

8/9/2016



August 08, 2016

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

Re: CHPRC SAF S16-007  
Work Order: 401495  
SDG: GEL401495

Dear Mr. Fitzgerald:

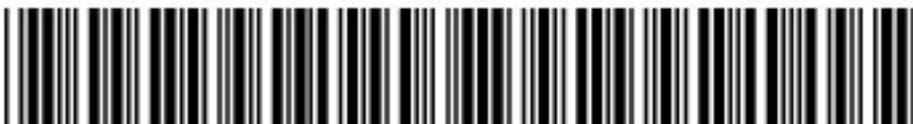
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 13, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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: 300072 - 7H  
Chain of Custody: S16-007-156  
Enclosures



## Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	7
Data Review Qualifier Definitions.....	11
Laboratory Certifications.....	13
Metals Analysis.....	15
Case Narrative.....	16
Sample Data Summary.....	20
Quality Control Summary.....	25
Radiological Analysis.....	34
Case Narrative.....	35
Sample Data Summary.....	39
Quality Control Summary.....	43

# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF S16-007  
SDG: GEL401495**

**August 08, 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 July 13, 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>
401495001	B35V24
401495002	B35V26

**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.

8/9/2016

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

**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL401495**  
**Work Order #: 401495**

## **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.

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

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

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of sodium. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203584624 (MB).

#### **Matrix Spike (MS/MSD) Recovery Statement**

The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike also did not meet the required control limits; thus, confirming matrix interferences and/or sample non-homogeneity.

Sample	Analyte	Value
1203584627 (B35V24MSD)	Sodium	126* (75%-125%)

#### **Post Spike (PS) Recovery Statement**

The PS did not meet the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the presence of matrix interferences.

Sample	Analyte	Value
1203594315 (B35V24PS)	Sodium	48.2* (80%-120%)

### **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.

### **Calibration Information**

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

The CRDL standard recoveries for SW846 6020A/6020B met the advisory control limits with the exception of

uranium. Client sample concentrations were greater than two times the PQL; therefore the data were not adversely affected.

### **Technical Information**

#### **Sample Dilutions**

Samples 401495001 (B35V24) and 401495002 (B35V26) were diluted to ensure that the analyte concentrations were within the linear calibration range of the instrument.

Analyte	401495	
	001	002
Strontium	5X	5X

### **Radiochemistry**

#### **I129LL\_SEP\_LEPS\_GS: COMMON (low level)**

There are no exceptions, anomalies or deviations from the specified methods. 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.

#### **9310\_ALPHABETA\_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**

Sample 1203586590 (LCS) was recounted due to high recovery. The recount is reported.

### **Miscellaneous Information**

#### **Additional Comments**

The matrix spike and matrix spike duplicate, 1203586588 (Non SDG 400886001MS) and 1203586589 (Non SDG 400886001MSD), aliquots were reduced to conserve sample volume.

**TRITIUM\_DIST\_LSC: COMMON**

There are no exceptions, anomalies or deviations from the specified methods. 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.

**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**

## CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # **S16-007-156**  
Page 1 of 2

**CH2M Hill Plateau Remediation Company**  
 Collector: Scott King CHPRC  
 SAF No. S16-007  
 Project Title: SURV, JULY 2016  
 Shipped To (Lab): **GEL Laboratories, LLC**  
 Protocol: SURV

Contact/Requester: Karen Waters-Husted  
 Sampling Origin: Hanford Site  
 Logbook No. HNF-N-506 86 / 48  
 Method of Shipment: Commercial Carrier  
 Priority: 30 Days **PRIORITY**

Telephone No. 509-376-4650  
 Purchase Order/Charge Code 300071  
 Ice Chest No. 6235-459  
 Bill of Lading/Air Bill No. 77671251 3125  
 Offsite Property No. 6812

**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  
 N/A  
 Special Handling: N/A  
 Total Activity Exemption: Yes  No

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B35V24	N	W	JUL 10 2016	1013	1x500-mL G/P	6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04	6 Months	HNO3 to pH <2
B35V24	N	W	↓	↓	2x1-L P	9310_ALPHABETA_GPC: COMMON	6 Months	HNO3 to pH <2
B35V24	N	W	↓	↓	2x4-L G/P	I129LL_SEP_LEPS_GS_LL: COMMON	6 Months	None
B35V24	N	W	↓	↓	1x500-mL P	TRITIUM_DIST_LSC: COMMON	6 Months	None
B35V26	Y	W	JUL 10 2016	1013	1x500-mL G/P	6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04	6 Months	HNO3 to pH <2

Received By: Janelle Zunker CHPRC  
 Received By: 550#1  
 Received By: Leahy Wall CHPRC  
 Received By: FEDEX

