

June 26, 2018

Rev 0



gel.com

June 26, 2018

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

Re: CHCPRC SAF I18-010
Work Order: 451640
SDG: GEL451640

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on June 02, 2018. 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,

A handwritten signature in black ink that reads "Heather Shaffer".

Heather Shaffer
Project Manager

Purchase Order: 300071 7H
Chain of Custody: I18-010-027 and I18-010-028
Enclosures



Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	6
Data Review Qualifier Definitions.....	10
Laboratory Certifications.....	12
Radiological Analysis.....	14
Case Narrative.....	15
Sample Data Summary.....	21
Quality Control Summary.....	30

Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHCPRC SAF I18-010
SDG: GEL451640**

June 26, 2018

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 02, 2018, 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.

Sample Identification

The laboratory received the following samples:

Laboratory Identification	Sample Description
451640001	B3J034
451640002	B3J036

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: 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.

June 26, 2018

Rev 0

Heather Shaffer

Heather Shaffer
Project Manager

Radiochemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL451640
Work Order #: 451640

GAMMA_GS:COMMON + GW 01

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 1204042189 (B3J023DUP) was recounted due to high relative percent difference/relative error ratio. The recount is reported.

Miscellaneous Information**Additional Comments**

The matrix spike and matrix spike duplicate, 1204042190 (B3J023MS) and 1204042191 (B3J023MSD), 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 451640002 (B3J036) was recounted due to results more negative than the three sigma TPU. The second count is reported. Sample 1204042201 (Non SDG 451638005DUP) was verified by recounting at least five days

from the separation date. The recount is reported.

TRITIUM_DIST_LSC: 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 1204042522 (LCS) was recounted due to low recovery. The recount is reported.

Miscellaneous Information

Additional Comments

The matrix spike, 1204042521 (Non SDG 451432004MS), aliquot was reduced to conserve sample volume.

C14_LSC: 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.

Miscellaneous Information

Additional Comments

The matrix spike, 1204049553 (Non SDG 451638003MS), aliquot was reduced to conserve sample volume.

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



SAMPLE RECEIPT & REVIEW FORM

Client: <u>CPCC</u>		SDG/AR/COC/Work Order: <u>451640</u>		
Received By: <u>C. TARPLIN</u>		Date Received: <u>June 02, 2018</u> <u>HS</u>		
Carrier and Tracking Number		Circle Applicable: <u>FedEx Express</u> FedEx Ground UPS Field Services Courier Other		
		<u>7723 70670910</u> <u>7723 76245701</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.		
Shipped as a DOT Hazardous?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____		
COC/Samples marked or classified as radioactive?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM/ mR/Hr Classified as: <u>Rad 1</u> Rad 2 Rad 3		
Is package, COC, and/or Samples marked HAZ?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____		
Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: <u>Wet Ice</u> Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: <u>1c</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: _____ IR4-17 Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Yes, Are Encores or Soil Kits present? Yes _____ No <u>X</u> (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes <u>X</u> No _____ N/A _____ (If unknown, select No) VOA vials free of headspace? Yes <u>X</u> No _____ N/A _____ Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: _____
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: _____
12 Are sample containers identifiable as GEL provided?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Comments (Use Continuation Form if needed):				

PM (or PMA) review: Initials HS Date 6/4/18 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 analyte was detected in the associated method blank \geq MDC or $>$ 5% sample activity.	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 26 June 2018

State	Certification
Alaska	17-018
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	LA180011
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
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
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-18-13
Utah NELAP	SC000122018-26
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL451640
Work Order #: 451640

Product: GAMMA_GS:COMMON + GW 01
Analytical Method: 901.1_GAMMA_GS
Analytical Procedure: GL-RAD-A-013 REV# 27
Analytical Batch: 1770186

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
451640001	B3J034
451640002	B3J036
1204041801	Method Blank (MB)
1204041802	451640001(B3J034) Sample Duplicate (DUP)
1204041803	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# 20
Analytical Batch: 1770366

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
451640001	B3J034
451640002	B3J036
1204042188	Method Blank (MB)
1204042189	451351003(B3J023) Sample Duplicate (DUP)
1204042190	451351003(B3J023) Matrix Spike (MS)
1204042191	451351003(B3J023) Matrix Spike Duplicate (MSD)
1204042192	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 1204042189 (B3J023DUP) was recounted due to high relative percent difference/relative error ratio. The recount is reported.

