

7/19/2016



July 19, 2016

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

Re: CHPRC SAF S16-006  
Work Order: 399955  
SDG: GEL399955

Dear Mr. Fitzgerald:

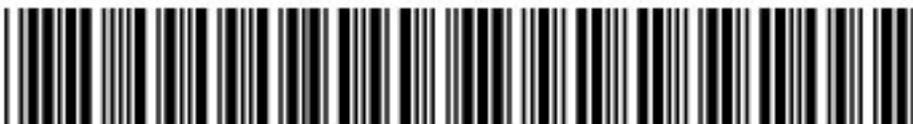
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on June 23, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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,

*B Luthman*  
Brielle Luthman for  
Heather Shaffer  
Project Manager

Purchase Order: 300071 - 7H  
Chain of Custody: S16-006-269  
Enclosures



## Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	6
Data Review Qualifier Definitions.....	10
Laboratory Certifications.....	12
Metals Analysis.....	14
Case Narrative.....	15
Sample Data Summary.....	19
Quality Control Summary.....	24
Radiological Analysis.....	33
Case Narrative.....	34
Sample Data Summary.....	38
Quality Control Summary.....	41

# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF S16-006  
SDG: GEL399955**

**July 19, 2016**

**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 June 23, 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. 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:

<b>Laboratory Identification</b>	<b>Sample Description</b>
399955001	B35C44
399955002	B35C46

**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: Metals and Radiochemistry.

We certify that this package is in compliance with the SOW, both technically and for completeness, including a full description of, explanation of, and corrective actions for, any and all deviations, from either the analyses requested or the case narrative requested. Release of the data contained in this hard copy data package has been authorized by the Laboratory Analytical Manager (or designee) and the laboratory's client services representative as verified by their signatures on this report.

7/19/2016

*B. Luthman*  
Brielle Luthman for  
Heather Shaffer  
Project Manager

**Technical Case Narrative**  
**CH2M Hill Plateau Remediation Company (CPRC)**  
**SDG #: GEL399955**  
**Work Order #: 399955**

## **Metals**

### **Determination of Metals by ICP**

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

#### **Calibration Information**

##### **CRDL/PQL Requirements**

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of potassium and sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 399955001 (B35C44) and 399955002 (B35C46).

### **Determination of Metals by ICP-MS**

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

#### **Quality Control (QC) Information**

##### **Method Blank (MB) Statement**

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of strontium. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203573164 (MB).

## **Radiochemistry**

### **9310\_ALPHA\_BETA\_GPC: COMMON**

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

#### **Technical Information**

##### **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**

Samples 1203574715 (B35D60MSD) and 1203574716 (LCS) were recounted due to high recovery. The recounts are reported.

**Miscellaneous Information****Additional Comments**

The matrix spike and matrix spike duplicate, 1203574714 (B35D60MS) and 1203574715 (B35D60MSD), aliquots were reduced to conserve sample volume.

**SRISO\_SEP\_PRECIP\_GPC: COMMON**

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

**Technical Information****Recounts**

Sample 1203574969 (B359Y1DUP) was recounted due to results more negative than the three sigma TPU. The second count is reported. Sample 399955001 (B35C44) was verified by recounting at least five days from the separation date. The recount is reported.

**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.

# **Chain of Custody and Supporting Documentation**

CH2M Hill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # **S16-006-269**  
Page 1 of 1A

Collector: Dan Woehle CHPRC  
 Contact/Requester: Karen Waters-Husted  
 Telephone No. 509-376-4650  
 SAF No. S16-006  
 Sampling Origin: Hanford Site  
 Purchase Order/Charge Code: 300071  
 Project Title: SURV, JUNE 2016  
 Logbook No. HNF-N-506 86/35  
 Ice Chest No. 625-559  
 Shipped To (Lab): GEL Laboratories, LLC  
 Method of Shipment: Commercial Carrier  
 Bill of Lading/Air Bill No. 7765 8051 1360  
 Protocol: SURV  
 Priority: 30 Days  
 Priority: **PRIORITY**  
 Offsite Property No. 6761

**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: N/A  
 Hold Time: \_\_\_\_\_  
 Total Activity Exemption: Yes  No

Sample No.	Filter	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B35C44	N	6-21-16	1027	1x500-mL G/P	6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04	6 Months	HNO3 to pH <2
B35C44	N	6-21-16	1027	2x1-L P	9310_ALPHABETA_GPC: COMMON	6 Months	HNO3 to pH <2
B35C44	N	6-21-16	1027	3x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2
B35C46	Y	6-21-16	1027	1x500-mL G/P	6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04	6 Months	HNO3 to pH <2

