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

COMPLETE COPY OF DATA PACKAGE TO:

No Distribution Required KW 2/22/16
INITIAL/DATE

COMMENTS:

SDG XP0224 SAF-RC-155

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

Sample Location: 618-10 concrete ddrum/grout batches, GR-237C

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

February 17, 2016

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

Re: RC-155 Other
Work Order: 391314
SDG: XP0224

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 12, 2016. 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

Heather Shaffer
Project Manager

Purchase Order: 1510
Chain of Custody: RC-155-203
Enclosures

Table of Contents

Case Narrative.....1

Chain of Custody and Supporting Documentation.....3

Laboratory Certifications.....12

Metals Analysis.....14

Case Narrative.....15

Sample Data Summary.....20

Quality Control Summary.....22

Miscellaneous.....29

Case Narrative

Receipt Narrative
for
Eberline
SDG: XP0224
Work Order: 391314

February 17, 2016

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 February 12, 2016 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 lab was unable to report a Sodium result for this SDG. Please see the enclosed e-mail for further details.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
391314001	J1V899
391314002	TUMBLE BLANK

Case Narrative:

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

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Metals.

Heather Shaffer

Heather Shaffer
Project Manager

Chain of Custody and Supporting Documentation

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-155-203

Collector: J. Craig	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9A	Data Turnaround: 3 days		
Project Designation: 618-10 & 618-11 Remediation	Sampling Location: 618-10 concrete ddrum/grout batches, GR- 237C		SAF No.: RC-155
Ice Chest No.: WCH-11-068	Field Logbook No.: EL-1664-01	COA: R618102F20	Method of Shipment: Commercial Carrier
Shipped To: TestAmerica Denver	Offsite Property No.: N/A JRC 2-2-16		Bill of Lading/Air Bill No.: SEE RSR
Other Labs Shipped To: N/A TRE 2-2-16			

280-79430 Chain of Custody

POSSIBLE SAMPLE HAZARDS/REMARKS

radioactive

Special Handling and/or Storage

trans ship RCF to TA-DEN

Preservation	None	none											
Type of Container	G/P	G/P											
No. of Container(s)	1	0											
Volume	1000mL	1000mL											
Sample Analysis	See item (1) in Special Instructions	RCF Shipping screen											

Sample No.	Matrix	Sample Date	Sample Time										
J1V899	OTHER	2/1/16	1010	X	X	39750	152g						

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
J. Craig	2-1-16 1025	C. Martinez/C. Martinez	1025 2/1/16
C. Martinez/C. Martinez	2/1/16 1045	T.R. Edmundson T.R. Edmundson	2-1-16 1045
T.R. Edmundson T.R. Edmundson	2-1-16 1110	D. Miller D. Miller (RCF)	1110 2-1-16
D. Miller D. Miller (RCF)	2-2-16 0710	T.R. Edmundson T.R. Edmundson	2-2-16 0710
T.R. Edmundson T.R. Edmundson (WCH)	2-2-16 ~~1500~~ 1500 (TRE 2-2-16)	Fed Ex	2-2-16
		[illegible]	2-3-16 10:10
[illegible]	2-11-16 15:15	[illegible]	2-12-16 0915

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals (TCLP) (Client List) - 1311/6010 {Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Lead, Nickel, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc}; Mercury (TCLP) - 1311/7470 (Client List) {Mercury}

XP0224
391314

8.8 IRT 10.0
[illegible] 2/3/16

REVIEWED BY [illegible] DATE 2-2-16

JP1029

WCH-EE-011

Analyst: JK

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

DV-IP-0012
TCLP/SPLP Worksheet No. 3
Bottle Leach Procedure for Metals and Semi-Volatile Organic Components

