



December 21, 2017

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

Re: CHPRC SAF I18-003
Work Order: 439740
SDG: GEL439740

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on December 09, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Heather Shaffer
Project Manager

Purchase Order: 300071 - 7H
Chain of Custody: I18-003-117, I18-003-119, I18-003-120, I18-003-126, I18-003-172, I18-003-173 and
I18-003-250
Enclosures



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Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF I18-003
SDG: GEL439740**

December 21, 2017

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 December 09, 2017, 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:

<u>Laboratory Identification</u>	<u>Sample Description</u>
439740001	B3FFJ3
439740002	B3FDW7
439740003	B3FDW8
439740004	B3FF96
439740005	B3FDW9
439740006	B3FDX0
439740007	B3FM80

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.



Heather Shaffer
Project Manager

**Radiochemistry
Technical Case Narrative
CH2M Hill Plateau Remediation Company (CPRC)
SDG #: GEL439740
Work Order #: 439740**

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.

TC99_EIE_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**

Samples 439740001 (B3FFJ3), 439740002 (B3FDW7), 439740003 (B3FDW8) and 439740004 (B3FF96) were recounted to verify sample results. Recounts are reported.

SE79_SEP_IE_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 1203936428 (LCS) was recounted due to low recovery. The recount is reported. Sample 439740006 (B3FDX0) was recounted to verify sample results. Recount is reported. Samples 1203936427 (B3FFJ3DUP) and 439740001 (B3FFJ3) were recounted due to high relative percent difference/relative error ratio. The recounts are reported.

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, 1203936477 (B3FFJ3MS), 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

CH2M Hill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # **I18-003-117**
Page 1 of 1

Collector: Juan Aguilar /CHPRC
Telephone No.: 509-376-4650

SAF No.: I18-003
Sampling Origin: Hanford Site
Purchase Order/Charge Code: 300071

Project Title: AEA, DECEMBER 2017
Logbook No.: HNF-N-506-96169
Ice Chest No.: 6W5618

Shipped To (Lab): GEL Laboratories, LLC
Method of Shipment: Commercial Carrier
Bill of Lading/Air Bill No.: 779946413117

Protocol: SURV
Priority: 15 Days
Offsite Property No.: 8835

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	* Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3FFJ3	N	12-8-17	0937	1x500-mL G/P	C14_LSC: COMMON	6 Months	None
B3FFJ3	N	↓	↓	1x4-L G/P	GAMMA_GS: COMMON; GAMMA_GS: GW 01	6 Months	HNO3 to pH <2
B3FFJ3	N	↓	↓	1x500-mL G/P	SE79_SEP_IE_LSC: COMMON	6 Months	HNO3 to pH <2
B3FFJ3	N	12-8-17	0937	1x500-mL G/P	TC99_EIE_LSC: COMMON	6 Months	HNO3 to pH <2

Relinquished By: Juan Aguilar /CHPRC
Signature: [Signature]
Date/Time: DEC 08 2017 1033

Received By: Chris Fulton /CHPRC
Signature: [Signature]
Date/Time: DEC 08 2017 1037

Relinquished By: Chris Fulton /CHPRC
Signature: [Signature]
Date/Time: DEC 08 2017 1400

Received By: [Signature]
Signature: [Signature]
Date/Time: DEC 08 2017

Relinquished By: [Signature]
Signature: [Signature]
Date/Time: 12-9-17 10:20

Received By: [Signature]
Signature: [Signature]
Date/Time: [Signature]

Relinquished By: [Signature]
Signature: [Signature]
Date/Time: [Signature]

Relinquished By: [Signature]
Signature: [Signature]
Date/Time: [Signature]

Matrix *
S = Soil
SE = Sediment
SO = Solid
SL = Sludge
W = Water
O = Oil
A = Air

DS = Drum Solids
DL = Drum Liquid
T = Tissue
WI = Wipe
L = Liquid
V = Vegetation
X = Other

FINAL SAMPLE DISPOSITION
Disposal Method (e.g., Return to customer, per lab procedure, used in process):
Disposed By: [Signature]
Date/Time: [Signature]

Printed On 10/24/2017
FSR ID = FSR52664
A-6004-942 (REV 3)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

CH2M Hill Plateau Remediation Company C.O.C.# **I18-003-119**
Page 1 of 1

Collector: Juan Aguilar /CHPRC **Contact/Requester:** Karen Waters-Husted **Telephone No.:** 509-376-4650

SAF No.: I18-003 **Sampling Origin:** Hanford Site **Purchase Order/Charge Code:** 300071