Relinquished By: Dan Woehle CHPRC Print Sign: <i>Dan Woehle</i>	Date/Time: JUN 21 2016 1229	Received By: J.C. Fulton CHPRC Sign: <i>J.C. Fulton</i>	Date/Time: JUN 21 2016 1229
Relinquished By: J.C. Fulton CHPRC Print Sign: <i>J.C. Fulton</i>	Date/Time: JUN 21 2016 1300	Received By: Chris Fulton CHPRC Sign: <i>Chris Fulton</i>	Date/Time: JUN 21 2016 1300
Relinquished By: J.C. Fulton CHPRC Print Sign: <i>J.C. Fulton</i>	Date/Time: JUN 22 2016 0900	Received By: Chris Fulton CHPRC Sign: <i>Chris Fulton</i>	Date/Time: JUN 22 2016 0900
Relinquished By: Chris Fulton CHPRC Print Sign: <i>Chris Fulton</i>	Date/Time: JUN 22 2016 1400	Received By: <b>FEDEx</b>	Date/Time: JUN 22 2016 1400

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

Disposed By: \_\_\_\_\_ 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



**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>APRC</u>		SDG/AR/COC/Work Order: <u>399955</u>
Received By: <u>mk</u>		Date Received: <u>6-23-16</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 checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u>
Classified Radioactive II or III by RSO?	<input checked="" type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	<input checked="" type="checkbox"/>	
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input checked="" type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?	<input checked="" type="checkbox"/>	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Ice bags Blue ice Dry ice <u>None</u> Other (describe) *all temperatures are recorded in Celsius <u>19c</u>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>130462962</u> Secondary Temperature Device Serial # (if Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7 VOA vials contain acid preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
11 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:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15 COC form is properly signed in-relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air <u>FedEx Ground</u> UPS Field Services Courier Other <u>7765 8051 1360</u>

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials AS

Date 6/24/16

Page 1 of 1

# **Data Review Qualifier Definitions**

## Project Specific Qualifier Definitions for GEL Client Code: CPRC

Qualifier	Qualifier Definition	Department	Fraction
U	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.		
J	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	Organics	
P	Aroclor target analyte with greater than 25% difference between column analyses.	Organics	
C	Analyte has been confirmed by GC/MS analysis	Organics	Pesticide
B	The analyte was detected in both the associated QC blank and in the sample.	Organics	
E	Concentration exceeds the calibration range of the instrument	Organics	
A	The TIC is a suspected aldol-condensation product	Organics	Semi-Volatile
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier		
N	Spike Sample recovery is outside control limits.		
*	Duplicate analysis not within control limits	Inorganics	
>	Result greater than quantifiable range or greater than upper limit of the analysis range	General Chemistry	
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier		
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).	Inorganics	Metals
D	Results are reported from a diluted aliquot of sample.		
E	Reported value is estimated due to interferences. See comment in narrative.	Inorganics	Metals
M	Duplicate precision not met.	Inorganics	Metals
o	Analyte failed to recover within LCS limits (Organics only)	Organics	
S	Reported value determined by the Method of Standard Additions (MSA)	Inorganics	
T	Spike and/or spike duplicate sample recovery is outside control limits.	Organics	
W	Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.	Inorganics	
B	The associated QC sample blank has a result $\geq 2X$ the MDA and, after corrections, result is $\geq$ MDA for this sample	Radiological	
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier		
+	Correlation coefficient for Method of Standard Additions (MSA) is < 0.995	Inorganics	
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).	General Chemistry	
C	Target analyte was detected in the sample and the associated blank. The associated blank concentration is $\geq$ EQL or is > 5% of the measured concentration and/or decision level for associated samples.	Inorganics	Metals
C	Target analyte was detected in the sample and the associated blank. The associated blank concentration is $\geq$ EQL or is > 5% of the measured concentration and/or decision level for associated samples.	General Chemistry	
<	Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide	General Chemistry	
UX	Gamma Spectroscopy--Uncertain identification	Radiological	

# Laboratory Certifications

## List of current GEL Certifications as of 19 July 2016

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
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	LA160006
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
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**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL399955**  
**Work Order #: 399955**

**Product:** Determination of Metals by ICP-MS  
**Analytical Method:** 6020\_METALS\_ICPMS  
**Analytical Procedure:** GL-MA-E-014 REV# 28  
**Analytical Batch:** 1576789

**Product:** Determination of Metals by ICP  
**Analytical Method:** 6010\_METALS\_ICP  
**Analytical Procedure:** GL-MA-E-013 REV# 26  
**Analytical Batch:** 1576807

**Preparation Method:** SW846 3005A  
**Preparation Procedure:** GL-MA-E-006 REV# 13  
**Preparation Batches:** 1576788 and 1576806

The following samples were analyzed using the above methods and analytical procedure(s).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
399955001	B35C44
399955002	B35C46
1203573209	Method Blank (MB)ICP
1203573210	Laboratory Control Sample (LCS)
1203573213	399946006(NonSDGL) Serial Dilution (SD)
1203573211	399946006(NonSDGS) Matrix Spike (MS)
1203573212	399946006(NonSDGSD) Matrix Spike Duplicate (MSD)
1203573164	Method Blank (MB)ICP-MS
1203573165	Laboratory Control Sample (LCS)
1203573168	399946006(NonSDGL) Serial Dilution (SD)
1203573166	399946006(NonSDGS) Matrix Spike (MS)
1203573167	399946006(NonSDGSD) Matrix Spike Duplicate (MSD)

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

**Data Summary:**

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

**Calibration Information**

**CRDL/PQL Requirements**

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of potassium and sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 399955001 (B35C44) and 399955002 (B35C46)-ICP.

