

October 6, 2014



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

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www.gel.com

October 06, 2014

Mr. Scot Fitzgerald
CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352

Re: CHPRC SAF S14-006
Work Order: 356294
SDG: GEL356294

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 09, 2014. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4505.

Sincerely,

Heather Shaffer
Project Manager

Purchase Order: 300071ES20
Chain of Custody: S14-006-203 and S14-006-204
Enclosures



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Case Narrative

October 6, 2014

**General Narrative
for
Hanford MSA (51204)
CHPRC SAF S14-006
SDG: GEL356294**

October 06, 2014

Laboratory Identification:

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

Summary

Sample receipt

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on September 09, 2014, 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. There are no additional comments concerning sample receipt.

Items of Note All efforts were made by the lab to meet any short hold times. Samples that were analyzed outside of the initial hold time but still within 2X hold time will be noted in the lab case narrative and DER.

Sample Identification

The laboratory received the following samples:

Laboratory Identification	Sample Description
356294001	B2WRV5
356294002	B2WRV6

Case Narrative

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) 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.

Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: General Chemistry, Metals and Radiochemistry. This package, to the best of my knowledge, is in compliance with technical and administrative requirements.

Heather Shaffer

Heather Shaffer
Project Manager

Chain of Custody and Supporting Documentation

CH2M Hill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C.# **S14-006-203** Page 1 of 1

77165

Collector: D.L. Floyd
CHPRC

SAF No.: S14-006

Project Title: SURV, JUNE 2014

Shipped To (Lab): GEL Laboratories, LLC

Protocol: SURV

Contact/Requester: Karen Waters-Husted

Telephone No.: 509-376-4650

Sampling Origin: Hanford Site

Purchase Order/Charge Code: 30007IES20

Logbook No.: HNF-N-506 67116

Ice Chest No.: 6005-422

Method of Shipment: Commercial Carrier

Bill of Lading/Air Bill No.: 1771082983941

Priority: 30 Days **PRIORITY**

Offsite Property No.: 5065

POSSIBLE SAMPLE HAZARDS/REMARKS

*** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1

SPECIAL INSTRUCTIONS Hold Time: Total Activity Exemption: Yes No

Sample No.	Filter	* Date	Time	No./Type Container	Sample Analysis	Holding Time	Preservative
B2WRV5	N	W SEP 08 2014	1253	1x250-mL G/P	2320_ALKALINITY: GW 01	14 Days	Cool <=6C
B2WRV5	N	W SEP 08 2014	1253	1x500-mL G/P	6010_METALS_ICP: COMMON; 6010_METALS_ICP: GW 03	6 Months	HNO3 to pH <2
B2WRV5	N	W SEP 08 2014	1253	1x500-mL G/P	ALPHA_GPC_DISCRETE: COMMON; BETA_GPC: COMMON	6 Months	HNO3 to pH <2
B2WRV5	N	W SEP 08 2014	1253	1x500-mL G/P	KPA_UTOT: COMMON	6 Months	HNO3 to pH <2
B2WRV5	N	W SEP 08 2014	1253	1x500-mL P	TRITIUM_DIST_LSC: COMMON	6 Months	None

Relinquished By: D.L. Floyd
CHPRC

Received By: M.A. White
CHPRC

Relinquished By: M.A. White
CHPRC

Received By: P. Went Patreia Dent

Relinquished By: Fed X

Received By:

Print Sign

Date/Time

Date/Time

Date/Time

Date/Time

Date/Time

Date/Time

Matrix *

S = Soil DS = Drum Solids
SE = Sediment DL = Drum Liquids
SO = Solid T = Tissue
SL = Sludge WI = Wipe
W = Water L = Liquid
O = Oil V = Vegetation
A = Air X = Other

FINAL SAMPLE DISPOSITION

Disposal Method (e.g., Return to customer, per lab procedure, used in process)

Disposed By

DATE/TIME

PRINTED O 5/9/2014

A-6004-842 (REV 2)

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October 6, 2014

CH2M Hill Plateau Remediation Company		C.O.C. # S14-006-204	
Collector: D.L. Floyd CHPRC		Page 1 of 1	
SAF No. S14-006	Contact/Requester: Karen Waters-Husted	Telephone No. 509-376-4650	
Project Title: SURV, JUNE 2014	Sampling Origin: Hanford Site	Purchase Order/Charge Code: 300071ES20	
Shipped To (Lab): GEL Laboratories, LLC	Logbook No. HNF-N-50667116	Ice Chest No. GWS-422	
Protocol: SURV	Method of Shipment: Commercial Carrier	Bill of Lading/Air Bill No. 1771082983941	
Priority: 30 Days		Offsite Property No. 5065	
SPECIAL INSTRUCTIONS: HOLD TIME		Total Activity Exemption: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
POSSIBLE SAMPLE HAZARDS/REMARKS *** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1			
Sample No. B2WRV6	Filter * N	Date * SEP 08 2014 12 53	Time
No/Type Container: 1x250-mL G/P	Sample Analysis: COMMON	Holding Time: 28 Days/48 Hours	Preservative: Cool <=6C