Miscellaneous Information

Additional Comments

The matrix spike and matrix spike duplicate, 1204042190 (B3J023MS) and 1204042191 (B3J023MSD), 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# 19

Analytical Batch: 1770369

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
451640002	B3J036
1204042200	Method Blank (MB)
1204042201	451638005(NonSDG) Sample Duplicate (DUP)
1204042202	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 451640002 (B3J036) was recounted due to results more negative than the three sigma TPU. The second count is reported. Sample 1204042201 (Non SDG 451638005DUP) was verified by recounting at least five days from the separation date. The recount is reported.

Product: TRITIUM_DIST_LSC: COMMON

Analytical Method: TRITIUM_DIST_LSC

Analytical Procedure: GL-RAD-A-002 REV# 22

Analytical Batch: 1770517

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
451640002	B3J036
1204042519	Method Blank (MB)
1204042520	451432004(NonSDG) Sample Duplicate (DUP)
1204042521	451432004(NonSDG) Matrix Spike (MS)
1204042522	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 1204042522 (LCS) was recounted due to low recovery. The recount is reported.

Miscellaneous Information

Additional Comments

The matrix spike, 1204042521 (Non SDG 451432004MS), aliquot was reduced to conserve sample volume.

Product: C14_LSC: COMMON

Analytical Method: C14_LSC

Analytical Procedure: GL-RAD-A-003 REV# 16

Analytical Batch: 1773520

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
451640001	B3J034
451640002	B3J036
1204049551	Method Blank (MB)
1204049552	451638003(NonSDG) Sample Duplicate (DUP)
1204049553	451638003(NonSDG) Matrix Spike (MS)
1204049554	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.

Miscellaneous Information**Additional Comments**

The matrix spike, 1204049553 (Non SDG 451638003MS), aliquot was reduced to conserve sample volume.

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: GEL451640 GEL Work Order: 451640

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:** 26 JUN 2018**Title:** Group Leader

Sample Data Summary

**Rad
Certificate of Analysis
Sample Summary**

SDG Number: GEL451640	Client: CPRC001	Project: CPRC0118010
Lab Sample ID: 451640001	Date Collected: 06/01/2018 10:50	Matrix: WATER
	Date Received: 06/02/2018 09:05	
Client ID: B3J034	Method: 9310_ALPHABETA_GPC	Prep Basis: "As Received"
Batch ID: 1770366	Analyst: JXK3	SOP Ref: GL-RAD-A-001
Run Date: 06/11/2018 10:11	Aliquot: 150 mL	Instrument: PIC12B
Data File: AB1770366r1.xls	Prep Method: EPA 900.0/SW846 9310	Count Time: 80 min
Prep Batch: 1770366		
Prep Date: 06/07/2018 08:49		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha ALPHA	U	2.47	pCi/L	+/-1.91	1.96	2.68	3.00
12587-47-2	Beta BETA		3.41	pCi/L	+/-1.73	1.82	2.56	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: GEL451640
Lab Sample ID: 451640001

Client ID: B3J034
Batch ID: 1770186
Run Date: 06/14/2018 12:34
Data File: G451640001.CNF;1
Prep Batch: 1770186
Prep Date: 06/04/2018 05:23

