

SAF-RC-155
618-10 & 618-11 Field Remediation –
Other
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

No Distribution Required

KW 9/17/15
INITIAL/DATE

COMMENTS:

SDG XP0222

SAF-RC-155

Rad only

Chem only

Rad & Chem

Complete

Partial

Sample Location: 618-10 (mock-up test sample)



September 14, 2015

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

Re: RC-155 Other
Work Order: 380439
SDG: XP0222

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 02, 2015. 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. 4505.

Sincerely,

Heather Shaffer
Project Manager

Purchase Order: 1510
Chain of Custody: RC-155-164
Enclosures



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Case Narrative

**Receipt Narrative
for
Eberline
SDG: XP0222
Work Order: 380439**

September 14, 2015

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 September 02, 2015 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. The client gave instruction not to continue with TCLP analysis on this SDG. Please see enclosed email for further details.

Sample Identification: The laboratory received the following sample:

<u>Laboratory ID</u>	<u>Client ID</u>
380439001	J1V828

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.

Heather Shaffer

Heather Shaffer
Project Manager

Chain of Custody and Supporting Documentation



SAMPLE RECEIPT & REVIEW FORM

Client: <u>HAND/wct/h</u>	SDG/AR/COC/Work Order: <u>XPO222</u>
Received By: <u>MK</u>	Date Received: <u>9-2-15</u>
Suspected Hazard Information	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No *If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>cpm 0</u>
Classified Radioactive II or III by RSO?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Preservation Method: <u>Ice bags</u> Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius <u>2C</u>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Temperature Device Serial #: <u>F5032015830</u> Secondary Temperature Device Serial # (if Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's and containers affected:
7 VOA vials contain acid preservation?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
16 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: <u>FedEx Air</u> FedEx Ground UPS Field Services Courier Other <u>7744 1589 2578</u>

Comments (Use Continuation Form if needed):

Subject: RE: GEL Weekly Status Report for WCH
From: "Kessner, Joan H" <joan.kessner@wch-rcc.com>
Date: 9/14/2015 9:31 AM
To: "'hea01394@gel.com'" <hea01394@gel.com>

Heather—

Please cancel the TCLP (ICP & Hg) Metals for SDG XP0222 – the project determined that no additional data is required.

Thanks for your help,
 Joan

From: hea01394@gel.com [mailto:hea01394@gel.com]
Sent: Sunday, September 13, 2015 7:00 AM
To: Kessner, Joan H
Subject: GEL Weekly Status Report for WCH

Subject: GEL Weekly Status Report for WCH Content-Type: text/html

Joan, Below is the weekly status report. Thank you, Heather Shaffer

Client SDG	Work Order	Project Description	Due Date	Fax Due Date	Fraction Logged	Fraction Logged wStatus
XP0222	380439	RC-155 Other	16-SEP-15	09-SEP-15	Project Management, Metals, General Chem, Electronic Data Deliverable	NEW Project Management, NEW Metals, NEW General Chem, NEW Electronic Data Deliverable

Email Sent To: joan.kessner@wch-rcc.com

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Laboratory Certifications

List of current GEL Certifications as of 14 September 2015

State	Certification
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California	2940 Interim
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013-10
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA150001
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
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
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-15-10
Utah NELAP	SC000122015-18
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0222
Work Order #: 380439

Sample ID	Client ID
380439001	J1V828
1203386240	Method Blank (MB)ICP
1203386241	Laboratory Control Sample (LCS)
1203386244	380439001(J1V828L) Serial Dilution (SD)
1203386242	380439001(J1V828D) Sample Duplicate (DUP)
1203386243	380439001(J1V828S) Matrix Spike (MS)
1203386589	380439001(J1V828PS) Post Spike (PS)
1203386229	Method Blank (MB)ICP-MS
1203386230	Laboratory Control Sample (LCS)
1203386233	380439001(J1V828L) Serial Dilution (SD)
1203386231	380439001(J1V828D) Sample Duplicate (DUP)
1203386232	380439001(J1V828S) Matrix Spike (MS)
1203386567	Method Blank (MB)CVAA
1203386568	Laboratory Control Sample (LCS)
1203386571	380439001(J1V828L) Serial Dilution (SD)
1203386569	380439001(J1V828D) Sample Duplicate (DUP)
1203386570	380439001(J1V828S) Matrix Spike (MS)

Sample Analysis

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

Method/Analysis Information

Analytical Batch:	1504947, 1504943 and 1505091
Prep Batch :	1504945, 1504941 and 1505090
Standard Operating Procedures:	GL-MA-E-013 REV# 24, GL-MA-E-009 REV# 25, GL-MA-E-014 REV# 26 and GL-MA-E-010 REV# 30
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 an ESI SC-FAST introduction, cyclonic spray

chamber, and yttrium or scandium internal standard.

