

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 9/3/13
INITIAL/DATE

COMMENTS:

SDG X0018

SAF-RC-232

Rad only

Chem only

Rad & Chem

Complete

Partial

Sample Location: 100-D-105 – Confirmatory Test Pits
Underlying Soils



August 22, 2013

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

Re: RC-232 Soil
Work Order: 331136
SDG: X0018

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 08, 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-232-039
Enclosures

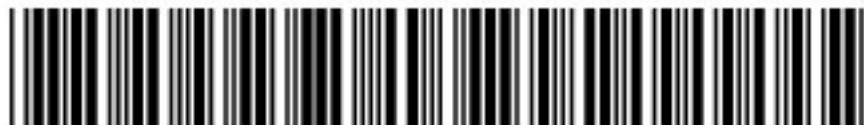


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Case Narrative

**Receipt Narrative
for
WC-HANFORD, INC.
SDG: X0018
Work Order: 331136**

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 08, 2013 for analysis.

Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
331136001	J1RV33
331136002	J1RV34

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: General Chemistry and Metals.



Orlette Johnson
Project Manager

Chain of Custody and Supporting Documentation

Washington Closure Hanford **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

Collector: **WF JACKSON** Telephone No.: **375-4688** Project Coordinator: **KESSNER, JH** Price Code: **8C**

Project Designation: **100-IU-2 & 100-IU-6 Remaining Waste Sites** Sampling Location: **100-D-105 - Confirmatory Test Pits Underlying Soils** SAF No.: **RC-232** Data Turnaround: **15 Days**

Ice Chest No.: **WCH-11-071** Field Logbook No.: **COA** Method of Shipment: **Fed Ex**

Shipped To: **Eberline - GEL** Offsite Property No.: **A120901** Bill of Lading/Air Bill No.: **See OSPC**

POSSIBLE SAMPLE HAZARDS/REMARKS

None

Special Handling and/or Storage

Cool 4 C

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	Freeze
J1RV31	SOIL	8-6-13	0843	See item (1) in Special Instructions	125mL	1	1	1	1	1	1	1	5
J1RV32	SOIL	8-6-13	1234	See item (2) in Special Instructions	125mL	1	1	1	1	1	1	1	40mL
J1RV33	SOIL	8-6-13	0843	See item (1) in Special Instructions	125mL	1	1	1	1	1	1	1	5
J1RV34	SOIL	8-6-13	1234	See item (2) in Special Instructions	125mL	1	1	1	1	1	1	1	40mL
J1RV35	SOIL	8-6-13	0843	See item (1) in Special Instructions	125mL	1	1	1	1	1	1	1	5

SAMPLE ANALYSIS

CHAIN OF POSSESSION

Relinquished By/Removed From: WF JACKSON	Date/Time: 8-6-13 1240
Received By/Stored In: MA Bamberger	Date/Time: 8-6-13 1430
Relinquished By/Removed From: MA Bamberger	Date/Time: 8-6-13 1430
Received By/Stored In: B. Fealey	Date/Time: 8-6-13 1600
Relinquished By/Removed From: B. Fealey	Date/Time: 8-6-13 1600
Received By/Stored In: DWShea DWSHEA	Date/Time: 8/7/13 0823
Relinquished By/Removed From: DWShea DWSHEA	Date/Time: 8/7/13 0823
Received By/Stored In: Fed Ex	Date/Time: 8-8-13
Relinquished By/Removed From: Fed Ex	Date/Time: 8-8-13

CHAIN OF POSSESSION

Received By/Stored In: **MA Bamberger** Date/Time: **8-6-13 1240**

Received By/Stored In: **MA Bamberger** Date/Time: **8-6-13 1430**

Received By/Stored In: **B. Fealey** Date/Time: **8-6-13 1430**

Received By/Stored In: **B. Fealey** Date/Time: **8-6-13 1600**

Received By/Stored In: **1060 Battelle Blvd. Ref 3C** Date/Time: **8-6-13 1600**

Received By/Stored In: **DWShea DWSHEA** Date/Time: **8/7/13 0823**

Received By/Stored In: **DWShea DWSHEA** Date/Time: **8/7/13 0823**

Received By/Stored In: **Fed Ex** Date/Time: **8-8-13**

Received By/Stored In: **Fed Ex** Date/Time: **8-8-13**

Received By/Stored In: **Jennifer Pellegrini** Date/Time: **8-8-13**

Received By/Stored In: **Jennifer Pellegrini** Date/Time: **8-8-13**

Disposal Method: **Disposed By** Date/Time: **8-8-13**

FINAL SAMPLE DISPOSITION

WCH-EE-011

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)

(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrate, Nitrite, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphate, Sulfate); NO2/NO3 - 353.1 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

* Custodian unavailable to remove samples from controlled storage. Shipper removed samples, taking custody for shipment to lab.