Date/Time: JUL 10 2016 1430  
 Date/Time: JUL 10 2016 1500  
 Date/Time: JUL 11 2016 0730  
 Date/Time: JUL 11 2016 0730

Print Sign  
 Print Sign  
 Print Sign  
 Print Sign

Relinquished By: Scott King CHPRC  
 Relinquished By: Janelle Zunker CHPRC  
 Relinquished By: 550#1  
 Relinquished By: Leahy Wall CHPRC

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 WJ = Wipe  
 W = Water L = Liquid  
 O = Oil V = Vegetation  
 A = Air X = Other

PRINTED ON 5/26/2016  
 FSR ID = FSR12600  
 A-6004-842 (REV 2)



**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>CPRE</u>		SDG/AR/COC/Work Order: <u>401495</u>
Received By: <u>MLC</u>		Date Received: <u>7-13-16</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>CPRE</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 ≤ 6 deg. C)?*	<input type="checkbox"/>	<input checked="" 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>18° 19° C</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: <u>FedEx Air</u> FedEx Ground UPS Field Services Courier Other <u>7767 1251 3125 18° C</u> <u>7767 2444 7216 19° C</u>

Comments (Use Continuation Form if needed):

# **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 08 August 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 #: GEL401495**  
**Work Order #: 401495**

**Product: Determination of Metals by ICP****Analytical Method:** 6010\_METALS\_ICP**Analytical Procedure:** GL-MA-E-013 REV# 26**Analytical Batch:** 1581649**Product: Determination of Metals by ICP-MS****Analytical Method:** 6020\_METALS\_ICPMS**Analytical Procedure:** GL-MA-E-014 REV# 28**Analytical Batch:** 1581658**Preparation Method:** SW846 3005A**Preparation Procedure:** GL-MA-E-006 REV# 13**Preparation Batches:** 1581648 and 1581657

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>
401495001	B35V24
401495002	B35V26
1203584624	Method Blank (MB) <b>ICP</b>
1203584625	Laboratory Control Sample (LCS)
1203584628	401495001(B35V24L) Serial Dilution (SD)
1203584626	401495001(B35V24S) Matrix Spike (MS)
1203584627	401495001(B35V24SD) Matrix Spike Duplicate (MSD)
1203594315	401495001(B35V24PS) Post Spike (PS)
1203584645	Method Blank (MB) <b>ICP-MS</b>
1203584646	Laboratory Control Sample (LCS)
1203584649	401494001(NonSDGL) Serial Dilution (SD)
1203584647	401494001(NonSDGS) Matrix Spike (MS)
1203584648	401494001(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 CRDL standard recoveries for SW846 6020A/6020B met the advisory control limits with the exception of uranium. Client sample concentrations were greater than two times the PQL; therefore the data were not adversely affected. ICP-MS.

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

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of sodium. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203584624 (MB)-ICP.

**Matrix Spike (MS/MSD) Recovery Statement**

The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike also did not meet the required control limits; thus, confirming matrix interferences and/or sample non-homogeneity.

Sample	Analyte	Value
1203584627 (B35V24MSD)	Sodium	126* (75%-125%)

**Post Spike (PS) Recovery Statement**

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

Sample	Analyte	Value
1203594315 (B35V24PS)	Sodium	48.2* (80%-120%)

**Technical Information****Sample Dilutions**

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Samples 401495001 (B35V24) and 401495002 (B35V26)-ICP-MS were diluted to ensure that the analyte concentrations were within the linear calibration range of the instrument.