Login No.	79426	79430	T1_00102							
Sample No.	1	1								
E. Determination of Sample Size										
1. Particle size reduction? Yes/no	no	no								
If yes, write NCM descibing how.										
2. Balance ID	24950431	24950431								
3. Weight of wet solids after filtration (g)	97.33	100.18								
F. Determination of Amount of Leach Fluid										
Fluid Type from Wksht 2	**TCLP 1**	**TCLP 1**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
1. TCLP Fluid 1 Lot #	T1_00102	T1_00102								
2. TCLP Fluid 2 Lot #										
3. SPLP 1 (East) Lot #										
4. SPLP 2 (West) Lot #										
5. pH of leach fluid	4.90	4.90	4.90							
6. Vol of Fluid = wet solids x 20 (mL)	1947	2004								
G. Record of Leach - leach period is 16 to 20 hours										
1. Rotator checked to be rotating between 28 and 32 RPM?	yes	yes	yes							
2. Leach start date and time	2.4.16 1610	2.4.16 1610	2.4.16 1610							
3. Leach stop date and time										
4. Room temperature										
Thermometer Correction Factor										
a.Temp Min (Observed) (°C)										
b.Temp Max (Observed) (°C)										
c.Temp Min (Actual) (°C)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
d.Temp Max (Actual) (°C)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. pH of leachate										
Was the sample multiphasic?	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6. Volume of leachate (mL)										
a. Oil recovered from leachate (mL)										
7. Volume of initial filtrate for recombination (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8. Combined initial filtrate + leachate (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
COMMENTS:										

(Volume of Fluid, F.4) = (Weight of wet solids, E.3) X 20

(Vol. of Combined Filtrate and Leachate, G.8) = (Vol of Leachate, G.6) + (Vol of Filtrate, G.7)

$$(\text{Vol. of Inital Filtrate for Recombinat ion, G.7}) = \frac{(\text{Solids Leachated, E.3})}{(\text{Tot. Wet Solids, B.4})} \times \frac{(\text{LeachateRe covered, G.6})}{(\text{FluidAdded , F.6})} \times (\text{InitialFil trat, B.7})$$

1311_T Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 280-312941

Analyst: Knauf, James R

Batch Open: 2/4/2016 4:12:47PM

Batch End: ~~2/10/2016 9:00:~~00AM
2/5/16 @ 0900
BMS 2/11/16

TCLP Extraction

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Div Rank	Comments	Output Sample Lab ID
1	LB~280-312941/1 N/A	N/A				N/A	N/A	N/A	Final pH = 4.91 Tumble Temperature: 23.0-23.8, corr. factor=-0.3	LB 280-312941/1-A
2	LCS~280-312941/2 N/A	N/A				N/A	N/A	N/A	Final pH = 4.91 Tumble Temperature: 23.0-23.8, corr. factor=-0.3	LCS 280-312941/2-A
3	280-79430-A-1 (7470A)	JP1029 (280-79430-1)	Solid			2/8/16	3_Day_RUSH	4	Final pH = 12.29 Tumble Temperature: 23.0-23.8, corr. factor=-0.3	280-79430-A-1-A
3	280-79430-A-1 (6010B)	JP1029 (280-79430-1)	Solid			2/8/16	3_Day_RUSH	4	Final pH = 12.29 Tumble Temperature: 23.0-23.8, corr. factor=-0.3	280-79430-A-1-A

1311_T Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 280-312941

Analyst: Knauf, James R

Batch Open: 2/4/2016 4:12:47PM

Batch End: 2/10/2016 9:00:00AM

Batch Notes

Hot Plate ID	
ID number of the thermometer	
First Start time	
First End time	
Rotation Time for 10 Revolutions	
Tumbler Rotations per Minute	
Balance ID	
pH Meter ID	
pH Meter Calibration Slope	
Room Temperature Thermometer ID	
Water Bath Thermometer ID	
Water Bath ID	
Uncorrected Water Bath Temperature	
Water Bath Temperature	
TCLP Fluid 1 ID	
TCLP Fluid 1 pH	
TCLP Fluid 2 ID	
TCLPFluid 2 pH	
Residual Chlorine indicator ID	

