000					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	AXV1	03/06/14	1755	1370869

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8310	
2	SW846 8310	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	6470 ug/kg	9470	68.3	(23%-104%)
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	7090 ug/kg	9470	74.8	(23%-104%)

**Notes:**

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## Certificate of Analysis

Report Date: March 12, 2014

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

Client SDG: X0033

Client Sample ID: J1TF35	Project: WCHN00213
Sample ID: 343912012	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28-FEB-14 08:27	
Receive Date: 04-MAR-14	
Collector: Client	
Moisture: 7.19%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	U	5.37	5.37	17.9	ug/kg	1	CWW	03/08/14	0425	1370872	1
Acenaphthylene	U	5.37	5.37	17.9	ug/kg	1					
Anthracene	TU	1.79	1.79	17.9	ug/kg	1					
Benzo(a)anthracene		5.22	0.573	1.79	ug/kg	1					
Benzo(a)pyrene		4.24	0.573	1.79	ug/kg	1					
Benzo(b)fluoranthene		6.69	0.573	1.79	ug/kg	1					
Benzo(ghi)perylene		3.12	0.573	1.79	ug/kg	1					
Benzo(k)fluoranthene	U	0.287	0.287	0.896	ug/kg	1					
Chrysene		5.60	0.573	1.79	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.573	0.573	1.79	ug/kg	1					
Fluoranthene		11.0	0.573	1.79	ug/kg	1					
Fluorene	U	5.37	5.37	17.9	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.573	0.573	1.79	ug/kg	1					
Naphthalene	U	5.37	5.37	17.9	ug/kg	1					
Phenanthrene	J	6.13	5.37	17.9	ug/kg	1					
Pyrene		12.8	0.573	1.79	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	03/06/14	1755	1370869

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"	5700 ug/kg	8960	63.7	(23%-104%)

**Notes:**

# QC Summary

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: March 12, 2014

Page 1 of 4

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

**Workorder: 343912**

**Client SDG: X0033**

**Project Description: RC-232 Soil**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1370872										
QC1203046266	LCS										
Acenaphthene	1670			1360	ug/kg		81.9	(58%-99%)	CWW	03/07/14	12:15
Acenaphthylene	1670			1350	ug/kg		81.1	(58%-98%)			
Anthracene	1670			1540	ug/kg		92.6	(63%-94%)			
Benzo(a)anthracene	167			148	ug/kg		89	(73%-98%)			
Benzo(a)pyrene	167			130	ug/kg		78	(63%-99%)			
Benzo(b)fluoranthene	167			146	ug/kg		87.4	(70%-130%)			
Benzo(ghi)perylene	167			143	ug/kg		85.9	(70%-130%)			
Benzo(k)fluoranthene	83.3			68.1	ug/kg		81.8	(70%-130%)			
Chrysene	167			166	ug/kg		99.9	(70%-130%)			
Dibenzo(a,h)anthracene	167			170	ug/kg		102	(70%-130%)			
Fluoranthene	167			143	ug/kg		85.6	(70%-130%)			
Fluorene	1670			1420	ug/kg		85.2	(65%-130%)			
Indeno(1,2,3-cd)pyrene	167			154	ug/kg		92.7	(70%-130%)			
Naphthalene	1670			1310	ug/kg		78.5	(57%-130%)			
Phenanthrene	1670			1430	ug/kg		86	(70%-130%)			
Pyrene	167			154	ug/kg		92.2	(70%-130%)			
**Decafluorobiphenyl	8330			6520	ug/kg		78.3	(23%-104%)			
QC1203046265	MB										
Acenaphthene			U	4.99	ug/kg					03/07/14	11:33
Acenaphthylene			U	4.99	ug/kg						

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## QC Summary

Workorder: 343912

Client SDG: X0033

Project Description: RC-232 Soil

Page 2 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1370872										
Anthracene			U	1.66	ug/kg						
Benzo(a)anthracene			U	0.532	ug/kg				CWW	03/07/14	11:33
Benzo(a)pyrene			U	0.532	ug/kg						
Benzo(b)fluoranthene			U	0.532	ug/kg						
Benzo(ghi)perylene			U	0.532	ug/kg						
Benzo(k)fluoranthene			U	0.266	ug/kg						
Chrysene			U	0.532	ug/kg						
Dibenzo(a,h)anthracene			U	0.532	ug/kg						
Fluoranthene			U	0.532	ug/kg						
Fluorene			U	4.99	ug/kg						
Indeno(1,2,3-cd)pyrene			U	0.532	ug/kg						
Naphthalene			U	4.99	ug/kg						
Phenanthrene			U	4.99	ug/kg						
Pyrene			U	0.532	ug/kg						
**Decafluorobiphenyl	8320			6230	ug/kg		74.9	(23%-104%)			
QC1203046267 343912002 MS											
Acenaphthene	1850	U	5.54	1470	ug/kg		79.2	(49%-90%)		03/07/14	15:04
Acenaphthylene	1850	U	5.54	1430	ug/kg		77.3	(48%-97%)			
Anthracene	1850	TU	1.85	1630	ug/kg		88.3	(49%-91%)			
Benzo(a)anthracene	185		5.53	159	ug/kg		82.9	(29%-126%)			
Benzo(a)pyrene	185		4.74	153	ug/kg		79.9	(26%-130%)			
Benzo(b)fluoranthene	185		9.06	158	ug/kg		80.3	(32%-135%)			
Benzo(ghi)perylene	185		3.72	149	ug/kg		78.6	(34%-125%)			

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## QC Summary

Workorder: **343912**

Client SDG: X0033

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1370872										
Benzo(k)fluoranthene	92.5	U	0.296		76.9	ug/kg		83.2 (48%-142%)	CWW	03/07/14	15:04
Chrysene	185		6.49		176	ug/kg		91.6 (39%-127%)			
Dibenzo(a,h)anthracene	185	U	0.591		180	ug/kg		97.4 (38%-130%)			
Fluoranthene	185		14.6		157	ug/kg		76.9 (20%-139%)			
Fluorene	1850	U	5.54		1530	ug/kg		82.7 (51%-90%)			
Indeno(1,2,3-cd)pyrene	185	U	0.591		159	ug/kg		85.7 (41%-145%)			
Naphthalene	1850	U	5.54		1310	ug/kg		70.9 (43%-87%)			
Phenanthrene	1850	J	6.16		1540	ug/kg		82.7 (50%-100%)			
Pyrene	185		12.6		174	ug/kg		87 (18%-149%)			
**Decafluorobiphenyl	9250		6030		6580	ug/kg		71.1 (23%-104%)			
QC1203046268 343912002 MSD											
Acenaphthene	1850	U	5.54		1550	ug/kg	5.40	83.8 (0%-30%)		03/07/14	15:46
Acenaphthylene	1850	U	5.54		1500	ug/kg	4.82	81.3 (0%-30%)			
Anthracene	1850	TU	1.85	T	1720	ug/kg	5.11	93.2* (0%-30%)			
Benzo(a)anthracene	185		5.53		167	ug/kg	5.06	87.5 (0%-30%)			
Benzo(a)pyrene	185		4.74		165	ug/kg	7.70	86.7 (0%-30%)			
Benzo(b)fluoranthene	185		9.06		171	ug/kg	8.41	87.9 (0%-30%)			
Benzo(ghi)perylene	185		3.72		160	ug/kg	6.89	84.5 (0%-30%)			
Benzo(k)fluoranthene	92.3	U	0.296		83.0	ug/kg	7.60	89.9 (0%-30%)			
Chrysene	185		6.49		188	ug/kg	6.69	98.5 (0%-30%)			
Dibenzo(a,h)anthracene	185	U	0.591		192	ug/kg	6.29	104 (0%-30%)			
Fluoranthene	185		14.6		171	ug/kg	8.45	84.6 (0%-30%)			

# GEL LABORATORIES LLC

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## QC Summary

Workorder: **343912**

Client SDG: X0033

Project Description: RC-232 Soil

Page 4 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1370872										
Fluorene	1850	U	5.54	1620	ug/kg	5.42	87.6	(0%-30%)	CWW	03/07/14	15:46
Indeno(1,2,3-cd)pyrene	185	U	0.591	169	ug/kg	6.57	91.7	(0%-30%)			
Naphthalene	1850	U	5.54	1370	ug/kg	4.30	74.2	(0%-30%)			
Phenanthrene	1850	J	6.16	1620	ug/kg	5.55	87.7	(0%-30%)			
Pyrene	185		12.6	188	ug/kg	8.03	95.1	(0%-30%)			
*Decafluorobiphenyl	9230		6030	6790	ug/kg		73.5	(23%-104%)			

**Notes:**

The Qualifiers in this report are defined as follows:

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

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

^ 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: 1370869      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)
1203046265 MB	06-MAR-2014 17:55:00	30.05	1	0.03328
1203046266 LCS	06-MAR-2014 17:55:00	30.02	1	0.03331
343912001	06-MAR-2014 17:55:00	30.06	1	0.03327
343912002	06-MAR-2014 17:55:00	30.07	1	0.03326
1203046267 MS (343912002)	06-MAR-2014 17:55:00	30.02	1	0.03331
1203046268 MSD (343912002)	06-MAR-2014 17:55:00	30.09	1	0.03323
343912003	06-MAR-2014 17:55:00	30.05	1	0.03328
343912004	06-MAR-2014 17:55:00	30.06	1	0.03327
343912005	06-MAR-2014 17:55:00	30	1	0.03333
343912006	06-MAR-2014 17:55:00	30.04	1	0.03329
343912007	06-MAR-2014 17:55:00	30.05	1	0.03328
343912008	06-MAR-2014 17:55:00	30.07	5	0.16628
343912009	06-MAR-2014 17:55:00	30.09	1	0.03323
343912010	06-MAR-2014 17:55:00	30.03	1	0.0333
343912011	06-MAR-2014 17:55:00	30.02	1	0.03331
343912012	06-MAR-2014 17:55:00	30.08	1	0.03324
344042001	06-MAR-2014 17:55:00	30.02	1	0.03331
1203046269 MS (344042001)	06-MAR-2014 17:55:00	30.01	1	0.03332
1203046270 MSD (344042001)	06-MAR-2014 17:55:00	30.1	1	0.03322

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203046266	8310 PAH SPIKE	UE131224-15	1	mL	Final Solvent: ACETONITRILE Verified By: SLW * Sample 343912008 became BI PHASIC (OIL-LIKE) after Acetonitrile Exchange from the water bath.
MS	1203046267	8310 PAH SPIKE	UE131224-15	1	mL	
MS	1203046269	8310 PAH SPIKE	UE131224-15	1	mL	
MSD	1203046268	8310 PAH SPIKE	UE131224-15	1	mL	
MSD	1203046270	8310 PAH SPIKE	UE131224-15	1	mL	
SURR	All	Decafluorobiphenyl 250 mg/L	UE140131-25	1	mL	
REGNT	All	Methylene Chloride	2057826-D	300	mL	
REGNT	All	HPLC Grade Acetonitrile	2069348	5	mL	
SOURC	All	SODIUM SULFATE	2051933	30	g	

# **FID Diesel Range Organics Analysis**

# Case Narrative

**FID Diesel Range Organics  
WC-HANFORD, INC. (WCHN)  
SDG X0033**

**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: 1370544  
Prep Batch Number: 1370541

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
343912001	J1TF03
343912002	J1TF04
343912003	J1TF05
343912004	J1TF06
343912005	J1TF07
343912006	J1TF08
343912007	J1TF09
343912008	J1TF10
343912009	J1TF11
343912010	J1TF33
343912011	J1TF34
343912012	J1TF35
1203045539	Method Blank (MB)
1203045540	Laboratory Control Sample (LCS)
1203045541	343912001(J1TF03) Matrix Spike (MS)
1203045542	343912001(J1TF03) Matrix Spike Duplicate (MSD)

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

**Preparation/Analytical Method Verification**

**SOP Reference**

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

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

## **Calibration Information**

### **Initial Calibration**

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

### **Continuing Calibration Verification (CCV) Requirements**

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

## **Quality Control (QC) Information**

### **Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

### **Surrogate Recoveries**

Samples 343912008 (J1TF10) and 343912011 (J1TF34) did not meet surrogate recovery acceptance criteria due to dilution.

### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

### **QC Sample Designation**

Sample 343912001 (J1TF03) 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**

Samples 343912008 (J1TF10) and 343912011 (J1TF34) were diluted due to the presence of over-range target analytes.

### **Sample Re-extraction/Re-analysis**

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

## **Miscellaneous Information**

### **Electronic Package Comment**

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

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

### **Data Exception (DER) Documentation**

Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. DER #1273045 was generated for this SDG.

### **Manual Integrations**

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

### **Additional Comments**

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

### **System Configuration**

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

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

### **Certification Statement**

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

**DATA EXCEPTION REPORT**

<b>Mo.Day Yr.</b> 10-MAR-14	<b>Division:</b> Federal	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> GC/FID	<b>Test / Method:</b> NWTPH-Dx in Soil	<b>Matrix Type:</b> Solid	<b>Client Code:</b> WCHN
<b>Batch ID:</b> 1370544	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 343912(X0033)</b>			
<b>Application Issues:</b> Failed Yield for Surrogates			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
1. Samples 343912008 and 343912011 recovered o-Terphenyl at 0%(SPC Limit: 50%-150%).		1. Samples were diluted due to overrange target analyte. As a result, the surrogates were diluted out of their acceptance limit. Data were reported.	