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Relinquished By: D.L. Floyd	Print: [Signature]	Sign: [Signature]	Received By: M.A. White	Print: [Signature]	Sign: [Signature]	Date/Time: SEP 08 2014 1345	Matrix * DS = Drum Solids
Relinquished By: M.A. White	Print: [Signature]	Sign: [Signature]	Received By: CHPRC	Print: [Signature]	Sign: [Signature]	Date/Time: SEP 08 2014 1345	DL = Drum Liquids
Relinquished By: [Signature]	Print: [Signature]	Sign: [Signature]	Received By: FEDEX	Print: [Signature]	Sign: [Signature]	Date/Time: SEP 08 2014 1400	T = Tissue
Relinquished By: [Signature]	Print: [Signature]	Sign: [Signature]	Received By: P. Went	Print: [Signature]	Sign: [Signature]	Date/Time: SEP 08 2014 0800	WI = Wipe
FINAL SAMPLE DISPOSITION							Matrix * L = Liquid
Disposal Method (e.g., Return to customer, per lab procedure, used in process)							V = Vegetation
PRINTED ON 5/9/2014							A = Air
A-6004-842 (REV 2)							X = Other

October 6, 2014

Effective 11/7/2013
Revision 0 Effective November 2013

Sample Receipt and Review Form

GL-CHL-SR-001 Rev 0
Page 1 of 1

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: <u>HMSA</u>		SDG/AR/COC/Work Order: <u>356294</u>
Received By: <u>P. Albert</u>		Date Received: <u>9/9/14</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"/> Yes <input checked="" type="checkbox"/> No	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0/cpm</u>
Classified Radioactive II or III by RSO?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input 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 type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?	<input 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 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 #: Secondary Temperature Device Serial # (If Applicable): <u>130462966</u>
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 checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7 Are Encore containers present?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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 type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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 type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7710 8298 4205</u> <u>7710 8298 3941</u> <u>7710 8298 3616</u> } <u>2c</u>

Comments (Use Continuation Form if needed):

Data Review Qualifier Definitions

Project Specific Qualifier Definitions for GEL Client Code: **HMSA**

Code	Status	Qualifier Definition	CofA	Department	Fraction	Additional Comments
U	Programmed	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.	Y			Includes MDA, TPU, count uncert.
J	Programmed	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated	Y	Organics		Organics only
P	Programmed	Aroclor target analyte with greater than 25% difference between column analyses.	Y	Organics		PCB only
C	Manual	Analyte has been confirmed by GC/MS analysis	Y	Organics	Pesticide	IF GC/MS confirmation was attempted but unsuccessful do not qualify with C
B	Programmed	The analyte was detected in both the associated QC blank and in the sample.	Y	Organics		
E	Manual	Concentration exceeds the calibration range of the instrument	Y	Organics		Qualifier Uploaded
A	Manual	The TIC is a suspected aldol-condensation product	Y	Organics	Semi-Volatile	Uploaded with TIC
X	Programmed	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			Replaces H Hold Date In RAD replaces UI. Same usage as standard X as well.
N	Programmed	Spike Sample recovery is outside control limits.	Y			
*	Programmed	Duplicate analysis not within control limits	Y	Inorganics		
>	Programmed	Result greater than quantifiable range or greater than upper limit of the analysis range	Y	General Chemistry		
Z	Manual	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			
B	Programmed	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).	Y	Inorganics	Metals	Replaces J Estimated Value
D	Programmed	Results are reported from a diluted aliquot of sample.	Y			Dilution
E	Programmed	Reported value is estimated due to interferences. See comment in narrative.	Y	Inorganics	Metals	GEL E
M	Manual	Duplicate precision not met.	Y	Inorganics	Metals	Replaces *
o	Programmed	Analyte failed to recover within LCS limits (Organics only)	Y	Organics		
S	Manual	Reported value determined by the Method of Standard Additions (MSA)	Y	Inorganics		Not coded B/C Rarely performed
T	Programmed	Spike and/or spike duplicate sample recovery is outside control limits.	Y	Organics		GC/MS only
W	Manual	Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.	Y	Inorganics		No GFAA in house.
B	Programmed	The associated QC sample blank has a result $\geq 2X$ the MDA and, after corrections, result is \geq MDA for this sample	Y	Radiological		
Y	Manual	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			
+	Manual	Correlation coefficient for Method of Standard Additions (MSA) is < 0.995	Y	Inorganics		
B	Programmed	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).	Y	General Chemistry		Replaces J Estimated Value
C	Programmed	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.	Y	Inorganics	Metals	Replaces B Blank Detection
C	Programmed	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.	Y	General Chemistry		Replaces B Blank Detection
<	Programmed	Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide	Y	General Chemistry		for Reactive CN/S