** per telecon, the PAL placed the samples into storage on 8/6/13 DWShea 8/7/13

REVIEWED BY *MA* **DATE** *8-7-13*

SAMPLE RECEIPT & REVIEW FORM

Client: <u>WCHN</u>		SDG/AR/COC/Work Order: <u>331126</u>
Received By: <u>JP</u>		Date Received: <u>8-8-13</u>
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?	<input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0cpm</u>
Classified Radioactive II or III by RSO?	<input type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	<input type="checkbox"/>	
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?	<input type="checkbox"/>	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?	<input type="checkbox"/>	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<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) *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>41502209</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: <u>FedEx Air</u> FedEx Ground UPS Field Services Courier Other <u>7904 1556 3913</u>

Comments (Use Continuation Form if needed):

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 X0018**

Sample Analysis

Sample ID	Client ID
331136001	J1RV33
331136002	J1RV34
1202927456	Method Blank (MB) ICP
1202927457	Laboratory Control Sample (LCS)
1202927463	331136001(J1RV33L) Serial Dilution (SD)
1202927461	331136001(J1RV33D) Sample Duplicate (DUP)
1202927462	331136001(J1RV33S) Matrix Spike (MS)
1202932408	331136001(J1RV33PS) Post Spike (PS)
1202929129	Method Blank (MB) ICP-MS
1202929157	Laboratory Control Sample (LCS)
1202929144	331136001(J1RV33L) Serial Dilution (SD)
1202929135	331136001(J1RV33D) Sample Duplicate (DUP)
1202929153	331136001(J1RV33S) Matrix Spike (MS)
1202927213	Method Blank (MB) CVAA
1202927214	Laboratory Control Sample (LCS)
1202927220	331136001(J1RV33L) Serial Dilution (SD)
1202927218	331136001(J1RV33D) Sample Duplicate (DUP)
1202927219	331136001(J1RV33S) 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, 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

All CRDL standards met the advisory control limits with the exceptions of aluminum, calcium, iron, silicon and sodium. However, the associated samples contain these elements at concentrations greater than 2x the PQL.

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: 331136001 (J1RV33)-ICP, CVAA and ICP-MS.

Matrix Spike (MS) Recovery Statement

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS 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 lead.

Post Spike (PS) Recovery Statement

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

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).

Matrix Spike Duplicate (MSD) Recovery Statement

The percent recovery (%R) obtained from the MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. All applicable elements met the acceptance criteria.

MS/MSD Relative Percent Difference (RPD) Statement

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

Technical Information

Holding Time Specifications

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

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 331136001 (J1RV33) and 331136002 (J1RV34) were diluted because titanium was over the linear range of the instrument and affects antimony, cobalt, lead, vanadium and zinc. The 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

DATA EXCEPTION REPORT

Mo.Day Yr. 19-AUG-13	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP/MS	Test / Method: SW846 3050B/6020A	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1323141	Sample Numbers: See Below		

Potentially affected work order(s)(SDG): 330624(X0013),330705(X0014),330707(X0015),330790(X0016),331001(X0017),331136(X0018),331422(X0019),331425(XP0006)

Application Issues:

Failed Recovery for MS/PS
Container scanning event for custody missed

Specification and Requirements Exception Description:

DER Disposition:

1. Failed Recovery for MS/PS:
 QC 1202929150MS,1202929154MS,
 1202929694PS
2. Container scanning event for custody missed:
 331250 001

The matrix spike (1202929150MS and 1202929154MS) recovery failed outside of the control limits for Se. The post spike failed outside the required control limits for Se in 1202929694PS but passed in all other PS's. This verifies the presence of a matrix interference for Se in sample 330707001 and verifies the absence of a matrix interference for all the other samples. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.

The samples were in the custody of the ICPMS lab during analysis. The data is reported as is.

