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

COMPLETE COPY OF DATA PACKAGE TO:

Kathy Wendt H4-21 KW 9/4/13
INITIAL/DATE

COMMENTS:

SDG XP0006 SAF-RC-232

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

Sample Location: 600-375:1 – Dry Cell Battery Debris Area 1

GEL Laboratories LLC

a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407

P 843.556.8171 F 843.766.1178

www.gel.com

August 22, 2013

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

Re: RC-232 Soil
Work Order: 331425
SDG: XP0006

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 13, 2013. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Orlette Johnson
Project Manager

Purchase Order: 1510
Chain of Custody: RC-232-046
Enclosures

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Case Narrative

Receipt Narrative
for
WC-HANFORD, INC.
SDG: XP0006
Work Order: 331425

August 22, 2013

Laboratory Identification:

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

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on August 13, 2013 for analysis.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
331425001	J1RW10
331425002	J1RW11
331425003	J1RW12

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

351425

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-046

Collector A. Dunnum	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Price Code 8C B MAB 8-7-13	**Data Turnaround** ~~15~~ 7 Days MAB 8-7-13		
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	**Sampling Location** 600-375:1 - Dry Cell Battery Debris Area 1	**SAF No.** RC-232	
Ice Chest No. WCH-11-018	**Field Logbook No.** EL-1666 - 01 MAB 8-7-13	**COA** 0603752000	**Method of Shipment** fed EX
Shipped To Eberline - GEL	**Offsite Property No.** A120903		**Bill of Lading/Air Bill No.** See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

None

Special Handling and/or Storage

Cool 4 C

Preservation	Cool 4C										
Type of Container	G/P										
No. of Container(s)	1										
Volume	125mL										
SAMPLE ANALYSIS	See item (1) in Special Instructions										
Sample No.	**Matrix**	**Sample Date**	**Sample Time**								
J1RW10	SOIL	8-12-13	0711	X							
J1RW11	SOIL	8-12-13	0711	X							
J1RW12	SOIL	8-12-13	0705	X							

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Aaron Dunnum	8-12-13 0715	MA Bamberger	8-12-13 0715
MA Bamberger	8-12-13 0849	Cindy Bingham	8-12-13 0849
Cindy Bingham WCH	8-12-13 1010	fed EX	
		Jennifer Pelkonini	8-13-13 0845

SPECIAL INSTRUCTIONS

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

REVIEWED BY DATE 8/12/13

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

XP0006

WCH-EE-011

Generated Date/Time: 08/07/2013 10:45, PDT

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WCHN	**SDG/AR/COC/Work Order:** 331422/331425
Received By: JP	**Date Received:** 8-13-13

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

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	~~Samples requiring cold preservation~~ within (0 ≤ 6 deg. C)?*	✓			Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 3
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: 415M2709 Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		✓		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
7	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			
14	Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 7964 4226 7330

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials HH Date 081313 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 22 August 2013

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

Metals Analysis

Case Narrative

Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0006

Sample Analysis

Sample ID	Client ID
331425001	J1RW10
331425002	J1RW11
331425003	J1RW12
1202927456	Method Blank (MB) **ICP**
1202927457	Laboratory Control Sample (LCS)
1202927469	331425001(J1RW10L) Serial Dilution (SD)
1202927467	331425001(J1RW10D) Sample Duplicate (DUP)
1202927468	331425001(J1RW10S) Matrix Spike (MS)
1202932409	331425001(J1RW10PS) Post Spike (PS)
1202929129	Method Blank (MB) **ICP-MS**
1202929157	Laboratory Control Sample (LCS)
1202929147	331425001(J1RW10L) Serial Dilution (SD)
1202929138	331425001(J1RW10D) Sample Duplicate (DUP)
1202929156	331425001(J1RW10S) Matrix Spike (MS)
1202927213	Method Blank (MB) **CVAA**
1202927214	Laboratory Control Sample (LCS)
1202927223	331425001(J1RW10L) Serial Dilution (SD)
1202927221	331425001(J1RW10D) Sample Duplicate (DUP)
1202927222	331425001(J1RW10S) Matrix Spike (MS)