Laboratory Certifications

List of current GEL Certifications as of 06 October 2014

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

Metals Analysis

Case Narrative

**Metals Fractional Narrative
Hanford MSA (HMSA)
SDG GEL356294**

Sample Analysis

Sample ID	Client ID
356294001	B2WRV5
1203163549	Method Blank (MB) ICP
1203163550	Laboratory Control Sample (LCS)
1203163553	356294001(B2WRV5L) Serial Dilution (SD)
1203163551	356294001(B2WRV5S) Matrix Spike (MS)
1203163552	356294001(B2WRV5SD) Matrix Spike Duplicate (MSD)

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

Method/Analysis Information

Analytical Batch:	1417568
Prep Batch :	1417567
Standard Operating Procedures:	GL-MA-E-013 REV# 22 and GL-MA-E-006 REV# 11
Analytical Method:	6010_METALS_ICP
Prep Method :	SW846 3005A

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. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 0.4L/min, argon gas flows of 13 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

All PQL standards for 6010C met the control limits with the exception of potassium and sodium listed below. The sample concentrations were less than the MDL or greater than 2x the PQL, so the data is not adversely affected. 356294001 (B2WRV5).

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 sample was selected as the quality control (QC) sample for this SDG: 356294001 (B2WRV5).

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. All applicable analytes met the acceptance criteria.

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 analytes met the acceptance criteria.

MS/MSD Relative Percent Difference (RPD) Statement

The relative percent difference (RPD) obtained from the designated matrix spike duplicate (MSD) is evaluated based on acceptance criteria of 20%. The RPD values between qualifying analyte results in the MS and MSD were within the acceptance limits.

Serial Dilution % Difference Statement

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

Technical Information

Holding Time Specifications

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those

holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

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

Preparation Information

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

Miscellaneous Information

Electronic Packaging Comment

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

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

Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. Data exception reports were included behind the Case Narrative or in the Miscellaneous Data section of this data package. A data exception report was not required for this SDG.

Additional Comments

Additional comments were not required for this SDG.

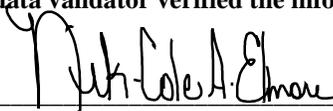
Certification Statement

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.

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: 10.6.14

Sample Data Summary

October 6, 2014

GEL LABORATORIES LLC

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

**Qualifier Definition Report
for**

HMSA001 Hanford MSA (51204)

Client SDG: GEL356294 GEL Work Order: 356294

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, Heather Shaffer.

Reviewed by

 10.6.14

Certificate of Analysis

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: **CHPRC SAF S14-006**

Report Date: October 3, 2014

Client Sample ID: B2WRV5	Project: HMSA00158
Lab Sample ID: 356294001	Client ID: HMSA001
Matrix: WATER	Client SDG: GEL356294
Collect Date: 08-SEP-14 12:53	
Receive Date: 09-SEP-14	
Collector: Client	

Parameter	Qualifier	Result	MDL	RL	CRDL	Units	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP												
<i>6010_METALS_ICP: COMMON +GW 03 "As Received"</i>												
Antimony	B	8.40	3.50	10.0	10.0	ug/L	1	HSC	09/12/14	16:25	1417568	1
Arsenic	U	5.00	5.00	30.0	30.0	ug/L	1					
Barium		53.1	1.00	5.00	5.00	ug/L	1					
Beryllium	U	1.00	1.00	5.00	5.00	ug/L	1					
Cadmium	U	1.00	1.00	5.00	5.00	ug/L	1					
Calcium		52600	50.0	200	200	ug/L	1					
Chromium	B	4.03	1.00	5.00	5.00	ug/L	1					
Copper	U	3.00	3.00	10.0	10.0	ug/L	1					
Iron	U	30.0	30.0	100	100	ug/L	1					
Magnesium		13900	110	300	300	ug/L	1					
Manganese	U	2.00	2.00	10.0	10.0	ug/L	1					
Nickel	U	1.50	1.50	5.00	5.00	ug/L	1					
Silver	U	1.00	1.00	5.00	5.00	ug/L	1					
Vanadium		13.2	1.00	5.00	5.00	ug/L	1					
Zinc	B	5.13	3.30	10.0	10.0	ug/L	1					
Cobalt	U	1.00	1.00	5.00	5.00	ug/L	1	HSC	09/15/14	14:38	1417568	2
Potassium		6780	50.0	150	150	ug/L	1					
Sodium		24700	100	300	300	ug/L	1					
Strontium		272	1.00	5.00	5.00	ug/L	1					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3005A	SW846 3005A for 6010C	JXM5	09/10/14	0800	1417567

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	6010_METALS_ICP	
2	6010_METALS_ICP	

Quality Control Summary

October 6, 2014

GEL LABORATORIES LLC

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

QC Summary

Report Date: October 3, 2014

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CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 356294