Analyte	401495	
	001	002
Strontium	5X	5X

**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: GEL401495 GEL Work Order: 401495

**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:** Nik-Cole Elmore

**Date:** 09 AUG 2016

**Title:** Data Validator

# Sample Data Summary

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

SDG No: GEL401495

CONTRACT: CPRC0S16007

METHOD TYPE: SW846

SAMPLE ID:401495001

BASIS: As Received

DATE COLLECTED 10-JUL-16

CLIENT ID: B35V24

LEVEL: Low

DATE RECEIVED 13-JUL-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	SKJ	07/28/16 22:05	160728-5	1581658
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	SKJ	07/30/16 02:40	160729-6	1581658
7440-38-2	Arsenic	5.87	ug/L		1.7	5	5	1	MS	BAJ	08/03/16 17:38	160803-4	1581658
7440-39-3	Barium	22.7	ug/L		0.6	2	2	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-41-7	Beryllium	0.20	ug/L	U	0.2	0.5	0.5	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-42-8	Boron	16.6	ug/L	B	15	50	50	1	P	HSC	07/21/16 10:12	072116-2	1581649
7440-43-9	Cadmium	0.110	ug/L	U	0.11	1	1	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-70-2	Calcium	27000	ug/L		50	200	200	1	P	HSC	07/19/16 12:34	071916-1	1581649
7440-47-3	Chromium	9.17	ug/L	B	2	10	10	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-48-4	Cobalt	0.229	ug/L	B	0.1	1	1	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-50-8	Copper	1.6	ug/L		0.35	1	1	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7439-89-6	Iron	281	ug/L		30	100	100	1	P	HSC	07/19/16 12:34	071916-1	1581649
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7439-95-4	Magnesium	9780	ug/L		110	300	300	1	P	HSC	07/19/16 12:34	071916-1	1581649
7439-96-5	Manganese	4.87	ug/L	B	1	5	5	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7439-98-7	Molybdenum	7.26	ug/L		0.165	0.5	0.5	1	MS	SKJ	08/01/16 12:11	160801-7	1581658
7440-02-0	Nickel	5.65	ug/L		0.5	2	2	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-09-7	Potassium	4520	ug/L		50	150	150	1	P	HSC	07/19/16 12:34	071916-1	1581649
7782-49-2	Selenium	1.65	ug/L	B	1.5	5	5	1	MS	BAJ	08/03/16 17:38	160803-4	1581658
7440-22-4	Silver	1.61	ug/L		0.2	1	1	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-23-5	Sodium	20000	ug/L	N	100	300	300	1	P	HSC	07/19/16 12:34	071916-1	1581649
7440-24-6	Strontium	212	ug/L	D	10	50	50	5	MS	SKJ	08/02/16 15:18	160802-17	1581658
7440-28-0	Thallium	0.450	ug/L	U	0.45	2	2	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-29-1	Thorium	0.389	ug/L	B	0.383	2	2	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-31-5	Tin	1	ug/L	U	1	5	5	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-61-1	Uranium	3.52	ug/L		0.067	0.2	0.2	1	MS	SKJ	07/28/16 22:05	160728-5	1581658
7440-62-2	Vanadium	29.6	ug/L		1	5	5	1	P	HSC	07/19/16 12:34	071916-1	1581649
7440-66-6	Zinc	15.6	ug/L		3.5	10	10	1	MS	SKJ	08/01/16 22:17	160801-16	1581658

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1581649	1581648	SW846 3005A	50	mL	50	mL	07/14/16	SXW1
1581658	1581657	SW846 3005A	50	mL	50	mL	07/14/16	SXW1

**\*Analytical Methods:**

---

METALS

-1-

INORGANICS ANALYSIS DATA PACKAGE

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

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

SDG No: GEL401495

CONTRACT: CPCR0S16007

METHOD TYPE: SW846

SAMPLE ID: 401495002

BASIS: As Received

DATE COLLECTED 10-JUL-16

CLIENT ID: B35V26

LEVEL: Low

DATE RECEIVED 13-JUL-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	SKJ	07/28/16 22:09	160728-5	1581658
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	SKJ	07/30/16 02:42	160729-6	1581658
7440-38-2	Arsenic	5.75	ug/L		1.7	5	5	1	MS	BAJ	08/03/16 17:40	160803-4	1581658
7440-39-3	Barium	22.8	ug/L		0.6	2	2	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-41-7	Beryllium	0.20	ug/L	U	0.2	0.5	0.5	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-42-8	Boron	17.9	ug/L	B	15	50	50	1	P	HSC	07/21/16 10:08	072116-2	1581649
7440-43-9	Cadmium	0.110	ug/L	U	0.11	1	1	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-70-2	Calcium	26700	ug/L		50	200	200	1	P	HSC	07/19/16 12:31	071916-1	1581649
7440-47-3	Chromium	2	ug/L	U	2	10	10	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-48-4	Cobalt	0.170	ug/L	B	0.1	1	1	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-50-8	Copper	1.78	ug/L		0.35	1	1	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	07/19/16 12:31	071916-1	1581649
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7439-95-4	Magnesium	9670	ug/L		110	300	300	1	P	HSC	07/19/16 12:31	071916-1	1581649
7439-96-5	Manganese	1	ug/L	U	1	5	5	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7439-98-7	Molybdenum	7.1	ug/L		0.165	0.5	0.5	1	MS	SKJ	08/01/16 12:13	160801-7	1581658
7440-02-0	Nickel	1.52	ug/L	B	0.5	2	2	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-09-7	Potassium	4480	ug/L		50	150	150	1	P	HSC	07/19/16 12:31	071916-1	1581649
7782-49-2	Selenium	1.5	ug/L	U	1.5	5	5	1	MS	BAJ	08/03/16 17:40	160803-4	1581658
7440-22-4	Silver	0.20	ug/L	U	0.2	1	1	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-23-5	Sodium	19800	ug/L	N	100	300	300	1	P	HSC	07/19/16 12:31	071916-1	1581649
7440-24-6	Strontium	209	ug/L	D	10	50	50	5	MS	SKJ	08/02/16 15:20	160802-17	1581658
7440-28-0	Thallium	0.450	ug/L	U	0.45	2	2	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-29-1	Thorium	0.383	ug/L	U	0.383	2	2	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-31-5	Tin	1	ug/L	U	1	5	5	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-61-1	Uranium	3.77	ug/L		0.067	0.2	0.2	1	MS	SKJ	07/28/16 22:09	160728-5	1581658
7440-62-2	Vanadium	29.2	ug/L		1	5	5	1	P	HSC	07/19/16 12:31	071916-1	1581649
7440-66-6	Zinc	5.22	ug/L	B	3.5	10	10	1	MS	SKJ	08/01/16 22:21	160801-16	1581658