**Originator's Name:**  
Benjamin Taft      10-MAR-14

**Data Validator/Group Leader:**  
Jimin Cao      10-MAR-14

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

**WCHN001 WC-HANFORD, INC.**

**Client SDG: X0033 GEL Work Order: 343912 Project: RC-232 Soil**

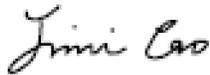
**The Qualifiers in this report are defined as follows:**

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

**Review/Validation**

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

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

**Signature:** 

**Name: Jimin Cao**

**Date: 10 MAR 2014**

**Title: Data Validator**

# Sample Data Summary

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF03	Project: WCHN00213
Sample ID: 343912001	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 09:41	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 5.41%	

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)		8560	2290	7040	ug/kg	1	BYT1	03/07/14	0028	1370544	1
Motor Oil (C20–C36)		23000	2290	7040	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	496 ug/kg	704	70.4	(50%–150%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF04	Project: WCHN00213
Sample ID: 343912002	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 09:50	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 10%	

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)		112000	2410	7400	ug/kg	1	BYT1	03/07/14	0224	1370544	1
Motor Oil (C20–C36)		95000	2410	7400	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	764 ug/kg	740	103	(50%–150%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF05	Project: WCHN00213
Sample ID: 343912003	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 10:05	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 6.81%	

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)		44600	2320	7150	ug/kg	1	BYT1	03/07/14	0302	1370544	1
Motor Oil (C20–C36)		67200	2320	7150	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	593 ug/kg	715	83.0	(50%–150%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF06	Project: WCHN00213
Sample ID: 343912004	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 10:45	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 7.02%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Diesel Range Organics</b>											
<b>SW 3541/NWTPH–Dx in Soil "Dry Weight Corrected"</b>											
Diesel Range Organics (C10–C20)	J	4650	2330	7170	ug/kg	1	BYT1	03/07/14	0341	1370544	1
Motor Oil (C20–C36)		12200	2330	7170	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	480 ug/kg	717	67.0	(50%–150%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF07	Project: WCHN00213
Sample ID: 343912005	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 10:35	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 6.38%	

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)		24600	2310	7110	ug/kg	1	BYT1	03/07/14	0537	1370544	1
Motor Oil (C20–C36)		24400	2310	7110	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	505 ug/kg	711	71.0	(50%–150%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF08	Project: WCHN00213
Sample ID: 343912006	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 10:23	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 6.44%	

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)		38900	2310	7120	ug/kg	1	BYT1	03/07/14	0615	1370544	1
Motor Oil (C20–C36)		62200	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	SXW3	03/05/14	1840	1370541

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"	642 ug/kg	712	90.2	(50%–150%)

**Notes:**

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## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF09	Project: WCHN00213
Sample ID: 343912007	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 09:18	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 6.82%	

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)	J	3010	2320	7150	ug/kg	1	BYT1	03/09/14	2215	1370544	1
Motor Oil (C20–C36)		14200	2320	7150	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	467 ug/kg	715	65.3	(50%–150%)

**Notes:**

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## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF10	Project: WCHN00213
Sample ID: 343912008	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 11:04	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 3.75%	

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)	D	15700000	900000	2770000	ug/kg	400	BYT1	03/09/14	2254	1370544	1
Motor Oil (C20–C36)	D	8250000	900000	2770000	ug/kg	400					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	0.00 ug/kg	692	0.00*	(50%–150%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF11	Project: WCHN00213
Sample ID: 343912009	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 10:52	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 5.2%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Diesel Range Organics											
SW 3541/NWTPH–Dx in Soil "Dry Weight Corrected"											
Diesel Range Organics (C10–C20)	U	2280	2280	7030	ug/kg	1	BYT1	03/09/14	2332	1370544	1
Motor Oil (C20–C36)	J	5950	2280	7030	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	453 ug/kg	703	64.5	(50%–150%)

**Notes:**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF33	Project: WCHN00213
Sample ID: 343912010	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 08:27	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 6.68%	

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)		17600	2320	7130	ug/kg	1	BYT1	03/10/14	0011	1370544	1
Motor Oil (C20–C36)		26600	2320	7130	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	462 ug/kg	713	64.9	(50%–150%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF34	Project: WCHN00213
Sample ID: 343912011	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 08:52	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 12.1%	

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)	D	165000	24600	75800	ug/kg	10	BYT1	03/10/14	0050	1370544	1
Motor Oil (C20–C36)	D	881000	24600	75800	ug/kg	10					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	0.00 ug/kg	758	0.00*	(50%–150%)

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 10, 2014

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

Client SDG: X0033

Client Sample ID: J1TF35	Project: WCHN00213
Sample ID: 343912012	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28–FEB–14 08:27	
Receive Date: 04–MAR–14	
Collector: Client	
Moisture: 7.19%	

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)		14300	2330	7180	ug/kg	1	BYT1	03/10/14	0128	1370544	1
Motor Oil (C20–C36)		17500	2330	7180	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	03/05/14	1840	1370541

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"	494 ug/kg	718	68.8	(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: March 10, 2014

Page 1 of 1

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

**Contact:** Joan Kessner

**Workorder:** 343912

**Client SDG:** X0033

**Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Diesel Range Organics</b>											
Batch	1370544										
QC1203045540	LCS										
Diesel Range Organics (C10–C20)	66600			49000	ug/kg		73.6	(70%–130%)	BYT1	03/06/14	23
Motor Oil (C20–C36)	66600			51800	ug/kg		77.7	(70%–130%)			
**o–Terphenyl	666			489	ug/kg		73.3	(50%–150%)			
QC1203045539	MB										
Diesel Range Organics (C10–C20)			U	2170	ug/kg					03/06/14	23
Motor Oil (C20–C36)			U	2170	ug/kg						
**o–Terphenyl	666			452	ug/kg		67.8	(50%–150%)			
QC1203045541	343912001 MS										
Diesel Range Organics (C10–C20)	70400	8560		62200	ug/kg		76.2	(70%–130%)		03/07/14	01
Motor Oil (C20–C36)	70400	23000		88500	ug/kg		92.9	(70%–130%)			
**o–Terphenyl	704	496		551	ug/kg		78.2	(50%–150%)			
QC1203045542	343912001 MSD										
Diesel Range Organics (C10–C20)	70400	8560		58300	ug/kg	6.55	70.6	(0%–20%)		03/07/14	01
Motor Oil (C20–C36)	70400	23000		78100	ug/kg	12.4	78.3	(0%–20%)			
**o–Terphenyl	704	496		512	ug/kg		72.7	(50%–150%)			

**Notes:**

The Qualifiers in this report are defined as follows:

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

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 343912

Client SDG: X0033

Project Description: RC-232 Soil

Page 2 of 2

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

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

^ 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:** 1370541      **Verified by:** \_\_\_\_\_  
**Analyst:** Shannon Whitehead  
**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)
1203045539 MB	05-MAR-2014 18:40:00	30.02	1	0.03331
1203045540 LCS	05-MAR-2014 18:40:00	30.01	1	0.03332
343912001	05-MAR-2014 18:40:00	30.02	1	0.03331
1203045541 MS (343912001)	05-MAR-2014 18:40:00	30.03	1	0.0333
1203045542 MSD (343912001)	05-MAR-2014 18:40:00	30.03	1	0.0333
343912002	05-MAR-2014 18:40:00	30.02	1	0.03331
343912003	05-MAR-2014 18:40:00	30.02	1	0.03331
343912004	05-MAR-2014 18:40:00	30.02	1	0.03331
343912005	05-MAR-2014 18:40:00	30.03	1	0.0333
343912006	05-MAR-2014 18:40:00	30.03	1	0.0333
343912007	05-MAR-2014 18:40:00	30.01	1	0.03332
343912008	05-MAR-2014 18:40:00	30.02	1	0.03331
343912009	05-MAR-2014 18:40:00	30.03	1	0.0333
343912010	05-MAR-2014 18:40:00	30.05	1	0.03328
343912011	05-MAR-2014 18:40:00	30.03	1	0.0333
343912012	05-MAR-2014 18:40:00	30.02	1	0.03331

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203045540	AZDRO SPIKE LCS STD,4000ug/ml	WF1140304-52	1	mL	Final Solvent: CH2Cl2 Verified By: AV
MS	1203045541	AZDRO SPIKE LCS STD,4000ug/ml	WF1140304-52	1	mL	
MSD	1203045542	AZDRO SPIKE LCS STD,4000ug/ml	WF1140304-52	1	mL	
SURR	All	20 ppm surrogate	WE140227-04	1	mL	
REGNT	All	Methylene Chloride	2057826-D	120	mL	
SOURC	All	SODIUM SULFATE	2051933	30	g	

# **PCB Analysis**

# Case Narrative

**PCB Case Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0033**

**Method/Analysis Information**

**Procedure:** Analysis of Polychlorinated Biphenyls by ECD  
Analytical Method: SW846 3541/8082A  
Prep Method: SW846 3541  
Analytical Batch Number: 1371742  
Prep Batch Number: 1371741

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
343912001	J1TF03
343912002	J1TF04
343912003	J1TF05
343912004	J1TF06
343912005	J1TF07
343912006	J1TF08
343912007	J1TF09
343912008	J1TF10
343912009	J1TF11
343912010	J1TF33
343912011	J1TF34
343912012	J1TF35
1203048292	Method Blank (MB)
1203048293	Laboratory Control Sample (LCS)
1203048294	343912003(J1TF05) Matrix Spike (MS)
1203048295	343912003(J1TF05) 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.

One of the five quantified peaks did not meet the acceptance criteria in Aroclor-1016 standards analyzed for this SDG; however, the average concentration of the five quantified peaks met the acceptance criteria.

## **Quality Control (QC) Information**

### **Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

### **Surrogate Recoveries**

Sample 343912006 (J1TF08) did not meet acceptance criteria for surrogate recovery due to dilution and sample matrix interference.

### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

### **QC Sample Designation**

Sample 343912003 (J1TF05) 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 did not meet spike recovery acceptance criteria due to dilution, sample matrix interference and multiple Aroclors presented in the parent sample.

### **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**

All WCHN samples in this SDG and the associated QC samples MS/MSD were diluted due to high level of

target and non-target analytes in the samples.

**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. DER #1274995 was generated for this SDG.

**Manual Integrations**

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

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>
----------------------	-------------------	-----------------------------	------------------	---------------------------

ECD9A.I_1	Agilent 7890A Gas Chromatograph/Dual ECD w/ 7693 Autosampler	7890A GC/ECD	Restek Rtx-CLPest 1	30m x 0.25mm, 0.25um
ECD9A.I_2	Agilent 7890A Gas Chromatograph/Dual ECD w/ 7693 Autosampler	7890A GC/ECD	Restek Rtx-CLPest 2	30m x 0.25mm, 0.20um

**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**

<b>Mo.Day Yr.</b> 17-MAR-14	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> GC/ECD	<b>Test / Method:</b> SW846 3541/8082A	<b>Matrix Type:</b> Solid	<b>Client Code:</b> WCHN
<b>Batch ID:</b> 1371742	<b>Sample Numbers:</b> See Below		

**Potentially affected work order(s)(SDG): 343912(X0033)**

**Application Issues:**  
Failed Yield for Surrogates

<b>Specification and Requirements Exception Description:</b>	<b>DER Disposition:</b>
Sample 343912006 did not meet surrogate recovery acceptance criteria.	The failure was attributed to sample matrix interference and dilution. The data were reported.