Client: CPRC001
Date Collected: 06/01/2018 10:50
Date Received: 06/02/2018 09:05

Method: 901.1_GAMMA_GS
Analyst: BSW1
Aliquot: 0.5 L
Prep Method: EPA 901.1

Project: CPRC0118010
Matrix: WATER

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-013
Instrument: GAM16
Count Time: 180 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14234-35-6	Antimony-125	U	-1.4	pCi/L	+/-8.29	8.32	15.2	
13967-70-9	Cesium-134	U	2.66	pCi/L	+/-4.46	4.62	6.53	
10045-97-3	Cesium-137	U	0.511	pCi/L	+/-3.27	3.28	6.19	15.0
10198-40-0	Cobalt-60	U	0.510	pCi/L	+/-3.11	3.11	6.46	
14683-23-9	Europium-152	U	-0.708	pCi/L	+/-8.64	8.65	16.1	
15585-10-1	Europium-154	U	16.5	pCi/L	+/-11.1	13.5	22.3	
14391-16-3	Europium-155	U	8.70	pCi/L	+/-9.85	10.6	18.7	
13966-00-2	Potassium-40	U	-36.8	pCi/L	+/-52.9	55.5	99.7	

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: GEL451640	Client: CPRC001	Project: CPRC0118010
Lab Sample ID: 451640001	Date Collected: 06/01/2018 10:50	Matrix: WATER
	Date Received: 06/02/2018 09:05	
Client ID: B3J034	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1773520	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 06/25/2018 11:52	Aliquot: 100 mL	Instrument: LSCBROWN
Data File: C1773520.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 15 min
Prep Batch: 1773520		
Prep Date: 06/22/2018 13:27		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	24.2	pCi/L	+/-20.7	21.2	34.5	50.0

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: GEL451640
Lab Sample ID: 451640002

Client: CPRC001
Date Collected: 06/01/2018 09:30
Date Received: 06/02/2018 09:05

Project: CPRC0118010
Matrix: WATER

Client ID: B3J036
Batch ID: 1770366
Run Date: 06/11/2018 10:11
Data File: AB1770366r1.xls
Prep Batch: 1770366
Prep Date: 06/07/2018 08:49

Method: 9310_ALPHABETA_GPC
Analyst: JXK3
Aliquot: 150 mL
Prep Method: EPA 900.0/SW846 9310

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-001
Instrument: PIC13B
Count Time: 80 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha ALPHA	U	1.50	pCi/L	+/-1.65	1.67	2.65	3.00
12587-47-2	Beta BETA		3.63	pCi/L	+/-1.33	1.46	1.60	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: GEL451640	Client: CPRC001	Project: CPRC0118010
Lab Sample ID: 451640002	Date Collected: 06/01/2018 09:30	Matrix: WATER
	Date Received: 06/02/2018 09:05	
Client ID: B3J036	Method: SRISO_SEP_PRECIP_GPC	Prep Basis: "As Received"
Batch ID: 1770369	Analyst: KSD1	SOP Ref: GL-RAD-A-004
Run Date: 06/13/2018 07:46	Aliquot: 300 mL	Instrument: PIC13B
Data File: S1770369r2.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 1770369		
Prep Date: 06/06/2018 11:26		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90	U	0.214	pCi/L	+/-0.367	0.369	0.653	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	3.70	4.19	mg	88.3	(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.

**Rad
Certificate of Analysis
Sample Summary**

SDG Number: GEL451640
 Lab Sample ID: 451640002

 Client ID: B3J036
 Batch ID: 1770186
 Run Date: 06/14/2018 12:34
 Data File: G451640002.CNF;1
 Prep Batch: 1770186
 Prep Date: 06/04/2018 05:23

Client: CPRC001
 Date Collected: 06/01/2018 09:30
 Date Received: 06/02/2018 09:05