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of strontium. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203573164 (MB)-ICP-MS.

**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**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL399955 GEL Work Order: 399955

**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.

**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:** Jamie Johnson

**Date:** 18 JUL 2016

**Title:** Group Leader

# Sample Data Summary

**METALS**  
-1-  
**INORGANICS ANALYSIS DATA PACKAGE**

SDG No: GEL399955

CONTRACT: CPRC0S16006

METHOD TYPE: SW846

SAMPLE ID: 399955001

BASIS: As Received

DATE COLLECTED 21-JUN-16

CLIENT ID: B35C44

LEVEL: Low

DATE RECEIVED 23-JUN-16

MATRIX: WATER

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	18	ug/L	B	15	50	50	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7440-38-2	Arsenic	1.7	ug/L	U	1.7	5	5	1	MS	BAJ	07/07/16 18:10	160707-2	1576789
7440-39-3	Barium	33.3	ug/L		0.6	2	2	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7440-41-7	Beryllium	0.20	ug/L	U	0.2	0.5	0.5	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	06/29/16 09:39	062916-1	1576807
7440-43-9	Cadmium	0.457	ug/L	B	0.11	1	1	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7440-70-2	Calcium	37500	ug/L		50	200	200	1	P	HSC	06/29/16 09:39	062916-1	1576807
7440-47-3	Chromium	2.12	ug/L	B	2	10	10	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7440-48-4	Cobalt	0.10	ug/L	U	0.1	1	1	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7440-50-8	Copper	0.890	ug/L	B	0.35	1	1	1	MS	BAJ	07/07/16 18:10	160707-2	1576789
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	06/29/16 09:39	062916-1	1576807
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7439-95-4	Magnesium	6890	ug/L		110	300	300	1	P	HSC	06/29/16 09:39	062916-1	1576807
7439-96-5	Manganese	1	ug/L	B	1	5	5	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7439-98-7	Molybdenum	0.548	ug/L		0.165	0.5	0.5	1	MS	BAJ	07/08/16 17:38	160708-6	1576789
7440-02-0	Nickel	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7440-09-7	Potassium	1570	ug/L		50	150	150	1	P	HSC	06/29/16 09:39	062916-1	1576807
7782-49-2	Selenium	1.5	ug/L	U	1.5	5	5	1	MS	BAJ	07/07/16 18:10	160707-2	1576789
7440-22-4	Silver	0.20	ug/L	U	0.2	1	1	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7440-23-5	Sodium	4150	ug/L		100	300	300	1	P	HSC	06/29/16 09:39	062916-1	1576807
7440-24-6	Strontium	191	ug/L		2	10	10	1	MS	BAJ	07/11/16 17:18	160711-16	1576789
7440-28-0	Thallium	0.450	ug/L	U	0.45	2	2	1	MS	BAJ	07/07/16 21:32	160707-3	1576789
7440-29-1	Thorium	0.712	ug/L	B	0.383	2	2	1	MS	BAJ	07/07/16 18:10	160707-2	1576789
7440-31-5	Tin	1	ug/L	U	1	5	5	1	MS	BAJ	07/07/16 18:10	160707-2	1576789
7440-61-1	Uranium	0.422	ug/L		0.067	0.2	0.2	1	MS	BAJ	07/08/16 09:59	160707-5	1576789
7440-62-2	Vanadium	2.72	ug/L	B	1	5	5	1	P	HSC	06/29/16 09:39	062916-1	1576807
7440-66-6	Zinc	5.29	ug/L	B	3.5	10	10	1	MS	BAJ	07/11/16 17:18	160711-16	1576789

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1576789	1576788	SW846 3005A	50	mL	50	mL	06/24/16	SXW1
1576807	1576806	SW846 3005A	50	mL	50	mL	06/24/16	SXW1