**Originator's Name:**  
James Maestas 17-MAR-14

**Data Validator/Group Leader:**  
Jimin Cao 17-MAR-14

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

**WCHN001 WC-HANFORD, INC.**

**Client SDG: X0033 GEL Work Order: 343912 Project: RC-232 Soil**

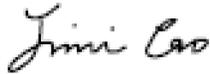
**The Qualifiers in this report are defined as follows:**

- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

**Review/Validation**

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

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

**Signature:** 

**Name: Jimin Cao**

**Date: 18 MAR 2014**

**Title: Data Validator**

# Sample Data Summary













# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 18, 2014

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

Client SDG: X0033

Client Sample ID: J1TF09	Project: WCHN00213
Sample ID: 343912007	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 28-FEB-14 09:18	
Receive Date: 04-MAR-14	
Collector: Client	
Moisture: 6.82%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Semi-Volatiles-PCB</b>											
<b>SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"</b>											
Aroclor-1016	DU	5.93	5.93	17.8	ug/kg	5	JXM	03/14/14	1134	1371742	1
Aroclor-1221	DU	5.93	5.93	17.8	ug/kg	5					
Aroclor-1232	DU	5.93	5.93	17.8	ug/kg	5					
Aroclor-1242	DU	5.93	5.93	17.8	ug/kg	5					
Aroclor-1248	DU	5.93	5.93	17.8	ug/kg	5					
Aroclor-1254	DU	5.93	5.93	17.8	ug/kg	5					
Aroclor-1260	DU	5.93	5.93	17.8	ug/kg	5					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	CXR2	03/12/14	0952	1371741

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.53 ug/kg	7.13	63.6	(44%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.82 ug/kg	7.13	81.7	(35%-119%)

**Notes:**











# **Quality Control Summary**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: March 18, 2014

Page 1 of 1

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

**Contact:** Joan Kessner

**Workorder:** 343912

**Client SDG:** X0033

**Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-PCB</b>											
Batch	1371742										
QC1203048293	LCS										
Aroclor-1016	33.0			25.0	ug/kg		75.8	(39%-120%)	JXM	03/14/14	09
Aroclor-1260	33.0			28.6	ug/kg		86.8	(50%-116%)			
**4cmx	6.60			4.80	ug/kg		72.7	(44%-106%)			
**Decachlorobiphenyl	6.60			6.05	ug/kg		91.6	(35%-119%)			
QC1203048292	MB										
Aroclor-1016			U	1.11	ug/kg					03/14/14	08
Aroclor-1221			U	1.11	ug/kg						
Aroclor-1232			U	1.11	ug/kg						
Aroclor-1242			U	1.11	ug/kg						
Aroclor-1248			U	1.11	ug/kg						
Aroclor-1254			U	1.11	ug/kg						
Aroclor-1260			U	1.11	ug/kg						
**4cmx	6.66			5.28	ug/kg		79.3	(44%-106%)			
**Decachlorobiphenyl	6.66			6.48	ug/kg		97.3	(35%-119%)			
QC1203048294	343912003 MS										
Aroclor-1016	35.4	DU	5.92 D	26.9	ug/kg		75.9	(25%-125%)		03/14/14	09
Aroclor-1260	35.4	D	541 D	551	ug/kg		N/A	(28%-127%)			
**4cmx	7.08		4.70	4.66	ug/kg		65.7	(44%-106%)			
**Decachlorobiphenyl	7.08		7.00	6.09	ug/kg		85.9	(35%-119%)			
QC1203048295	343912003 MSD										
Aroclor-1016	35.7	DU	5.92 D	26.2	ug/kg	2.55	73.4	(0%-30%)		03/14/14	10

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 343912      Client SDG: X0033      Project Description: RC-232 Soil      Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-PCB</b>											
Batch	1371742										
Aroclor-1260	35.7	D	541 DE	704	ug/kg	24.3	N/A	(0%-30%)			
**4cmx	7.14		4.70	4.49	ug/kg		62.9	(44%-106%)	JXM	03/14/14	10
**Decachlorobiphenyl	7.14		7.00	6.11	ug/kg		85.6	(35%-119%)			

**Notes:**

The Qualifiers in this report are defined as follows:

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

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

^ 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: 1371741      Verified by: \_\_\_\_\_  
 Analyst: Courtney Robinson  
 Method: SW846 3541

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

Sample ID	Run Date	Aliquot (g)	Clean Up 1 Amount 1 (mL)	Clean Up Post Clean Up Amount 1 (mL)	Final Volume (mL)	Prepped Factor (mL/g)
1203048292 MB	12-MAR-2014 09:52:00	30.02	H2SO4/KM 2 nO4	9	1	0.03331
1203048293 LCS	12-MAR-2014 09:52:00	30.3	H2SO4/KM 2 nO4	9	1	0.033
343912001	12-MAR-2014 09:52:00	30.22	H2SO4/KM 2 nO4	9	1	0.03309
343912002	12-MAR-2014 09:52:00	30.22	H2SO4/KM 2 nO4	9	1	0.03309
343912003	12-MAR-2014 09:52:00	30.19	H2SO4/KM 2 nO4	9	1	0.03312
1203048294 MS (343912003)	12-MAR-2014 09:52:00	30.29	H2SO4/KM 2 nO4	9	1	0.03301
1203048295 MSD (343912003)	12-MAR-2014 09:52:00	30.04	H2SO4/KM 2 nO4	9	1	0.03329
343912004	12-MAR-2014 09:52:00	30.01	H2SO4/KM 2 nO4	9	1	0.03332
343912005	12-MAR-2014 09:52:00	30.05	H2SO4/KM 2 nO4	9	1	0.03328
343912006	12-MAR-2014 09:52:00	30.31	H2SO4/KM 2 nO4	9	1	0.03299
343912007	12-MAR-2014 09:52:00	30.12	H2SO4/KM 2 nO4	9	1	0.0332
343912008	12-MAR-2014 09:52:00	30.14	H2SO4/KM 2 nO4	9	1	0.03318
343912009	12-MAR-2014 09:52:00	30.05	H2SO4/KM 2 nO4	9	1	0.03328
343912010	12-MAR-2014 09:52:00	30.05	H2SO4/KM 2 nO4	9	1	0.03328
343912011	12-MAR-2014 09:52:00	30.26	H2SO4/KM 2 nO4	9	1	0.03305
343912012	12-MAR-2014 09:52:00	30.47	H2SO4/KM 2 nO4	9	1	0.03282

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203048293	PCB Laboratory Control	WE140227-06	1	mL	Final Solvent: Hexane Verified BY: SJW
MS	1203048294	PCB Laboratory Control	WE140227-06	1	mL	
MSD	1203048295	PCB Laboratory Control	WE140227-06	1	mL	Prior to Clean-up Amount: 2mL Clean-up SOP: GL-OA-E-037 REV.7
SURR	All	PEST LOW LEVEL SURROGATE 200 UG/L	WE140108-01	1	mL	Clean-up Initials: CR
REGNT	All	5% Potassium Permanganate	2068449	5	mL	Clean-up Date: 3/12/14
REGNT	All	Hexane	2075069-B4	120	mL	
REGNT	All	1:1 sulfuric acid	2078359	5	mL	Sample 343912008 separated from the acid very slowly. Sample 343912011 changed from a clear, colorless solution to a clean, golden yellow solution during the extraction process.
SOURC	All	SODIUM SULFATE	2051933	30	g	

# Prep Logbook

**Batch ID:** 1371741      **Verified by:** \_\_\_\_\_  
**Analyst:** Courtney Robinson  
**Method:** SW846 3541

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

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Sample ID	Run Date	Aliquot (g)	Clean Up 1	Clean Up Amount 1 (mL)	Post Clean Up Amount 1 (mL)	Final Volume (mL)	Prepped Factor (mL/g)
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# **Metals Analysis**

# Case Narrative

**Metals Fractional Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0033**

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
343912001	J1TF03
343912002	J1TF04
343912003	J1TF05
343912004	J1TF06
343912005	J1TF07
343912006	J1TF08
343912007	J1TF09
343912008	J1TF10
343912009	J1TF11
343912010	J1TF33
343912011	J1TF34
343912012	J1TF35
343912013	J1TF36
1203045202	Method Blank (MB) <b>ICP</b>
1203045203	Laboratory Control Sample (LCS)
1203045206	343912001(J1TF03L) Serial Dilution (SD)
1203045204	343912001(J1TF03D) Sample Duplicate (DUP)
1203045205	343912001(J1TF03S) Matrix Spike (MS)
1203052101	343912001(J1TF03PS) Post Spike (PS)
1203045207	Method Blank (MB) <b>ICP-MS</b>
1203045208	Laboratory Control Sample (LCS)
1203045211	343912001(J1TF03L) Serial Dilution (SD)
1203045209	343912001(J1TF03D) Sample Duplicate (DUP)
1203045210	343912001(J1TF03S) Matrix Spike (MS)
1203046711	Method Blank (MB) <b>CVAA</b>
1203046712	Laboratory Control Sample (LCS)
1203046716	343912001(J1TF03L) Serial Dilution (SD)
1203046713	343912001(J1TF03D) Sample Duplicate (DUP)
1203046714	343912001(J1TF03S) Matrix Spike (MS)
1203046728	343912001(J1TF03PS) Post Spike (PS)

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

### **Method/Analysis Information**

**Analytical Batch:** 1370397, 1370399 and 1371060  
**Prep Batch :** 1370396, 1370398 and 1371059  
**Standard Operating Procedures:** GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 22, GL-MA-E-014 REV# 25 and GL-MA-E-010 REV# 27  
**Analytical Method:** SW846 3050B/6010C, SW846 3050B/6020A and SW846 7471B  
**Prep Method :** SW846 3050B and SW846 7471B Prep

### **Preparation/Analytical Method Verification**

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

### **System Configuration**

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

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

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

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm. Sample introduction

through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 80 mL/min.

### **Calibration Information**

#### **Instrument Calibration**

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

#### **CRDL Requirements**

The CRDL standard recoveries met the 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**

Target analytes were not detected in the blanks in this SDG above the RDL, except for chromium in method blank (1203045202-ICP). Chromium concentrations in client samples were more than ten times the amount present in the method blank; therefore the data were not adversely affected.

#### **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: 343912001 (J1TF03)-ICP, ICP-MS and CVAA.

#### **Matrix Spike (MS) Recovery Statement**

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS did not meet all the recommended quality control acceptance criteria for percent recoveries for the applicable analytes. The recoveries for antimony and barium in sample 1203045205 (J1TF03) and mercury in sample 1203046714 (J1TF03)-CVAA were not within the acceptance limits. See data exception reports (DER ID 1273257 and 1275273) behind the case narrative in this data package.

### **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 reporting 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. Not all applicable analytes met these requirements. The RPD values for chromium, copper, and silicon were not within the acceptance limits. See data exception report (DER ID 1275273) behind the case narrative in this data package.

### **Post Spike (PS) Recovery Statement**

The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS did not meet all the recommended quality control acceptance criteria for percent recoveries for the applicable analytes and verifies the presence of matrix interferences. The barium recovery was not within the acceptance limits in sample 1203052101 (J1TF03)-ICP. See data exception report (DER ID 1275273) behind the case narrative in this data package.

### **Serial Dilution % Difference Statement**

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 25x the IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. All applicable analytes met the established acceptance criteria.

### **Technical Information**

#### **Holding Time Specifications**

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

#### **Preparation/Analytical Method Verification**

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

#### **Sample Dilutions**

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Samples 343912001 (J1TF03), 343912002 (J1TF04), 343912003 (J1TF05), 343912004 (J1TF06), 343912005 (J1TF07), 343912006 (J1TF08), 343912007 (J1TF09), 343912008 (J1TF10), 343912009 (J1TF11), 343912010 (J1TF33), 343912011 (J1TF34) and 343912012 (J1TF35)-ICP were diluted because the titanium concentrations exceeded the linear range of the instrument which affected antimony, cobalt, lead, vanadium, and zinc. The samples in this SDG were diluted the standard two times

for solids analyzed on the ICPMS.

### **Preparation Information**

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

### **Miscellaneous Information**

#### **Electronic Packaging Comment**

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

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

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. Data exception reports (DER ID 1275273 and 1273257) were generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this SDG.

### **Certification Statement**

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

#### **Review Validation:**

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

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

Reviewer: Pat Steell Date: 03/19/2014

**DATA EXCEPTION REPORT**

<b>Mo.Day Yr.</b> 10-MAR-14	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> MERCURY	<b>Test / Method:</b> SW846 7471B	<b>Matrix Type:</b> Solid	<b>Client Code:</b> ALBE, WCHN
<b>Batch ID:</b> 1371060	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 343912(X0033)</b>			
<b>Application Issues:</b> Failed Recovery for MS/PS			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
<p>1. Failed Recovery for MS/PS:</p> <p>QC 1203046714MS</p>		<p>The matrix spike recovery failed outside of the control limits for mercury. The post spike passed the required control limits. 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.</p>	

**Originator's Name:**  
Nik-Cole Elmore 10-MAR-14

**Data Validator/Group Leader:**  
Bryan Davis 10-MAR-14

**DATA EXCEPTION REPORT**

<b>Mo.Day Yr.</b> 18-MAR-14	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> ICP	<b>Test / Method:</b> SW846 3050B/6010C	<b>Matrix Type:</b> Solid	<b>Client Code:</b> WCHN
<b>Batch ID:</b> 1370397	<b>Sample Numbers:</b> See Below		

**Potentially affected work order(s)(SDG): 343912(X0033)**

**Application Issues:**

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

**Specification and Requirements Exception Description:**

**DER Disposition:**

1. Failed Recovery for MS/PS:  
QC 1203045205MS,1203052101PS
2. Failed RPD for DUP:  
QC 1203045204DUP
3. Method Blank contamination:  
QC 1203045202MB
4. Low level PQL recovered high for potassium.

1. The matrix spike recovery failed outside of the control limits for barium and antimony. The post spike failed outside the required control limits for barium but passed for all other analytes. This verifies the presence of a matrix interference for barium and verifies the absence of a matrix interference for all the other analytes. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.
2. The sample and sample duplicate % RPD failed outside the control limits for copper, 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.
3. The method blank was slightly contaminated for zinc but samples in this SDG either did not contain the above noted analytes at concentrations higher than the RDL, or the analytes were present at concentrations more than ten times the amount in the method blank. The data was not adversely affected and was reported.
4. The samples were analyzed on 3 separate passing calibrations. The closing PQL recovered high for potassium in all 3 analyses due to possible matrix interactions. Sample #343912013 was the only one not less than the MDL and 2x greater than the PQL. The data is being reported.