 Method: 901.1_GAMMA_GS
 Analyst: BSW1
 Aliquot: 0.5 L
 Prep Method: EPA 901.1

Project: CPRC0118010
 Matrix: WATER

 Prep Basis: "As Received"
 SOP Ref: GL-RAD-A-013
 Instrument: GAM25
 Count Time: 180 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14234-35-6	Antimony-125	U	2.49	pCi/L	+/-8.84	8.91	16.9	
13967-70-9	Cesium-134	U	-0.123	pCi/L	+/-4.68	4.68	7.96	
10045-97-3	Cesium-137	U	1.02	pCi/L	+/-4.23	4.25	7.88	15.0
10198-40-0	Cobalt-60	U	-0.853	pCi/L	+/-4.46	4.47	8.21	
14683-23-9	Europium-152	U	7.44	pCi/L	+/-10.4	11.0	20.4	
15585-10-1	Europium-154	U	-6.36	pCi/L	+/-12.7	13.1	21.1	
14391-16-3	Europium-155	U	-0.942	pCi/L	+/-8.75	8.76	15.5	
13966-00-2	Potassium-40	U	-45.5	pCi/L	+/-66.7	69.9	121	

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: GEL451640	Client: CPRC001	Project: CPRC0118010
Lab Sample ID: 451640002	Date Collected: 06/01/2018 09:30	Matrix: WATER
	Date Received: 06/02/2018 09:05	
Client ID: B3J036	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1770517	Analyst: MXH8	SOP Ref: GL-RAD-A-002
Run Date: 06/06/2018 17:38	Aliquot: 50 mL	Instrument: LSCBROWN
Data File: T1770517R.xls	Prep Method: EPA 906.0 Modified	Count Time: 50 min
Prep Batch: 1770517		
Prep Date: 06/06/2018 08:02		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		1410	pCi/L	+/-240	363	322	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.

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL451640	Client: CPRC001	Project: CPRC0118010
Lab Sample ID: 451640002	Date Collected: 06/01/2018 09:30	Matrix: WATER
	Date Received: 06/02/2018 09:05	
Client ID: B3J036	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1773520	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 06/25/2018 12:09	Aliquot: 100 mL	Instrument: LSCBROWN
Data File: C1773520.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 15 min
Prep Batch: 1773520		
Prep Date: 06/22/2018 13:27		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	23.8	pCi/L	+/-20.7	21.2	34.5	50.0

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: June 26, 2018
Page 1 of 4

Client : CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352
Contact: Mr. Scot Fitzgerald
Workorder: 451640

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1770186								
QC1204041801	MB								
Antimony-125			U	0.624	pCi/L			BSW1	06/14/1812:34
				Uncert: +/-7.87					
				TPU: +/-7.88					
Cesium-134			U	0.00379	pCi/L				
				Uncert: +/-3.60					
				TPU: +/-3.60					
Cesium-137			U	0.0357	pCi/L				
				Uncert: +/-3.28					
				TPU: +/-3.28					
Cobalt-60			U	1.96	pCi/L				
				Uncert: +/-3.84					
				TPU: +/-3.95					
Europium-152			U	-2.55	pCi/L				
				Uncert: +/-8.64					
				TPU: +/-8.72					
Europium-154			U	6.68	pCi/L				
				Uncert: +/-9.65					
				TPU: +/-10.1					
Europium-155			U	1.42	pCi/L				
				Uncert: +/-8.49					
				TPU: +/-8.52					
Potassium-40			U	-16.8	pCi/L				
				Uncert: +/-51.1					
				TPU: +/-51.7					
QC1204041802	451640001	DUP							
Antimony-125		U	-1.4	U	0.589	pCi/L			06/14/1818:13
					Uncert: +/-8.29				
					TPU: +/-8.32				
Cesium-134		U	2.66	U	-1.95	pCi/L			
					Uncert: +/-4.46				
					TPU: +/-4.62				
Cesium-137		U	0.511	U	-1.88	pCi/L			
					Uncert: +/-3.27				
					TPU: +/-3.28				
Cobalt-60		U	0.510	U	-3.82	pCi/L			
					Uncert: +/-3.11				
					TPU: +/-3.11				
Europium-152		U	-0.708	U	-3.01	pCi/L			
					Uncert: +/-8.64				
					TPU: +/-8.65				
Europium-154		U	16.5	U	4.38	pCi/L			
					Uncert: +/-11.1				
					TPU: +/-13.5				
Europium-155		U	8.70	U	0.816	pCi/L			
					Uncert: +/-12.8				
					TPU: +/-12.9				