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1417568										
QC1203163550	LCS										
Antimony	500			486	ug/L		97.1	(80%-120%)	HSC	09/12/14	16:22
Arsenic	500			472	ug/L		94.4	(80%-120%)			
Barium	500			488	ug/L		97.7	(80%-120%)			
Beryllium	500			485	ug/L		97	(80%-120%)			
Cadmium	500			472	ug/L		94.3	(80%-120%)			
Calcium	5000			5020	ug/L		100	(80%-120%)			
Chromium	500			481	ug/L		96.2	(80%-120%)			
Cobalt	500			522	ug/L		104	(80%-120%)		09/15/14	14:35
Copper	500			488	ug/L		97.6	(80%-120%)		09/12/14	16:22
Iron	5000			5110	ug/L		102	(80%-120%)			
Magnesium	5000			5200	ug/L		104	(80%-120%)			
Manganese	500			487	ug/L		97.4	(80%-120%)			
Nickel	500			478	ug/L		95.6	(80%-120%)			
Potassium	5000			5290	ug/L		106	(80%-120%)		09/15/14	14:35
Silver	500			472	ug/L		94.3	(80%-120%)		09/12/14	16:22
Sodium	5000			5640	ug/L		113	(80%-120%)		09/15/14	14:35
Strontium	500			536	ug/L		107	(80%-120%)			
Vanadium	500			505	ug/L		101	(80%-120%)		09/12/14	16:22
Zinc	500			488	ug/L		97.7	(80%-120%)			

QC1203163549 MB

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QC Summary

Workorder: 356294

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1417568										
Antimony			U	3.50	ug/L					09/12/14	16:19
Arsenic			U	5.00	ug/L				HSC		
Barium			U	1.00	ug/L						
Beryllium			U	1.00	ug/L						
Cadmium			U	1.00	ug/L						
Calcium			U	50.0	ug/L						
Chromium			U	1.00	ug/L						
Cobalt			U	1.00	ug/L					09/15/14	14:31
Copper			U	3.00	ug/L					09/12/14	16:19
Iron			U	30.0	ug/L						
Magnesium			U	110	ug/L						
Manganese			U	2.00	ug/L						
Nickel			U	1.50	ug/L						
Potassium			U	50.0	ug/L					09/15/14	14:31
Silver			U	1.00	ug/L					09/12/14	16:19
Sodium			U	100	ug/L					09/15/14	14:31
Strontium			U	1.00	ug/L						
Vanadium			U	1.00	ug/L					09/12/14	16:19
Zinc			U	3.30	ug/L						
QC1203163551 356294001 MS											
Antimony	500	B	8.40	489	ug/L		96.2	(75%-125%)		09/12/14	16:29
Arsenic	500	U	5.00	492	ug/L		98.3	(75%-125%)			
Barium	500		53.1	542	ug/L		97.8	(75%-125%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1417568										
Beryllium	500	U	1.00	492	ug/L		98.3	(75%-125%)	HSC	09/12/14	16:29
Cadmium	500	U	1.00	462	ug/L		92.4	(75%-125%)			
Calcium	5000		52600	57200	ug/L		N/A	(75%-125%)			
Chromium	500	B	4.03	475	ug/L		94.2	(75%-125%)			
Cobalt	500	U	1.00	492	ug/L		98.5	(75%-125%)		09/15/14	14:41
Copper	500	U	3.00	509	ug/L		102	(75%-125%)		09/12/14	16:29
Iron	5000	U	30.0	5030	ug/L		100	(75%-125%)			
Magnesium	5000		13900	18800	ug/L		97.8	(75%-125%)			
Manganese	500	U	2.00	487	ug/L		97.1	(75%-125%)			
Nickel	500	U	1.50	476	ug/L		95.1	(75%-125%)			
Potassium	5000		6780	12000	ug/L		103	(75%-125%)		09/15/14	14:41
Silver	500	U	1.00	484	ug/L		96.8	(75%-125%)		09/12/14	16:29
Sodium	5000		24700	30700	ug/L		N/A	(75%-125%)		09/15/14	14:41
Strontium	500		272	802	ug/L		106	(75%-125%)			
Vanadium	500		13.2	525	ug/L		102	(75%-125%)		09/12/14	16:29
Zinc	500	B	5.13	485	ug/L		96	(75%-125%)			
QC1203163552 356294001 MSD											
Antimony	500	B	8.40	496	ug/L	1.46	97.6	(0%-20%)		09/12/14	16:32
Arsenic	500	U	5.00	500	ug/L	1.67	100	(0%-20%)			
Barium	500		53.1	545	ug/L	0.585	98.4	(0%-20%)			
Beryllium	500	U	1.00	495	ug/L	0.719	99	(0%-20%)			
Cadmium	500	U	1.00	465	ug/L	0.669	93	(0%-20%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1417568										
Calcium	5000		52600	57300	ug/L	0.171	N/A	(0%-20%)	HSC	09/12/14	16:32
Chromium	500	B	4.03	477	ug/L	0.425	94.6	(0%-20%)			
Cobalt	500	U	1.00	501	ug/L	1.67	100	(0%-20%)		09/15/14	14:44
Copper	500	U	3.00	512	ug/L	0.577	102	(0%-20%)		09/12/14	16:32
Iron	5000	U	30.0	5070	ug/L	0.932	101	(0%-20%)			
Magnesium	5000		13900	18900	ug/L	0.318	99	(0%-20%)			
Manganese	500	U	2.00	490	ug/L	0.741	97.9	(0%-20%)			
Nickel	500	U	1.50	477	ug/L	0.260	95.4	(0%-20%)			
Potassium	5000		6780	11700	ug/L	2.53	97.4	(0%-20%)		09/15/14	14:44
Silver	500	U	1.00	488	ug/L	0.797	97.5	(0%-20%)		09/12/14	16:32
Sodium	5000		24700	30200	ug/L	1.49	N/A	(0%-20%)		09/15/14	14:44
Strontium	500		272	786	ug/L	1.99	103	(0%-20%)			
Vanadium	500		13.2	529	ug/L	0.763	103	(0%-20%)		09/12/14	16:32
Zinc	500	B	5.13	487	ug/L	0.444	96.4	(0%-20%)			
QC1203163553 356294001 SDILT											
Antimony		B	8.40	DU	17.5	ug/L	N/A	(0%-10%)		09/12/14	16:35
Arsenic		U	-0.89	DU	25.0	ug/L	N/A	(0%-10%)			
Barium			53.1	D	10.8	ug/L	1.81	(0%-10%)			
Beryllium		U	0.301	DU	5.00	ug/L	N/A	(0%-10%)			
Cadmium		U	0.222	DU	5.00	ug/L	N/A	(0%-10%)			
Calcium			52600	D	10600	ug/L	.287	(0%-10%)			
Chromium		B	4.03	D	1.13	ug/L	40.7	(0%-10%)			