1311_T Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 280-312941

Analyst: Knauf, James R

Batch Open: 2/4/2016 4:12:47PM

Batch End: 2/10/2016 9:00:00AM

pH Buffer 1 ID	
pH Buffer 2 ID	
pH Buffer 3 ID	
pH Buffer 4 ID	
Lot # of Nitric Acid	
1N HCl Lot #	
Filter Lot #	
Uncorrected Maximum Temperature	
Maximum Temperature	
Uncorrected Minimum Temperature	
Minimum Temperature	
Person who performed Spike	
Person who witnessed spiking	
Bottle Lot Number	
Batch Comment	

Comments

280-79430-A-1

Method Comments: WC_Dont batch w/ other Jobs_If <100g used, include volume used in NCM

280-79430-A-1

Method Comments: WC_Dont batch w/ other Jobs_QC=MS&SampDup_If <100g used, include volume used in NCM

1311_T Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 280-312941

Analyst: Knauf, James R

Batch Open: 2/4/2016 4:12:47PM

Batch End: 2/10/2016 9:00:00AM

Reagent Additions Worksheet

Lab ID	Reagent Code	Amount Added	Final Amount	By	Witness

Other Reagents:

Reagent	Amount/Units	Lot#:

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WCHN		**SDG/AR/COC/Work Order:** XP0224 391314	
Received By: MK		**Date Received:** 2-12-16	
Suspected Hazard Information	**Yes**	**No**	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): cpm 0
Classified Radioactive II or III by RSO?		✓	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?		✓	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		✓	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		✓	

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	✓			Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 3C
2a	Daily check performed and passed on IR temperature gun?		✓		Temperature Device Serial #: 13046296 Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?	✓			Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples have headspace as required?		✓		Sample ID's and containers affected:
7	VOA vials contain acid preservation?		✓		(If unknown, select No)
8	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
9	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
10	Samples received within holding time?	✓			ID's and tests affected:
11	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
12	Date & time on COC match date & time on bottles?			✓	Sample ID's affected: NO DATE OR TIME ON CONTAINERS
13	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
14	Are sample containers identifiable as GEL provided?			✓	
15	COC form is properly signed in relinquished/received sections?	✓			
16	Carrier and tracking number.	✓			Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 6559 1463 2094

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials DB Date 2/12/16 Page 1 of 1 GL-CHL-SR-001 Rev 2

Subject: RC-155 - Sodium in the tumble solution
From: Heather Shaffer <Heather.Shaffer@gel.com>
Date: 2/15/2016 11:23 AM
To: "Weiss, Richard L" <richard.weiss@wch-rcc.com>, "Kessner, Joan H" <joan.kessner@wch-rcc.com>

Rich and Joan,

For the 3 samples we received the leachate for under RC-155, the lab noted a very high sodium result. The group leader noted that there is sodium present in the tumble solution. Your reporting list is requesting sodium, but the lab does not feel comfortable reporting the result they are getting. The lab has asked for relief to not report sodium for these samples. Please advise if this will be acceptable.

Sample IDs are: J1V8C1, J1V899, J1V8C0

Thank you,
Heather

--
Heather Shaffer
Project Manager
GEL Laboratories, LLC
2040 Savage Road
Charleston, SC (USA) 29407
Direct: 843.769.7386
Main: 843.556.8171 xt 4505
Fax: 843.766.1178
E-mail: heather.shaffer@gel.com
Web: www.gel.com

Laboratory Certifications

List of current GEL Certifications as of 17 February 2016

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	P330−15−00283, P330−15−00253
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
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−16−11
Utah NELAP	SC000122016−20
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0224
Work Order #: 391314