**\*Analytical Methods:**

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METALS

-1-

INORGANICS ANALYSIS DATA PACKAGE

P SW846 3005A/6010C  
MS SW846 3005A/6020A

**METALS**  
-1-  
**INORGANICS ANALYSIS DATA PACKAGE**

SDG No: GEL399955

CONTRACT: CPRC0S16006

METHOD TYPE: SW846

SAMPLE ID: 399955002

BASIS: As Received

DATE COLLECTED 21-JUN-16

CLIENT ID: B35C46

LEVEL: Low

DATE RECEIVED 23-JUN-16

MATRIX: WATER

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	15	ug/L	U	15	50	50	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7440-38-2	Arsenic	1.7	ug/L	U	1.7	5	5	1	MS	BAJ	07/07/16 18:12	160707-2	1576789
7440-39-3	Barium	33.6	ug/L		0.6	2	2	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7440-41-7	Beryllium	0.20	ug/L	U	0.2	0.5	0.5	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	06/29/16 09:42	062916-1	1576807
7440-43-9	Cadmium	0.110	ug/L	U	0.11	1	1	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7440-70-2	Calcium	37300	ug/L		50	200	200	1	P	HSC	06/29/16 09:42	062916-1	1576807
7440-47-3	Chromium	2	ug/L	U	2	10	10	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7440-48-4	Cobalt	0.10	ug/L	U	0.1	1	1	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7440-50-8	Copper	0.350	ug/L	U	0.35	1	1	1	MS	BAJ	07/07/16 18:12	160707-2	1576789
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	06/29/16 09:42	062916-1	1576807
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7439-95-4	Magnesium	6770	ug/L		110	300	300	1	P	HSC	06/29/16 09:42	062916-1	1576807
7439-96-5	Manganese	1	ug/L	U	1	5	5	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7439-98-7	Molybdenum	0.439	ug/L	B	0.165	0.5	0.5	1	MS	BAJ	07/08/16 17:39	160708-6	1576789
7440-02-0	Nickel	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7440-09-7	Potassium	1580	ug/L		50	150	150	1	P	HSC	06/29/16 09:42	062916-1	1576807
7782-49-2	Selenium	1.5	ug/L	U	1.5	5	5	1	MS	BAJ	07/07/16 18:12	160707-2	1576789
7440-22-4	Silver	0.20	ug/L	U	0.2	1	1	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7440-23-5	Sodium	3680	ug/L		100	300	300	1	P	HSC	06/29/16 09:42	062916-1	1576807
7440-24-6	Strontium	192	ug/L		2	10	10	1	MS	BAJ	07/11/16 17:20	160711-16	1576789
7440-28-0	Thallium	0.450	ug/L	U	0.45	2	2	1	MS	BAJ	07/07/16 21:34	160707-3	1576789
7440-29-1	Thorium	0.383	ug/L	U	0.383	2	2	1	MS	BAJ	07/07/16 18:12	160707-2	1576789
7440-31-5	Tin	1	ug/L	U	1	5	5	1	MS	BAJ	07/07/16 18:12	160707-2	1576789
7440-61-1	Uranium	0.495	ug/L		0.067	0.2	0.2	1	MS	BAJ	07/08/16 10:00	160707-5	1576789
7440-62-2	Vanadium	2.5	ug/L	B	1	5	5	1	P	HSC	06/29/16 09:42	062916-1	1576807
7440-66-6	Zinc	3.62	ug/L	B	3.5	10	10	1	MS	BAJ	07/11/16 17:20	160711-16	1576789

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1576789	1576788	SW846 3005A	50	mL	50	mL	06/24/16	SXW1
1576807	1576806	SW846 3005A	50	mL	50	mL	06/24/16	SXW1

**\*Analytical Methods:**

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METALS

-1-

INORGANICS ANALYSIS DATA PACKAGE

P SW846 3005A/6010C  
MS SW846 3005A/6020A

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: July 18, 2016

Page 1 of 8

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 399955

Parmname	NOM	Sample Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>										
Batch	1576789									
QC1203573165	LCS									
Aluminum	2000		2110	ug/L		106	(80%-120%)	BAJ	07/07/16	21:14
Antimony	50.0		48.7	ug/L		97.3	(80%-120%)			
Arsenic	50.0		51.9	ug/L		104	(80%-120%)		07/07/16	17:52
Barium	50.0		47.4	ug/L		94.8	(80%-120%)		07/07/16	21:14
Beryllium	50.0		57.3	ug/L		115	(80%-120%)			
Cadmium	50.0		51.0	ug/L		102	(80%-120%)			
Chromium	50.0		50.8	ug/L		102	(80%-120%)			
Cobalt	50.0		50.9	ug/L		102	(80%-120%)			
Copper	50.0		52.0	ug/L		104	(80%-120%)		07/07/16	17:52
Lead	50.0		49.9	ug/L		99.7	(80%-120%)		07/07/16	21:14
Manganese	50.0		51.5	ug/L		103	(80%-120%)			
Molybdenum	50.0		53.6	ug/L		107	(80%-120%)		07/08/16	17:31
Nickel	50.0		51.0	ug/L		102	(80%-120%)		07/07/16	21:14
Selenium	50.0		51.5	ug/L		103	(80%-120%)		07/07/16	17:52
Silver	50.0		52.4	ug/L		105	(80%-120%)		07/07/16	21:14
Strontium	50.0		55.2	ug/L		110	(80%-120%)		07/11/16	17:09
Thallium	50.0		48.1	ug/L		96.2	(80%-120%)		07/07/16	21:14
Thorium	50.0		46.5	ug/L		93	(80%-120%)		07/07/16	17:52
Tin	50.0		50.8	ug/L		102	(80%-120%)			
Uranium	50.0		50.6	ug/L		101	(80%-120%)		07/08/16	09:51