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Table with columns: Parmname, NOM, Sample, Qual, QC, Units, RPD/D%, REC%, Range, Anlst, Date, Time. Rows include Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Silver, Sodium, Strontium, Vanadium, Zinc.

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.

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

General Chem Analysis

Case Narrative

**General Chemistry Narrative
Hanford MSA (HMSA)
SDG GEL356294**

Method/Analysis Information

Product: Ion Chromatography
Analytical Batch: 1417583 **Method:** 9056_ANIONS_IC:COMMON

Sample Analysis

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

Sample ID	Client ID
356294002	B2WRV6
1203163603	MB for batch 1417583
1203163604	Laboratory Control Sample (LCS)
1203163605	356296003(B2XDL4) Sample Duplicate (DUP)
1203163606	356296003(B2XDL4) Post Spike (PS)

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-086 REV# 23.

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: 356296003 (B2XDL4).

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

The spike recovery falls outside of the established acceptance limits due to matrix interference: 1203163606 (B2XDL4). The spike recovery falls outside of the GEL acceptance limits but within the client specified limits. 1203163606 (B2XDL4).

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 following samples in this sample group were diluted due to high concentration: 1203163605 (B2XDL4), 1203163606 (B2XDL4) and 356294002 (B2WRV6). The following samples were diluted based on historical data: 356294002 (B2WRV6).

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: 1203163605 (B2XDL4) and 356294002 (B2WRV6).

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: Alkalinity
Analytical Batch: 1417582 **Method:** 2320_ALKALINITY: GW 01

Sample Analysis

The following samples were analyzed using the analytical protocol as established in 2320_ALKALINITY:

Sample ID	Client ID
356294001	B2WRV5
1203163591	MB for batch 1417582
1203163593	Laboratory Control Sample (LCS)
1203163598	356294001(B2WRV5) Sample Duplicate (DUP)
1203163602	356294001(B2WRV5) Matrix Spike (MS)

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-033 REV# 11.

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 Titration and Ion analysis was performed on a manually operated buret.

Initial Standardization

The titrant was properly standardized

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: 356294001 (B2WRV5).

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.

Additional Comments

50mL of sample was used due to limited sample volume. 1203163598 (B2WRV5), 1203163602 (B2WRV5) and 356294001 (B2WRV5).

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.

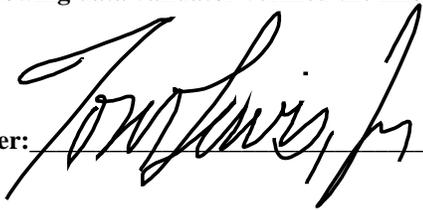
Certification Statement

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: 06Oct14

Sample Data Summary

October 6, 2014

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**Certificate of Analysis Report
for**

HMSA001 Hanford MSA (51204)

Client SDG: GEL356294 GEL Work Order: 356294

The Qualifiers in this report are defined as follows:

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, Heather Shaffer.