Originator's Name:

Paul Boyd 19-AUG-13

Data Validator/Group Leader:

Aubrey Kingsbury 20-AUG-13

DATA EXCEPTION REPORT

Mo.Day Yr. 22-AUG-13	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1322447	Sample Numbers: 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:
<p>1. Failed Recovery for MS/PS:</p> <p>QC 1202927459MS,1202927462MS, 1202927465MS, 1202927468MS, 1202932407PS, 1202932408PS, 1202932409PS</p> <p>2. Failed RPD for DUP:</p> <p>QC 1202927458DUP, 1202927461DUP, 1202927464DUP, 1202927467DUP</p>	<p>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.</p> <p>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.</p>

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: X0018 GEL Work Order: 331136 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

Byron Davis

8-22-13

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: August 22, 2013

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

Client SDG: X0018

Client Sample ID: J1RV33
Sample ID: 331136001

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: August 22, 2013

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

Client SDG: X0018

Client Sample ID: J1RV34
Sample ID: 331136002

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:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: August 22, 2013

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

Workorder: 331136 **Client SDG: X0018**

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch 1323141											
QC1202929135	331136001	DUP									
Selenium		DU	0.309	DU	0.326	mg/kg	N/A ^		PRB	08/19/13	04:19
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
QC1202929153	331136001	MS									
Selenium	5.09	DU	0.309	D	4.60	mg/kg	90.4	(75%-125%)		08/19/13	04:24
QC1202929144	331136001	SDILT									
Selenium		DU	-0.397	DU	1.55	ug/L	N/A	(0%-10%)		08/19/13	04:36
Metals Analysis-ICP											
Batch 1322447											
QC1202927461	331136001	DUP									
Aluminum			7030		7580	mg/kg	7.54	(0%-20%)	HSC	08/17/13	17:09
Antimony		DU	1.64	DU	1.57	mg/kg	N/A ^			08/20/13	17:07
Arsenic		B	1.80	B	2.05	mg/kg	13.0 ^	(+/-2.85)		08/17/13	17:09
Barium			72.2		73.0	mg/kg	0.978	(0%-20%)			
Beryllium			0.693		0.715	mg/kg	3.14 ^	(+/-0.476)			
Boron		B	1.97	B	2.13	mg/kg	7.74 ^	(+/-4.76)			
Cadmium		U	0.0994	U	0.0952	mg/kg	N/A ^				
Calcium			5430		5570	mg/kg	2.55	(0%-20%)			
Chromium			13.4		14.4	mg/kg	7.40	(0%-20%)			
Cobalt		D	8.78	D	9.22	mg/kg	4.90 ^	(+/-2.38)		08/20/13	17:07
Copper			17.9		18.7	mg/kg	4.41	(0%-20%)		08/17/13	17:09
Iron			23100		23600	mg/kg	2.02	(0%-20%)			

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QC Summary

Workorder: 331136

Client SDG: X0018

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1322447										
Lead	*D	5.04	*D	16.1	mg/kg	105*^		(+/-4.76)	HSC	08/20/13	17:07
Magnesium		4910		5180	mg/kg	5.29		(0%-20%)		08/17/13	17:09
Manganese		323		326	mg/kg	0.864		(0%-20%)			
Molybdenum	U	0.199	U	0.190	mg/kg	N/A	^				
Nickel		13.0		14.2	mg/kg	9.20		(0%-20%)			
Potassium		1970		1930	mg/kg	2.00		(0%-20%)		08/21/13	15:56
Silicon	N	465		522	mg/kg	11.6		(0%-20%)		08/17/13	17:09
Silver	U	0.0994	B	0.137	mg/kg	296	^	(+/-0.476)			
Sodium		114		119	mg/kg	4.58	^	(+/-23.8)			
Vanadium	D	55.3	D	57.2	mg/kg	3.41		(0%-20%)		08/20/13	17:07
Zinc	D	48.7	D	50.9	mg/kg	4.33		(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

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QC Summary

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Client SDG: X0018

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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						