Sample ID	Client ID
391314001	J1V899
391314002	TCLP Blank (TB)
1203488996	Method Blank (MB)**ICP**
1203488997	Laboratory Control Sample (LCS)
1203489000	391314001(J1V899L) Serial Dilution (SD)
1203488998	391314001(J1V899D) Sample Duplicate (DUP)
1203488999	391314001(J1V899S) Matrix Spike (MS)
1203488979	Method Blank (MB)**CVAA**
1203488980	Laboratory Control Sample (LCS)
1203488983	391314001(J1V899L) Serial Dilution (SD)
1203488981	391314001(J1V899D) Sample Duplicate (DUP)
1203488982	391314001(J1V899S) Matrix Spike (MS)

Sample Analysis

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

Method/Analysis Information

Analytical Batch:	1544806 and 1544799
Prep Batch :	1544805 and 1544798
Standard Operating Procedures:	GL-MA-E-013 REV# 25, GL-MA-E-008 REV# 18 and GL-MA-E-010 REV# 31
Analytical Method:	SW846 3010A/6010C and SW846 7470A
Prep Method :	SW846 3010A and SW846 7470A 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-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: 391314001 (J1V899)-ICP 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 matrix spike met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes.

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. The relative percent differences (RPD) between the sample and its duplicate (DUP) were within acceptable limits for all applicable analytes.

Serial Dilution % Difference Statement
All applicable analytes in the serial dilution (SDILT) demonstrated acceptable correlation to its associated sample and met the established acceptance percent difference criteria.

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.

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

Preparation Information
The samples and associated matrix QC were prepared at a ten times or greater dilution factor to minimize potential interferences arising from the high sodium content in the TCLP leaching solution. ICP. Samples in this SDG were prepared at a ten times dilution factor due to the miscellaneous liquid classification. 1203488981 (J1V899DUP), 1203488982 (J1V899MS), 1203488983 (J1V899SDILT), 391314001 (J1V899) and 391314002 (TB)-CVAA.

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 was not required for this SDG.

Additional Comments
Additional comments were not required for this SDG.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report
for

WCHN001 Eberline

Client SDG: XP0224 GEL Work Order: 391314 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.

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: Nik-Cole A. Elmore **Name: Nik-Cole Elmore**

Date: 17 FEB 2016 **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: February 17, 2016

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

Client SDG: XP0224

Client Sample ID:	J1V899	Project:	WCHN00414
Sample ID:	391314001	Client ID:	WCHN001
Matrix:	OTHERLIQ		
Collect Date:	01-FEB-16 10:10		
Receive Date:	12-FEB-16		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
7470 Cold Vapor Hg Liquid "As Received"											
Mercury	U	0.670	0.670	2.00	ug/L	1	MTM1	02/15/16	1000	1544799	1
Metals Analysis-ICP											
SW846 3010A/6010C Liquid "As Received"											
Aluminum	B	1070	680	2000	ug/L	1	HSC	02/15/16	0949	1544806	2
Antimony	U	35.0	35.0	100	ug/L	1					
Arsenic	U	50.0	50.0	300	ug/L	1					
Barium		4290	10.0	50.0	ug/L	1					
Beryllium	U	10.0	10.0	50.0	ug/L	1					
Cadmium	U	10.0	10.0	50.0	ug/L	1					
Chromium	B	39.2	10.0	50.0	ug/L	1					
Lead		271	33.0	100	ug/L	1					
Nickel	U	15.0	15.0	50.0	ug/L	1					
Selenium	U	60.0	60.0	300	ug/L	1					
Silver	U	10.0	10.0	50.0	ug/L	1					
Thallium	U	50.0	50.0	200	ug/L	1					
Vanadium	U	10.0	10.0	50.0	ug/L	1					
Zinc	B	50.6	33.0	100	ug/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3010A	ICP-TRACE SW846 3010A	JXM5	02/12/16	1400	1544805
SW846 7470A Prep	EPA 7470A Mercury Prep Liquid	AXS5	02/12/16	1330	1544798

The following Analytical Methods were performed:

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

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: February 17, 2016

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

Contact: **Joan Kessner**

Workorder: **391314** **Client SDG:** XP0224 **Project Description:** RC-155 Other