**Originator's Name:**

Helen Camello 18-MAR-14

**Data Validator/Group Leader:**

Jerry Wigfall 18-MAR-14

# Sample Data Summary

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0033 GEL Work Order: 343912 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  $\leq 5$  times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- N Spike Sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

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

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

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

Reviewed by

Pat Steel 03/19/2014



# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF03  
Sample ID: 343912001

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

**Notes:**



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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF04  
Sample ID: 343912002

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

**Notes:**



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

Client SDG: X0033

Client Sample ID: J1TF05  
Sample ID: 343912003

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

**Notes:**



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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF06  
Sample ID: 343912004

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

Notes:



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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF07  
Sample ID: 343912005

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

Notes:



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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF08  
Sample ID: 343912006

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

Notes:

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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF09      Project: WCHN00213  
 Sample ID: 343912007      Client ID: WCHN001  
 Matrix: SOIL  
 Collect Date: 28-FEB-14 09:18  
 Receive Date: 04-MAR-14  
 Collector: Client  
 Moisture: 6.82%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>SW846 7471B Mercury in Solid "Dry Weight Corrected"</b>											
Mercury	N	0.0206	0.0042	0.0126	mg/kg	1	NOR1	03/10/14	1020	1371060	1
<b>Metals Analysis-ICP</b>											
<b>ICP METALS 6010TR Close-out List "Dry Weight Corrected"</b>											
Arsenic		4.02	0.510	3.06	mg/kg	1	HSC	03/07/14	1444	1370397	2
Beryllium		0.717	0.102	0.510	mg/kg	1					
Boron	U	1.02	1.02	5.10	mg/kg	1					
Cadmium	U	0.102	0.102	0.510	mg/kg	1					
Calcium		7880	8.16	25.5	mg/kg	1					
Copper	*	19.0	0.306	1.02	mg/kg	1					
Iron		19500	8.16	25.5	mg/kg	1					
Magnesium		3810	8.67	30.6	mg/kg	1					
Manganese		260	0.204	1.02	mg/kg	1					
Molybdenum	B	0.292	0.204	1.02	mg/kg	1					
Nickel		7.79	0.153	0.510	mg/kg	1					
Silver	B	0.253	0.102	0.510	mg/kg	1					
Sodium		175	7.14	25.5	mg/kg	1					
Aluminum		5250	6.94	20.4	mg/kg	1	HSC	03/17/14	0902	1370397	3
Barium	N	59.1	0.102	0.510	mg/kg	1					
Chromium	*	7.48	0.153	0.510	mg/kg	1					
Potassium		912	6.53	25.5	mg/kg	1					
Silicon	*	1540	1.53	10.2	mg/kg	1					
Antimony	DNU	1.68	1.68	5.10	mg/kg	5	HSC	03/17/14	1536	1370397	4
Cobalt	D	8.60	0.765	2.55	mg/kg	5					
Lead	D	16.1	1.68	5.10	mg/kg	5					
Vanadium	D	62.0	0.510	2.55	mg/kg	5					
Zinc	D	88.5	2.04	5.10	mg/kg	5					

**Metals Analysis-ICP-MS**

**SW846 3050B/6020A Selenium "Dry Weight Corrected"**

Selenium	DU	0.328	0.328	1.00	mg/kg	2	BAJ	03/12/14	0524	1370399	5
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	KXP3	03/07/14	0900	1370398
SW846 3050B	SW846 3050B Prep for 6010C	KXP3	03/07/14	0900	1370396
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	03/07/14	1515	1371059

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF09  
Sample ID: 343912007

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

Notes:



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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF10  
Sample ID: 343912008

Project: WCHN00213  
Client ID: WCHN001

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The following Analytical Methods were performed:

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

Notes:

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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF11      Project: WCHN00213  
 Sample ID: 343912009      Client ID: WCHN001  
 Matrix: SOIL  
 Collect Date: 28-FEB-14 10:52  
 Receive Date: 04-MAR-14  
 Collector: Client  
 Moisture: 5.2%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>SW846 7471B Mercury in Solid "Dry Weight Corrected"</b>											
Mercury	N	0.0372	0.00393	0.0117	mg/kg	1	NOR1	03/10/14	1024	1371060	1
<b>Metals Analysis-ICP</b>											
<b>ICP METALS 6010TR Close-out List "Dry Weight Corrected"</b>											
Arsenic	B	2.29	0.523	3.14	mg/kg	1	HSC	03/07/14	1450	1370397	2
Beryllium		0.725	0.105	0.523	mg/kg	1					
Boron	B	2.82	1.05	5.23	mg/kg	1					
Cadmium	U	0.105	0.105	0.523	mg/kg	1					
Calcium		4290	8.37	26.2	mg/kg	1					
Copper	*	18.0	0.314	1.05	mg/kg	1					
Iron		18700	8.37	26.2	mg/kg	1					
Magnesium		3300	8.89	31.4	mg/kg	1					
Manganese		240	0.209	1.05	mg/kg	1					
Molybdenum	B	0.391	0.209	1.05	mg/kg	1					
Nickel		6.56	0.157	0.523	mg/kg	1					
Silver	B	0.258	0.105	0.523	mg/kg	1					
Sodium		243	7.33	26.2	mg/kg	1					
Aluminum		5670	7.12	20.9	mg/kg	1	HSC	03/17/14	0906	1370397	3
Barium	N	108	0.105	0.523	mg/kg	1					
Chromium	*	6.46	0.157	0.523	mg/kg	1					
Potassium		832	6.70	26.2	mg/kg	1					
Silicon	*	1800	1.57	10.5	mg/kg	1					
Antimony	DNU	1.73	1.73	5.23	mg/kg	5	HSC	03/17/14	1542	1370397	4
Cobalt	D	8.14	0.785	2.62	mg/kg	5					
Lead	D	8.82	1.73	5.23	mg/kg	5					
Vanadium	D	59.3	0.523	2.62	mg/kg	5					
Zinc	D	62.4	2.09	5.23	mg/kg	5					

**Metals Analysis-ICP-MS**

**SW846 3050B/6020A Selenium "Dry Weight Corrected"**

Selenium	DU	0.322	0.322	1.00	mg/kg	2	BAJ	03/12/14	0538	1370399	5
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	KXP3	03/07/14	0900	1370398
SW846 3050B	SW846 3050B Prep for 6010C	KXP3	03/07/14	0900	1370396
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	03/07/14	1515	1371059

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF11  
Sample ID: 343912009

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

Notes:



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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF33  
Sample ID: 343912010

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

**Notes:**



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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF34  
Sample ID: 343912011

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

Notes:



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## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF35  
Sample ID: 343912012

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

**Notes:**



# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: March 19, 2014

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

Client SDG: X0033

Client Sample ID: J1TF36  
Sample ID: 343912013

Project: WCHN00213  
Client ID: WCHN001

---

The following Analytical Methods were performed:

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

**Notes:**

# **Quality Control Summary**

# GEL LABORATORIES LLC

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## QC Summary

Report Date: March 19, 2014

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

**Workorder: 343912**

**Client SDG: X0033**

**Project Description: RC-232 Soil**

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1370399										
QC1203045209	343912001	DUP									
Selenium		DU	0.317	DU	0.335	mg/kg	N/A ^		BAJ	03/12/14	04:05
QC1203045208	LCS										
Selenium	4.97		D	4.55	mg/kg		91.6	(80%-120%)		03/12/14	03:38
QC1203045207	MB										
Selenium			DU	0.296	mg/kg					03/12/14	03:32
QC1203045210	343912001	MS									
Selenium	4.75	DU	0.317	D	3.93	mg/kg		82.8	(75%-125%)	03/12/14	04:11
QC1203045211	343912001	SDILT									
Selenium		DU	-1.32	DU	1.59	ug/L	N/A	(0%-10%)		03/12/14	04:25
<b>Metals Analysis-ICP</b>											
Batch	1370397										
QC1203045204	343912001	DUP									
Aluminum			7190		6790	mg/kg	5.80	(0%-20%)	HSC	03/17/14	08:37
Antimony		DNU	1.62	DU	1.74	mg/kg	N/A ^			03/17/14	15:03
Arsenic			4.82		4.83	mg/kg	0.213 ^	(+/-3.17)		03/07/14	14:15
Barium		N	100		85.6	mg/kg	15.6	(0%-20%)		03/17/14	08:37
Beryllium			0.923		0.910	mg/kg	1.39 ^	(+/-0.529)		03/07/14	14:15
Boron		B	3.89	B	3.35	mg/kg	15.0 ^	(+/-5.29)			
Cadmium		B	0.160	U	0.106	mg/kg	67.5 ^	(+/-0.529)			
Calcium			7350		6050	mg/kg	19.4	(0%-20%)			
Chromium		*	11.1	*	8.68	mg/kg	24.7*	(0%-20%)		03/17/14	08:37
Cobalt		D	11.0	D	11.4	mg/kg	4.04 ^	(+/-2.64)		03/17/14	15:03
Copper		*	23.2	*	35.1	mg/kg	41.0*	(0%-20%)		03/07/14	14:15
Iron			23900		23700	mg/kg	0.924	(0%-20%)			

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## QC Summary

Workorder: **343912**

Client SDG: X0033

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1370397										
Lead	D	13.8	D	14.6	mg/kg	6.19	^	(+/-5.29)	HSC	03/17/14	15:03
Magnesium		4710		4730	mg/kg	0.481		(0%-20%)		03/07/14	14:15
Manganese		414		388	mg/kg	6.41		(0%-20%)			
Molybdenum	B	0.397	B	0.314	mg/kg	23.6	^	(+/-1.06)			
Nickel		10.4		10.7	mg/kg	2.67		(0%-20%)			
Potassium		1130		1080	mg/kg	4.18		(0%-20%)		03/17/14	08:37
Silicon	*	2170	*	1760	mg/kg	21.3*		(0%-20%)			
Silver	U	0.0981	U	0.106	mg/kg	N/A	^			03/07/14	14:15
Sodium		211		210	mg/kg	0.353		(0%-20%)			
Vanadium	D	70.5	D	62.4	mg/kg	12.3		(0%-20%)		03/17/14	15:03
Zinc	D	113	D	119	mg/kg	5.20		(0%-20%)			
QC1203045203	LCS										
Aluminum		473		492	mg/kg			104 (80%-120%)		03/17/14	08:32
Antimony		47.3		48.5	mg/kg			103 (80%-120%)			
Arsenic		47.3		48.7	mg/kg			103 (80%-120%)		03/07/14	14:09
Barium		47.3		49.3	mg/kg			104 (80%-120%)		03/17/14	08:32
Beryllium		47.3		50.4	mg/kg			107 (80%-120%)		03/07/14	14:09
Boron		47.3		48.9	mg/kg			103 (80%-120%)			
Cadmium		47.3		50.4	mg/kg			107 (80%-120%)			
Calcium		473		497	mg/kg			105 (80%-120%)			
Chromium		47.3		48.9	mg/kg			104 (80%-120%)		03/17/14	08:32
Cobalt		47.3		49.0	mg/kg			104 (80%-120%)			

# GEL LABORATORIES LLC

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## QC Summary

Workorder: **343912**

Client SDG: X0033

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1370397										
Copper	47.3			50.0	mg/kg		106	(80%-120%)	HSC	03/07/14	14:09
Iron	473			497	mg/kg		105	(80%-120%)			
Lead	47.3			49.2	mg/kg		104	(80%-120%)		03/17/14	08:32
Magnesium	473			512	mg/kg		108	(80%-120%)		03/07/14	14:09
Manganese	47.3			48.8	mg/kg		103	(80%-120%)			
Molybdenum	47.3			48.5	mg/kg		103	(80%-120%)			
Nickel	47.3			48.7	mg/kg		103	(80%-120%)			
Potassium	473			485	mg/kg		103	(80%-120%)		03/17/14	08:32
Silicon	473			438	mg/kg		92.6	(80%-120%)			
Silver	47.3			50.0	mg/kg		106	(80%-120%)		03/07/14	14:09
Sodium	473			498	mg/kg		105	(80%-120%)			
Vanadium	47.3			49.3	mg/kg		104	(80%-120%)		03/17/14	08:32
Zinc	47.3			49.7	mg/kg		105	(80%-120%)			
QC1203045202	MB										
Aluminum			U	6.30	mg/kg					03/17/14	08:28
Antimony			B	0.400	mg/kg						
Arsenic			U	0.463	mg/kg					03/07/14	14:06
Barium			U	0.0926	mg/kg					03/17/14	08:28
Beryllium			U	0.0926	mg/kg					03/07/14	14:06
Boron			U	0.926	mg/kg						
Cadmium			U	0.0926	mg/kg						
Calcium			U	7.41	mg/kg						