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.

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.

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

The CRDL/PQL standard recoveries met the referenced advisory control limits.

ICSA/ICSAB Statement

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

Continuing Calibration Blanks (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: 380439001 (J1V828)-ICP, ICP-MS and CVAA.

Matrix Spike (MS/MSD) Recovery Statement

The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analytes. The post spike recoveries were within the required control limits for some of the analytes. This verifies the absence of a matrix interference in the post-digested sample. For other analytes the post spike failed verifying the presence of a matrix interference in the post-digested sample. The failing spike recoveries may be attributed to possible matrix interference and/or sample non-homogeneity.

Sample	Analyte	Value
1203386243 (J1V828MS)	Antimony	72.2* (75%-125%)
	Silicon	19.7* (75%-125%)

Duplicate Relative Percent Difference (RPD) Statement

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203386242 (J1V828DUP)	Silicon	59.1* (0%-20%)

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 all applicable analytes and verifies the presence of matrix interferences.

Sample	Analyte	Value
1203386589 (J1V828PS)	Silicon	-103* (80%-120%)

Serial Dilution % Difference Statement

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 25x the IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified.

Sample	Analyte	Value
1203386244 (J1V828SDILT)	Barium	10.2 *(0%-10%)
	Nickel	12.8 *(0%-10%)

Technical Information**Holding Time Specifications**

GEL assigns holding times based on the associated methodology. Holding time is measured by comparison of the date and time of sample collection to the date and time of sample preparation and analysis. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

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

Sample Dilutions

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Sample was diluted for calcium and titanium in order to bring raw values within the linear range of the instrument, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for silver, beryllium, sodium, lead, strontium, cobalt, antimony, thallium, vanadium and zinc. 380439001 (J1V828)-ICP. Sample 380439001 (J1V828)-ICP-MS was diluted to ensure that the analyte concentration was within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times. ICP-MS.

Analyte	380439 001
Several	2X 10X 1X

Preparation Information

The samples in this SDG were not diluted and prepared 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

A Data exception report (DER) was generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) 1446056 was generated for samples 1203386242 (J1V828DUP), 1203386243 (J1V828MS), 1203386243 (J1V828MS), 1203386244 (J1V828SDILT) and 1203386589 (J1V828PS) in this SDG/batch.

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.

DATA EXCEPTION REPORT

Mo.Day Yr. 08-SEP-15	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1504947	Sample Numbers: See Below		

Potentially affected work order(s)(SDG): 380439(XP0222)

Application Issues:

- Failed Recovery for MS/MSD, or PS/PSD
- Failed RPD for DUP
- Failed Recovery for PS/PSD
- Failed difference for SDILT

Specification and Requirements Exception Description:

DER Disposition:

1. Failed RPD for DUP:
QC 1203386242DUP
2. Failed Recovery for MS/MSD, or PS/PSD:
QC 1203386243MS
3. Failed Recovery for PS/PSD:
QC 1203386589PS
4. Failed difference for SDILT:
QC 1203386244SDILT

1. Not all the applicable analyte RPD values were within the acceptance criteria.
1203386242 (J1V828DUP) Silicon [59.1* (0%-20%)].
2. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits for some of the analyte. This verifies the absence of a matrix interference in the post-digested sample. For other analyte the post spike failed verifying the presence of a matrix interference in the post-digested sample. The failing spike recovery may be attributed to possible matrix interference and/or sample non-homogeneity.
1203386243 (J1V828MS) Antimony [72.2* (75%-125%)] and Silicon [19.7* (75%-125%)].
3. The PS did not meet the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the presence of matrix interferences.
1203386589 (J1V828PS) Silicon [-103* (80%-120%)].
4. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified.
1203386244 (J1V828SDILT) Barium [10.2 *(0%-10%)] and Nickel [12.8 *(0%-10%)].