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 399955

Page 2 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1576789										
Zinc	50.0			56.7	ug/L		113	(80%-120%)	BAJ	07/11/16	17:09
QC1203573164	MB										
Aluminum			U	15.0	ug/L					07/07/16	21:11
Antimony			U	1.00	ug/L						
Arsenic			U	1.70	ug/L					07/07/16	17:49
Barium			U	0.600	ug/L					07/07/16	21:11
Beryllium			U	0.200	ug/L						
Cadmium			U	0.110	ug/L						
Chromium			U	2.00	ug/L						
Cobalt			U	0.100	ug/L						
Copper			U	0.350	ug/L					07/07/16	17:49
Lead			U	0.500	ug/L					07/07/16	21:11
Manganese			U	1.00	ug/L						
Molybdenum			U	0.165	ug/L					07/08/16	17:29
Nickel			U	0.500	ug/L					07/07/16	21:11
Selenium			U	1.50	ug/L					07/07/16	17:49
Silver			U	0.200	ug/L					07/07/16	21:11
Strontium			B	2.56	ug/L					07/11/16	17:07
Thallium			U	0.450	ug/L					07/07/16	21:11
Thorium			U	0.383	ug/L					07/07/16	17:49
Tin			U	1.00	ug/L						
Uranium			U	0.067	ug/L					07/08/16	09:50

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 399955

Page 3 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1576789										
Zinc			U	3.50	ug/L				BAJ	07/11/16	17:07
QC1203573166 399946006 MS											
Aluminum	2000	U	15.0	2070	ug/L		103	(75%-125%)		07/07/16	21:21
Antimony	50.0	U	1.00	45.8	ug/L		91.3	(75%-125%)			
Arsenic	50.0	B	1.91	52.7	ug/L		102	(75%-125%)		07/07/16	17:59
Barium	50.0		94.8	135	ug/L		80.8	(75%-125%)		07/07/16	21:21
Beryllium	50.0	U	0.200	53.0	ug/L		106	(75%-125%)			
Cadmium	50.0	U	0.110	47.0	ug/L		94	(75%-125%)			
Chromium	50.0	U	2.00	48.9	ug/L		95.9	(75%-125%)			
Cobalt	50.0	B	0.978	48.1	ug/L		94.2	(75%-125%)			
Copper	50.0		1.05	43.6	ug/L		85.1	(75%-125%)		07/07/16	17:59
Lead	50.0	U	0.500	45.7	ug/L		90.5	(75%-125%)		07/07/16	21:21
Manganese	50.0		271	313	ug/L		N/A	(75%-125%)			
Molybdenum	50.0		3.41	57.0	ug/L		107	(75%-125%)		07/08/16	17:34
Nickel	50.0	B	1.78	46.8	ug/L		90	(75%-125%)		07/07/16	21:21
Selenium	50.0	B	2.71	53.5	ug/L		102	(75%-125%)		07/07/16	17:59
Silver	50.0	U	0.200	47.0	ug/L		94.1	(75%-125%)		07/07/16	21:21
Strontium	50.0		603	643	ug/L		N/A	(75%-125%)		07/11/16	17:13
Thallium	50.0	U	0.450	44.7	ug/L		89.3	(75%-125%)		07/07/16	21:21
Thorium	50.0	B	0.493	46.8	ug/L		92.5	(75%-125%)		07/07/16	17:59
Tin	50.0	U	1.00	50.2	ug/L		100	(75%-125%)			
Uranium	50.0		10.3	60.1	ug/L		99.7	(75%-125%)		07/08/16	09:55