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## QC Summary

Workorder: 343912

Client SDG: X0033

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1370397										
Chromium				0.464	mg/kg				HSC	03/17/14	08:28
Cobalt			U	0.139	mg/kg						
Copper			U	0.278	mg/kg					03/07/14	14:06
Iron			U	7.41	mg/kg						
Lead			U	0.306	mg/kg					03/17/14	08:28
Magnesium			U	7.87	mg/kg					03/07/14	14:06
Manganese			U	0.185	mg/kg						
Molybdenum			U	0.185	mg/kg						
Nickel			U	0.139	mg/kg						
Potassium			U	5.93	mg/kg					03/17/14	08:28
Silicon			U	1.39	mg/kg						
Silver			U	0.0926	mg/kg					03/07/14	14:06
Sodium			U	6.48	mg/kg						
Vanadium			U	0.0926	mg/kg					03/17/14	08:28
Zinc			B	0.901	mg/kg						
QC1203045205 343912001 MS											
Aluminum	494		7190	9740	mg/kg		N/A	(75%-125%)		03/17/14	08:39
Antimony	49.4	DNU	1.62	DN	37.1	mg/kg	72.5 *	(75%-125%)		03/17/14	15:06
Arsenic	49.4		4.82		53.7	mg/kg	99	(75%-125%)		03/07/14	14:18
Barium	49.4	N	100	N	127	mg/kg	54.4 *	(75%-125%)		03/17/14	08:39
Beryllium	49.4		0.923		50.9	mg/kg	101	(75%-125%)		03/07/14	14:18
Boron	49.4	B	3.89		51.2	mg/kg	95.7	(75%-125%)			

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## QC Summary

Workorder: **343912**

Client SDG: X0033

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1370397										
Cadmium	49.4	B	0.160		49.2	mg/kg	99.3	(75%-125%)	HSC	03/07/14	14:18
Calcium	494		7350		6950	mg/kg	N/A	(75%-125%)			
Chromium	49.4	*	11.1		57.8	mg/kg	94.4	(75%-125%)		03/17/14	08:39
Cobalt	49.4	D	11.0	D	58.1	mg/kg	95.4	(75%-125%)		03/17/14	15:06
Copper	49.4	*	23.2		79.4	mg/kg	114	(75%-125%)		03/07/14	14:18
Iron	494		23900		25800	mg/kg	N/A	(75%-125%)			
Lead	49.4	D	13.8	D	62.0	mg/kg	97.7	(75%-125%)		03/17/14	15:06
Magnesium	494		4710		5470	mg/kg	N/A	(75%-125%)		03/07/14	14:18
Manganese	49.4		414		413	mg/kg	N/A	(75%-125%)			
Molybdenum	49.4	B	0.397		49.0	mg/kg	98.3	(75%-125%)			
Nickel	49.4		10.4		60.1	mg/kg	101	(75%-125%)			
Potassium	494		1130		1730	mg/kg	122	(75%-125%)		03/17/14	08:39
Silicon	494	*	2170		2230	mg/kg	N/A	(75%-125%)			
Silver	49.4	U	0.0981		50.3	mg/kg	102	(75%-125%)		03/07/14	14:18
Sodium	494		211		741	mg/kg	107	(75%-125%)			
Vanadium	49.4	D	70.5	D	123	mg/kg	106	(75%-125%)		03/17/14	15:06
Zinc	49.4	D	113	D	152	mg/kg	78.7	(75%-125%)			
QC1203052101 343912001 PS											
Antimony	500	DNU	2.67	D	487	ug/L	96.9	(80%-120%)		03/17/14	15:08
Barium	500	N	1020		1100	ug/L	16.6*	(80%-120%)		03/17/14	14:58
QC1203045206 343912001 SDILT											
Aluminum			73300	D	15300	ug/L	3.99	(0%-10%)		03/17/14	08:41
Antimony		DNU	2.67	D	3.91	ug/L	N/A	(0%-10%)		03/17/14	15:11

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## QC Summary

Workorder: 343912

Client SDG: X0033

Project Description: RC-232 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1370397										
Arsenic		49.2	D	15.4	ug/L	56.7		(0%-10%)	HSC	03/07/14	14:21
Barium	N	1020	D	209	ug/L	2.62		(0%-10%)		03/17/14	08:41
Beryllium		9.41	D	1.80	ug/L	4.07		(0%-10%)		03/07/14	14:21
Boron	B	39.7	DU	4.90	ug/L	N/A		(0%-10%)			
Cadmium	B	1.63	DU	0.490	ug/L	N/A		(0%-10%)			
Calcium		74900	D	15400	ug/L	2.88		(0%-10%)			
Chromium	*	113	D	22.8	ug/L	.432		(0%-10%)		03/17/14	08:41
Cobalt	D	22.3	D	4.53	ug/L	1.3		(0%-10%)		03/17/14	15:11
Copper	*	236	D	43.3	ug/L	8.36		(0%-10%)		03/07/14	14:21
Iron		244000	D	51800	ug/L	6.26		(0%-10%)			
Lead	D	28.1	D	6.07	ug/L	8.2		(0%-10%)		03/17/14	15:11
Magnesium		48000	D	9870	ug/L	2.83		(0%-10%)		03/07/14	14:21
Manganese		4220	D	841	ug/L	.381		(0%-10%)			
Molybdenum	B	4.05	DU	0.981	ug/L	N/A		(0%-10%)			
Nickel		106	D	21.3	ug/L	.714		(0%-10%)			
Potassium		11500	D	2280	ug/L	1.03		(0%-10%)		03/17/14	08:41
Silicon	*	22200	D	4450	ug/L	.32		(0%-10%)			
Silver	U	-4.5	DU	0.490	ug/L	N/A		(0%-10%)		03/07/14	14:21
Sodium		2150	D	434	ug/L	.773		(0%-10%)			
Vanadium	D	144	D	29.4	ug/L	2.18		(0%-10%)		03/17/14	15:11
Zinc	D	231	D	46.9	ug/L	1.54		(0%-10%)			

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## QC Summary

Workorder: **343912**

Client SDG: X0033

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-Mercury</b>											
Batch	1371060										
QC1203046713	343912001	DUP									
Mercury		N	0.475		0.437	mg/kg	8.40	(0%-20%)	NOR1	03/10/14	10:02
QC1203046712	LCS										
Mercury	0.115				0.119	mg/kg		104	(80%-120%)	03/10/14	09:59
QC1203046711	MB										
Mercury			U		0.00383	mg/kg				03/10/14	09:57
QC1203046714	343912001	MS									
Mercury	0.122	N	0.475	N	0.532	mg/kg		46.8*	(80%-120%)	03/10/14	10:04
QC1203046728	343912001	PS									
Mercury	2.00	N	7.85		9.47	ug/L		81.1	(80%-120%)	03/10/14	10:07
QC1203046716	343912001	SDILT									
Mercury		N	7.85	D	1.43	ug/L	9.18		(0%-10%)	03/10/14	10:05

**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

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 343912

Client SDG: X0033

Project Description: RC-232 Soil

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<u>Parmname</u>	<u>NOM</u>	<u>Sample Qual</u>	<u>QC</u>	<u>Units</u>	<u>RPD/D%</u>	<u>REC%</u>	<u>Range</u>	<u>Anlst</u>	<u>Date</u>	<u>Time</u>
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N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ 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:	1370396	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	Karen Paolucci	LCS	1203045203	Metals Spike Mix I	UI2047539-01	.25	mL
Method:	SW846 3050B	LCS	1203045203	Metals Spike Mix II	UI2047551-06	.25	mL
Lab SOP:	GL-MA-E-009 REV# 22	MS	1203045205	Metals Spike Mix I	UI2047539-01	.25	mL
Instrument:	BAL-892	MS	1203045205	Metals Spike Mix II	UI2047551-06	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203045202 MB	07-MAR-2014 09:00:51	Soil	0.54	50	92.59259
1203045203 LCS	07-MAR-2014 09:00:51	Soil	0.529	50	94.51796
343912001	07-MAR-2014 09:00:51	Soil	0.539	50	92.76438
1203045204 DUP (343912001)	07-MAR-2014 09:00:51	Soil	0.5	50	100
1203045205 MS (343912001)	07-MAR-2014 09:00:51	Soil	0.535	50	93.45794
1203045206 SDILT (343912001)	07-MAR-2014 09:00:51	Soil	0.539	50	92.76438
343912002	07-MAR-2014 09:00:51	Soil	0.535	50	93.45794
343912003	07-MAR-2014 09:00:51	Soil	0.516	50	96.89922
343912004	07-MAR-2014 09:00:51	Soil	0.555	50	90.09009
343912005	07-MAR-2014 09:00:51	Soil	0.507	50	98.61933
343912006	07-MAR-2014 09:00:51	Soil	0.559	50	89.44544
343912007	07-MAR-2014 09:00:51	Soil	0.526	50	95.05703
343912008	07-MAR-2014 09:00:51	Soil	0.551	50	90.7441
343912009	07-MAR-2014 09:00:51	Soil	0.504	50	99.20635
343912010	07-MAR-2014 09:00:51	Soil	0.544	50	91.91176
343912011	07-MAR-2014 09:00:51	Soil	0.544	50	91.91176
343912012	07-MAR-2014 09:00:51	Soil	0.529	50	94.51796
343912013	07-MAR-2014 09:00:51	Soil	0.503	50	99.40358

Reagent/Solvent Lot ID	Description	Amount	Comments:
2056579	HYDROCHLORIC ACID	10 mL	Block Temperature: 93 C
2059610	Concentrated Nitric Acid	1.25 mL	Thermometer ID: 118840 Hot Block ID: 09 Dark brown granular solid

# Prep Logbook

## Acid Digestion of Sediments, Sludges, and Soils

Batch ID:	1370398	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	Karen Paolucci	LCS	1203045208	ICP-MS spiking solution A	UI2065986-A	.25	mL
Method:	SW846 3050B	LCS	1203045208	ICP-MS spiking solution B	UI2065988-B	.25	mL
Lab SOP:	GL-MA-E-009 REV# 22	MS	1203045210	ICP-MS spiking solution A	UI2065986-A	.25	mL
Instrument:	BAL-892	MS	1203045210	ICP-MS spiking solution B	UI2065988-B	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203045207 MB	07-MAR-2014 09:00:25	Soil	0.558	50	89.60573
1203045208 LCS	07-MAR-2014 09:00:25	Soil	0.503	50	99.40358
343912001	07-MAR-2014 09:00:25	Soil	0.55	50	90.90909
1203045209 DUP (343912001)	07-MAR-2014 09:00:25	Soil	0.521	50	95.96929
1203045210 MS (343912001)	07-MAR-2014 09:00:25	Soil	0.557	50	89.76661
1203045211 SDILT (343912001)	07-MAR-2014 09:00:25	Soil	0.55	50	90.90909
343912002	07-MAR-2014 09:00:25	Soil	0.575	50	86.95652
343912003	07-MAR-2014 09:00:25	Soil	0.558	50	89.60573
343912004	07-MAR-2014 09:00:25	Soil	0.532	50	93.98496
343912005	07-MAR-2014 09:00:25	Soil	0.515	50	97.08738
343912006	07-MAR-2014 09:00:25	Soil	0.574	50	87.10801
343912007	07-MAR-2014 09:00:25	Soil	0.54	50	92.59259
343912008	07-MAR-2014 09:00:25	Soil	0.54	50	92.59259
343912009	07-MAR-2014 09:00:25	Soil	0.54	50	92.59259
343912010	07-MAR-2014 09:00:25	Soil	0.526	50	95.05703
343912011	07-MAR-2014 09:00:25	Soil	0.54	50	92.59259
343912012	07-MAR-2014 09:00:25	Soil	0.534	50	93.63296
343912013	07-MAR-2014 09:00:25	Soil	0.522	50	95.78544

Reagent/Solvent Lot ID	Description	Amount	Comments:
1976094-02	Hydrogen Peroxide 30%	1.5 mL	Block Temperature: 93 C
2059610	Concentrated Nitric Acid	5 mL	Thermometer ID: 118840 Hot Block ID: 09 Dark brown granular solid