Originator's Name:

Helen Camello 08-SEP-15

Data Validator/Group Leader:

Louise Smith 08-SEP-15

GEL LABORATORIES LLC

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

Qualifier Definition Report for

WCHN001 Eberline

Client SDG: XP0222 GEL Work Order: 380439 Project: RC-155 Other

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.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

Review/Validation

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

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

Signature:



Name: Nik-Cole Elmore

Date: 15 SEP 2015

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 15, 2015

Company : WC-Hanford, Inc.
 Address : 2620 Fermi Avenue
 MSIN H4-21
 Richland, Washington 99354
 Contact: Joan Kessner
 Project: RC-155 Other

Client SDG: XP0222

Client Sample ID: J1V828	Project: WCHN00414
Sample ID: 380439001	Client ID: WCHN001
Matrix: OTHERSOLID	
Collect Date: 01-SEP-15 09:05	
Receive Date: 02-SEP-15	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time Batch	Method
Mercury Analysis-CVAA										
SW846 7471B Mercury in Solid "As Received"										
Mercury		0.0202	0.004	0.0119	mg/kg	1	MTM1	09/04/15	1114 1505091	1
Metals Analysis-ICP										
ICP METALS 6010TR Client List +Tl & Sr "As Received"										
Aluminum		14700	6.61	19.5	mg/kg	1	HSC	09/03/15	1547 1504947	2
Arsenic		8.07	0.486	2.92	mg/kg	1				
Barium	M	559	0.0973	0.486	mg/kg	1				
Boron		39.7	0.973	4.86	mg/kg	1				
Cadmium		0.602	0.0973	0.486	mg/kg	1				
Chromium		27.2	0.146	0.486	mg/kg	1				
Copper		39.0	0.292	0.973	mg/kg	1				
Iron		16700	7.78	24.3	mg/kg	1				
Magnesium		8300	8.27	29.2	mg/kg	1				
Manganese		299	0.195	0.973	mg/kg	1				
Molybdenum		2.08	0.195	0.973	mg/kg	1				
Nickel	M	16.1	0.146	0.486	mg/kg	1				
Potassium		2150	6.23	24.3	mg/kg	1				
Silicon	*N	1330	1.46	9.73	mg/kg	1				
Antimony	BDN	5.87	3.21	9.73	mg/kg	10	HSC	09/04/15	1231 1504947	3
Beryllium	BD	1.36	0.973	4.86	mg/kg	10				
Calcium	D	193000	77.8	243	mg/kg	10				
Cobalt	D	7.06	1.46	4.86	mg/kg	10				
Lead	BD	8.23	3.21	9.73	mg/kg	10				
Silver	DU	0.973	0.973	4.86	mg/kg	10				
Sodium	D	2230	68.1	243	mg/kg	10				
Strontium	D	282	0.973	4.86	mg/kg	10				
Thallium	BD	5.58	4.86	19.5	mg/kg	10				
Vanadium	D	58.2	0.973	4.86	mg/kg	10				
Zinc	D	98.7	3.89	9.73	mg/kg	10				
Metals Analysis-ICP-MS										
SW846 3050B/6020A Se, Zr "As Received"										
Selenium	DU	0.327	0.327	1.00	mg/kg	2	SKJ	09/04/15	1802 1504943	4
Zirconium	D	36.2	0.496	9.92	mg/kg	10	SKJ	09/09/15	1245 1504943	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
--------	-------------	---------	------	------	------------

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 15, 2015

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-155 Other

Client SDG: XP0222

Client Sample ID: J1V828
Sample ID: 380439001

Project: WCHN00414
Client ID: WCHN001

SW846 3050B	ICP-MS 3050BS PREP	JP1	09/02/15	1730	1504941
SW846 3050B	SW846 3050B Prep for 6010C	JP1	09/02/15	1730	1504945
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	09/03/15	1230	1505090

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7471B	
2	SW846 3050B/6010C	
3	SW846 3050B/6010C	
4	SW846 3050B/6020A	
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: September 15, 2015