Project Title: AEA, DECEMBER 2017 **Logbook No.:** HNF-N-506 - 96/169 **Ice Chest No.:** 3009-577

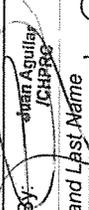
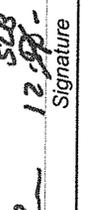
Shipped To (Lab): GEL Laboratories, LLC **Method of Shipment:** Commercial Carrier **Bill of Lading/Air Bill No.:** 770946125650

Protocol: SURV **Priority:** 15 Days **PRIORITY** **Offsite Property No.:** 8834

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3FDW7	N	W	12-8-17	1000	1x500-mL G/P	C14_LSC: COMMON	6 Months	None
B3FDW7	N	W	12-8-17	1000	1x4-L G/P	GAMMA_GS: COMMON; GAMMA_GS: GW 01; GAMMA_GS: TH234	6 Months	HNO3 to pH <2
B3FDW7	N	W	12-8-17	1000	1x500-mL G/P	TC99_EIE_LSC: COMMON	6 Months	HNO3 to pH <2

Relinquished By: Juan Aguilar /CHPRC Signature:  Date/Time: DEC 08 2017 12:33	Received By: Chris Fulton /CHPRC Signature:  Date/Time: DEC 08 2017 10:37
Relinquished By: Chris Fulton /CHPRC Signature:  Date/Time: DEC 08 2017 1400	Received By: FEDEX Signature:  Date/Time:
Relinquished By: Chris Fulton /CHPRC Signature:  Date/Time: DEC 08 2017	Received By: STACY BOONE /SLB Signature:  Date/Time: 12-9-17 10:20
Relinquished By:	Received By:
Relinquished By:	Received By:
Relinquished By:	Received By:

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

FINAL SAMPLE DISPOSITION Disposal Method (e.g., Return to customer, per lab procedure, used in process):
 Disposed By: _____ Date/Time: _____

Printed On 11/17/2017 FSR ID = FSR53081 A-6004-842 (REV 3)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

CH2M Hill Plateau Remediation Company
 Juan Aguilar /CHPRC
 I18-003
 AEA, DECEMBER 2017
 GEL Laboratories, LLC
 SURV

Collector: Juan Aguilar /CHPRC
SAF No.: I18-003
Project Title: AEA, DECEMBER 2017
Shipped To (Lab): GEL Laboratories, LLC
Protocol: SURV

Contact/Requester: Karen Waters-Husted
Sampling Origin: Hanford Site
Logbook No.: HNF-N-506 - 96/169
Method of Shipment: Commercial Carrier
Priority: 15 Days **PRIORITY**

Telephone No.: 509-376-4650
Purchase Order/Charge Code: 300071
Ice Chest No.: CWS-618
Bill of Lading/Air Bill No.: 77094641311A
Offsite Property No.: 8835

C.O.C.# I18-003-120
 Page 1 of 1

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

SPECIAL INSTRUCTIONS
 N/A

Sample No.	Filter	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3FDW8	N	12-8-17	1000	1x500-mL G/P	C14_LSC: COMMON	6 Months	None
B3FDW8	N	12-8-17	1000	1x4-L G/P	GAMMA_GS: COMMON; GAMMA_GS: GW 01; GAMMA_GS: TH234	6 Months	HNO3 to pH <2
B3FDW8	N	12-8-17	1000	1x500-mL G/P	TC99_EIE_LSC: COMMON	6 Months	HNO3 to pH <2

Relinquished By: Juan Aguilar /CHPRC Signature: [Signature] Date/Time: DEC 08 2017 1033	Received By: Chris Fulton /CHPRC Signature: [Signature] Date/Time: DEC 08 2017 1037
Relinquished By: Chris Fulton /CHPRC Signature: [Signature] Date/Time: DEC 08 2017 1400	Received By: FEDEX Signature: [Signature] Date/Time: DEC 08 2017
Relinquished By: [Signature] Signature: [Signature] Date/Time: DEC 08 2017	Received By: STACY BOONE /CH B- Signature: [Signature] Date/Time: 12-9-17 10:20
Relinquished By: [Signature] Signature: [Signature] Date/Time:	Received By: [Signature] Signature: [Signature] Date/Time:
Relinquished By: [Signature] Signature: [Signature] Date/Time:	Received By: [Signature] Signature: [Signature] Date/Time:

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

FINAL SAMPLE DISPOSITION
 Disposal Method (e.g., Return to customer, per lab procedure, used in process):
 Disposed By: [Signature]
 Date/Time:

Printed On 11/17/2017 FSR ID = FSR53081 A-6004-842 (REV 3)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C.#
I18-003-126
Page 1 of 1

CH2MHill Plateau
Remediation Company

Collector: Juan Aguilar I18-003	Contact/Requester: Karen Waters-Husted	Telephone No.: 509-376-4650
SAF No.: AEA, DECEMBER 2017	Sampling Origin: Hanford Site	Purchase Order/Charge Code: 300071
Project Title: GEL Laboratories, LLC	Logbook No.: HNF-N-506 - 96/48	Ice Chest No.: CWS-730
Shipped To (Lab): SURV	Method of Shipment: Commercial Carrier	Bill of Lading/Air Bill No.: 770941485523
Protocol: SURV	Priority: 15 Days PRIORITY	Offsite Property No.: 883A

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	* Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3FF96	N	W 12-7-17	1324	1x500-mL G/P	TC99_EIE_LSC: COMMON	6 Months	HNO3 to pH <2

Relinquished By: Juan Aguilar (CH2M)	Signature	DEC 07 2017	Date/Time	Received By: SSU-1	Signature	DEC 07 2017	Date/Time
Relinquished By: SSU-1	Signature	DEC 08 2017	Date/Time	Received By: MIKE ESPARZA (CH2M)	Signature	DEC 08 2017	Date/Time
Relinquished By: MIKE ESPARZA	Signature	DEC 08 2017	Date/Time	Received By: SLBOONE (CH2M)	Signature	12-9-17	Date/Time
Relinquished By: Fodex	Signature	DEC 08 2017	Date/Time	Received By: Fodex	Signature	10:20	Date/Time

Matrix *

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

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

Disposed By: _____ Date/Time: _____

CH2M Hill Plateau Remediation Company		C.O.C.# I18-003-172	
439740		Page 1 of 1	
Collector: Juan Aguilar /CHPRC	Contact/Requester: Karen Waters-Husted	Telephone No.: 509-376-4650	
SAF No.: I18-003	Sampling Origin: Hanford Site	Purchase Order/Charge Code: 300071	
Project Title: AEA, DECEMBER 2017	Logbook No.: HNF-N-506 - G/L/Leq	Ice Chest No.: 6 WS-618	
Shipped To (Lab): GEL Laboratories, LLC	Method of Shipment: Commercial Carrier	Bill of Lading/Air Bill No.: 770546413117	
Protocol: SURV	Priority: 15 Days	Offsite Property No.: 8835	
POSSIBLE SAMPLE HAZARDS/REMARK ** ** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1		SPECIAL INSTRUCTIONS N/A	
Sample No. B3FDW9	Filter N	* W	Time 12-8-17 1000
No/Type Container	1x500-mL G/P		SE79_SEP_IE_LSC: COMMON
Sample Analysis		Holding Time	6 Months
Preservative		HNO3 to pH <2	

Relinquished By: Juan Aguilar /CHPRC	Signature	DEC 08 2017	Date/Time	1033	Date/Time	Received By: Chris Fulton /CHPRC	Signature	DEC 08 2017	Date/Time	1033	Date/Time
Relinquished By: Chris Fulton /CHPRC	Signature	DEC 08 2017	Date/Time	1400	Date/Time	Received By: FEDEX	Signature	DEC 08 2017	Date/Time	12-8-17	Date/Time
Relinquished By:	Signature	DEC 08 2017	Date/Time		Date/Time	Received By: Hope Taylor	Signature	12.09.17	Date/Time	1000	Date/Time
Relinquished By:	Signature		Date/Time		Date/Time	Received By:	Signature		Date/Time		Date/Time
Relinquished By:	Signature		Date/Time		Date/Time	Disposed By:	Signature		Date/Time		Date/Time

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

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C.#

I18-003-173

Page 1 of 1

CH2M Hill Plateau
Remediation Company

Collector: Juan Aguilar /CHPRC

SAF No.: I18-003

Project Title: AEA, DECEMBER 2017

Shipped To (Lab): GEL Laboratories, LLC

Protocol: SURV

Contact/Requester: Karen Waters-Husted

Sampling Origin: Hanford Site

Logbook No.: HNF-N-506 - 96/169

Method of Shipment: Commercial Carrier

Priority: 15 Days PRIORITY

Telephone No.: 509-376-4650

Purchase Order/Charge Code: 300071

Ice Chest No.: 605-618

Bill of Lading/Air Bill No.: 770946413117

Offsite Property No.: 8835

POSSIBLE SAMPLE HAZARDS/REMARK

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

SPECIAL INSTRUCTIONS

N/A

Sample No.	Filter	* Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3FDX0	N	12-8-17	1000	1x500-mL G/P	SE79_SEP_IE_LSC: COMMON	6 Months	HNO3 to pH <2