Reviewed by



Certificate of Analysis

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: **CHPRC SAF S14-006**

Report Date: October 6, 2014

Client Sample ID: B2WRV5	Project: HMSA00158
Lab Sample ID: 356294001	Client ID: HMSA001
Matrix: WATER	Client SDG: GEL356294
Collect Date: 08-SEP-14 12:53	
Receive Date: 09-SEP-14	
Collector: Client	

Parameter	Qualifier	Result	MDL	RL	CRDL	Units	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis												
<i>2320_ALKALINITY: GW 01 "As Received"</i>												
Alkalinity, Total as CaCO3		137000	1450	2000	2000	ug/L	PX01	09/09/14	18:36	1417582	1	
Bicarbonate alkalinity (CaCO3)		137000	1450	2000	2000	ug/L						
Carbonate alkalinity (CaCO3)	U	1450	1450	2000	2000	ug/L						
Hydroxide alkalinity as CaCO3	U	1450	1450	2000	2000	ug/L						

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	2320_ALKALINITY	

~~October 6, 2014~~
GEL LABORATORIES LLC

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

Certificate of Analysis

Company : CH2MHill Plateau Remediation
Company
Address : MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352
Contact: Mr. Scot Fitzgerald
Project: **CHPRC SAF S14-006**

Report Date: October 6, 2014

Client Sample ID:	B2WRV6	Project:	HMSA00158
Lab Sample ID:	356294002	Client ID:	HMSA001
Matrix:	WATER	Client SDG:	GEL356294
Collect Date:	08-SEP-14 12:53		
Receive Date:	09-SEP-14		
Collector:	Client		

Parameter	Qualifier	Result	MDL	RL	CRDL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
<i>9056_ANIONS_IC:COMMON "As Received"</i>												
Chloride		16200	134	400	200	ug/L	2	RXB5	09/09/14	13:31	1417583	1
Fluoride		288	66.0	200	500	ug/L	2					
Nitrate-N		6730	66.0	200	250	ug/L	2					
Nitrite-N		76.0	76.0	200	250	ug/L	2					
Sulfate		64400	665	2000	500	ug/L	5	RXB5	09/10/14	00:21	1417583	2

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	

Quality Control Summary

October 6, 2014
GEL LABORATORIES LLC

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QC Summary

Report Date: October 6, 2014

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 356294

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1417583										
QC1203163605	356296003	DUP									
Chloride		17800		17800	ug/L	0.082		(0%-20%)	RXB5	09/09/14	16:06
Fluoride		249		244	ug/L	2.03	^	(+/-500)			
Nitrate-N		5480		5500	ug/L	0.230		(0%-20%)			
Nitrite-N		0.00		0.00	ug/L	0.00	^	(+/-250)			
Sulfate		51500		51300	ug/L	0.359		(0%-20%)		09/10/14	01:54
QC1203163604	LCS										
Chloride	5000			4780	ug/L			95.5 (90%-110%)		09/10/14	03:26
Fluoride	2500			2470	ug/L			98.9 (90%-110%)			
Nitrate-N	2500			2450	ug/L			98 (90%-110%)			
Nitrite-N	2500			2430	ug/L			97.1 (90%-110%)			
Sulfate	10000			9830	ug/L			98.3 (90%-110%)			
QC1203163603	MB										
Chloride				0.00	ug/L					09/10/14	02:55
Fluoride				0.00	ug/L						
Nitrate-N				0.00	ug/L						
Nitrite-N				0.00	ug/L						
Sulfate				0.00	ug/L						
QC1203163606	356296003	PS									
Chloride	5.00	8.91		14.6	mg/L			113* (90%-110%)		09/09/14	16:37
Fluoride	2.50	0.125		2.46	mg/L			93.5 (90%-110%)			
Nitrate-N	2.50	2.74		5.36	mg/L			105 (90%-110%)			

October 6, 2014

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QC Summary

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Table with columns: Parmname, NOM, Sample, Qual, QC, Units, RPD%, REC%, Range, Anlst, Date, Time. Contains data for Ion Chromatography (Nitrite-N, Sulfate) and Titration and Ion Analysis (Alkalinity, Total as CaCO3, Bicarbonate alkalinity, Carbonate alkalinity, Hydroxide alkalinity as CaCO3).

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

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QC Summary

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

Radiological Analysis

October 6, 2014
Radiochemistry Case Narrative
Hanford MSA (HMSA)
SDG GEL356294
Work Order 356294

Method/Analysis Information

Product: 9310_ALPHABETA_GPC: COMMON

Analytical Method: BETA_GPC

Analytical Batch Number: 1419068

Sample ID	Client ID
356294001	B2WRV5
1203167438	MB for batch 1419068
1203167442	Laboratory Control Sample (LCS)
1203167439	356431004(B2XH59) Sample Duplicate (DUP)
1203167440	356431004(B2XH59) Matrix Spike (MS)
1203167441	356431004(B2XH59) Matrix Spike Duplicate (MSD)

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-RAD-A-001 REV# 17.