Page 1 of 8

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

Workorder: 380439

Client SDG: XP0222

Project Description: RC-155 Other

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch 1504943											
QC1203386231	380439001	DUP									
Selenium	DU	0.327	DU	0.320	mg/kg	N/A			SKJ	09/04/15	18:06
Zirconium	D	36.2	D	39.9	mg/kg	9.66 ^		(+/-9.69)		09/09/15	12:47
QC1203386230	LCS										
Selenium	4.81		D	4.44	mg/kg		92.4	(80%-120%)		09/04/15	17:51
Zirconium	4.81		D	4.97	mg/kg		103	(80%-120%)		09/09/15	12:41
QC1203386229	MB										
Selenium			DU	0.319	mg/kg					09/04/15	17:47
Zirconium			DU	0.0965	mg/kg					09/09/15	12:40
QC1203386232	380439001	MS									
Selenium	4.97	DU	0.327	D	4.59	mg/kg		87.4	(75%-125%)	09/04/15	18:10
Zirconium	4.97	D	36.2	D	46.8	mg/kg		N/A	(75%-125%)	09/09/15	12:48
QC1203386233	380439001	SDILT									
Selenium	DU	1.22	DU	1.64	ug/L	N/A		(0%-10%)		09/04/15	18:17
Zirconium	D	36.5	D	7.93	ug/L	8.6		(0%-10%)		09/09/15	12:51
Metals Analysis-ICP											
Batch 1504947											
QC1203386242	380439001	DUP									
Aluminum		14700		14500	mg/kg	1.81		(0%-20%)	HSC	09/03/15	15:50
Antimony	BDN	5.87	DU	3.14	mg/kg	81.6 ^		(+/-9.51)		09/04/15	12:34
Arsenic		8.07		8.18	mg/kg	1.4 ^		(+/-2.85)		09/03/15	15:50
Barium	M	559		544	mg/kg	2.65		(0%-20%)			
Beryllium	BD	1.36	BD	1.40	mg/kg	3.21 ^		(+/-4.75)		09/04/15	12:34
Boron		39.7		39.4	mg/kg	0.946		(0%-20%)		09/03/15	15:50
Cadmium		0.602		0.586	mg/kg	2.79 ^		(+/-0.475)			

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QC Summary

Workorder: 380439

Client SDG: XP0222

Project Description: RC-155 Other

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1504947										
Calcium	D	193000	D	193000	mg/kg	0.0922		(0%-20%)	HSC	09/04/15	12:34
Chromium		27.2		27.6	mg/kg	1.32		(0%-20%)		09/03/15	15:50
Cobalt	D	7.06	D	6.34	mg/kg	10.9	^	(+/-4.75)		09/04/15	12:34
Copper		39.0		38.5	mg/kg	1.16		(0%-20%)		09/03/15	15:50
Iron		16700		16300	mg/kg	2.21		(0%-20%)			
Lead	BD	8.23	BD	6.45	mg/kg	24.3	^	(+/-9.51)		09/04/15	12:34
Magnesium		8300		7930	mg/kg	4.58		(0%-20%)		09/03/15	15:50
Manganese		299		284	mg/kg	5.23		(0%-20%)			
Molybdenum		2.08		2.11	mg/kg	1.29	^	(+/-0.951)			
Nickel	M	16.1		13.8	mg/kg	15.3		(0%-20%)			
Potassium		2150		2120	mg/kg	1.18		(0%-20%)			
Silicon	*N	1330	*	725	mg/kg	59.1	*	(0%-20%)			
Silver	DU	0.973	DU	0.951	mg/kg	N/A				09/04/15	12:34
Sodium	D	2230	D	2250	mg/kg	0.731		(0%-20%)			
Strontium	D	282	D	276	mg/kg	2.07		(0%-20%)			
Thallium	BD	5.58	BD	6.67	mg/kg	17.7	^	(+/-19.0)			
Vanadium	D	58.2	D	55.1	mg/kg	5.49		(0%-20%)			
Zinc	D	98.7	D	94.3	mg/kg	4.61		(0%-20%)			
QC1203386241	LCS										
Aluminum		495		513	mg/kg		104	(80%-120%)		09/03/15	15:43
Antimony		49.5		47.2	mg/kg		95.4	(80%-120%)		09/04/15	12:27
Arsenic		49.5		50.7	mg/kg		102	(80%-120%)		09/03/15	15:43