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1581649	1581648	SW846 3005A	50	mL	50	mL	07/14/16	SXW1
1581658	1581657	SW846 3005A	50	mL	50	mL	07/14/16	SXW1

**\*Analytical Methods:**

---

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: August 9, 2016

Page 1 of 8

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 401495

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1581658										
QC1203584646	LCS										
Aluminum	2000			2060	ug/L		103	(80%-120%)	SKJ	07/28/16	21:33
Antimony	50.0			57.7	ug/L		115	(80%-120%)		07/30/16	02:32
Arsenic	50.0			55.5	ug/L		111	(80%-120%)	BAJ	08/03/16	17:29
Barium	50.0			45.8	ug/L		91.6	(80%-120%)	SKJ	07/28/16	21:33
Beryllium	50.0			52.0	ug/L		104	(80%-120%)			
Cadmium	50.0			49.9	ug/L		99.8	(80%-120%)			
Chromium	50.0			53.6	ug/L		107	(80%-120%)			
Cobalt	50.0			55.4	ug/L		111	(80%-120%)			
Copper	50.0			56.3	ug/L		113	(80%-120%)			
Lead	50.0			49.3	ug/L		98.6	(80%-120%)			
Manganese	50.0			55.3	ug/L		111	(80%-120%)			
Molybdenum	50.0			53.2	ug/L		106	(80%-120%)		08/01/16	11:59
Nickel	50.0			56.5	ug/L		113	(80%-120%)		07/28/16	21:33
Selenium	50.0			56.2	ug/L		112	(80%-120%)	BAJ	08/03/16	17:29
Silver	50.0			53.0	ug/L		106	(80%-120%)	SKJ	07/28/16	21:33
Strontium	50.0			54.2	ug/L		108	(80%-120%)		08/02/16	15:01
Thallium	50.0			47.6	ug/L		95.2	(80%-120%)		07/28/16	21:33
Thorium	50.0			49.9	ug/L		99.8	(80%-120%)			
Tin	50.0			49.8	ug/L		99.7	(80%-120%)			
Uranium	50.0			50.6	ug/L		101	(80%-120%)			

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401495

Page 2 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1581658										
Zinc	50.0			54.9	ug/L		110	(80%-120%)	SKJ	08/01/16	21:57
QC1203584645	MB										
Aluminum			U	15.0	ug/L					07/28/16	21:29
Antimony			U	1.00	ug/L					07/30/16	02:31
Arsenic			U	1.70	ug/L				BAJ	08/03/16	17:28
Barium			U	0.600	ug/L				SKJ	07/28/16	21:29
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						
Lead			U	0.500	ug/L						
Manganese			U	1.00	ug/L						
Molybdenum			U	0.165	ug/L					08/01/16	11:57
Nickel			U	0.500	ug/L					07/28/16	21:29
Selenium			U	1.50	ug/L				BAJ	08/03/16	17:28
Silver			U	0.200	ug/L				SKJ	07/28/16	21:29
Strontium			U	2.00	ug/L					08/02/16	14:58
Thallium			U	0.450	ug/L					07/28/16	21:29
Thorium			U	0.383	ug/L						
Tin			U	1.00	ug/L						
Uranium			U	0.067	ug/L						