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 399955

Page 4 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1576789										
Zinc	50.0	114		162	ug/L		96.8	(75%-125%)	BAJ	07/11/16	17:13
QC1203573167 399946006 MSD											
Aluminum	2000	U	15.0	2120	ug/L	2.47	105	(0%-20%)		07/07/16	21:24
Antimony	50.0	U	1.00	48.4	ug/L	5.48	96.5	(0%-20%)			
Arsenic	50.0	B	1.91	54.2	ug/L	2.85	105	(0%-20%)		07/07/16	18:02
Barium	50.0		94.8	138	ug/L	2.13	86.6	(0%-20%)		07/07/16	21:24
Beryllium	50.0	U	0.200	54.6	ug/L	3.06	109	(0%-20%)			
Cadmium	50.0	U	0.110	48.7	ug/L	3.52	97.4	(0%-20%)			
Chromium	50.0	U	2.00	49.7	ug/L	1.59	97.5	(0%-20%)			
Cobalt	50.0	B	0.978	49.8	ug/L	3.42	97.6	(0%-20%)			
Copper	50.0		1.05	44.4	ug/L	1.86	86.8	(0%-20%)		07/07/16	18:02
Lead	50.0	U	0.500	46.6	ug/L	2	92.3	(0%-20%)		07/07/16	21:24
Manganese	50.0		271	331	ug/L	5.43	N/A	(0%-20%)			
Molybdenum	50.0		3.41	58.6	ug/L	2.72	110	(0%-20%)		07/08/16	17:36
Nickel	50.0	B	1.78	47.7	ug/L	1.96	91.9	(0%-20%)		07/07/16	21:24
Selenium	50.0	B	2.71	55.8	ug/L	4.21	106	(0%-20%)		07/07/16	18:02
Silver	50.0	U	0.200	46.8	ug/L	0.62	93.5	(0%-20%)		07/07/16	21:24
Strontium	50.0		603	641	ug/L	0.401	N/A	(0%-20%)		07/11/16	17:15
Thallium	50.0	U	0.450	45.4	ug/L	1.6	90.8	(0%-20%)		07/07/16	21:24
Thorium	50.0	B	0.493	50.3	ug/L	7.36	99.7	(0%-20%)		07/07/16	18:02
Tin	50.0	U	1.00	50.5	ug/L	0.661	101	(0%-20%)			
Uranium	50.0		10.3	60.6	ug/L	0.759	101	(0%-20%)		07/08/16	09:56

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 399955

Page 5 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1576789										
Zinc	50.0	114		168	ug/L	3.51	108	(0%-20%)	BAJ	07/11/16	17:15
QC1203573168 399946006 SDILT											
Aluminum	U	11.5	DU	75.0	ug/L	N/A		(0%-10%)		07/07/16	21:29
Antimony	U	0.121	DU	5.00	ug/L	N/A		(0%-10%)			
Arsenic	B	1.91	DU	8.50	ug/L	N/A		(0%-10%)		07/07/16	18:07
Barium		94.8	D	19.2	ug/L	1.29		(0%-10%)		07/07/16	21:29
Beryllium	U	0.007	DU	1.00	ug/L	N/A		(0%-10%)			
Cadmium	U	0.026	DU	0.550	ug/L	N/A		(0%-10%)			
Chromium	U	0.996	DU	10.0	ug/L	N/A		(0%-10%)			
Cobalt	B	0.978	BD	0.231	ug/L	18.1		(0%-10%)			
Copper		1.05	DU	1.75	ug/L	N/A		(0%-10%)		07/07/16	18:07
Lead	U	0.480	DU	2.50	ug/L	N/A		(0%-10%)		07/07/16	21:29
Manganese		271	D	57.6	ug/L	6.15		(0%-10%)			
Molybdenum		3.41	D	0.661	ug/L	2.97		(0%-10%)		07/08/16	17:37
Nickel	B	1.78	DU	2.50	ug/L	N/A		(0%-10%)		07/07/16	21:29
Selenium	B	2.71	DU	7.50	ug/L	N/A		(0%-10%)		07/07/16	18:07
Silver	U	0.004	DU	1.00	ug/L	N/A		(0%-10%)		07/07/16	21:29
Strontium		603	D	122	ug/L	1.51		(0%-10%)		07/11/16	17:17
Thallium	U	0.049	BD	0.859	ug/L	N/A		(0%-10%)		07/07/16	21:29
Thorium	B	0.493	BD	1.10	ug/L	1010		(0%-10%)		07/07/16	18:07
Tin	U	0.201	DU	5.00	ug/L	N/A		(0%-10%)			
Uranium		10.3	D	2.03	ug/L	1.18		(0%-10%)		07/08/16	09:58

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 399955

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1576789										
Zinc		114	D	29.1	ug/L	27.9		(0%-10%)	BAJ	07/11/16	17:17
<b>Metals Analysis-ICP</b>											
Batch	1576807										
QC1203573210	LCS										
Boron	500			509	ug/L		102	(80%-120%)	HSC	06/29/16	09:33
Calcium	5000			5110	ug/L		102	(80%-120%)			
Iron	5000			5060	ug/L		101	(80%-120%)			
Magnesium	5000			5220	ug/L		104	(80%-120%)			
Potassium	5000			4980	ug/L		99.7	(80%-120%)			
Sodium	5000			5080	ug/L		102	(80%-120%)			
Vanadium	500			500	ug/L		99.9	(80%-120%)			
QC1203573209	MB										
Boron			U	15.0	ug/L					06/29/16	09:29
Calcium			U	50.0	ug/L						
Iron			U	30.0	ug/L						
Magnesium			U	110	ug/L						
Potassium			U	50.0	ug/L						
Sodium			U	100	ug/L						
Vanadium			U	1.00	ug/L						
QC1203573211	399946006	MS									
Boron	500	B	35.2	557	ug/L		104	(75%-125%)		06/29/16	09:48
Calcium	5000		100000	106000	ug/L		N/A	(75%-125%)			
Iron	5000		262	5150	ug/L		97.7	(75%-125%)			
Magnesium	5000		20300	25400	ug/L		N/A	(75%-125%)			