Calibration Information:

Calibration Information

All initial and continuing calibration requirements have been met.

Standards Information

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information

The blank volume is representative of the sample volume in this batch.

Designated QC

The following sample was used for QC: 356431004 (B2XH59).

QC Information

October 6, 2014

All of the QC samples meet the required acceptance limits with the following exceptions: The Matrix Spike and Matrix Spike Duplicate 1203167440 (B2XH59) and 1203167441 (B2XH59) did not meet beta recovery requirements due to the sample activity being greater than five times the spiked nominal concentration.

Technical Information:

Holding Time

All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

Chemical Recoveries

All chemical recoveries meet the required acceptance limits for this sample set.

Gross Alpha/Beta Preparation Information

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

Recounts

None of the samples in this sample set were recounted.

Miscellaneous Information:

Data Exception (DER) Documentation

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

Sample-Specific MDA/MDC

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

Additional Comments

The matrix spike and matrix spike duplicate, 1203167440 (B2XH59) and 1203167441 (B2XH59), aliquots were reduced to conserve sample volume.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product: KPA_UTOT: COMMON
Analytical Method: UTOT_KPA
Analytical Batch Number: 1417119

Sample ID Client ID

October 6, 2014

356294001	B2WRV5
1203162309	MB for batch 1417119
1203162312	Laboratory Control Sample (LCS)
1203162313	Laboratory Control Sample (LCS)
1203162310	356207001(B2XJN7) Sample Duplicate (DUP)
1203162311	356207001(B2XJN7) Matrix Spike (MS)

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-RAD-A-023 REV# 19.

Calibration Information:

Standards Information

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information

The blank volume is representative of the sample volume in this batch.

Designated QC

The following sample was used for QC: 356207001 (B2XJN7).

Technical Information:

Holding Time

All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis

Sample 356294001 (B2WRV5) was treated with a post-spike due to contractual requirements and reanalyzed to test for quenching. The post-spike verified the initial result, so the initial result is reported.

Recounts

None of the samples in this sample set were recounted.

Miscellaneous Information:

Data Exception (DER) Documentation

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

Additional Comments

MB 1203162309 (MB) failed R2 and/or lifetime. This was due to insufficient uranium in the sample for measurement. The results are reported.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product: TRITIUM_DIST_LSC: COMMON
Analytical Method: TRITIUM_DIST_LSC
Analytical Batch Number: 1418820

Sample ID	Client ID
356294001	B2WRV5
1203166815	MB for batch 1418820
1203166818	Laboratory Control Sample (LCS)
1203166816	356403002(B2X7N8) Sample Duplicate (DUP)
1203166817	356403002(B2X7N8) Matrix Spike (MS)

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-RAD-A-002 REV# 21.

Calibration Information:

Calibration Information

All initial and continuing calibration requirements have been met.

Standards Information

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information

The blank volume is representative of the sample volume in this batch.

Designated QC

The following sample was used for QC: 356403002 (B2X7N8).

QC Information

All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time

All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

Recounts

Samples 1203166816 (B2X7N8), 1203166817 (B2X7N8), 1203166818 (LCS) and 356294001 (B2WRV5) were recounted due to low recovery. The recounts are reported. Sample 1203166815 (MB) was recounted due to low recovery and then recounted due to high MDC. The third count is reported.

Miscellaneous Information:

Data Exception (DER) Documentation

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

Sample-Specific MDA/MDC

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

Additional Comments

Additional comments were not required for this sample set.

Qualifier Information

Manual qualifiers were not required.

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.

October 6, 2014

GEL LABORATORIES LLC

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

**Qualifier Definition Report
for**

HMSA001 Hanford MSA (51204)

Client SDG: GEL356294 GEL Work Order: 356294

The Qualifiers in this report are defined as follows:

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: Kate Gellatly

Date: 02 OCT 2014

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : CH2MHill Plateau Remediation
 Address : Company
 MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF S14-006

Report Date: October 2, 2014

Client Sample ID: B2WRV5
 Sample ID: 356294001
 Matrix: WATER
 Collect Date: 08-SEP-14
 Receive Date: 09-SEP-14
 Collector: Client

Project: HMSA00158
 Client ID: HMSA001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting													
<i>9310_ALPHABETA_GPC: COMMON "As Received"</i>													
Alpha		3.68	+/-2.08	2.94	+/-2.17	3.00	pCi/L		JXH3	09/24/14	1018	1419068	1
Beta		21.7	+/-2.36	2.42	+/-4.31	4.00	pCi/L						
Rad Liquid Scintillation Analysis													
<i>TRITIUM_DIST_LSC: COMMON "As Received"</i>													
Tritium		7710	+/-324	145	+/-1520	100	pCi/L		BYS1	09/26/14	1046	1418820	2
Rad Total Uranium													
<i>KPA_UTOT: COMMON "As Received"</i>													
Total Uranium		6.13	+/-0.150	0.233	+/-0.528	1.00	ug/L	1	JAOC	09/30/14	1237	1417119	3