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QC Summary

Workorder: 380439

Client SDG: XP0222

Project Description: RC-155 Other

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1504947										
Barium	49.5			50.3	mg/kg		102	(80%-120%)	HSC	09/03/15	15:43
Beryllium	49.5			50.2	mg/kg		101	(80%-120%)		09/04/15	12:27
Boron	49.5			51.6	mg/kg		104	(80%-120%)		09/03/15	15:43
Cadmium	49.5			50.6	mg/kg		102	(80%-120%)			
Calcium	495			499	mg/kg		101	(80%-120%)		09/04/15	12:27
Chromium	49.5			49.9	mg/kg		101	(80%-120%)		09/03/15	15:43
Cobalt	49.5			47.7	mg/kg		96.3	(80%-120%)		09/04/15	12:27
Copper	49.5			51.0	mg/kg		103	(80%-120%)		09/03/15	15:43
Iron	495			527	mg/kg		107	(80%-120%)			
Lead	49.5			48.8	mg/kg		98.6	(80%-120%)		09/04/15	12:27
Magnesium	495			534	mg/kg		108	(80%-120%)		09/03/15	15:43
Manganese	49.5			49.7	mg/kg		100	(80%-120%)			
Molybdenum	49.5			49.0	mg/kg		99.1	(80%-120%)			
Nickel	49.5			51.5	mg/kg		104	(80%-120%)			
Potassium	495			503	mg/kg		102	(80%-120%)			
Silicon	495			427	mg/kg		86.3	(80%-120%)			
Silver	49.5			48.1	mg/kg		97.2	(80%-120%)		09/04/15	12:27
Sodium	495			481	mg/kg		97.2	(80%-120%)			
Strontium	49.5			48.9	mg/kg		98.7	(80%-120%)			
Thallium	49.5			49.2	mg/kg		99.4	(80%-120%)			
Vanadium	49.5			48.4	mg/kg		97.7	(80%-120%)			

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QC Summary

Workorder: 380439

Client SDG: XP0222

Project Description: RC-155 Other

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1504947										
Zinc	49.5			48.3	mg/kg		97.5	(80%-120%)			
QC1203386240	MB										
Aluminum			U	6.75	mg/kg				HSC	09/03/15	15:40
Antimony			U	0.327	mg/kg					09/04/15	12:24
Arsenic			U	0.496	mg/kg					09/03/15	15:40
Barium			U	0.0992	mg/kg						
Beryllium			U	0.0992	mg/kg					09/04/15	12:24
Boron			U	0.992	mg/kg					09/03/15	15:40
Cadmium			U	0.0992	mg/kg						
Calcium			U	7.94	mg/kg					09/04/15	12:24
Chromium			U	0.149	mg/kg					09/03/15	15:40
Cobalt			U	0.149	mg/kg					09/04/15	12:24
Copper			U	0.298	mg/kg					09/03/15	15:40
Iron			U	7.94	mg/kg						
Lead			U	0.327	mg/kg					09/04/15	12:24
Magnesium			U	8.43	mg/kg					09/03/15	15:40
Manganese			U	0.198	mg/kg						
Molybdenum			U	0.198	mg/kg						
Nickel			U	0.149	mg/kg						
Potassium			U	6.35	mg/kg						
Silicon			B	2.70	mg/kg						
Silver			U	0.0992	mg/kg					09/04/15	12:24
Sodium			B	20.5	mg/kg						