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 399955

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1576807										
Potassium	5000	7650		12700	ug/L		102	(75%-125%)			
Sodium	5000	110000		112000	ug/L		N/A	(75%-125%)	HSC	06/29/16	09:48
Vanadium	500	B 4.29		502	ug/L		99.6	(75%-125%)			
QC1203573212 399946006 MSD											
Boron	500	B 35.2		551	ug/L	1.13	103	(0%-20%)		06/29/16	09:51
Calcium	5000	100000		105000	ug/L	0.818	N/A	(0%-20%)			
Iron	5000	262		5130	ug/L	0.382	97.3	(0%-20%)			
Magnesium	5000	20300		25100	ug/L	1.33	N/A	(0%-20%)			
Potassium	5000	7650		12600	ug/L	0.986	99.3	(0%-20%)			
Sodium	5000	110000		111000	ug/L	0.394	N/A	(0%-20%)			
Vanadium	500	B 4.29		496	ug/L	1.2	98.4	(0%-20%)			
QC1203573213 399946006 SDILT											
Boron		B 35.2	DU	75.0	ug/L	N/A		(0%-10%)		06/29/16	09:55
Calcium		100000	D	19900	ug/L	.549		(0%-10%)			
Iron		262	BD	53.4	ug/L	2.03		(0%-10%)			
Magnesium		20300	D	4040	ug/L	.578		(0%-10%)			
Potassium		7650	D	1530	ug/L	.344		(0%-10%)			
Sodium		110000	D	21100	ug/L	3.76		(0%-10%)			
Vanadium		B 4.29	BD	1.11	ug/L	29.2		(0%-10%)			

**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



# Radiological Analysis

# Case Narrative

**Radiochemistry  
 Technical Case Narrative  
 CH2MHill Plateau Remediation Company (CPRC)  
 SDG #: GEL399955  
 Work Order #: 399955**

**Product:** 9310\_ALPHABETA\_GPC: COMMON

**Analytical Method:** 9310\_ALPHABETA\_GPC

**Analytical Procedure:** GL-RAD-A-001 REV# 18

**Analytical Batch:** 1577403

The following samples were analyzed using the above methods and analytical procedure(s).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
399955001	B35C44
1203574712	Method Blank (MB)
1203574713	399366006(B35D60) Sample Duplicate (DUP)
1203574714	399366006(B35D60) Matrix Spike (MS)
1203574715	399366006(B35D60) Matrix Spike Duplicate (MSD)
1203574716	Laboratory Control Sample (LCS)

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

**Data Summary:**

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

**Technical Information**

**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**

Samples 1203574715 (B35D60MSD) and 1203574716 (LCS) were recounted due to high recovery. The recounts are reported.

**Miscellaneous Information**

**Additional Comments**

The matrix spike and matrix spike duplicate, 1203574714 (B35D60MS) and 1203574715 (B35D60MSD), aliquots were reduced to conserve sample volume.

**Product:** SRISO\_SEP\_PRECIP\_GPC: COMMON

**Analytical Method:** SRISO\_SEP\_PRECIP\_GPC

**Analytical Procedure:** GL-RAD-A-004 REV# 17

**Analytical Batch:** 1577470

The following samples were analyzed using the above methods and analytical procedure(s).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
399955001	B35C44
1203574968	Method Blank (MB)
1203574969	399704005(B359Y1) Sample Duplicate (DUP)
1203574970	Laboratory Control Sample (LCS)

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

#### **Data Summary:**

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

#### **Technical Information**

##### **Recounts**

Sample 1203574969 (B359Y1DUP) was recounted due to results more negative than the three sigma TPU. The second count is reported. Sample 399955001 (B35C44) was verified by recounting at least five days from the separation date. The recount is reported.

#### **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**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL399955 GEL Work Order: 399955

**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:** 18 JUL 2016

**Title:** Analyst I

# Sample Data Summary

**Rad**  
**Certificate of Analysis**  
**Sample Summary**

<b>SDG Number:</b> GEL399955	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0S16006
<b>Lab Sample ID:</b> 399955001	<b>Date Collected:</b> 06/21/2016 10:27	<b>Matrix:</b> WATER
	<b>Date Received:</b> 06/23/2016 09:00	
<b>Client ID:</b> B35C44		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1577403	<b>Method:</b> 9310_ALPHABETA_GPC	<b>SOP Ref:</b> GL-RAD-A-001
<b>Run Date:</b> 07/01/2016 11:45	<b>Analyst:</b> JXC9	<b>Instrument:</b> PIC13D
<b>Data File:</b> AB1577403rr.xls	<b>Aliquot:</b> 150 mL	<b>Count Time:</b> 60 min
<b>Prep Batch:</b> 1577403	<b>Prep Method:</b> EPA 900.0/SW846 9310	
<b>Prep Date:</b> 06/30/2016 14:18		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha ALPHA	U	1.65	pCi/L	+/-1.92	1.95	2.71	3.00
12587-47-2	Beta BETA		689	pCi/L	+/-18.8	114	2.47	4.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error. TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma). The MDC is a sample specific MDC.