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401495

Page 3 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1581658										
Zinc			U	3.50	ug/L				SKJ	08/01/16	21:53
QC1203584647 401494001 MS											
Aluminum	2000	U	15.0	2030	ug/L		102	(75%-125%)		07/28/16	21:49
Antimony	50.0	U	1.00	58.9	ug/L		117	(75%-125%)		07/30/16	02:35
Arsenic	50.0		6.25	61.6	ug/L		111	(75%-125%)	BAJ	08/03/16	17:33
Barium	50.0		46.7	94.6	ug/L		95.8	(75%-125%)	SKJ	07/28/16	21:49
Beryllium	50.0	U	0.200	57.3	ug/L		115	(75%-125%)			
Cadmium	50.0	B	0.155	51.0	ug/L		102	(75%-125%)			
Chromium	50.0	U	2.00	51.7	ug/L		103	(75%-125%)			
Cobalt	50.0	B	0.208	50.3	ug/L		100	(75%-125%)			
Copper	50.0		1.04	50.8	ug/L		99.4	(75%-125%)			
Lead	50.0		4.62	55.8	ug/L		102	(75%-125%)			
Manganese	50.0	B	1.97	53.3	ug/L		103	(75%-125%)			
Molybdenum	50.0		7.22	62.8	ug/L		111	(75%-125%)		08/01/16	12:06
Nickel	50.0		2.42	52.3	ug/L		99.8	(75%-125%)		07/28/16	21:49
Selenium	50.0		6.60	63.3	ug/L		113	(75%-125%)	BAJ	08/03/16	17:33
Silver	50.0	U	0.200	49.9	ug/L		99.7	(75%-125%)	SKJ	07/28/16	21:49
Strontium	50.0	D	308	D 360	ug/L		N/A	(75%-125%)		08/02/16	15:11
Thallium	50.0	U	0.450	48.6	ug/L		96.6	(75%-125%)		07/28/16	21:49
Thorium	50.0	B	0.471	52.6	ug/L		104	(75%-125%)			
Tin	50.0	U	1.00	52.8	ug/L		105	(75%-125%)			
Uranium	50.0		23.7	77.0	ug/L		107	(75%-125%)			

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401495

Page 4 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time	
<b>Metals Analysis - ICPMS</b>												
Batch	1581658											
Zinc	50.0	264		314	ug/L		N/A	(75%-125%)	SKJ	08/01/16	22:05	
QC1203584648 401494001 MSD												
Aluminum	2000	U	15.0	2080	ug/L	2.35	104	(0%-20%)		07/28/16	21:53	
Antimony	50.0	U	1.00	59.9	ug/L	1.71	119	(0%-20%)		07/30/16	02:37	
Arsenic	50.0		6.25	61.7	ug/L	0.182	111	(0%-20%)	BAJ	08/03/16	17:35	
Barium	50.0		46.7	95.3	ug/L	0.749	97.2	(0%-20%)	SKJ	07/28/16	21:53	
Beryllium	50.0	U	0.200	59.7	ug/L	4.08	119	(0%-20%)				
Cadmium	50.0	B	0.155	52.0	ug/L	1.84	104	(0%-20%)				
Chromium	50.0	U	2.00	51.4	ug/L	0.557	103	(0%-20%)				
Cobalt	50.0	B	0.208	48.8	ug/L	2.87	97.3	(0%-20%)				
Copper	50.0		1.04	47.6	ug/L	6.34	93.2	(0%-20%)				
Lead	50.0		4.62	56.5	ug/L	1.3	104	(0%-20%)				
Manganese	50.0	B	1.97	51.2	ug/L	3.93	98.5	(0%-20%)				
Molybdenum	50.0		7.22	62.4	ug/L	0.69	110	(0%-20%)		08/01/16	12:08	
Nickel	50.0		2.42	49.9	ug/L	4.76	94.9	(0%-20%)		07/28/16	21:53	
Selenium	50.0		6.60	61.7	ug/L	2.59	110	(0%-20%)	BAJ	08/03/16	17:35	
Silver	50.0	U	0.200	50.2	ug/L	0.685	100	(0%-20%)	SKJ	07/28/16	21:53	
Strontium	50.0	D	308	D	373	ug/L	3.58	N/A	(0%-20%)		08/02/16	15:13
Thallium	50.0	U	0.450	49.0	ug/L	0.834	97.4	(0%-20%)		07/28/16	21:53	
Thorium	50.0	B	0.471	54.1	ug/L	2.97	107	(0%-20%)				
Tin	50.0	U	1.00	54.4	ug/L	2.89	108	(0%-20%)				
Uranium	50.0		23.7	77.7	ug/L	0.831	108	(0%-20%)				