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

Method/Analysis Information

Analytical Batch:	1322447, 1323141 and 1322356
Prep Batch :	1322445, 1323139 and 1322353
Standard Operating Procedures:	GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 22, GL-MA-E-014 REV# 25 and GL-MA-E-010 REV# 26

Analytical Method:	SW846 3050B/6010C, SW846 3050B/6020A and SW846 7471B
Prep Method :	SW846 3050B and SW846 7471B Prep

Preparation/Analytical Method Verification

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

System Configuration

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

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

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

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

Calibration Information

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

CRDL Requirements
All CRDL standards met the advisory control limits with the exception of aluminum, silicon, iron, calcium, and potassium. PQL08 (analyzed at 17:28 on 08/17/13) recovered high for aluminum, silicon, iron, and calcium; however, the sample results were greater than 2x the PQL, therefore the data is reported. PQL06 (analyzed at 16:02 on 08/21/13) recovered low for potassium; however, the sample results were greater than 2x the PQL, therefore the data is reported.

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

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

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

Quality Control (QC) Information

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

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

Quality Control (QC) Sample Statement
The following sample was selected as the quality control (QC) sample for this SDG: 331425001 (J1RW10).

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

Duplicate Relative Percent Difference (RPD) Statement
The 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. All applicable analytes met these requirements with the exception of silicon.

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

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

Technical Information

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

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

Sample Dilutions
Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Samples 331425001 and 331425002 required dilutions in order to bring raw values of titanium within the linear range of the instrument, and for the analytes antimony, cobalt, lead, vanadium, and zinc that titanium interferes with, in order to ensure that the inter-element correction factors were valid on the ICP. Samples in this SDG were diluted the standard 2x for solids on the ICPMS.

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

Miscellaneous Information

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to

as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

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

Data Exception (DER) Documentation
Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG: 1214276. A copy is included in the Miscellaneous Data section of this package.

Additional Comments
Additional comments were not required for this SDG.

Certification Statement

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

Review Validation:

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

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

Reviewer: _____ **Date:** 08/27/13

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
22-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ICP	SW846 3050B/6010C	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1322447	See Below		

Potentially affected work order(s)(SDG): 331001(X0017),331136(X0018),331422(X0019),331425(XP0006)

Application Issues:

Failed Recovery for MS/PS

Failed RPD for DUP

Specification and Requirements Exception Description:	**DER Disposition:**
1. Failed Recovery for MS/PS: QC 1202927459MS,1202927462MS, 1202927465MS, 1202927468MS, 1202932407PS, 1202932408PS, 1202932409PS 2. Failed RPD for DUP: QC 1202927458DUP, 1202927461DUP, 1202927464DUP, 1202927467DUP	1. The matrix spike recovery failed outside of the control limits for silicon. The post spike failed outside the required control limits for silicon but passed for all other analytes. This verifies the presence of a matrix interference for silicon and verifies the absence of a matrix interference for all the other analytes. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported. 2. The sample and sample duplicate % RPD failed outside the control limits for barium,silicon,lead,calcium,cobalt,zinc,chromium,copper, molybdenum and nickel due to possible sample non-homogeneity and/or matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.

Originator's Name:

Helen Camello 22-AUG-13

Data Validator/Group Leader:

Jamie Johnson 22-AUG-13

Sample Data Summary

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

Qualifier Definition Report
for

WCHN001 WC-HANFORD, INC.

Client SDG: XP0006 GEL Work Order: 331425 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.

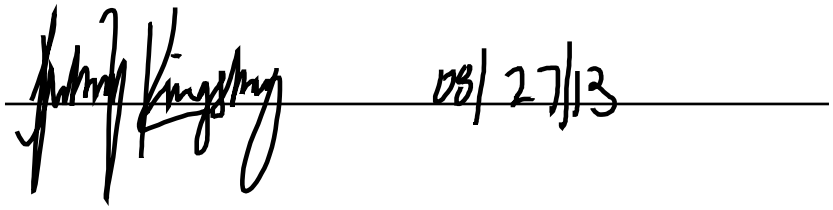
N Spike Sample recovery is outside control limits.