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1544806										
QC1203488998 391314001 DUP										
Aluminum	B	1070	B	993	ug/L	7.49 ^		(+/-2000)	HSC	02/15/16 09:52
Antimony	U	35.0	U	35.0	ug/L	N/A				
Arsenic	U	50.0	U	50.0	ug/L	N/A				
Barium		4290		4250	ug/L	0.926		(0%-20%)		
Beryllium	U	10.0	U	10.0	ug/L	N/A				
Cadmium	U	10.0	U	10.0	ug/L	N/A				
Chromium	B	39.2	B	40.5	ug/L	3.31 ^		(+/-50.0)		
Lead		271		276	ug/L	1.92 ^		(+/-100)		
Nickel	U	15.0	U	15.0	ug/L	N/A				
Selenium	U	60.0	U	60.0	ug/L	N/A				
Silver	U	10.0	U	10.0	ug/L	N/A				
Thallium	U	50.0	U	50.0	ug/L	N/A				
Vanadium	U	10.0	U	10.0	ug/L	N/A				
Zinc	B	50.6	B	47.0	ug/L	7.42 ^		(+/-100)		
QC1203488997 LCS										
Aluminum	50000			47300	ug/L		94.7	(80%-120%)		02/15/16 09:46
Antimony	5000			4960	ug/L		99.3	(80%-120%)		
Arsenic	5000			4820	ug/L		96.3	(80%-120%)		
Barium	5000			4990	ug/L		99.8	(80%-120%)		
Beryllium	5000			4880	ug/L		97.5	(80%-120%)		

QC Summary

Workorder: **391314** **Client SDG:** XP0224 **Project Description:** RC-155 Other

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1544806										
Cadmium	5000			4860	ug/L		97.3	(80%-120%)		
Chromium	5000			4860	ug/L		97.2	(80%-120%)	HSC	02/15/16 09:46
Lead	5000			4970	ug/L		99.5	(80%-120%)		
Nickel	5000			4840	ug/L		96.8	(80%-120%)		
Selenium	5000			4490	ug/L		89.7	(80%-120%)		
Silver	5000			4930	ug/L		98.6	(80%-120%)		
Thallium	5000			4960	ug/L		99.2	(80%-120%)		
Vanadium	5000			5010	ug/L		100	(80%-120%)		
Zinc	5000			4720	ug/L		94.5	(80%-120%)		
QC1203488996 MB										
Aluminum			U	680	ug/L					02/15/16 09:40
Antimony			U	35.0	ug/L					
Arsenic			U	50.0	ug/L					
Barium			U	10.0	ug/L					
Beryllium			U	10.0	ug/L					
Cadmium			U	10.0	ug/L					
Chromium			U	10.0	ug/L					
Lead			U	33.0	ug/L					
Nickel			U	15.0	ug/L					
Selenium			U	60.0	ug/L					
Silver			U	10.0	ug/L					
Thallium			U	50.0	ug/L					
Vanadium			U	10.0	ug/L					

QC Summary

Workorder: **391314** **Client SDG:** XP0224 **Project Description:** RC-155 Other