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QC Summary

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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						
QC1202927462 331136001 MS											
Aluminum	484			7030	9270	mg/kg	N/A	(75%-125%)		08/17/13	17:11
Antimony	48.4	DU		1.64	D	44.7	mg/kg	92.4	(75%-125%)	08/20/13	17:10
Arsenic	48.4	B		1.80		49.6	mg/kg	98.8	(75%-125%)	08/17/13	17:11
Barium	48.4			72.2		123	mg/kg	106	(75%-125%)		
Beryllium	48.4			0.693		49.2	mg/kg	100	(75%-125%)		
Boron	48.4	B		1.97		48.2	mg/kg	95.4	(75%-125%)		

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Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP												
Batch	1322447											
Cadmium	48.4	U	0.0994		48.7	mg/kg		100	(75%-125%)	HSC	08/17/13	17:11
Calcium	484		5430		6290	mg/kg		N/A	(75%-125%)			
Chromium	48.4		13.4		58.4	mg/kg		92.9	(75%-125%)			
Cobalt	48.4	D	8.78	D	59.9	mg/kg		106	(75%-125%)		08/20/13	17:10
Copper	48.4		17.9		69.7	mg/kg		107	(75%-125%)		08/17/13	17:11
Iron	484		23100		25200	mg/kg		N/A	(75%-125%)			
Lead	48.4	*D	5.04	D	57.7	mg/kg		109	(75%-125%)		08/20/13	17:10
Magnesium	484		4910		5920	mg/kg		N/A	(75%-125%)		08/17/13	17:11
Manganese	48.4		323		385	mg/kg		N/A	(75%-125%)			
Molybdenum	48.4	U	0.199		44.8	mg/kg		92.6	(75%-125%)			
Nickel	48.4		13.0		58.8	mg/kg		94.6	(75%-125%)			
Potassium	484		1970		2540	mg/kg		N/A	(75%-125%)		08/21/13	16:08
Silicon	484	N	465	N	520	mg/kg		11.2*	(75%-125%)		08/17/13	17:11
Silver	48.4	U	0.0994		49.3	mg/kg		102	(75%-125%)			
Sodium	484		114		599	mg/kg		100	(75%-125%)			
Vanadium	48.4	D	55.3	D	109	mg/kg		110	(75%-125%)		08/20/13	17:10
Zinc	48.4	D	48.7	D	102	mg/kg		109	(75%-125%)			
QC1202932408 331136001 PS												
Silicon	5000	N	4680		26500	ug/L		436*	(80%-120%)		08/21/13	16:33
QC1202927463 331136001 SDILT												
Aluminum			70700	D	14600	ug/L	3.14		(0%-10%)		08/17/13	17:14
Antimony		DU	-0.914	DU	8.20	ug/L	N/A		(0%-10%)		08/20/13	17:13
Arsenic		B	18.1	D	8.27	ug/L	128		(0%-10%)		08/17/13	17:14

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1322447										
Barium		727	D	150	ug/L	3.49		(0%-10%)	HSC	08/17/13	17:14
Beryllium		6.97	D	1.54	ug/L	10.8		(0%-10%)			
Boron	B	19.9	DU	4.97	ug/L	N/A		(0%-10%)			
Cadmium	U	0.844	DU	0.497	ug/L	N/A		(0%-10%)			
Calcium		54600	D	11100	ug/L	1.33		(0%-10%)			
Chromium		135	D	26.8	ug/L	.524		(0%-10%)			
Cobalt	D	17.7	D	3.71	ug/L	4.93		(0%-10%)		08/20/13	17:13
Copper		180	D	34.6	ug/L	4.06		(0%-10%)		08/17/13	17:14
Iron		232000	D	48100	ug/L	3.63		(0%-10%)			
Lead	*D	10.1	DU	8.20	ug/L	N/A		(0%-10%)		08/20/13	17:13
Magnesium		49400	D	10100	ug/L	2.03		(0%-10%)		08/17/13	17:14
Manganese		3250	D	681	ug/L	4.75		(0%-10%)			
Molybdenum	U	-0.792	DU	0.994	ug/L	N/A		(0%-10%)			
Nickel		130	D	27.1	ug/L	4.01		(0%-10%)			
Potassium		19800	D	4030	ug/L	1.87		(0%-10%)		08/21/13	16:10
Silicon	N	4680	D	975	ug/L	4.14		(0%-10%)		08/17/13	17:14
Silver	U	-0.268	DU	0.497	ug/L	N/A		(0%-10%)			
Sodium		1140	D	198	ug/L	13.4		(0%-10%)			
Vanadium	D	111	D	22.0	ug/L	.886		(0%-10%)		08/20/13	17:13
Zinc	D	98.0	D	19.1	ug/L	2.69		(0%-10%)			