GEL LABORATORIES LLC

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

QC Summary

Workorder: 451640

Page 2 of 4

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Gamma Spec										
Batch	1770186									
		Uncert:	+/-9.85	+/-9.81						
		TPU:	+/-10.6	+/-9.82		RPD: 0	N/A			
						RER: 1.07	(0-2)			
Potassium-40		U	-36.8	U	-83.2	pCi/L				
		Uncert:	+/-52.9	+/-62.7		RPD: 0	N/A			
		TPU:	+/-55.5	+/-73.5		RER: 0.987	(0-2)			
QC1204041803	LCS									
Americium-241	1.10E+05			1.21E+05	pCi/L	REC: 111	(80%-120%)		06/14/18	18:13
		Uncert:		+/-2940						
		TPU:		+/-10500						
Antimony-125				U	-316	pCi/L				
		Uncert:			+/-336					
		TPU:			+/-366					
Cesium-134				U	76.2	pCi/L				
		Uncert:			+/-140					
		TPU:			+/-144					
Cesium-137	41100				44200	pCi/L	REC: 107	(80%-120%)		
		Uncert:			+/-742					
		TPU:			+/-3760					
Cobalt-60	33500				35700	pCi/L	REC: 106	(80%-120%)		
		Uncert:			+/-815					
		TPU:			+/-3710					
Europium-152				U	240	pCi/L				
		Uncert:			+/-309					
		TPU:			+/-328					
Europium-154				U	210	pCi/L				
		Uncert:			+/-200					
		TPU:			+/-222					
Europium-155				U	5.10	pCi/L				
		Uncert:			+/-317					
		TPU:			+/-317					
Potassium-40				U	-742	pCi/L				
		Uncert:			+/-616					
		TPU:			+/-705					
Rad Gas Flow										
Batch	1770366									
QC1204042188	MB									
Alpha				U	0.129	pCi/L		JXK3	06/11/18	10:04
		Uncert:			+/-0.736					
		TPU:			+/-0.737					
Beta				U	-0.983	pCi/L				
		Uncert:			+/-1.23					
		TPU:			+/-1.23					
QC1204042189	451351003	DUP								
Alpha		U	1.94		4.20	pCi/L			06/11/18	13:33
		Uncert:	+/-1.81		+/-2.10		RPD: 74	(0% - 100%)		
		TPU:	+/-1.85		+/-2.22		RER: 1.53	(0-2)		
Beta			179		166	pCi/L				
		Uncert:	+/-6.19		+/-5.89		RPD: 8	(0%-20%)		
		TPU:	+/-29.7		+/-27.6		RER: 0.654	(0-2)		