# Prep Logbook

## Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Batch ID:	1371059	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	Alan Stanley	LCS	1203046712	MHGSOILMSSPIKE	WHG140307-14	.3	mL
Method:	SW846 7471B Prep	MS	1203046714	MHGSOILMSSPIKE	WHG140307-14	.3	mL
Lab SOP:	GL-MA-E-010 REV# 27	MS	1203046718	MHGSOILMSSPIKE	WHG140307-14	.3	mL
Instrument:	Metals Manual Instrument	MS	1203046726	MHGSOILMSSPIKE	WHG140307-14	.3	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203046711 MB	07-MAR-2014 15:15:06	Soil	0.525	30	57.14286
1203046712 LCS	07-MAR-2014 15:15:06	Soil	0.524	30	57.25191
343912001	07-MAR-2014 15:15:06	Soil	0.524	30	57.25191
1203046713 DUP (343912001)	07-MAR-2014 15:15:06	Soil	0.517	30	58.02708
1203046714 MS (343912001)	07-MAR-2014 15:15:06	Soil	0.522	30	57.47126
1203046716 SDILT (343912001)	07-MAR-2014 15:15:06	Soil	0.524	30	57.25191
343912002	07-MAR-2014 15:15:06	Soil	0.539	30	55.65863
343912003	07-MAR-2014 15:15:06	Soil	0.517	30	58.02708
343912004	07-MAR-2014 15:15:06	Soil	0.531	30	56.49718
343912005	07-MAR-2014 15:15:06	Soil	0.509	30	58.9391
343912006	07-MAR-2014 15:15:06	Soil	0.537	30	55.86592
343912007	07-MAR-2014 15:15:06	Soil	0.513	30	58.47953
343912008	07-MAR-2014 15:15:06	Soil	0.553	30	54.24955
343912009	07-MAR-2014 15:15:06	Soil	0.539	30	55.65863
343912010	07-MAR-2014 15:15:06	Soil	0.563	30	53.28597
343912011	07-MAR-2014 15:15:06	Soil	0.507	30	59.1716
343912012	07-MAR-2014 15:15:06	Soil	0.539	30	55.65863
343912013	07-MAR-2014 15:15:06	Soil	0.56	30	53.57143
344042001	07-MAR-2014 15:15:06	Soil	0.565	30	53.09735
1203046717 DUP (344042001)	07-MAR-2014 15:15:06	Soil	0.522	30	57.47126
1203046718 MS (344042001)	07-MAR-2014 15:15:06	Soil	0.505	30	59.40594
1203046719 SDILT (344042001)	07-MAR-2014 15:15:06	Soil	0.505	30	59.40594
344080001	07-MAR-2014 15:15:06	Oil	0.114	30	263.15789
1203046724 DUP (344080001)	07-MAR-2014 15:15:06	Oil	0.127	30	236.22047
1203046727 TRI (344080001)	07-MAR-2014 15:15:06	Oil	0.123	30	243.90244
1203046725 SDILT (344080001)	07-MAR-2014 15:15:06	Oil	0.114	30	263.15789
1203046726 MS (344080001)	07-MAR-2014 15:15:06	Oil	0.11	30	272.72727

# Prep Logbook

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
<b>Reagent/Solvent Lot ID</b>	<b>Description</b>	<b>Amount</b>	<b>Comments:</b>		
2071784-C	5% KMnO4 solution	7.5 mL	Digestion Start Date: 07-MAR-2014 15:17		
2072331-C	Hg reducing agent	2 mL	Digestion End Date: 07-MAR-2014 15:47		
2073967-A	Hydrochloric Acid Conc.	1.125 mL	Block Temperature: 95 C		
2077152-1	NITRIC ACID	.375 mL	Thermometer ID: 118533		
WHG140307-07	Mercury Working Standard 1st Source CAL S 0.2/CRA	30 uL	Hot Block ID: 12		
WHG140307-08	Mercury Working Standard 1st Source CAL S 0.5	75 uL	The first QC was a brown soil and pebble like material. The second QC was a sand and pebble like material. Less sample used for 344080001 due to the potassium permanganate falling out.		
WHG140307-09	Mercury Working 1st Source CAL S 2.0	300 uL			
WHG140307-10	Mercury Working 1st Source CAL S 5.0/CCV	750 uL			
WHG140307-11	Mercury Working 1st Source CAL S 10.0	1500 uL			
WHG140307-12	Mercury Working 2nd Source S 5.0/ICV	750 uL			



March 31, 2014

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

Re: RC-232 Soil  
Work Order: 343914  
SDG: X0033A

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 04, 2014. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Orlette Johnson  
Project Manager

Purchase Order: 1510  
Chain of Custody: RC-232-079 and RC-232-080  
Enclosures



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# Case Narrative

**Receipt Narrative  
for  
WC-HANFORD, INC.  
SDG: X0033A  
Work Order: 343914**

**March 31, 2014**

**Laboratory Identification:**

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

**Summary:**

**Sample receipt:** The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on March 04, 2014 for analysis.

**Sample Identification:** The laboratory received the following samples:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
343914001	J1TF03
343914002	J1TF04
343914003	J1TF05
343914004	J1TF06
343914005	J1TF07
343914006	J1TF08
343914007	J1TF09
343914008	J1TF10
343914009	J1TF11
343914010	J1TF33
343914011	J1TF34
343914012	J1TF35

**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**

**Washington Closure Hanford**  
 Collector: *E. White*  
 Project Designation: 100-IU-2 & 100-IU-6 Remaining Waste Sites  
 Ice Chest No.: *WCH-11-001*  
 Shipped To: GEL Laboratories Charlston  
 Other Labs Shipped To: Eberline Services Oak Ridge Radiological Counting Facility

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**  
 Company Contact: Joan Kessner, Telephone No. 375-4688  
 Sampling Location: 100-B-35, 151-B primary substation)  
 Field Logbook No.: EL-1667-01  
 Offsite Property No.: *A131054*  
 Project Coordinator: KESSNER, JH  
 SAF No.: RC-232  
 Method of Shipment: Commercial Carrier - *fed ex*  
 Bill of Lading/Air Bill No.: *See OSPC*  
 Price Code: 8C  
 RC-232-079  
 Data Turnaround: *343912 343915 Days*

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Freeze
J1TF03	SOIL	2/28/14	0941	125mL	125mL	125mL	125mL	125mL	none
J1TF04	SOIL	2/28/14	0950	125mL	125mL	125mL	125mL	125mL	aG
J1TF05	SOIL	2/28/14	1005	125mL	125mL	125mL	125mL	125mL	1
J1TF06	SOIL	2/28/14	1045	125mL	125mL	125mL	125mL	125mL	5
J1TF07	SOIL	2/28/14	1035	125mL	125mL	125mL	125mL	125mL	40mL

**POSSIBLE SAMPLE HAZARDS/REMARKS**  
 None

**Special Handling and/or Storage**  
 Perform leach on TCLP sample and hold for instructions from J. Kessner

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Freeze
J1TF03	SOIL	2/28/14	0941	125mL	125mL	125mL	125mL	125mL	none
J1TF04	SOIL	2/28/14	0950	125mL	125mL	125mL	125mL	125mL	aG
J1TF05	SOIL	2/28/14	1005	125mL	125mL	125mL	125mL	125mL	1
J1TF06	SOIL	2/28/14	1045	125mL	125mL	125mL	125mL	125mL	5
J1TF07	SOIL	2/28/14	1035	125mL	125mL	125mL	125mL	125mL	40mL

**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)

Perform leach of TCLP analysis and hold pending instructions from J. Kessner - DWSHA 2/24/14



**CHAIN OF POSSESSION**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
<i>E. White</i>	2-28-14 1218	DWSHA	2/28/14 1218
<i>DWSHA</i>	2/28/14 1315	Fridge 3A	2/28/14 1315
<i>Fridge 3A</i>	2/28/14 1000	DWSHA	2/28/14 1000
<i>DWSHA</i>	2/28/14 1022	fed ex	2/28/14 1022
<i>Fridge 3A</i>	2/28/14 1022	W. Taylor	2/28/14 1022
<i>W. Taylor</i>	2/28/14 0920		2/28/14 0920

**FINAL SAMPLE DISPOSITION**  
 Disposal Method: *WCH-EE-011*



**Washington Closure Hanford**      **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**      Page 1 of 1  
 Collector: *E. White*      Project Coordinator: KESSNER, JH      Date Turnaround: *03/28/14*  
 Project Designation: 100-IU-2 & 100-IU-6 Remaining Waste Sites      Price Code: 8C      15 Days  
 Ice Chest No.: *WCH-11-001*      Method of Shipment: Commercial Carrier - *fed EX*

Company Contact: Joan Kessner      Telephone No.: 375-4688      Project Coordinator: KESSNER, JH      Price Code: 8C  
 Sampling Location: 100-B-35, (151-B primary substation, below grade)      SAF No.: RC-232  
 Field Logbook No.:      COA: C10B35A000      Method of Shipment: Commercial Carrier - *fed EX*  
 Offsite Property No.: *A131054*      Bill of Lading/Air Bill No.: *See OSPC*

Other Labs Shipped To: Eberline Services Oak Ridge Radiological Counting Facility

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Cool 4C	Freeze				
J1TF33	SOIL	2/28/14	0827		G/P	aG	aG	aG	aG	none
J1TF34	SOIL	2/28/14	0852		125mL	125mL	125mL	125mL	125mL	aG
J1TF35	SOIL	2/28/14	0827		125mL	125mL	125mL	125mL	125mL	5
J1TF36	SOIL	2/28/14	0753		125mL	125mL	125mL	125mL	125mL	1
J1TF86	SOIL	2/28/14								20mL

**POSSIBLE SAMPLE HAZARDS/REMARKS**  
*NA*

**Special Handling and/or Storage**  
*COO14C*

**Sample Analysis**

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Cool 4C	Freeze				
J1TF33	SOIL	2/28/14	0827		G/P	aG	aG	aG	aG	none
J1TF34	SOIL	2/28/14	0852		125mL	125mL	125mL	125mL	125mL	aG
J1TF35	SOIL	2/28/14	0827		125mL	125mL	125mL	125mL	125mL	5
J1TF36	SOIL	2/28/14	0753		125mL	125mL	125mL	125mL	125mL	1
J1TF86	SOIL	2/28/14								20mL

**CHAIN OF POSSESSION**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
<i>E. White / Fed</i>	2-28-14 12:18	<i>DWSHEA</i>	2/28/14 12:48
<i>DWSHEA</i>	2/28/14 13:15	<i>Fridge 3B</i>	2/28/14 13:15
<i>Fridge 3B</i>	2/28/14 10:22	<i>DWSHEA</i>	2/28/14 10:20
<i>DWSHEA</i>	2/28/14 10:22	<i>Fed EX</i>	

**CHAIN OF PRINT NAMES**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
<i>E. White / Fed</i>	2-28-14 12:18	<i>DWSHEA</i>	2/28/14 12:48
<i>DWSHEA</i>	2/28/14 13:15	<i>Fridge 3B</i>	2/28/14 13:15
<i>Fridge 3B</i>	2/28/14 10:22	<i>DWSHEA</i>	2/28/14 10:20
<i>DWSHEA</i>	2/28/14 10:22	<i>Fed EX</i>	

**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)

*perform leach of TCLP analysis and hold pending instruction from J. Kessner 3-3-14 CMB*

**REVIEWED BY**  
*K. WOOD via email*

**DATE**  
*3/3/14*

**FINAL SAMPLE DISPOSITION**  
 Disposed By: \_\_\_\_\_ Date/Time: \_\_\_\_\_

WCH-EE-011

**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>WCHN</u>		SDG/AR/COC/Work Order: <u>343912 343914</u>	
Received By: <u>H. Taylor</u>		Date Received: <u>030414</u>	
<b>Suspected Hazard Information</b>		*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
COC/Samples marked as radioactive?		Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>00cpm</u>	
Classified Radioactive II or III by RSO?		If yes, Were swipes taken of sample containers < action levels?	
COC/Samples marked containing PCBs?			
Package, COC, and/or Samples marked as beryllium or asbestos containing?		If yes, samples are to be segregated 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?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: <u>4</u> Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius
2a	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>130462161</u> Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7	Are Encore containers present?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
12	Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14	Carrier and tracking number.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7980 9187 6124</u>

Comments (Use Continuation Form if needed):

# **Laboratory Certifications**

**List of current GEL Certifications as of 31 March 2014**

<b>State</b>	<b>Certification</b>
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013-10
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA130005
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122014-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68-00485
Plant Material Permit	PDEP-12-00260
South Carolina Chemistry	10120001
South Carolina GVL	23611001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235-14-9
Utah NELAP	SC000122013-11
Vermont	VT87156
Virginia NELAP	460202
Washington	C780-12
Wisconsin	999887790

# **Metals Analysis**

# Case Narrative

**Metals Fractional Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0033A**

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
343914001	J1TF03
343914002	J1TF04
343914003	J1TF05
343914004	J1TF06
343914005	J1TF07
343914006	J1TF08
343914007	J1TF09
343914008	J1TF10
343914009	J1TF11
343914010	J1TF33
343914011	J1TF34
343914012	J1TF35
1203045056	Tumbling Blank (TB)
1203045645	Method Blank (MB) <b>ICP</b>
1203045646	Laboratory Control Sample (LCS)
1203045649	343914001(J1TF03L) Serial Dilution (SD)
1203045647	343914001(J1TF03D) Sample Duplicate (DUP)
1203045055	343914001(J1TF03S) Matrix Spike (MS)
1203045056	Tumbling Blank (TB)
1203056163	Method Blank (MB) <b>CVAA</b>
1203056164	Laboratory Control Sample (LCS)
1203056167	343914001(J1TF03L) Serial Dilution (SD)
1203056165	343914001(J1TF03D) Sample Duplicate (DUP)
1203045055	343914001(J1TF03S) Matrix Spike (MS)
1203056169	343914001(J1TF03PS) Post Spike (PS)

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

## **Method/Analysis Information**

**Analytical Batch:** 1370606 and 1375112  
**Prep Batch :** 1370605 and 1375111  
**TCLP Prep Batch :** 1370342  
**Standard Operating Procedures:** GL-MA-E-013 REV# 22, GL-MA-E-008 REV# 14, GL-LB-E-006 REV# 19 and GL-MA-E-010 REV# 27  
**Analytical Method:** SW846 3010A/6010C and SW846 7470A  
**Prep Method :** SW846 3010A and SW846 7470A Prep  
**TCLP Prep Method :** SW846 1311

## **Preparation/Analytical Method Verification**

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

## **System Configuration**

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

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

## **Calibration Information**

### **Instrument Calibration**

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

### **CRDL Requirements**

The CRDL standard recoveries met the referenced advisory control limits.