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401495

Page 5 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1581658										
Zinc	50.0	264		310	ug/L	1.29	N/A	(0%-20%)	SKJ	08/01/16	22:09
QC1203584649 401494001 SDILT											
Aluminum	U	2.75	DU	75.0	ug/L	N/A		(0%-10%)		07/28/16	22:01
Antimony	U	0.391	DU	5.00	ug/L	N/A		(0%-10%)		07/30/16	02:39
Arsenic		6.25	DU	8.50	ug/L	N/A		(0%-10%)	BAJ	08/03/16	17:36
Barium		46.7	D	9.82	ug/L	5.14		(0%-10%)	SKJ	07/28/16	22:01
Beryllium	U	0.001	DU	1.00	ug/L	N/A		(0%-10%)			
Cadmium	B	0.155	DU	0.550	ug/L	N/A		(0%-10%)			
Chromium	U	-0.087	DU	10.0	ug/L	N/A		(0%-10%)			
Cobalt	B	0.208	DU	0.500	ug/L	N/A		(0%-10%)			
Copper		1.04	DU	1.75	ug/L	N/A		(0%-10%)			
Lead		4.62	BD	1.01	ug/L	8.94		(0%-10%)			
Manganese	B	1.97	DU	5.00	ug/L	N/A		(0%-10%)			
Molybdenum		7.22	D	1.53	ug/L	5.7		(0%-10%)		08/01/16	12:10
Nickel		2.42	DU	2.50	ug/L	N/A		(0%-10%)		07/28/16	22:01
Selenium		6.60	BD	1.67	ug/L	26.4		(0%-10%)	BAJ	08/03/16	17:36
Silver	U	0.022	DU	1.00	ug/L	N/A		(0%-10%)	SKJ	07/28/16	22:01
Strontium	D	61.6	D	12.0	ug/L	2.76		(0%-10%)		08/02/16	15:15
Thallium	U	0.298	DU	2.25	ug/L	N/A		(0%-10%)		07/28/16	22:01
Thorium	B	0.471	BD	0.734	ug/L	679		(0%-10%)			
Tin	U	0.357	DU	5.00	ug/L	N/A		(0%-10%)			
Uranium		23.7	D	5.18	ug/L	9.17		(0%-10%)			

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401495

Page 6 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1581658										
Zinc		264	D	53.6	ug/L	1.59		(0%-10%)	SKJ	08/01/16	22:13
<b>Metals Analysis-ICP</b>											
Batch	1581649										
QC1203584625	LCS										
Boron	500			536	ug/L		107	(80%-120%)	HSC	07/21/16	10:05
Calcium	5000			4990	ug/L		99.8	(80%-120%)		07/19/16	12:27
Iron	5000			5020	ug/L		100	(80%-120%)			
Magnesium	5000			5070	ug/L		101	(80%-120%)			
Potassium	5000			4770	ug/L		95.3	(80%-120%)			
Sodium	5000			5290	ug/L		106	(80%-120%)			
Vanadium	500			503	ug/L		101	(80%-120%)			
QC1203584624	MB										
Boron			U	15.0	ug/L					07/21/16	10:01
Calcium			U	50.0	ug/L					07/19/16	12:23
Iron			U	30.0	ug/L						
Magnesium			U	110	ug/L						
Potassium			U	50.0	ug/L						
Sodium			B	156	ug/L						
Vanadium			U	1.00	ug/L						
QC1203584626	401495001 MS										
Boron	500	B	16.6	549	ug/L		106	(75%-125%)		07/21/16	10:15
Calcium	5000		27000	31400	ug/L		N/A	(75%-125%)		07/19/16	12:37
Iron	5000		281	5220	ug/L		98.7	(75%-125%)			
Magnesium	5000		9780	14600	ug/L		96.9	(75%-125%)			

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401495

Page 7 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1581649										
Potassium	5000	4520		9400	ug/L		97.5	(75%-125%)			
Sodium	5000	N	20000	25200	ug/L		104	(75%-125%)	HSC	07/19/16	12:37
Vanadium	500	29.6		526	ug/L		99.2	(75%-125%)			
QC1203584627	401495001 MSD										
Boron	500	B	16.6	565	ug/L	2.88	110	(0%-20%)		07/21/16	10:18
Calcium	5000		27000	32900	ug/L	4.49	N/A	(0%-20%)		07/19/16	12:40
Iron	5000		281	5420	ug/L	3.78	103	(0%-20%)			
Magnesium	5000		9780	15200	ug/L	4.09	109	(0%-20%)			
Potassium	5000		4520	9820	ug/L	4.4	106	(0%-20%)			
Sodium	5000	N	20000	N	26300	ug/L	4.27	126*	(0%-20%)		
Vanadium	500		29.6	537	ug/L	2.13	101	(0%-20%)			
QC1203594315	401495001 PS										
Sodium	5000	N	20000	22400	ug/L		48.2*	(80%-120%)		07/28/16	09:24
QC1203584628	401495001 SDILT										
Boron		B	16.6	DU	75.0	ug/L	N/A	(0%-10%)		07/21/16	10:21
Calcium			27000	D	5460	ug/L	1	(0%-10%)		07/19/16	12:43
Iron			281	BD	56.7	ug/L	.832	(0%-10%)			
Magnesium			9780	D	2000	ug/L	2	(0%-10%)			
Potassium			4520	D	863	ug/L	4.56	(0%-10%)			
Sodium		N	20000	D	4050	ug/L	1.01	(0%-10%)			
Vanadium			29.6	D	5.91	ug/L	.324	(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