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QC Summary

Workorder: **380439**

Client SDG: XP0222

Project Description: RC-155 Other

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1504947										
Strontium			U	0.0992	mg/kg				HSC	09/04/15	12:24
Thallium			U	0.496	mg/kg						
Vanadium			U	0.0992	mg/kg						
Zinc			U	0.397	mg/kg						
QC1203386243 380439001 MS											
Aluminum	494	14700		15400	mg/kg		N/A	(75%-125%)		09/03/15	15:54
Antimony	49.4	BDN	5.87 DN	41.5	mg/kg		72.2 *	(75%-125%)		09/04/15	12:37
Arsenic	49.4		8.07	55.8	mg/kg		96.7	(75%-125%)		09/03/15	15:54
Barium	49.4	M	559	606	mg/kg		N/A	(75%-125%)			
Beryllium	49.4	BD	1.36 D	50.2	mg/kg		98.8	(75%-125%)		09/04/15	12:37
Boron	49.4		39.7	86.6	mg/kg		94.8	(75%-125%)		09/03/15	15:54
Cadmium	49.4		0.602	40.8	mg/kg		81.5	(75%-125%)			
Calcium	494	D	193000 D	196000	mg/kg		N/A	(75%-125%)		09/04/15	12:37
Chromium	49.4		27.2	69.7	mg/kg		86	(75%-125%)		09/03/15	15:54
Cobalt	49.4	D	7.06 D	52.8	mg/kg		92.5	(75%-125%)		09/04/15	12:37
Copper	49.4		39.0	89.2	mg/kg		102	(75%-125%)		09/03/15	15:54
Iron	494		16700	16700	mg/kg		N/A	(75%-125%)			
Lead	49.4	BD	8.23 D	55.5	mg/kg		95.6	(75%-125%)		09/04/15	12:37
Magnesium	494		8300	8470	mg/kg		N/A	(75%-125%)		09/03/15	15:54
Manganese	49.4		299	320	mg/kg		N/A	(75%-125%)			
Molybdenum	49.4		2.08	45.6	mg/kg		88.1	(75%-125%)			
Nickel	49.4	M	16.1	53.1	mg/kg		75	(75%-125%)			

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QC Summary

Workorder: **380439**

Client SDG: XP0222

Project Description: RC-155 Other

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1504947										
Potassium	494	2150		2690	mg/kg		N/A	(75%-125%)	HSC	09/03/15	15:54
Silicon	494	*N	1330	N	1430	mg/kg	19.7*	(75%-125%)			
Silver	49.4	DU	0.973	D	48.8	mg/kg	98.7	(75%-125%)		09/04/15	12:37
Sodium	494	D	2230	D	2540	mg/kg	N/A	(75%-125%)			
Strontium	49.4	D	282	D	327	mg/kg	N/A	(75%-125%)			
Thallium	49.4	BD	5.58	D	54.1	mg/kg	98.3	(75%-125%)			
Vanadium	49.4	D	58.2	D	105	mg/kg	93.8	(75%-125%)			
Zinc	49.4	D	98.7	D	143	mg/kg	88.8	(75%-125%)			
QC1203386589 380439001 PS											
Antimony	500	BDN	6.04	D	482	ug/L	95.2	(80%-120%)		09/04/15	12:40
Silicon	5000	*N	13700		8570	ug/L	0*	(80%-120%)		09/03/15	16:08
QC1203386244 380439001 SDILT											
Aluminum			152000	D	30100	ug/L	.745	(0%-10%)		09/03/15	15:58
Antimony		BDN	6.04	DU	16.1	ug/L	N/A	(0%-10%)		09/04/15	12:43
Arsenic			83.0	D	17.4	ug/L	5.1	(0%-10%)		09/03/15	15:58
Barium		M	5740	DM	1270	ug/L	10.2*	(0%-10%)			
Beryllium		BD	1.40	DU	4.86	ug/L	N/A	(0%-10%)		09/04/15	12:43
Boron			408	D	91.9	ug/L	12.5	(0%-10%)		09/03/15	15:58
Cadmium			6.19	D	1.02	ug/L	17.7	(0%-10%)			
Calcium		D	198000	D	40000	ug/L	.695	(0%-10%)		09/04/15	12:43
Chromium			280	D	59.8	ug/L	6.85	(0%-10%)		09/03/15	15:58
Cobalt		D	7.26	DU	7.30	ug/L	N/A	(0%-10%)		09/04/15	12:43
Copper			401	D	77.8	ug/L	2.91	(0%-10%)		09/03/15	15:58

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QC Summary

Workorder: 380439

Client SDG: XP0222

Project Description: RC-155 Other

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1504947										
Iron		171000	D	36500	ug/L	6.34		(0%-10%)	HSC	09/03/15	15:58
Lead	BD	8.46	DU	16.1	ug/L	N/A		(0%-10%)		09/04/15	12:43
Magnesium		85400	D	18100	ug/L	5.98		(0%-10%)		09/03/15	15:58
Manganese		3080	D	670	ug/L	8.87		(0%-10%)			
Molybdenum		21.4	D	4.80	ug/L	12		(0%-10%)			
Nickel	M	165	DM	37.2	ug/L	12.8*		(0%-10%)			
Potassium		22100	D	4200	ug/L	4.93		(0%-10%)			
Silicon	*N	13700	D	2900	ug/L	6.01		(0%-10%)			
Silver	DU	0.0176	DU	4.86	ug/L	N/A		(0%-10%)		09/04/15	12:43
Sodium	D	2290	D	481	ug/L	4.87		(0%-10%)			
Strontium	D	290	D	56.3	ug/L	2.97		(0%-10%)			
Thallium	BD	5.74	DU	24.3	ug/L	N/A		(0%-10%)			
Vanadium	D	59.8	D	11.5	ug/L	4.04		(0%-10%)			
Zinc	D	101	D	24.2	ug/L	19.3		(0%-10%)			