The following Analytical Methods were performed

Method	Description
1	EPA 900.0/SW846 9310
2	EPA 906.0 Modified
3	ASTM D 5174

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
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Notes:
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Quality Control Data

GEL LABORATORIES LLC

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QC Summary

Report Date: October 2, 2014
Page 1 of 3

Client : CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352
Contact: Mr. Scot Fitzgerald
Workorder: 356294

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gas Flow									
Batch	1419068								
QC1203167438	MB								
Alpha			U	0.262	pCi/L			JXH3	09/24/1411:54
				Uncert: +/-0.711					
				TPU: +/-0.712					
Beta			U	-8.73	pCi/L				
				Uncert: +/-1.18					
				TPU: +/-1.18					
QC1203167439	356431004	DUP							
Alpha		2.74	U	2.03	pCi/L				09/24/1411:54
				Uncert: +/-1.16		RPD: 30 (0% - 100%)			
				TPU: +/-1.24		RER: 0.592 (0-2)			
Beta		23900		24000	pCi/L				
				Uncert: +/-37.2		RPD: 1 (0% - 20%)			
				TPU: +/-3910		RER: 0.052 (0-2)			
QC1203167440	356431004	MS							
Alpha		411		2.74	pCi/L	REC: 110 (75%-125%)			09/24/1411:54
				Uncert: +/-1.16					
				TPU: +/-1.24					
Beta		1600		23900	pCi/L	REC: N/A			
				Uncert: +/-37.2					
				TPU: +/-3910					
QC1203167441	356431004	MSD							
Alpha		411		2.74	pCi/L	REC: 113 (75%-125%)			09/24/1411:54
				Uncert: +/-1.16		RPD: 3 (0%-20%)			
				TPU: +/-1.24		RER: 0.222 (0-2)			
Beta		1600		23900	pCi/L	REC: N/A			
				Uncert: +/-37.2		RPD: 6 (0%-20%)			
				TPU: +/-3910		RER: 0.518 (0-2)			
QC1203167442	LCS								
Alpha		82.3		89.2	pCi/L	REC: 108 (80%-120%)			09/24/1411:54
				Uncert: +/-8.51					
				TPU: +/-17.3					
Beta		319		362	pCi/L	REC: 113 (80%-120%)			
				Uncert: +/-12.5					
				TPU: +/-61.2					
Rad Liquid Scintillation									
Batch	1418820								
QC1203166815	MB								
Tritium			U	49.4	pCi/L			BYS1	09/30/1405:19
				Uncert: +/-50.4					
				TPU: +/-51.3					
QC1203166816	356403002	DUP							
Tritium		1160		1050	pCi/L				09/26/1420:40
				Uncert: +/-144		RPD: 10 (0% - 20%)			
				TPU: +/-266		RER: 0.593 (0-2)			

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QC Summary

Workorder: 356294

Page 2 of 3

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Liquid Scintillation									
Batch 1418820									
QC1203166817	356403002	MS							
Tritium	1910	1160		2800	pCi/L	REC: 86	(75%-125%)		09/26/1422:13
	Uncert:	+/-144		+/-340					
	TPU:	+/-266		+/-639					
QC1203166818	LCS								
Tritium	1910			1750	pCi/L	REC: 92	(80%-120%)		09/26/1422:45
	Uncert:			+/-268					
	TPU:			+/-432					
Rad Total U									
Batch 1417119									
QC1203162309	MB								
Total Uranium			U	0.0079	ug/L			JAOC	09/30/1412:46
	Uncert:			+/-0.00153					
	TPU:			+/-0.00166					
QC1203162310	356207001	DUP							
Total Uranium		0.941		0.888	ug/L				09/30/1412:49
	Uncert:	+/-0.0261		+/-0.0236		RPD: 6	(0% - 100%)		
	TPU:	+/-0.082		+/-0.077		RER: 0.923	(0-2)		
QC1203162311	356207001	MS							
Total Uranium	50.0	0.941		54.7	ug/L	REC: 108	(75%-125%)		09/30/1412:52
	Uncert:	+/-0.0261		+/-3.38					
	TPU:	+/-0.082		+/-5.64					
QC1203162312	LCS								
Total Uranium	50.0			54.5	ug/L	REC: 109	(80%-120%)		09/30/1412:54
	Uncert:			+/-3.39					
	TPU:			+/-5.63					
QC1203162313	LCS								
Total Uranium	5.00			5.22	ug/L	REC: 104	(80%-120%)		09/30/1412:56
	Uncert:			+/-0.130					
	TPU:			+/-0.450					

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

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
- < 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).
- B The associated QC sample blank has a result >= 2X the MDA and, after corrections, result is >= MDA for this sample
- 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)

QC Summary

Workorder: 356294

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
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.

** Indicates analyte is a surrogate compound.

^ 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.

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.