GEL LABORATORIES LLC

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

QC Summary

Workorder: 451640

Page 3 of 4

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gas Flow									
Batch	1770366								
QC1204042190	451351003	MS							
Alpha	302	U	1.94	292	pCi/L	REC: 97	(75%-125%)		06/11/1810:04
	Uncert:		+/-1.81	+/-32.1					
	TPU:		+/-1.85	+/-57.5					
Beta	1170		179	1480	pCi/L	REC: 111	(75%-125%)		
	Uncert:		+/-6.19	+/-48.7					
	TPU:		+/-29.7	+/-251					
QC1204042191	451351003	MSD							
Alpha	302	U	1.94	329	pCi/L	REC: 109	(75%-125%)		06/11/1810:05
	Uncert:		+/-1.81	+/-33.0		RPD: 12	(0%-20%)		
	TPU:		+/-1.85	+/-65.1		RER: 0.85	(0-2)		
Beta	1170		179	1440	pCi/L	REC: 108	(75%-125%)		
	Uncert:		+/-6.19	+/-47.0		RPD: 2	(0%-20%)		
	TPU:		+/-29.7	+/-239		RER: 0.198	(0-2)		
QC1204042192	LCS								
Alpha	80.5			82.5	pCi/L	REC: 103	(80%-120%)		06/11/1810:05
	Uncert:			+/-7.78					
	TPU:			+/-16.1					
Beta	312			353	pCi/L	REC: 113	(80%-120%)		
	Uncert:			+/-12.1					
	TPU:			+/-58.6					
Batch	1770369								
QC1204042200	MB								
Strontium-90			U	-0.322	pCi/L			KSD1	06/09/1814:52
	Uncert:			+/-0.945					
	TPU:			+/-0.945					
**Strontium Carrier	4.19			3.40	mg	REC: 81	(40%-110%)		
QC1204042201	451638005	DUP							
Strontium-90			7.43	6.73	pCi/L				06/13/1807:46
	Uncert:		+/-1.05	+/-0.940		RPD: 10	(0%-20%)		
	TPU:		+/-1.57	+/-1.42		RER: 0.655	(0-2)		
**Strontium Carrier	4.19		3.90	4.40	mg	REC: 105	(40%-110%)		
QC1204042202	LCS								
Strontium-90	77.9			64.4	pCi/L	REC: 83	(80%-120%)		06/09/1814:52
	Uncert:			+/-3.77					
	TPU:			+/-11.4					
**Strontium Carrier	4.19			3.70	mg	REC: 88	(40%-110%)		
Rad Liquid Scintillation									
Batch	1770517								
QC1204042519	MB								
Tritium			U	-125	pCi/L			MXH8	06/06/1818:30
	Uncert:			+/-177					
	TPU:			+/-177					
QC1204042520	451432004	DUP							
Tritium		U	-195	U -103	pCi/L				06/06/1819:22
	Uncert:		+/-174	+/-176		RPD: 0	N/A		
	TPU:		+/-174	+/-176		RER: 0.733	(0-2)		
QC1204042521	451432004	MS							
Tritium	5080	U	-195	4830	pCi/L	REC: 95	(75%-125%)		06/06/1820:14
	Uncert:		+/-174	+/-536					

GEL LABORATORIES LLC

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

QC Summary

Workorder: 451640

Page 4 of 4

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Liquid Scintillation										
Batch	1770517									
		TPU:	+/-174		+/-1080					
QC1204042522	LCS									
Tritium	2540			2100	pCi/L	REC:	83 (80%-120%)		06/07/1810:41	
		Uncert:		+/-459						
		TPU:		+/-613						
Batch	1773520									
QC1204049551	MB									
Carbon-14			U	-6.2	pCi/L			BXM4	06/25/1815:09	
		Uncert:		+/-19.6						
		TPU:		+/-19.6						
QC1204049552	451638003	DUP								
Carbon-14		U	4.42	U	1.89	pCi/L			06/25/1815:25	
		Uncert:	+/-20.0		+/-20.0		RPD: 0	N/A		
		TPU:	+/-20.0		+/-20.0		RER: 0.176	(0-2)		
QC1204049553	451638003	MS								
Carbon-14	3750	U	4.42		3730	pCi/L	REC:	99 (75%-125%)	06/25/1815:42	
		Uncert:	+/-20.0		+/-195					
		TPU:	+/-20.0		+/-720					
QC1204049554	LCS									
Carbon-14	751				727	pCi/L	REC:	97 (80%-120%)	06/25/1815:58	
		Uncert:			+/-38.5					
		TPU:			+/-140					

Notes:

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

The Qualifiers in this report are defined as follows:

- B The analyte was detected in the associated method blank >= MDC or >5% sample activity.
- 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.
- UX Gamma Spectroscopy--Uncertain identification
- 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.