Metals Analysis-Mercury

Batch 1505091

QC1203386569	380439001	DUP									
Mercury				0.0202		0.0153	mg/kg	27.5 ^	(+/-0.0119)	MTM1	09/04/15 11:15
QC1203386568	LCS										
Mercury				0.120		0.120	mg/kg	99.9	(80%-120%)		09/04/15 11:12
QC1203386567	MB										
Mercury			U			0.00387	mg/kg				09/04/15 11:10
QC1203386570	380439001	MS									
Mercury				0.119	0.0202	0.138	mg/kg	99	(80%-120%)		09/04/15 11:21
QC1203386571	380439001	SDILT									

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QC Summary

Workorder: 380439

Client SDG: XP0222

Project Description: RC-155 Other

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury											
Batch	1505091										
Mercury		0.339	DU	0.020	ug/L	N/A		(0%-10%)		09/04/15	11:23

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. The associated blank concentration is \geq EQL or is $>$ 5% of the measured concentration and/or decision level for associated samples.
- 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 or %RPD not applicable.

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

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

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

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

Miscellaneous

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID: 1504945	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst: James Pressley	LCS	1203386241	Metals Spike Mix II	UI150721-02	.25	mL
Method: SW846 3050B	LCS	1203386241	Metals Spike Mix I	UI2286758-01	.25	mL
Lab SOP: GL-MA-E-009 REV# 25	MS	1203386243	Metals Spike Mix II	UI150721-02	.25	mL
Instrument: BAL-893	MS	1203386243	Metals Spike Mix I	UI2286758-01	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203386240 MB	02-SEP-2015 17:30:00	Solid	0.504	50	99.20635
1203386241 LCS	02-SEP-2015 17:30:00	Solid	0.505	50	99.0099
380439001	02-SEP-2015 17:30:00	Solid	0.514	50	97.27626
1203386242 DUP (380439001)	02-SEP-2015 17:30:00	Solid	0.526	50	95.05703
1203386243 MS (380439001)	02-SEP-2015 17:30:00	Solid	0.506	50	98.81423
1203386244 SDILT (380439001)	02-SEP-2015 17:30:00	Solid	0.514	50	97.27626

Reagent/Solvent Lot ID	Description	Amount	Comments:
150720	Concentrated Nitric Acid	1.25 mL	Block Temperature: 92 C
150721	HYDROCHLORIC ACID	10 mL	Thermometer ID: 1120213992
			Hot Block ID: 4

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID:	1504941	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	James Pressley	LCS	1203386230	ICP-MS spiking solution A	UI2268554-A	.25	mL
Method:	SW846 3050B	LCS	1203386230	ICP-MS spiking solution B	UI2268557-B	.25	mL
Lab SOP:	GL-MA-E-009 REV# 25	MS	1203386232	ICP-MS spiking solution A	UI2268554-A	.25	mL
Instrument:	BAL-893	MS	1203386232	ICP-MS spiking solution B	UI2268557-B	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203386229 MB	02-SEP-2015 17:30:00	Solid	0.518	50	96.5251
1203386230 LCS	02-SEP-2015 17:30:00	Solid	0.52	50	96.15385
380439001	02-SEP-2015 17:30:00	Solid	0.504	50	99.20635
1203386231 DUP (380439001)	02-SEP-2015 17:30:00	Solid	0.516	50	96.89922
1203386232 MS (380439001)	02-SEP-2015 17:30:00	Solid	0.503	50	99.40358
1203386233 SDILT (380439001)	02-SEP-2015 17:30:00	Solid	0.504	50	99.20635