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1544806											
Zinc				U	33.0	ug/L				HSC	02/15/16 09:40
QC1203488999 391314001 MS											
Aluminum	50000	B	1070		47400	ug/L		92.7	(75%-125%)		02/15/16 09:55
Antimony	5000	U	35.0		5050	ug/L		101	(75%-125%)		
Arsenic	5000	U	50.0		4950	ug/L		99	(75%-125%)		
Barium	5000		4290		9220	ug/L		98.6	(75%-125%)		
Beryllium	5000	U	10.0		4860	ug/L		97.2	(75%-125%)		
Cadmium	5000	U	10.0		4750	ug/L		95	(75%-125%)		
Chromium	5000	B	39.2		4770	ug/L		94.5	(75%-125%)		
Lead	5000		271		5080	ug/L		96.1	(75%-125%)		
Nickel	5000	U	15.0		4650	ug/L		93	(75%-125%)		
Selenium	5000	U	60.0		4650	ug/L		92.8	(75%-125%)		
Silver	5000	U	10.0		4880	ug/L		97.6	(75%-125%)		
Thallium	5000	U	50.0		4850	ug/L		97	(75%-125%)		
Vanadium	5000	U	10.0		5020	ug/L		100	(75%-125%)		
Zinc	5000	B	50.6		4890	ug/L		96.8	(75%-125%)		
QC1203489000 391314001 SDILT											
Aluminum		B	107	DU	3400	ug/L	N/A		(0%-10%)		02/15/16 09:58
Antimony		U	1.93	DU	175	ug/L	N/A		(0%-10%)		
Arsenic		U	-1.85	DU	250	ug/L	N/A		(0%-10%)		
Barium			429	D	85.6	ug/L	.184		(0%-10%)		
Beryllium		U	-0.111	DU	50.0	ug/L	N/A		(0%-10%)		
Cadmium		U	0.0506	DU	50.0	ug/L	N/A		(0%-10%)		

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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 1544806										
Chromium	B	3.92	DU	50.0	ug/L	N/A		(0%-10%)	HSC	02/15/16 09:58
Lead		27.1	D	5.27	ug/L	2.74		(0%-10%)		
Nickel	U	-0.635	DU	75.0	ug/L	N/A		(0%-10%)		
Selenium	U	1.00	DU	300	ug/L	N/A		(0%-10%)		
Silver	U	-1.56	DU	50.0	ug/L	N/A		(0%-10%)		
Thallium	U	-5.36	DU	250	ug/L	N/A		(0%-10%)		
Vanadium	U	0.376	DU	50.0	ug/L	N/A		(0%-10%)		
Zinc	B	5.06	D	3.49	ug/L	244		(0%-10%)		
QC391314002 TB										
Aluminum			U	680	ug/L					02/15/16 09:43
Antimony			U	35.0	ug/L					
Arsenic			U	50.0	ug/L					
Barium			U	10.0	ug/L					
Beryllium			U	10.0	ug/L					
Cadmium			U	10.0	ug/L					
Chromium			U	10.0	ug/L					
Lead			U	33.0	ug/L					
Nickel			U	15.0	ug/L					
Selenium			U	60.0	ug/L					
Silver			U	10.0	ug/L					
Thallium			U	50.0	ug/L					
Vanadium			U	10.0	ug/L					

QC Summary

Workorder: **391314** **Client SDG:** XP0224 **Project Description:** RC-155 Other

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1544806											
Zinc				U	33.0	ug/L				HSC	02/15/16 09:43
Metals Analysis-Mercury											
Batch 1544799											
QC1203488981 391314001 DUP											
Mercury		U	0.670	U	0.670	ug/L	N/A			MTM1	02/15/16 10:02
QC1203488980 LCS											
Mercury	2.00				2.12	ug/L		106	(80%-120%)		02/15/16 09:59
QC1203488979 MB											
Mercury				U	0.067	ug/L					02/15/16 09:54
QC1203488982 391314001 MS											
Mercury	20.0	U	0.670		21.8	ug/L		107	(75%-125%)		02/15/16 10:04
QC1203488983 391314001 SDILT											
Mercury		U	0.045	DU	3.35	ug/L	N/A		(0%-10%)		02/15/16 10:06
QC391314002 TB											
Mercury				U	0.670	ug/L					02/15/16 10:09

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 >= 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

QC Summary

Workorder: **391314** **Client SDG:** XP0224 **Project Description:** RC-155 Other

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more 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 Total Metals in Aqueous Samples and Extracts for Analysis by ICP and ICP-MS

Batch ID: **1544805**
Analyst: Jack Mabry
Method: SW846 3010A
Lab SOP: GL-MA-E-008 REV# 18
Instrument: Metals Manual Instrument