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  08/27/13

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

Certificate of Analysis

Report Date: August 26, 2013

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

Client SDG: XP0006

Client Sample ID: J1RW10
Sample ID: 331425001
Matrix: SOIL
Collect Date: 12-AUG-13 07:11
Receive Date: 13-AUG-13
Collector: Client
Moisture: .684%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	0.00391	0.00391	0.0117	mg/kg	1	NOR1	08/15/13	1225	1322356	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		6650	6.60	19.4	mg/kg	1	HSC	08/17/13	1740	1322447	2
Arsenic	B	1.50	0.485	2.91	mg/kg	1					
Barium		80.7	0.097	0.485	mg/kg	1					
Beryllium		0.619	0.097	0.485	mg/kg	1					
Boron	B	1.19	0.970	4.85	mg/kg	1					
Cadmium	U	0.097	0.097	0.485	mg/kg	1					
Calcium		3270	7.76	24.3	mg/kg	1					
Chromium		12.1	0.146	0.485	mg/kg	1					
Copper		13.6	0.291	0.970	mg/kg	1					
Iron		20000	7.76	24.3	mg/kg	1					
Magnesium		4530	8.25	29.1	mg/kg	1					
Manganese		306	0.194	0.970	mg/kg	1					
Molybdenum	U	0.194	0.194	0.970	mg/kg	1					
Nickel		11.3	0.146	0.485	mg/kg	1					
Silicon	*N	478	1.46	9.70	mg/kg	1					
Silver	B	0.0982	0.097	0.485	mg/kg	1					
Sodium		109	6.79	24.3	mg/kg	1					
Antimony	DU	1.60	1.60	4.85	mg/kg	5	HSC	08/20/13	1742	1322447	3
Cobalt	D	7.23	0.728	2.43	mg/kg	5					
Lead	D	6.17	1.60	4.85	mg/kg	5					
Vanadium	D	47.2	0.485	2.43	mg/kg	5					
Zinc	D	41.0	1.94	4.85	mg/kg	5					
Potassium		1420	6.21	24.3	mg/kg	1	HSC	08/21/13	1616	1322447	4
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.320	0.320	1.00	mg/kg	2	PRB	08/19/13	0643	1323141	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	BCD1	08/17/13	0926	1323139
SW846 3050B	SW846 3050B Prep for 6010C	BCD1	08/16/13	0800	1322445
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	08/14/13	1641	1322353

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

Certificate of Analysis

Report Date: August 26, 2013

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0006
Project:	RC-232 Soil		

Client Sample ID:	J1RW10	Project:	WCHN00213
Sample ID:	331425001	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: August 26, 2013

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

Client SDG: XP0006

Client Sample ID: J1RW11
Sample ID: 331425002
Matrix: SOIL
Collect Date: 12-AUG-13 07:11
Receive Date: 13-AUG-13
Collector: Client
Moisture: .772%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	0.00381	0.00381	0.0114	mg/kg	1	NOR1	08/15/13	1232	1322356	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		6590	6.35	18.7	mg/kg	1	HSC	08/17/13	1751	1322447	2
Arsenic	B	2.19	0.467	2.80	mg/kg	1					
Barium		81.1	0.0933	0.467	mg/kg	1					
Beryllium		0.615	0.0933	0.467	mg/kg	1					
Boron	B	1.10	0.933	4.67	mg/kg	1					
Cadmium	U	0.0933	0.0933	0.467	mg/kg	1					
Calcium		3330	7.47	23.3	mg/kg	1					
Chromium		12.2	0.140	0.467	mg/kg	1					
Copper		14.2	0.280	0.933	mg/kg	1					
Iron		20100	7.47	23.3	mg/kg	1					
Magnesium		4440	7.93	28.0	mg/kg	1					
Manganese		306	0.187	0.933	mg/kg	1					
Molybdenum	U	0.187	0.187	0.933	mg/kg	1					
Nickel		10.8	0.140	0.467	mg/kg	1					
Silicon	*N	615	1.40	9.33	mg/kg	1					
Silver	B	0.165	0.0933	0.467	mg/kg	1					
Sodium		104	6.53	23.3	mg/kg	1					
Antimony	DU	1.54	1.54	4.67	mg/kg	5	HSC	08/20/13	1754	1322447	3
Cobalt	D	7.30	0.700	2.33	mg/kg	5					
Lead	D	5.02	1.54	4.67	mg/kg	5					
Vanadium	D	48.9	0.467	2.33	mg/kg	5					
Zinc	D	40.2	1.87	4.67	mg/kg	5					
Potassium		1430	5.97	23.3	mg/kg	1	HSC	08/21/13	1626	1322447	4
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	D	0.333	0.333	1.01	mg/kg	2	PRB	08/19/13	0711	1323141	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	BCD1	08/17/13	0926	1323139
SW846 3050B	SW846 3050B Prep for 6010C	BCD1	08/16/13	0800	1322445
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	08/14/13	1641	1322353