**Rad  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL399955	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0S16006
<b>Lab Sample ID:</b> 399955001	<b>Date Collected:</b> 06/21/2016 10:27	<b>Matrix:</b> WATER
	<b>Date Received:</b> 06/23/2016 09:00	
<b>Client ID:</b> B35C44	<b>Method:</b> SRISO_SEP_PRECIP_GPC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1577470	<b>Analyst:</b> KSD1	<b>SOP Ref:</b> GL-RAD-A-004
<b>Run Date:</b> 07/11/2016 11:55	<b>Aliquot:</b> 300 mL	<b>Instrument:</b> PIC6A
<b>Data File:</b> S1577470r.xls	<b>Prep Method:</b> EPA 905.0 Modified/DOE RP5	<b>Count Time:</b> 60 min
<b>Prep Batch:</b> 1577470		
<b>Prep Date:</b> 07/05/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90		265	pCi/L	+/-5.81	44.6	0.812	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	6.80	7.37	mg	92.3	(40%-110%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).  
 The MDC is a sample specific MDC.

# Quality Control Summary

7/19/2016

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: July 18, 2016

Page 1 of 2

Client : CH2MHill Plateau Remediation Company  
 MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352

Contact: Mr. Scot Fitzgerald

Workorder: 399955

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gas Flow</b>									
Batch	1577403								
QC1203574712	MB								
Alpha			U	-0.427	pCi/L			JXC9	07/01/1611:46
				Uncert: +/-1.27					
				TPU: +/-1.27					
Beta			U	-0.345	pCi/L				
				Uncert: +/-1.58					
				TPU: +/-1.58					
QC1203574713	399366006	DUP							
Alpha		27.6		27.2	pCi/L				07/01/1611:46
				Uncert: +/-4.33		RPD: 1 (0% - 20%)			
				TPU: +/-6.28		RER: 0.0727 (0-2)			
Beta		49.0		48.8	pCi/L				
				Uncert: +/-3.23		RPD: 0 (0% - 20%)			
				TPU: +/-8.75		RER: 0.0305 (0-2)			
QC1203574714	399366006	MS							
Alpha	240	27.6		283	pCi/L	REC: 107 (75%-125%)			07/01/1611:50
				Uncert: +/-4.33					
				TPU: +/-6.28					
Beta	876	49.0		1130	pCi/L	REC: 124 (75%-125%)			
				Uncert: +/-3.23					
				TPU: +/-8.75					
QC1203574715	399366006	MSD							
Alpha	240	27.6		252	pCi/L	REC: 94 (75%-125%)			07/06/1614:30
				Uncert: +/-4.33		RPD: 12 (0%-20%)			
				TPU: +/-6.28		RER: 0.769 (0-2)			
Beta	876	49.0		925	pCi/L	REC: 100 (75%-125%)			
				Uncert: +/-3.23		RPD: 20 (0%-20%)			
				TPU: +/-8.75		RER: 1.64 (0-2)			
QC1203574716	LCS								
Alpha	79.9			89.2	pCi/L	REC: 112 (80%-120%)			07/07/1610:00
				Uncert: +/-8.19					
				TPU: +/-16.9					
Beta	292			345	pCi/L	REC: 118 (80%-120%)			
				Uncert: +/-12.3					
				TPU: +/-58.2					
Batch	1577470								
QC1203574968	MB								
Strontium-90			U	-0.308	pCi/L			KSD1	07/06/1613:36
				Uncert: +/-0.968					
				TPU: +/-0.969					
**Strontium Carrier	7.37			6.80	mg	REC: 92 (40%-110%)			
QC1203574969	399704005	DUP							
Strontium-90		U	0.777	U	-0.0764	pCi/L			07/07/1611:17
				Uncert: +/-0.817		RPD: 0 N/A			
				TPU: +/-0.826		RER: 1.76 (0-2)			

QC Summary

Workorder: 39955

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
<b>Rad Gas Flow</b>										
Batch	1577470									
**Strontium Carrier	7.37	6.10		7.10	mg	REC: 96	(40%-110%)			
QC1203574970	LCS									
Strontium-90	72.9			82.0	pCi/L	REC: 112	(80%-120%)		07/06/16	13:37
	Uncert:			+/-4.65						
	TPU:			+/-13.6						
**Strontium Carrier	7.37			7.10	mg	REC: 96	(40%-110%)			

**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
- 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  $\geq 2X$  the MDA and, after corrections, result is  $\geq$  MDA for this sample
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is  $\geq$  EQL or is  $> 5\%$  of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- UX Gamma Spectroscopy--Uncertain identification
- 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.