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203488997	Metals Spike Mix I	UI2351278-01	.25	mL
LCS	1203488997	Metals Spike Mix II	UI2351281-02	.25	mL
MS	1203488999	Metals Spike Mix I	UI2351278-01	.25	mL
MS	1203488999	Metals Spike Mix II	UI2351281-02	.25	mL

Sample ID	Run Date	Matrix	Initial Volume (mL)	Final Volume (mL)	Prep Factor (mL/mL)	pH Check
1203488996 MB	12-FEB-2016 14:00:29	Misc Liquid	5	50	10	<2
1203488997 LCS	12-FEB-2016 14:00:29	Misc Liquid	5	50	10	<2
391314001	12-FEB-2016 14:00:29	Misc Liquid	5	50	10	<2
1203488998 DUP (391314001)	12-FEB-2016 14:00:29	Misc Liquid	5	50	10	<2
1203488999 MS (391314001)	12-FEB-2016 14:00:29	Misc Liquid	5	50	10	<2
1203489000 SDILT (391314001)	12-FEB-2016 14:00:29	Misc Liquid	5	50	10	<2
391314002 TB	12-FEB-2016 14:00:29	Misc Liquid	5	50	10	<2

Reagent/Solvent Lot ID	Description	Amount
151204	Concentrated Nitric Acid	3 mL
2361989	HYDROCHLORIC ACID	2.5 mL

Comments:
Block Temperature (90-95C): 92 C
Temperature within limits (Y/N)?: Y
Thermometer ID: 61066-A1
Hot Block ID: 8

Prep Logbook

Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Batch ID: **1544798**
Analyst: Alan Stanley
Method: SW846 7470A Prep
Lab SOP: GL-MA-E-010 REV# 31
Instrument: BAL 423

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203488980	MHGLIQLCSMSSPIKE	WHG160212-13	.2	mL
MS	1203488982	MHGLIQLCSMSSPIKE	WHG160212-13	.2	mL

Sample ID	Run Date	Matrix	Initial Volume (mL)	Final Volume (mL)	Prep Factor (mL/mL)	pH Check
1203488979 MB	12-FEB-2016 13:30:36	Misc Liquid	20	20	1	<2
1203488980 LCS	12-FEB-2016 13:30:36	Misc Liquid	20	20	1	<2
391314001	12-FEB-2016 13:30:36	Misc Liquid	2	20	10	
1203488981 DUP (391314001)	12-FEB-2016 13:30:36	Misc Liquid	2	20	10	
1203488982 MS (391314001)	12-FEB-2016 13:30:36	Misc Liquid	2	20	10	
1203488983 SDILT (391314001)	12-FEB-2016 13:30:36	Misc Liquid	2	20	10	
391314002 TB	12-FEB-2016 13:30:36	Misc Liquid	2	20	10	

Reagent/Solvent Lot ID	Description	Amount
2347437-1	NITRIC ACID	.5 mL
2349143	Sulfuric Acid, Concentrated	1 mL
2358424-C	Hg reducing agent	1 mL
2364159-C	5% KMnO4 solution	3 mL
2366261-C	5% Potassium Persulfate	1.5 mL
WHG160212-01A	Mercury Working 1st Source CAL 0.2/CRA	20 uL
WHG160212-02	Mercury Working 1st Source CAL 0.5	50 uL
WHG160212-03	Mercury Working 1st Source CAL 2.0	200 uL
WHG160212-04	Mercury Working 1st Source CAL 5.0/CCV	500 uL
WHG160212-05	Mercury Working 1st Source CAL 10.0	1 mL
WHG160212-06	Mercury Working 2nd Source 5.0/ICV	500 uL

Comments:
Digestion Start Date: 12-FEB-2016 13:30
Digestion End Date: 12-FEB-2016 15:30
Block Temperature (90-95C): 94 C
Temperature within limits (Y/N)?: Y
Thermometer ID: 118629
Hot Block ID: 7