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

Certificate of Analysis

Report Date: August 26, 2013

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0006
Project:	RC-232 Soil		

Client Sample ID:	J1RW11	Project:	WCHN00213
Sample ID:	331425002	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: August 26, 2013

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

Client SDG: XP0006

Client Sample ID: J1RW12
Sample ID: 331425003
Matrix: SOIL
Collect Date: 12-AUG-13 07:05
Receive Date: 13-AUG-13
Collector: Client
Moisture: <0.1%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	0.0036	0.0036	0.0107	mg/kg	1	NOR1	08/15/13	1233	1322356	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		127	6.69	19.7	mg/kg	1	HSC	08/17/13	1754	1322447	2
Arsenic	B	0.650	0.492	2.95	mg/kg	1					
Barium		3.00	0.0984	0.492	mg/kg	1					
Beryllium	U	0.0984	0.0984	0.492	mg/kg	1					
Boron	U	0.984	0.984	4.92	mg/kg	1					
Cadmium	U	0.0984	0.0984	0.492	mg/kg	1					
Calcium		41.6	7.87	24.6	mg/kg	1					
Chromium	U	0.148	0.148	0.492	mg/kg	1					
Copper	U	0.295	0.295	0.984	mg/kg	1					
Iron		1120	7.87	24.6	mg/kg	1					
Magnesium	B	19.2	8.37	29.5	mg/kg	1					
Manganese		26.9	0.197	0.984	mg/kg	1					
Molybdenum	U	0.197	0.197	0.984	mg/kg	1					
Nickel	U	0.148	0.148	0.492	mg/kg	1					
Silicon	*N	146	1.48	9.84	mg/kg	1					
Silver	U	0.0984	0.0984	0.492	mg/kg	1					
Sodium	U	6.89	6.89	24.6	mg/kg	1					
Antimony	U	0.325	0.325	0.984	mg/kg	1	HSC	08/20/13	1758	1322447	3
Cobalt	B	0.218	0.148	0.492	mg/kg	1					
Lead		1.01	0.325	0.984	mg/kg	1					
Vanadium	B	0.405	0.0984	0.492	mg/kg	1					
Zinc		2.29	0.394	0.984	mg/kg	1					
Potassium		49.9	6.30	24.6	mg/kg	1	HSC	08/21/13	1628	1322447	4
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	D	0.316	0.316	1.00	mg/kg	2	PRB	08/19/13	0716	1323141	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	BCD1	08/17/13	0926	1323139
SW846 3050B	SW846 3050B Prep for 6010C	BCD1	08/16/13	0800	1322445
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	08/14/13	1641	1322353

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

Certificate of Analysis

Report Date: August 26, 2013

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0006
Project:	RC-232 Soil		

Client Sample ID:	J1RW12	Project:	WCHN00213
Sample ID:	331425003	Client ID:	WCHN001

The following Analytical Methods were performed:

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

Notes:

Quality Control Summary

QC Summary

Report Date: August 26, 2013

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

Contact: **Joan Kessner**

Workorder: **331425** **Client SDG:** XP0006 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS											
Batch 1323141											
QC1202929138 331425001 DUP											
Selenium		DU	0.320	DU	0.323	mg/kg	N/A ^			PRB	08/19/13 06:49
QC1202929157 LCS											
Selenium	4.65			D	4.42	mg/kg		95.2	(80%-120%)		08/19/13 00:19
QC1202929129 MB											
Selenium				DU	0.289	mg/kg					08/19/13 00:14
QC1202929156 331425001 MS											
Selenium	4.63	DU	0.320	D	3.84	mg/kg		83	(75%-125%)		08/19/13 06:54
QC1202929147 331425001 SDILT											
Selenium		DU	-1.27	DU	1.60	ug/L	N/A		(0%-10%)		08/19/13 07:05
Metals Analysis-ICP											
Batch 1322447											
QC1202927467 331425001 DUP											
Aluminum			6650		6860	mg/kg	3.10		(0%-20%)	HSC	08/17/13 17:43
Antimony		DU	1.60	DU	1.65	mg/kg	N/A ^				08/20/13 17:45
Arsenic		B	1.50	B	2.16	mg/kg	35.9 ^		(+/-3.00)		08/17/13 17:43
Barium			80.7		82.6	mg/kg	2.22		(0%-20%)		
Beryllium			0.619		0.698	mg/kg	12.0 ^		(+/-0.500)		
Boron		B	1.19	B	1.28	mg/kg	7.18 ^		(+/-5.00)		
Cadmium		U	0.097	U	0.100	mg/kg	N/A ^				
Calcium			3270		3350	mg/kg	2.40		(0%-20%)		
Chromium			12.1		12.0	mg/kg	1.03		(0%-20%)		
Cobalt		D	7.23	D	7.48	mg/kg	3.51 ^		(+/-2.50)		08/20/13 17:45
Copper			13.6		14.0	mg/kg	3.39		(0%-20%)		08/17/13 17:43
Iron			20000		20900	mg/kg	4.41		(0%-20%)		

QC Summary

Workorder: 331425 **Client SDG:** XP0006 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1322447										
Lead	D	6.17	D	5.30	mg/kg	15.1 ^		(+/-5.00)	HSC	08/20/13 17:45
Magnesium		4530		4570	mg/kg	0.889		(0%-20%)		08/17/13 17:43
Manganese		306		317	mg/kg	3.47		(0%-20%)		
Molybdenum	U	0.194	U	0.200	mg/kg	N/A ^				
Nickel		11.3		11.0	mg/kg	2.42		(0%-20%)		
Potassium		1420		1430	mg/kg	0.902		(0%-20%)		08/21/13 16:18
Silicon	*N	478	*	648	mg/kg	30.1*		(0%-20%)		08/17/13 17:43
Silver	B	0.0982	B	0.118	mg/kg	18.0 ^		(+/-0.500)		
Sodium		109		103	mg/kg	5.74 ^		(+/-25.0)		
Vanadium	D	47.2	D	51.2	mg/kg	8.12		(0%-20%)		08/20/13 17:45
Zinc	D	41.0	D	42.8	mg/kg	4.14		(0%-20%)		
QC1202927457 LCS										
Aluminum	478			491	mg/kg		103	(80%-120%)		08/17/13 16:39
Antimony	47.8			46.4	mg/kg		97.1	(80%-120%)		08/20/13 16:35
Arsenic	47.8			48.3	mg/kg		101	(80%-120%)		08/17/13 16:39
Barium	47.8			48.5	mg/kg		102	(80%-120%)		
Beryllium	47.8			49.6	mg/kg		104	(80%-120%)		
Boron	47.8			47.2	mg/kg		98.6	(80%-120%)		
Cadmium	47.8			50.0	mg/kg		105	(80%-120%)		
Calcium	478			511	mg/kg		107	(80%-120%)		
Chromium	47.8			46.2	mg/kg		96.6	(80%-120%)		
Cobalt	47.8			48.8	mg/kg		102	(80%-120%)		08/20/13 16:35