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401495

Page 8 of 8

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
B	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).										
C	Target analyte was detected in the sample and the associated blank. The associated blank concentration is $\geq$ EQL or is $> 5\%$ of the measured concentration and/or decision level for associated samples.										
D	Results are reported from a diluted aliquot of sample.										
E	Reported value is estimated due to interferences. See comment in narrative.										
M	Duplicate precision not met.										
N	Spike Sample recovery is outside control limits.										
S	Reported value determined by the Method of Standard Additions (MSA)										
U	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.										
W	Post-digestion spike recovery for GFAA out of control limit. Sample absorbency $< 50\%$ of spike absorbency.										
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										

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

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

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

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

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

# Radiological Analysis

# Case Narrative

**Radiochemistry**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL401495**  
**Work Order #: 401495**

**Product:** I129LL\_SEP\_LEPS\_GS: COMMON (low level)

**Analytical Method:** DOE EML HASL-300,I-01 Modified

**Analytical Procedure:** GL-RAD-A-006 REV# 21

**Analytical Batch:** 1581778

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>
401495001	B35V24
1203584985	Method Blank (MB)
1203584986	401492001(NonSDG) Sample Duplicate (DUP)
1203584987	401492001(NonSDG) Matrix Spike (MS)
1203584988	Laboratory Control Sample (LCS)

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

**Data Summary:**

There are no exceptions, anomalies or deviations from the specified methods. 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.

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

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

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

**Analytical Batch:** 1582447

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>
401495001	B35V24
1203586586	Method Blank (MB)
1203586587	400886001(NonSDG) Sample Duplicate (DUP)
1203586588	400886001(NonSDG) Matrix Spike (MS)
1203586589	400886001(NonSDG) Matrix Spike Duplicate (MSD)
1203586590	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**

Sample 1203586590 (LCS) was recounted due to high recovery. The recount is reported.

### **Miscellaneous Information**

#### **Additional Comments**

The matrix spike and matrix spike duplicate, 1203586588 (Non SDG 400886001MS) and 1203586589 (Non SDG 400886001MSD), aliquots were reduced to conserve sample volume.

**Product: TRITIUM\_DIST\_LSC: COMMON**

**Analytical Method: TRITIUM\_DIST\_LSC**

**Analytical Procedure: GL-RAD-A-002 REV# 21**

**Analytical Batch: 1582195**

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>
401495001	B35V24
1203586023	Method Blank (MB)
1203586024	400884001(NonSDG) Sample Duplicate (DUP)
1203586025	400884001(NonSDG) Matrix Spike (MS)
1203586026	Laboratory Control Sample (LCS)

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

### **Data Summary:**

There are no exceptions, anomalies or deviations from the specified methods. 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.

### **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: GEL401495 GEL Work Order: 401495

**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:** Theresa Austin

**Date:** 09 AUG 2016

**Title:** Group Leader

# Sample Data Summary

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

SDG Number: GEL401495	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401495001	Date Collected: 07/10/2016 10:13	Matrix: WATER
	Date Received: 07/13/2016 09:10	
Client ID: B35V24		Prep Basis: "As Received"
Batch ID: 1582447	Method: 9310_ALPHABETA_GPC	SOP Ref: GL-RAD-A-001
Run Date: 07/28/2016 06:32	Analyst: JXC9	Instrument: LB4100E1
Data File: AB1582447r.xls	Aliquot: 150 mL	Count Time: 150 min
Prep Batch: 1582447	Prep Method: EPA 900.0/SW846 9310	
Prep Date: 07/26/2016 16:51		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha <i>ALPHA</i>	U	2.19	pCi/L	+/-1.63	1.67	2.50	3.00
12587-47-2	Beta <i>BETA</i>		5.95	pCi/L	+/-1.82	2.07	2.64	4.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
---------------------------	--------	---------	-------	-----------	-------------------

**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**

SDG Number: GEL401495	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401495001	Date Collected: 07/10/2016 10:13	Matrix: WATER
	Date Received: 07/13/2016 09:10	
Client ID: B35V24		Prep Basis: "As Received"
Batch ID: 1581778	Method: DOE EML HASL-300,I-01 Mo	SOP Ref: GL-RAD-A-006
Run Date: 08/05/2016 15:36	Analyst: MJH1	Instrument: XRAY4
Data File: I401495001.CNF;1	Aliquot: 1.5 L	Count Time: 120 min
Prep Batch: 1581778	Prep Method: DOE EML HASL-300,I-01 M	
Prep Date: 08/04/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129		2.38	pCi/L	+/-0.645	0.687	0.610	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

**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**

SDG Number: GEL401495	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401495001	Date Collected: 07/10/2016 10:13	Matrix: WATER
	Date Received: 07/13/2016 09:10	
Client ID: B35V24	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1582195	Analyst: TXJ1	SOP Ref: GL-RAD-A-002
Run Date: 07/25/2016 13:49	Aliquot: 50 mL	Instrument: LSCRED
Data File: T1582195.xls	Prep Method: EPA 906.0 Modified	Count Time: 40 min
Prep Batch: 1582195		
Prep Date: 07/22/2016 12:17		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		9650	pCi/L	+/-492	1930	330	400