### **ICSA/ICSAB Statement**

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

### **Continuing Calibration 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: 343914001 (J1TF03)-ICP and CVAA.

#### **Matrix Spike (MS) Recovery Statement**

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS did not meet all the recommended quality control acceptance criteria for percent recoveries for the applicable analytes. The mercury recovery was not within the acceptance limits in sample 1203045055 (J1TF03)-CVAA. See data exception report (DER ID 1277953) behind the case narrative in this data package.

#### **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 25x the IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. All applicable analytes met the established acceptance criteria.

#### **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 mercury and verifies the absence of matrix interferences in the post-digested sample.

## **Technical Information**

### **Holding Time Specifications**

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

### **Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

### **Sample Dilutions**

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. The samples in this SDG did not require dilutions.

### **Preparation Information**

The samples and associated matrix QC were prepared at a ten times dilution factor for ICP/CVAA 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. Data exception report (DER ID 1277953) was generated for this SDG.

### **Additional Comments**

Additional comments were not required for this SDG.

**Certification Statement**

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

**Review Validation:**

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

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

Reviewer: Pat Steell Date: 03/31/2014

**DATA EXCEPTION REPORT**

<b>Mo.Day Yr.</b> 26-MAR-14	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> MERCURY	<b>Test / Method:</b> SW846 7470A	<b>Matrix Type:</b> Solid	<b>Client Code:</b> WCHN
<b>Batch ID:</b> 1375112	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 343914(X0033A)</b>			
<b>Application Issues:</b> Failed Recovery for MS/PS			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
<p>1. Failed Recovery for MS/PS:</p> <p>QC 1203045055MS</p>		<p>The matrix spike recovery failed outside of the control limits for mercury. The post spike passed the required control limits. This verifies the absence of matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.</p>	

**Originator's Name:**

Nik-Cole Elmore 26-MAR-14

**Data Validator/Group Leader:**

Bryan Davis 26-MAR-14

# **Sample Data Summary**

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0033A GEL Work Order: 343914 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).

D Results are reported from a diluted aliquot of sample.

N Spike Sample recovery is outside control limits.

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

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

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

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

Reviewed by

 03/31/2014

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF03  
Sample ID: 343914001  
Matrix: Soil  
Collect Date: 28-FEB-14 09:41  
Receive Date: 04-MAR-14  
Collector: Client

Project: WCHN00213  
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
TCLP Hg in Solid "As Received"											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1120	1375112	1
Metals Analysis-ICP											
TCLP ICP Metals - 1311/3010A/6010C "As Received"											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1743	1370606	2
Barium		0.302	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	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

Notes:

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF04  
Sample ID: 343914002  
Matrix: Soil  
Collect Date: 28-FEB-14 09:50  
Receive Date: 04-MAR-14  
Collector: Client

Project: WCHN00213  
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
TCLP Hg in Solid "As Received"											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1128	1375112	1
Metals Analysis-ICP											
TCLP ICP Metals - 1311/3010A/6010C "As Received"											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1755	1370606	2
Barium		0.248	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	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

Notes:

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## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF05	Project: WCHN00213
Sample ID: 343914003	Client ID: WCHN001
Matrix: Soil	
Collect Date: 28-FEB-14 10:05	
Receive Date: 04-MAR-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>TCLP Hg in Solid "As Received"</b>											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1130	1375112	1
<b>Metals Analysis-ICP</b>											
<b>TCLP ICP Metals - 1311/3010A/6010C "As Received"</b>											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1758	1370606	2
Barium		0.326	0.010	0.050	mg/L	1					
Cadmium	U	0.010	0.010	0.050	mg/L	1					
Chromium	B	0.0144	0.010	0.050	mg/L	1					
Lead	U	0.033	0.033	0.100	mg/L	1					
Selenium	B	0.0806	0.060	0.300	mg/L	1					
Silver	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

**Notes:**

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## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF06	Project: WCHN00213
Sample ID: 343914004	Client ID: WCHN001
Matrix: Soil	
Collect Date: 28-FEB-14 10:45	
Receive Date: 04-MAR-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>TCLP Hg in Solid "As Received"</b>											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1135	1375112	1
<b>Metals Analysis-ICP</b>											
<b>TCLP ICP Metals - 1311/3010A/6010C "As Received"</b>											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1808	1370606	2
Barium		0.260	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	B	0.0799	0.060	0.300	mg/L	1					
Silver	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

**Notes:**

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## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF07	Project: WCHN00213
Sample ID: 343914005	Client ID: WCHN001
Matrix: Soil	
Collect Date: 28-FEB-14 10:35	
Receive Date: 04-MAR-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>TCLP Hg in Solid "As Received"</b>											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1137	1375112	1
<b>Metals Analysis-ICP</b>											
<b>TCLP ICP Metals - 1311/3010A/6010C "As Received"</b>											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1811	1370606	2
Barium		0.253	0.010	0.050	mg/L	1					
Cadmium	U	0.010	0.010	0.050	mg/L	1					
Chromium	B	0.011	0.010	0.050	mg/L	1					
Lead	U	0.033	0.033	0.100	mg/L	1					
Selenium	B	0.0869	0.060	0.300	mg/L	1					
Silver	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

**Notes:**

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## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF08  
Sample ID: 343914006  
Matrix: Soil  
Collect Date: 28-FEB-14 10:23  
Receive Date: 04-MAR-14  
Collector: Client

Project: WCHN00213  
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
TCLP Hg in Solid "As Received"											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1138	1375112	1
Metals Analysis-ICP											
TCLP ICP Metals - 1311/3010A/6010C "As Received"											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1814	1370606	2
Barium		0.254	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	B	0.0345	0.033	0.100	mg/L	1					
Selenium	B	0.0679	0.060	0.300	mg/L	1					
Silver	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

Notes:

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF09	Project: WCHN00213
Sample ID: 343914007	Client ID: WCHN001
Matrix: Soil	
Collect Date: 28-FEB-14 09:18	
Receive Date: 04-MAR-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>TCLP Hg in Solid "As Received"</b>											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1140	1375112	1
<b>Metals Analysis-ICP</b>											
<b>TCLP ICP Metals - 1311/3010A/6010C "As Received"</b>											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1817	1370606	2
Barium		0.322	0.010	0.050	mg/L	1					
Cadmium	U	0.010	0.010	0.050	mg/L	1					
Chromium	B	0.0126	0.010	0.050	mg/L	1					
Lead	B	0.044	0.033	0.100	mg/L	1					
Selenium	U	0.060	0.060	0.300	mg/L	1					
Silver	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

**Notes:**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF10  
Sample ID: 343914008  
Matrix: Soil  
Collect Date: 28-FEB-14 11:04  
Receive Date: 04-MAR-14  
Collector: Client

Project: WCHN00213  
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
TCLP Hg in Solid "As Received"											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1142	1375112	1
Metals Analysis-ICP											
TCLP ICP Metals - 1311/3010A/6010C "As Received"											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1820	1370606	2
Barium		0.351	0.010	0.050	mg/L	1					
Cadmium		0.439	0.010	0.050	mg/L	1					
Chromium	B	0.0481	0.010	0.050	mg/L	1					
Lead		0.494	0.033	0.100	mg/L	1					
Selenium	U	0.060	0.060	0.300	mg/L	1					
Silver	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

Notes:

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF11	Project: WCHN00213
Sample ID: 343914009	Client ID: WCHN001
Matrix: Soil	
Collect Date: 28-FEB-14 10:52	
Receive Date: 04-MAR-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>TCLP Hg in Solid "As Received"</b>											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1144	1375112	1
<b>Metals Analysis-ICP</b>											
<b>TCLP ICP Metals - 1311/3010A/6010C "As Received"</b>											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1823	1370606	2
Barium		0.430	0.010	0.050	mg/L	1					
Cadmium	U	0.010	0.010	0.050	mg/L	1					
Chromium	B	0.0109	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	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

**Notes:**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF33  
 Sample ID: 343914010  
 Matrix: Soil  
 Collect Date: 28-FEB-14 08:27  
 Receive Date: 04-MAR-14  
 Collector: Client

Project: WCHN00213  
 Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>TCLP Hg in Solid "As Received"</b>											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1145	1375112	1
<b>Metals Analysis-ICP</b>											
<b>TCLP ICP Metals - 1311/3010A/6010C "As Received"</b>											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1826	1370606	2
Barium		0.294	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	B	0.0603	0.060	0.300	mg/L	1					
Silver	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

**Notes:**

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## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF34  
Sample ID: 343914011  
Matrix: Soil  
Collect Date: 28-FEB-14 08:52  
Receive Date: 04-MAR-14  
Collector: Client

Project: WCHN00213  
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
TCLP Hg in Solid "As Received"											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1147	1375112	1
Metals Analysis-ICP											
TCLP ICP Metals - 1311/3010A/6010C "As Received"											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1829	1370606	2
Barium		0.522	0.010	0.050	mg/L	1					
Cadmium	U	0.010	0.010	0.050	mg/L	1					
Chromium	B	0.0157	0.010	0.050	mg/L	1					
Lead	U	0.033	0.033	0.100	mg/L	1					
Selenium	B	0.0961	0.060	0.300	mg/L	1					
Silver	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

Notes:

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: March 31, 2014

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

Client SDG: X0033A

Client Sample ID: J1TF35  
 Sample ID: 343914012  
 Matrix: Soil  
 Collect Date: 28-FEB-14 08:27  
 Receive Date: 04-MAR-14  
 Collector: Client

Project: WCHN00213  
 Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>TCLP Hg in Solid "As Received"</b>											
Mercury	NU	0.00067	0.00067	0.002	mg/L	1	NOR1	03/26/14	1149	1375112	1
<b>Metals Analysis-ICP</b>											
<b>TCLP ICP Metals - 1311/3010A/6010C "As Received"</b>											
Arsenic	U	0.050	0.050	0.300	mg/L	1	HSC	03/17/14	1832	1370606	2
Barium		0.264	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	U	0.010	0.010	0.050	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	EXF1	03/04/14	1537	1370342
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	MTM1	03/14/14	1500	1370605
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/25/14	1142	1375111

The following Analytical Methods were performed:

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

**Notes:**

# **Quality Control Summary**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: March 31, 2014

Page 1 of 4

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

**Workorder: 343914**

**Client SDG: X0033A**

**Project Description: RC-232 Soil**

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1370606										
QC1203045647	343914001	DUP									
Arsenic	U	0.050	U	0.050	mg/L	N/A	^		HSC	03/17/14	17:46
Barium		0.302		0.315	mg/L	4.24		(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	B	0.0895	mg/L	45.2	^	(+/-0.300)			
Silver	U	0.010	U	0.010	mg/L	N/A	^				
QC1203045646	LCS										
Arsenic	5.00			5.03	mg/L		101	(80%-120%)		03/17/14	17:40
Barium	5.00			5.06	mg/L		101	(80%-120%)			
Cadmium	5.00			4.99	mg/L		99.8	(80%-120%)			
Chromium	5.00			5.06	mg/L		101	(80%-120%)			
Lead	5.00			5.16	mg/L		103	(80%-120%)			
Selenium	5.00			4.38	mg/L		87.6	(80%-120%)			
Silver	5.00			4.96	mg/L		99.1	(80%-120%)			
QC1203045645	MB										
Arsenic			U	0.050	mg/L					03/17/14	17:33
Barium			U	0.010	mg/L						
Cadmium			U	0.010	mg/L						
Chromium			U	0.010	mg/L						
Lead			U	0.033	mg/L						

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## QC Summary

Workorder: **343914**

Client SDG: X0033A

Project Description: RC-232 Soil

Page 2 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1370606										
Selenium			U	0.060	mg/L				HSC	03/17/14	17:33
Silver			B	-0.0116	mg/L						
QC1203045055 343914001 MS											
Arsenic	5.00	U	0.050	5.08	mg/L		102	(75%-125%)		03/17/14	17:49
Barium	10.0		0.302	10.0	mg/L		97	(75%-125%)			
Cadmium	1.00	U	0.010	0.955	mg/L		95.5	(75%-125%)			
Chromium	5.00	U	0.010	4.84	mg/L		96.7	(75%-125%)			
Lead	5.00	U	0.033	4.86	mg/L		96.5	(75%-125%)			
Selenium	1.00	U	0.060	0.948	mg/L		89.2	(75%-125%)			
Silver	0.503	U	0.010	0.500	mg/L		98.4	(75%-125%)			
QC1203045649 343914001 SDILT											
Arsenic		U	-0.508 DU	0.250	ug/L	N/A		(0%-10%)		03/17/14	17:52
Barium			30.2 D	5.99	ug/L	.896		(0%-10%)			
Cadmium		U	-0.224 DU	0.050	ug/L	N/A		(0%-10%)			
Chromium		U	0.366 DU	0.050	ug/L	N/A		(0%-10%)			
Lead		U	3.20 DU	0.165	ug/L	N/A		(0%-10%)			
Selenium		U	5.65 DU	0.300	ug/L	N/A		(0%-10%)			
Silver		U	0.533 DU	0.050	ug/L	N/A		(0%-10%)			
QC1203045056 TB											
Arsenic			U	0.050	mg/L					03/17/14	17:37
Barium			B	0.0184	mg/L						
Cadmium			U	0.010	mg/L						
Chromium			U	0.010	mg/L						