QC Summary

Workorder: 331425 **Client SDG:** XP0006 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1322447										
Copper	47.8			47.6	mg/kg		99.6	(80%-120%)	HSC	08/17/13 16:39
Iron	478			498	mg/kg		104	(80%-120%)		
Lead	47.8			50.1	mg/kg		105	(80%-120%)		08/20/13 16:35
Magnesium	478			516	mg/kg		108	(80%-120%)		08/17/13 16:39
Manganese	47.8			45.9	mg/kg		96.1	(80%-120%)		
Molybdenum	47.8			45.7	mg/kg		95.6	(80%-120%)		
Nickel	47.8			46.5	mg/kg		97.3	(80%-120%)		
Potassium	478			493	mg/kg		103	(80%-120%)		08/20/13 16:35
Silicon	478			415	mg/kg		86.9	(80%-120%)		08/17/13 16:39
Silver	47.8			49.1	mg/kg		103	(80%-120%)		
Sodium	478			493	mg/kg		103	(80%-120%)		
Vanadium	47.8			47.6	mg/kg		99.7	(80%-120%)		08/20/13 16:35
Zinc	47.8			47.3	mg/kg		99	(80%-120%)		
QC1202927456 MB										
Aluminum			U	6.34	mg/kg					08/17/13 16:36
Antimony			U	0.308	mg/kg					08/20/13 16:32
Arsenic			U	0.466	mg/kg					08/17/13 16:36
Barium			U	0.0933	mg/kg					
Beryllium			U	0.0933	mg/kg					
Boron			U	0.933	mg/kg					
Cadmium			U	0.0933	mg/kg					
Calcium			U	7.46	mg/kg					

QC Summary

Workorder: 331425 **Client SDG:** XP0006 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1322447											
Chromium				U	0.140	mg/kg				HSC	08/17/13 16:36
Cobalt				U	0.140	mg/kg					08/20/13 16:32
Copper				U	0.280	mg/kg					08/17/13 16:36
Iron				U	7.46	mg/kg					
Lead				U	0.308	mg/kg					08/20/13 16:32
Magnesium				U	7.93	mg/kg					08/17/13 16:36
Manganese				U	0.187	mg/kg					
Molybdenum				U	0.187	mg/kg					
Nickel				U	0.140	mg/kg					
Potassium				U	5.97	mg/kg					08/20/13 16:32
Silicon				U	1.40	mg/kg					08/17/13 16:36
Silver				U	0.0933	mg/kg					
Sodium				U	6.53	mg/kg					
Vanadium				U	0.0933	mg/kg					08/20/13 16:32
Zinc				U	0.373	mg/kg					
QC1202927468 331425001 MS											
Aluminum	493		6650		8280	mg/kg		N/A	(75%-125%)		08/17/13 17:46
Antimony	49.3	DU	1.60	D	46.5	mg/kg		94.3	(75%-125%)		08/20/13 17:48
Arsenic	49.3	B	1.50		49.2	mg/kg		96.9	(75%-125%)		08/17/13 17:46
Barium	49.3		80.7		127	mg/kg		94.2	(75%-125%)		
Beryllium	49.3		0.619		49.1	mg/kg		98.5	(75%-125%)		
Boron	49.3	B	1.19		46.9	mg/kg		92.9	(75%-125%)		