Metals Analysis-Mercury

Batch 1322356

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Client SDG: X0018

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury											
Batch 1322356											
QC1202927218	331136001	DUP									
Mercury		B	0.00492	B	0.00421	mg/kg	15.5 ^	(+/-0.0122)	NOR1	08/15/13	12:12
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
QC1202927219	331136001	MS									
Mercury	0.116	B	0.00492		0.132	mg/kg		109 (80%-120%)		08/15/13	12:13
QC1202927220	331136001	SDILT									
Mercury		B	0.084	DU	0.0196	ug/L	N/A	(0%-10%)		08/15/13	12:17

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.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

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

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

General Chem Analysis

Case Narrative

**General Chemistry Narrative
WC-HANFORD, INC. (WCHN)
SDG X0018**

Method/Analysis Information

Product: pH
Analytical Batch: 1322316 **Method:** SW9045D pH

Sample Analysis

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

Sample ID	Client ID
331136001	J1RV33
331136002	J1RV34
1202927128	331136001(J1RV33) Sample Duplicate (DUP)
1202927130	Laboratory Control Sample (LCS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information (CCV)

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

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 331136001 (J1RV33).

Duplicate Relative Percent Difference (RPD) Statement

The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

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

Holding Times

The following samples from this sample group were received by the lab outside of the method specified holding time: 331136001 (J1RV33) and 331136002 (J1RV34).

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Data Exception (DER) Documentation**

The following DER was generated for this SDG: 1211797 331136001 (J1RV33) and 331136002 (J1RV34).

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Ion Chromatography
Analytical Batch: 1321407 **Method:** SW846 9056A Anions
Prep Batch : 1321405 **Method:** SW846 9056A

Sample Analysis

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

Sample ID	Client ID
331136001	J1RV33
331136002	J1RV34
1202924726	Method Blank (MB)
1202924727	331136001(J1RV33) Sample Duplicate (DUP)
1202924728	331136001(J1RV33) Matrix Spike (MS)
1202924729	Laboratory Control Sample (LCS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

All continuing calibration verification standards (CCVs) associated with reported data from this batch were within

acceptance limits.

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 331136001 (J1RV33).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement

The MS/PS recovery for this sample set was within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Manual Integrations

The following samples from this sample group had to be manually integrated due to errors in the instrument software peak integration: 1202924727 (J1RV33), 331136001 (J1RV33) and 331136002 (J1RV34).

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Nitrate + Nitrite
Analytical Batch: 1320037 **Method:** EPA 353.2 Nitrogen and Nitrate/Nitrite
Prep Batch : 1320036 **Method:** EEPA 353.2 Modified

Sample Analysis

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

Sample ID	Client ID
331136001	J1RV33
331136002	J1RV34
1202921411	Method Blank (MB)
1202921418	Laboratory Control Sample (LCS)
1202925377	331136001(J1RV33) Sample Duplicate (DUP)
1202925378	331136001(J1RV33) Matrix Spike (MS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Calibration Verification Information

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

Continuing Calibration Blanks

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 331136001 (J1RV33).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement

The MS/PS recoveries for this sample set were within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Hexavalent Chromium
Analytical Batch: 1321464 **Method:** SW846_7196A Hexavalent Chromium
Prep Batch : 1321453 **Method:** SW846 3060A

Sample Analysis

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

Sample ID	Client ID
331136001	J1RV33
331136002	J1RV34
1202924865	Method Blank (MB)
1202924866	Laboratory Control Sample (LCS)
1202924879	331136001(J1RV33) Sample Duplicate (DUP)
1202924880	331136001(J1RV33) Matrix Spike (MS)
1202924881	331136001(J1RV33) Matrix Spike Duplicate (MSD)
1202924909	Insoluble Lab Control Sample (ILCS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 331136001 (J1RV33).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement

The MS/PS recovery for this sample set was within the required acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The spike duplicate recovery falls outside of the established acceptance limits. Since both the spike recovery and the RPD between the spike and spike duplicate fall within acceptance limits, the data is reported. 1202924881 (J1RV33).

MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the spike and spike duplicate met the acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

The values for the sample and duplicate are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable. 1202924879 (J1RV33).