Reagent/Solvent Lot ID	Description	Amount	Comments:
150720	Concentrated Nitric Acid	5 mL	Block Temperature: 92 C
2278373	Hydrogen Peroxide 30%, from Bioassay	1.5 mL	Thermometer ID: 89095-622
			Hot Block ID: 11

Prep Logbook

Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Batch ID: 1505090	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst: Alan Stanley	LCS	1203386568	MHGSOILMSSPIKE	WHG150903-14	.3	mL
Method: SW846 7471B Prep	MS	1203386570	MHGSOILMSSPIKE	WHG150903-14	.3	mL
Lab SOP: GL-MA-E-010 REV# 30						
Instrument: BAL 423						

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203386567 MB	03-SEP-2015 12:30:00	Solid	0.52	30	57.69231
1203386568 LCS	03-SEP-2015 12:30:00	Solid	0.5	30	60
380439001	03-SEP-2015 12:30:00	Solid	0.503	30	59.64215
1203386569 DUP (380439001)	03-SEP-2015 12:30:00	Solid	0.505	30	59.40594
1203386570 MS (380439001)	03-SEP-2015 12:30:00	Solid	0.504	30	59.52381
1203386571 SDILT (380439001)	03-SEP-2015 12:30:00	Solid	0.503	30	59.64215

Reagent/Solvent Lot ID	Description	Amount	Comments:
2265384-C	Hg reducing agent	3 mL	Digestion Start Date: 03-SEP-2015 12:30 Digestion End Date: 03-SEP-2015 13:00 Block Temperature: 94 C Thermometer ID: 1120212857 Hot Block ID: 6
2286228-C	5% KMnO4 solution	7.5 mL	
2305100-C	50% Aqua Regia	3 mL	
WHG150903-07	Mercury Working Standard 1st Source CAL S 0.2/CRA	30 uL	
WHG150903-08	Mercury Working Standard 1st Source CAL S 0.5	75 uL	
WHG150903-09	Mercury Working 1st Source CAL S 2.0	300 uL	
WHG150903-10	Mercury Working 1st Source CAL S 5.0/CCV	750 uL	
WHG150903-11	Mercury Working 1st Source CAL S 10.0	1.5 mL	
WHG150903-12	Mercury Working 2nd Source S 5.0/ICV	750 uL	

General Chem Analysis

Case Narrative

**General Chemistry
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0222
Work Order #: 380439**

Method/Analysis Information

Product: **Specific Gravity**

Analytical Batch: 1505099 **Method:** ASTM D 5057 Specific Gravity

Sample Analysis

The following samples were analyzed using the analytical protocol as established in ASTM D 5057:

Sample ID	Client ID
380439001	J1V828
1203386592	380439001(J1V828) Sample Duplicate (DUP)

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-065 REV# 7.

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 Hazardous Waste analysis was performed on a Sartorius Balance B-001. IC Lab

Initial Calibration

All initial calibration requirements have been met for this SDG.

Quality Control (QC) Information

Quality Control (QC) Designation

Sample 380439001 (J1V828) was selected for QC analysis.

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.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

WCHN001 Eberline

Client SDG: XP0222 GEL Work Order: 380439 Project: RC-155 Other

The Qualifiers in this report are defined as follows:

Review/Validation

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

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

Signature:



Name: Thomas Lewis

Date: 14 SEP 2015

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 14, 2015

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-155 Other

Client SDG: XP0222

Client Sample ID: J1V828
Sample ID: 380439001
Matrix: OTHERSOLID
Collect Date: 01-SEP-15 09:05
Receive Date: 02-SEP-15
Collector: Client

Project: WCHN00414
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Hazardous Waste											
ASTM D 5057 Specific Gravity "As Received"											
Specific Gravity		2.51	0.010	0.100	none	1	MXB3	09/03/15	0827	1505099	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 5057	

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: September 14, 2015

Page 1 of 1

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

Workorder: 380439

Client SDG: XP0222

Project Description: RC-155 Other

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Hazardous Waste											
Batch	1505099										
QC1203386592	380439001	DUP									
Specific Gravity		2.51		2.51	none	0.0833		(0%-10%)	MXB3	09/03/15	08:28

Notes:

The Qualifiers in this report are defined as follows:

- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > 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. The associated blank concentration is \geq EQL or is $>$ 5% of the measured concentration and/or decision level for associated samples.
- 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 or %RPD not applicable.

^ 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.