QC Summary

Workorder: 331425 **Client SDG:** XP0006 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1322447											
Cadmium	49.3	U	0.097		48.6	mg/kg		98.7	(75%-125%)	HSC	08/17/13 17:46
Calcium	493		3270		3850	mg/kg		N/A	(75%-125%)		
Chromium	49.3		12.1		55.3	mg/kg		87.7	(75%-125%)		
Cobalt	49.3	D	7.23	D	58.3	mg/kg		104	(75%-125%)		08/20/13 17:48
Copper	49.3		13.6		63.9	mg/kg		102	(75%-125%)		08/17/13 17:46
Iron	493		20000		20500	mg/kg		N/A	(75%-125%)		
Lead	49.3	D	6.17	D	56.2	mg/kg		102	(75%-125%)		08/20/13 17:48
Magnesium	493		4530		4980	mg/kg		N/A	(75%-125%)		08/17/13 17:46
Manganese	49.3		306		340	mg/kg		N/A	(75%-125%)		
Molybdenum	49.3	U	0.194		45.3	mg/kg		92	(75%-125%)		
Nickel	49.3		11.3		56.1	mg/kg		91.1	(75%-125%)		
Potassium	493		1420		1950	mg/kg		108	(75%-125%)		08/21/13 16:20
Silicon	493	*N	478	N	594	mg/kg		23.4*	(75%-125%)		08/17/13 17:46
Silver	49.3	B	0.0982		49.2	mg/kg		99.6	(75%-125%)		
Sodium	493		109		591	mg/kg		97.7	(75%-125%)		
Vanadium	49.3	D	47.2	D	96.3	mg/kg		99.7	(75%-125%)		08/20/13 17:48
Zinc	49.3	D	41.0	D	89.9	mg/kg		99.2	(75%-125%)		
QC1202932409 331425001 PS											
Silicon	5000	*N	4930		24800	ug/L		397*	(80%-120%)		08/21/13 16:36
QC1202927469 331425001 SDILT											
Aluminum			68600	D	14400	ug/L	4.84		(0%-10%)		08/17/13 17:48
Antimony		DU	-0.479	DU	8.00	ug/L	N/A		(0%-10%)		08/20/13 17:51
Arsenic		B	15.5	DU	2.43	ug/L	N/A		(0%-10%)		08/17/13 17:48

QC Summary

Workorder: 331425 **Client SDG:** XP0006 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1322447										
Barium		832	D	174	ug/L	4.66		(0%-10%)	HSC	08/17/13 17:48
Beryllium		6.38	D	1.94	ug/L	52		(0%-10%)		
Boron	B	12.3	DU	4.85	ug/L	N/A		(0%-10%)		
Cadmium	U	0.0494	DU	0.485	ug/L	N/A		(0%-10%)		
Calcium		33700	D	6860	ug/L	1.82		(0%-10%)		
Chromium		125	D	24.8	ug/L	.915		(0%-10%)		
Cobalt	D	14.9	D	3.27	ug/L	9.91		(0%-10%)		08/20/13 17:51
Copper		140	D	27.2	ug/L	2.78		(0%-10%)		08/17/13 17:48
Iron		206000	D	43000	ug/L	4.34		(0%-10%)		
Lead	D	12.7	DU	8.00	ug/L	N/A		(0%-10%)		08/20/13 17:51
Magnesium		46700	D	9500	ug/L	1.83		(0%-10%)		08/17/13 17:48
Manganese		3160	D	673	ug/L	6.55		(0%-10%)		
Molybdenum	U	-1.64	DU	0.970	ug/L	N/A		(0%-10%)		
Nickel		116	D	24.4	ug/L	4.87		(0%-10%)		
Potassium		14600	D	2990	ug/L	1.97		(0%-10%)		08/21/13 16:23
Silicon	*N	4930	D	1060	ug/L	7.56		(0%-10%)		08/17/13 17:48
Silver	B	1.01	DU	0.485	ug/L	N/A		(0%-10%)		
Sodium		1130	D	224	ug/L	.816		(0%-10%)		
Vanadium	D	97.3	D	19.5	ug/L	.357		(0%-10%)		08/20/13 17:51
Zinc	D	84.6	D	16.1	ug/L	4.89		(0%-10%)		
Metals Analysis-Mercury										
Batch 1322356										

QC Summary

Workorder: 331425 **Client SDG:** XP0006 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-Mercury										
Batch 1322356										
QC1202927221 331425001 DUP										
Mercury	U	0.00391	U	0.00405	mg/kg	N/A ^			NOR1	08/15/13 12:27
QC1202927214 LCS										
Mercury	0.115			0.112	mg/kg		97.4	(80%-120%)		08/15/13 12:06
QC1202927213 MB										
Mercury			U	0.00393	mg/kg					08/15/13 12:05
QC1202927222 331425001 MS										
Mercury	0.119	U 0.00391		0.128	mg/kg		106	(80%-120%)		08/15/13 12:28
QC1202927223 331425001 SDILT										
Mercury	U	0.040	DU	0.0195	ug/L	N/A		(0%-10%)		08/15/13 12:30

Notes:

The Qualifiers in this report are defined as follows:

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

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

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