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Data Exception (DER) Documentation**

The following DER was generated for this SDG: 1211199 1202924881 (J1RV33).

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

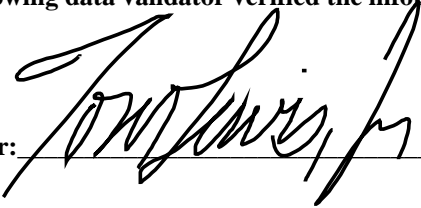
Certification Statement

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

Review Validation:

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

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

Reviewer:  Date: 22Aug13

DATA EXCEPTION REPORT

Mo.Day Yr. 13-AUG-13	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: VIS SPECTROMETER	Test / Method: SW846 7196A	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1321464	Sample Numbers: See below.		
Potentially affected work order(s)(SDG): 330624(X0013),330705(X0014),330790(X0016),331001(X0017),331136(X0018)			
Application Issues: Container scanning event for custody missed Failed Recovery for MSD/PSD			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. Failed Recovery for MSD: QC 1202924881MSD</p> <p>2. Container scanning event for custody missed: 330624 001,002,003 330705 001,002 330790 001 331001 001,002 331136 001,002</p>		<p>1. The spike duplicate recovery falls outside of the established acceptance limits. Since both the spike recovery and the RPD between the spike and spike duplicate fall within acceptance limits, the data is reported.</p> <p>2. The analyst neglected to scan sample containers to the analytical batch; however, the samples were in the analyst's custody at the time of analysis.</p>	

Originator's Name:

Lindsey Jensen 13-AUG-13

Data Validator/Group Leader:

Julia Hamilton 14-AUG-13

DATA EXCEPTION REPORT

Mo.Day Yr. 15-AUG-13	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ELECTRODE	Test / Method: SW846 9045D	Matrix Type: Solid	Client Code: WCHN, SOOP, OLAB
Batch ID: 1322316	Sample Numbers: See below.		
Potentially affected work order(s)(SDG): 331001(X0017),331136(X0018),331249(X308038),331287,331422(X0019)			
Application Issues: Sample received out of holding			
Specification and Requirements Exception Description:		DER Disposition:	
1. Sample received out of holding: 331001001, 331001002, 331136001, 331136002, 331249001, 331287001, and 331422001		1. Samples were received out of holding.	

Originator's Name:

Lisa Gregory 15-AUG-13

Data Validator/Group Leader:

Julia Hamilton 15-AUG-13

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0018 GEL Work Order: 331136 Project: RC-232 Soil

The Qualifiers in this report are defined as follows:

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

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

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

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

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

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

Reviewed by



Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: August 21, 2013

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

Workorder: 331136

Client SDG: X0018

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Electrode Analysis											
Batch	1322316										
QC1202927128	331136001	DUP									
pH	X	8.11	X	8.24	pH	1.59		(0%-10%)	LYG1	08/15/13	09:28
QC1202927130	LCS										
pH	7.00			7.01	pH		100	(99%-101%)		08/15/13	09:21
Ion Chromatography											
Batch	1321407										
QC1202924727	331136001	DUP									
Bromide	U	0.682	U	0.682	mg/kg	N/A	^		MAR1	08/17/13	07:04
Chloride		2.15		2.17	mg/kg	0.755	^	(+/-2.04)			
Fluoride	U	0.336	U	0.336	mg/kg	N/A	^				
Nitrate-N		1.85		1.85	mg/kg	0.055	^	(+/-1.02)			
Nitrite-N	U	0.336	U	0.336	mg/kg	N/A	^				
O-Phosphate as P	B	0.811	B	0.898	mg/kg	10.1	^	(+/-2.04)			
Sulfate	B	1.55	B	1.55	mg/kg	0.329	^	(+/-4.07)			
QC1202924729	LCS										
Bromide	12.5			12.2	mg/kg		97.8	(90%-110%)		08/17/13	05:59
Chloride	50.0			48.5	mg/kg		97	(90%-110%)			
Fluoride	25.0			25.1	mg/kg		100	(90%-110%)			
Nitrate-N	25.0			24.8	mg/kg		99.1	(90%-110%)			
Nitrite-N	25.0			25.1	mg/kg		100	(90%-110%)			
O-Phosphate as P	12.5			12.4	mg/kg		99.4	(90%-110%)			
Sulfate	100			100	mg/kg		100	(90%-110%)			
QC1202924726	MB										
Bromide			U	0.670	mg/kg					08/17/13	05:26