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## QC Summary

**Workorder:** 343914

**Client SDG:** X0033A

**Project Description:** RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1370606										
Lead			U	0.033	mg/L						
Selenium			U	0.060	mg/L				HSC	03/17/14	17:37
Silver			U	0.010	mg/L						
<b>Metals Analysis-Mercury</b>											
Batch	1375112										
QC1203056165	343914001	DUP									
Mercury		NU	0.00067	U	0.00067	mg/L	N/A ^		NOR1	03/26/14	11:23
QC1203056164	LCS										
Mercury	0.020				0.0196	mg/L	97.8	(80%-120%)		03/26/14	11:18
QC1203056163	MB										
Mercury			U	0.00067	mg/L					03/26/14	11:15
QC1203045055	343914001	MS									
Mercury	0.020	NU	0.00067	N	0.0323	mg/L	161 *	(75%-125%)		03/26/14	11:22
QC1203056169	343914001	PS									
Mercury	2.00	NU	-0.019		1.95	ug/L	97.5	(80%-120%)		03/26/14	11:27
QC1203056167	343914001	SDILT									
Mercury		NU	-0.019	DU	0.00335	ug/L	N/A	(0%-10%)		03/26/14	11:25
QC1203045056	TB										
Mercury			U	0.00067	mg/L					03/26/14	11:17

**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.

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## QC Summary

Workorder: 343914

Client SDG: X0033A

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
W											
X											
Y											
Z											

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

<b>Batch ID:</b> 1370605	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst: Monifa Basdeo	LCS	1203045646	Metals Spike Mix I	UI1977019-01	.25	mL
Method: SW846 3010A	LCS	1203045646	Metals Spike Mix II	UI1977022-06	.25	mL
Lab SOP: GL-MA-E-008 REV# 14						
Instrument: Metals Manual Instrument						

Sample ID	Run Date	Matrix	Initial Volume (mL)	Final Volume (mL)	Prep Factor (mL/mL)	pH Check
1203045645 MB	14-MAR-2014 15:00:51	Soil	5	50	10	<2
1203045056 TB	14-MAR-2014 15:00:51	Soil	5	50	10	<2
1203045646 LCS	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914001	14-MAR-2014 15:00:51	Soil	5	50	10	<2
1203045055 MS (343914001)	14-MAR-2014 15:00:51	Soil	5	50	10	<2
1203045647 DUP (343914001)	14-MAR-2014 15:00:51	Soil	5	50	10	<2
1203045649 SDILT (343914001)	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914002	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914003	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914004	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914005	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914006	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914007	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914008	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914009	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914010	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914011	14-MAR-2014 15:00:51	Soil	5	50	10	<2
343914012	14-MAR-2014 15:00:51	Soil	5	50	10	<2

Reagent/Solvent Lot ID	Description	Amount	Comments:
1961850	Concentrated Nitric Acid	3 mL	Block Temperature: 95 C
2056579	HYDROCHLORIC ACID	2.5 mL	Thermometer ID: 118680 Hot Block ID: 14

# Prep Logbook

## Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

<b>Batch ID:</b> 1375111	<u>Type</u>	<u>Sample Id</u>	<u>Description</u>	<u>Serial Number</u>	<u>Spike Amount</u>	<u>Spike Units</u>
Analyst: Alan Stanley	LCS	1203056164	MHGLIQLCSMSSPIKE	WHG140325-13	.2	mL
Method: SW846 7470A Prep						
Lab SOP: GL-MA-E-010 REV# 27						
Instrument: Metals Manual Instrument						

Sample ID	Run Date	Matrix	Initial Volume (mL)	Final Volume (mL)	Prep Factor (mL/mL)	pH Check
1203056163 MB	25-MAR-2014 11:42:29	Soil	2	20	10	<2
1203045056 TB	25-MAR-2014 11:42:29	Soil	2	20	10	<2
1203056164 LCS	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914001	25-MAR-2014 11:42:29	Soil	2	20	10	<2
1203045055 MS (343914001)	25-MAR-2014 11:42:29	Soil	2	20	10	<2
1203056165 DUP (343914001)	25-MAR-2014 11:42:29	Soil	2	20	10	<2
1203056167 SDILT (343914001)	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914002	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914003	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914004	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914005	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914006	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914007	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914008	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914009	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914010	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914011	25-MAR-2014 11:42:29	Soil	2	20	10	<2
343914012	25-MAR-2014 11:42:29	Soil	2	20	10	<2

Reagent/Solvent Lot ID	Description	Amount	Comments:
1948209	Sulfuric Acid, Concentrated	1 mL	Digestion Start Date: 25-MAR-2014 11:42
2071731-C	5% Potassium Persulfate	1.5 mL	Digestion End Date: 25-MAR-2014 13:42
2072331-C	Hg reducing agent	1 mL	Block Temperature: 95 C
2077152-1	NITRIC ACID	.5 mL	Thermometer ID: 118533
2082082-C	5% KMnO4 solution	3 mL	Hot Block ID: 12
WHG140325-01A	Mercury Working 1st Source CAL 0.2/CRA	20 uL	

# Prep Logbook

Sample ID	Run Date	Matrix	Initial Volume (mL)	Final Volume (mL)	Prep Factor (mL/mL)	pH Check
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Reagent/Solvent Lot ID	Description	Amount	Comments:
WHG140325-02	Mercury Working 1st Source CAL 0.5	50 uL	
WHG140325-03	Mercury Working 1st Source CAL 2.0	200 uL	
WHG140325-04	Mercury Working 1st Source CAL 5.0/CCV	500 uL	
WHG140325-05	Mercury Working 1st Source CAL 10.0	1 mL	
WHG140325-06	Mercury Working 2nd Source 5.0/ICV	500 uL	

# Prep Logbook

## Toxicity Characteristic Leaching Procedure Preparation

**Batch ID:** 1370342      **Verified by:** \_\_\_\_\_  
**Analyst:** Edmund Frampton  
**Method:** SW846 1311

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

Sample ID	1203045056 TB	343914001	1203045055 MS (343914001)	343914002
Analysis Start Date	04-MAR-2014 15:37:28	04-MAR-2014 15:37:28	04-MAR-2014 15:37:28	04-MAR-2014 15:37:28
100% Solid Y/N		y	y	y
(I) Sub Sample Aliquot I=G-H (g)		100	100	100
Initial pH (su)	4.91	8.59	8.59	9.55
pH Temperature (celsius)		50	50	50
Final pH (su)		1.78	1.78	1.89
Filtrate pH (su)		5	5	5
Tumbler Speed	28	28	28	28
Sample Properties <math>\neq</math> Water	TCLP 1	Solid	Solid	Solid
(J) 10X Wet Solid Weight 20XI (g)	2000	2000	2000	2000
Filtrate Volume (mL)	500	100	100	100

Type	Sample Id	Description	Spike Amt	Units	Comments:
MS	1203045055	TCLP Spiking Solution Hg	UI1971358	.25 mL	Extraction End Date: 05-MAR-2014 08:00:00
MS	1203045055	TCLP Spiking Solution A/B	UI2041108	.25 mL	Filtration End Date: 05-MAR-2014 09:00:30
RGNT	All	1N HCl for pH testing	140204	3.5 mL	Bottle Lot Number: 41011425
RGNT	All	TCLP EXTRACTION FLUID 1	T140220-1-2	2000 mL	Filter Lot Number: 400073-4016
REGNT	All	Concentrated Nitric Acid	140218-tclp	2 mL	Extraction Start Temperature: 23 C Extraction End Temperature: 23 C Filtration End Temperature: 23 C

# Prep Logbook

## Toxicity Characteristic Leaching Procedure Preparation

**Batch ID:** 1370342      **Verified by:** \_\_\_\_\_  
**Analyst:** Edmund Frampton  
**Method:** SW846 1311

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

Sample ID	343914003	343914004	343914005	343914006
Analysis Start Date	04-MAR-2014 15:37:28	04-MAR-2014 15:37:28	04-MAR-2014 15:37:28	04-MAR-2014 15:37:28
100% Solid Y/N	y	y	y	y
(I) Sub Sample Aliquot I=G-H (g)	100	100	100	100
Initial pH (su)	9.92	9.85	9.9	9.91
pH Temperature (celsius)	50	50	50	50
Final pH (su)	1.75	1.76	1.71	1.79
Filtrate pH (su)	5	5	5	5
Tumbler Speed	28	28	28	28
Sample Properties <math>\neq</math> Water	Solid	Solid	Solid	Solid
(J) 10X Wet Solid Weight 20XI (g)	2000	2000	2000	2000
Filtrate Volume (mL)	100	100	100	100

Type	Sample Id	Description	Spike Amt	Units	Comments:
MS	1203045055	TCLP Spiking Solution Hg	UI1971358	.25 mL	Extraction End Date: 05-MAR-2014 08:00:00
MS	1203045055	TCLP Spiking Solution A/B	UI2041108	.25 mL	Filtration End Date: 05-MAR-2014 09:00:30
RGNT	All	1N HCl for pH testing	140204	3.5 mL	Bottle Lot Number: 41011425
RGNT	All	TCLP EXTRACTION FLUID 1	T140220-1-2	2000 mL	Filter Lot Number: 400073-4016
REGNT	All	Concentrated Nitric Acid	140218-tclp	2 mL	Extraction Start Temperature: 23 C Extraction End Temperature: 23 C Filtration End Temperature: 23 C

# Prep Logbook

## Toxicity Characteristic Leaching Procedure Preparation

**Batch ID:** 1370342      **Verified by:** \_\_\_\_\_  
**Analyst:** Edmund Frampton  
**Method:** SW846 1311

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

Sample ID	343914007	343914008	343914009	343914010
Analysis Start Date	04-MAR-2014 15:37:28	04-MAR-2014 15:37:28	04-MAR-2014 15:37:28	04-MAR-2014 15:37:28
100% Solid Y/N	y	y	y	y
(I) Sub Sample Aliquot I=G-H (g)	100	100	100	100
Initial pH (su)	9.91	9.87	9.51	9.87
pH Temperature (celsius)	50	50	50	50
Final pH (su)	1.74	1.75	1.64	1.68
Filtrate pH (su)	5	5	5	5
Tumbler Speed	28	28	28	28
Sample Properties <math>\diamond</math>/= Water	Solid	Solid	Solid	Solid
(J) 10X Wet Solid Weight 20XI (g)	2000	2000	2000	2000
Filtrate Volume (mL)	100	100	100	100

Type	Sample Id	Description	Spike Amt	Units	Comments:
MS	1203045055	TCLP Spiking Solution Hg	UI1971358	.25 mL	Extraction End Date: 05-MAR-2014 08:00:00
MS	1203045055	TCLP Spiking Solution A/B	UI2041108	.25 mL	Filtration End Date: 05-MAR-2014 09:00:30
RGNT	All	1N HCl for pH testing	140204	3.5 mL	Bottle Lot Number: 41011425
RGNT	All	TCLP EXTRACTION FLUID 1	T140220-1-2	2000 mL	Filter Lot Number: 400073-4016
REGNT	All	Concentrated Nitric Acid	140218-tclp	2 mL	Extraction Start Temperature: 23 C Extraction End Temperature: 23 C Filtration End Temperature: 23 C

# Prep Logbook

## Toxicity Characteristic Leaching Procedure Preparation

**Batch ID:** 1370342      **Verified by:** \_\_\_\_\_  
**Analyst:** Edmund Frampton  
**Method:** SW846 1311

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

Sample ID	343914011	343914012
Analysis Start Date	04-MAR-2014 15:37:28	04-MAR-2014 15:37:28
100% Solid Y/N	y	y
(I) Sub Sample Aliquot I=G-H (g)	100	100
Initial pH (su)	9.69	9.87
pH Temperature (celsius)	50	50
Final pH (su)	1.72	1.68
Filtrate pH (su)	5	5
Tumbler Speed	28	28
Sample Properties <math>\neq</math> Water	Solid	Solid
(J) 10X Wet Solid Weight 20XI (g)	2000	2000
Filtrate Volume (mL)	100	100

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
MS	1203045055	TCLP Spiking Solution Hg	UI1971358	.25	mL	Extraction End Date: 05-MAR-2014 08:00:00
MS	1203045055	TCLP Spiking Solution A/B	UI2041108	.25	mL	Filtration End Date: 05-MAR-2014 09:00:30
RGNT	All	1N HCl for pH testing	140204	3.5	mL	Bottle Lot Number: 41011425
RGNT	All	TCLP EXTRACTION FLUID 1	T140220-1-2	2000	mL	Filter Lot Number: 400073-4016
REGNT	All	Concentrated Nitric Acid	140218-tclp	2	mL	Extraction Start Temperature: 23 C Extraction End Temperature: 23 C Filtration End Temperature: 23 C