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

**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

## GEL LABORATORIES LLC

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

QC Summary

Report Date: August 8, 2016

Page 1 of 3

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

Contact: Mr. Scot Fitzgerald

Workorder: 401495

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1581778								
QC1203584985	MB								
Iodine-129			U	-0.117	pCi/L			MJH1	08/06/1615:24
				Uncert: +/-0.234					
				TPU: +/-0.240					
QC1203584986	401492001	DUP							
Iodine-129		U	-0.105	U	-0.0243	pCi/L			08/06/1615:24
				Uncert: +/-0.242	+/-0.234		RPD: 0 N/A		
				TPU: +/-0.247	+/-0.234		RER: 0.465 (0-2)		
QC1203584987	401492001	MS							
Iodine-129		U	-0.105		25.3	pCi/L	REC: 92 (75%-125%)		08/06/1615:25
				Uncert: +/-0.242	+/-1.97				
				TPU: +/-0.247	+/-3.21				
QC1203584988	LCS								
Iodine-129				27.7	29.0	pCi/L	REC: 104 (80%-120%)		08/06/1615:27
				Uncert: +/-2.01					
				TPU: +/-3.53					
<b>Rad Gas Flow</b>									
Batch	1582447								
QC1203586586	MB								
Alpha			U	-0.0251	pCi/L			JXC9	07/28/1606:22
				Uncert: +/-0.906					
				TPU: +/-0.907					
Beta			U	-1.68	pCi/L				
				Uncert: +/-1.97					
				TPU: +/-1.97					
QC1203586587	400886001	DUP							
Alpha		U	-0.462	U	0.411	pCi/L			07/28/1606:36
				Uncert: +/-1.24	+/-1.52		RPD: 0 N/A		
				TPU: +/-1.24	+/-1.52		RER: 0.874 (0-2)		
Beta				11.5	12.0	pCi/L			
				Uncert: +/-1.91	+/-1.76		RPD: 4 (0% - 20%)		
				TPU: +/-2.69	+/-2.62		RER: 0.252 (0-2)		
QC1203586588	400886001	MS							
Alpha		U	-0.462		214	pCi/L	REC: 89 (75%-125%)		07/28/1606:18
				Uncert: +/-1.24	+/-24.8				
				TPU: +/-1.24	+/-42.9				
Beta				874	11.5	pCi/L	REC: 115 (75%-125%)		
				Uncert: +/-1.91	+/-38.0				
				TPU: +/-2.69	+/-170				
QC1203586589	400886001	MSD							
Alpha		U	-0.462		234	pCi/L	REC: 98 (75%-125%)		07/28/1606:18
				Uncert: +/-1.24	+/-25.0		RPD: 9 (0%-20%)		
				TPU: +/-1.24	+/-45.7		RER: 0.625 (0-2)		
Beta				874	11.5	pCi/L	REC: 112 (75%-125%)		
				Uncert: +/-1.91	+/-36.4		RPD: 3 (0%-20%)		

## GEL LABORATORIES LLC

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

QC Summary

Workorder: 401495

Page 2 of 3

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
<b>Rad Gas Flow</b>										
Batch	1582447									
		TPU:	+/-2.69	+/-166						
						RER:	0.253	(0-2)		
QC1203586590	LCS									
Alpha	79.9			71.0	pCi/L	REC:	89	(80%-120%)	08/02/16	11:17
		Uncert:		+/-7.54						
		TPU:		+/-13.9						
Beta	291			324	pCi/L	REC:	111	(80%-120%)		
		Uncert:		+/-12.2						
		TPU:		+/-55.1						
<b>Rad Liquid Scintillation</b>										
Batch	1582195									
QC1203586023	MB									
Tritium			U	-22.9	pCi/L				TXJ1	07/25/16
		Uncert:		+/-180						
		TPU:		+/-180						
QC1203586024	400884001	DUP								
Tritium		U	39.3	U	165	pCi/L				07/25/16
		Uncert:	+/-195		+/-198		RPD:	0	N/A	
		TPU:	+/-195		+/-200		RER:	0.882	(0-2)	
QC1203586025	400884001	MS								
Tritium	2320	U	39.3		1900	pCi/L	REC:	82	(75%-125%)	07/25/16
		Uncert:	+/-195		+/-275					
		TPU:	+/-195		+/-459					
QC1203586026	LCS									
Tritium	2320				1940	pCi/L	REC:	84	(80%-120%)	07/25/16
		Uncert:			+/-274					
		TPU:			+/-464					

**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.

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401495

Page 3 of 3

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	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.

\*\* 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.