GEL LABORATORIES LLC

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QC Summary

Workorder: 331136

Client SDG: X0018

Project Description: RC-232 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1321407										
Chloride			U	0.670	mg/kg				MAR1	08/17/13	05:26
Fluoride			U	0.330	mg/kg						
Nitrate-N			U	0.330	mg/kg						
Nitrite-N			U	0.330	mg/kg						
O-Phosphate as P			U	0.670	mg/kg						
Sulfate			U	1.33	mg/kg						
QC1202924728 331136001 MS											
Bromide	12.7	U	0.682	12.7	mg/kg		100	(70%-134%)		08/17/13	07:37
Chloride	50.7		2.15	52.4	mg/kg		99.2	(46%-150%)			
Fluoride	25.3	U	0.336	22.0	mg/kg		85.9	(34%-134%)			
Nitrate-N	25.3		1.85	26.2	mg/kg		96.3	(68%-129%)			
Nitrite-N	25.3	U	0.336	24.8	mg/kg		97	(68%-130%)			
O-Phosphate as P	12.7	B	0.811	12.7	mg/kg		93.9	(26%-124%)			
Sulfate	101	B	1.55	100	mg/kg		97.2	(50%-151%)			
Nutrient Analysis											
Batch	1320037										
QC1202925377 331136001 DUP											
Nitrogen, Nitrate/Nitrite			1.51	1.37	mg/kg	9.68 ^		(+/-0.510)	KLP1	08/15/13	13:42
QC1202921418 LCS											
Nitrogen, Nitrate/Nitrite	10.0			10.0	mg/kg		100	(90%-110%)		08/15/13	13:23
QC1202921411 MB											
Nitrogen, Nitrate/Nitrite			U	0.170	mg/kg					08/15/13	13:21
QC1202925378 331136001 MS											
Nitrogen, Nitrate/Nitrite	10.1		1.51	11.0	mg/kg		94.1	(75%-125%)		08/15/13	13:43

Spectrometric Analysis

Batch 1321464

GEL LABORATORIES LLC

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QC Summary

Workorder: 331136

Client SDG: X0018

Project Description: RC-232 Soil

Page 3 of 3

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Spectrometric Analysis											
Batch	1321464										
QC1202924879	331136001	DUP									
Hexavalent Chromium		U	0.158	U	0.162	mg/kg	N/A ^		LXA1	08/13/13	16:33
QC1202924909	ILCS										
Hexavalent Chromium	8.00				7.66	mg/kg	95.8	(80%-120%)		08/13/13	15:09
QC1202924866	LCS										
Hexavalent Chromium	3.99				4.04	mg/kg	101	(80%-120%)		08/13/13	15:09
QC1202924865	MB										
Hexavalent Chromium			U		0.160	mg/kg				08/13/13	15:09
QC1202924880	331136001	MS									
Hexavalent Chromium	3.97	U	0.158		3.09	mg/kg	75.4	(75%-125%)		08/13/13	16:33
QC1202924881	331136001	MSD									
Hexavalent Chromium	3.99	U	0.158		3.04	mg/kg	1.64	74*	(0%-30%)	08/13/13	16:33

Notes:

The Qualifiers in this report are defined as follows:

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

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

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Miscellaneous

Moisture LogBook

Batch: 1321129

Analyst: LYT1

Date/Time: 09-AUG-2013

Procedure Code DRY WEIGHT

Procedure Description Dry Weight-Percent Moisture

Lab Sop: GL-OA-E-020

Sample St	Sample Id	Rpd(%)
DUP	1202924067	10.262

Sample Id	Sample Type	Original Hsn	Instrument	Run Time	Container Wt	Initial Wt	Final Wt (g)	Net Initial Wt (g)	Net Final Wt (g)	Moisture (%)
331136001	SAMPLE		BALHD2000D	06:31	7.005	28.771	28.383	21.766	21.378	1.78
331136002	SAMPLE		BALHD2000D	06:31	7.12	32.765	31.056	25.645	23.936	6.66
1202924067	DUP	331136001	BALHD2000D	06:31	7.249	26.941	26.552	19.692	19.303	1.98

Comments:

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

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