Relinquished By: Juan Aguilar /CHPRC	Signature	DEC 08 2017	Date/Time	1400	Date/Time	DEC 08 2017	Date/Time	Received By: Chris Fulton /CHPRC	Signature	DEC 08 2017	Date/Time
Relinquished By: Chris Fulton /CHPRC	Signature	DEC 08 2017	Date/Time	1400	Date/Time	DEC 08 2017	Date/Time	Received By: FedEx	Signature	DEC 08 2017	Date/Time
Relinquished By:	Signature		Date/Time		Date/Time		Date/Time	Received By: Hope Taylor	Signature	DEC 08 2017	Date/Time
Relinquished By:	Signature		Date/Time		Date/Time		Date/Time	Received By:	Signature		Date/Time
Relinquished By:	Signature		Date/Time		Date/Time		Date/Time	Received By:	Signature		Date/Time

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

Disposed By:

Date/Time:

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

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 21 December 2017

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	LA170010
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 Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-25
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL439740
Work Order #: 439740

Product: GAMMA_GS:COMMON + GW 01
Analytical Method: 901.1_GAMMA_GS
Analytical Procedure: GL-RAD-A-013 REV# 27
Analytical Batch: 1725111

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
439740001	B3FFJ3
439740002	B3FDW7
439740003	B3FDW8
1203935596	Method Blank (MB)
1203935597	439581002(B3FDY7) Sample Duplicate (DUP)
1203935598	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: TC99_EIE_LSC: COMMON
Analytical Method: TC99_EIE_LSC
Analytical Procedure: GL-RAD-A-059 REV# 5
Analytical Batch: 1725359

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
439740001	B3FFJ3
439740002	B3FDW7
439740003	B3FDW8
439740004	B3FF96
1203936390	Method Blank (MB)
1203936391	439419001(NonSDG) Sample Duplicate (DUP)
1203936392	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**

Samples 439740001 (B3FFJ3), 439740002 (B3FDW7), 439740003 (B3FDW8) and 439740004 (B3FF96) were recounted to verify sample results. Recounts are reported.

Product: SE79_SEP_IE_LSC: COMMON

Analytical Method: SE79_SEP_IE_LSC

Analytical Procedure: GL-RAD-A-031 REV# 13

Analytical Batch: 1725372

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
439740001	B3FFJ3
439740005	B3FDW9
439740006	B3FDX0
439740007	B3FM80
1203936426	Method Blank (MB)
1203936427	439740001(B3FFJ3) Sample Duplicate (DUP)
1203936428	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 1203936428 (LCS) was recounted due to low recovery. The recount is reported. Sample 439740006 (B3FDX0) was recounted to verify sample results. Recount is reported. Samples 1203936427 (B3FFJ3DUP) and 439740001 (B3FFJ3) were recounted due to high relative percent difference/relative error ratio. The recounts are reported.

Product: C14_LSC: COMMON

Analytical Method: C14_LSC

Analytical Procedure: GL-RAD-A-003 REV# 15

Analytical Batch: 1725389

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
439740001	B3FFJ3
439740002	B3FDW7
439740003	B3FDW8
1203936475	Method Blank (MB)
1203936476	439740001(B3FFJ3) Sample Duplicate (DUP)
1203936477	439740001(B3FFJ3) Matrix Spike (MS)
1203936478	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, 1203936477 (B3FFJ3MS), 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: GEL439740 GEL Work Order: 439740

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: Heather McCarty

Date: 21 DEC 2017

Title: Analyst II

Sample Data Summary

**Rad
Certificate of Analysis
Sample Summary**

SDG Number: GEL439740
Lab Sample ID: 439740001

Client ID: B3FFJ3
Batch ID: 1725111
Run Date: 12/11/2017 06:42
Data File: G439740001.CNF;1
Prep Batch: 1725111
Prep Date: 12/11/2017 06:29

Client: CPRC001
Date Collected: 12/08/2017 09:37
Date Received: 12/09/2017 10:20

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

Project: CPRC0118003
Matrix: WATER

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-013
Instrument: GAM19
Count Time: 120 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14234-35-6	Antimony-125	U	-2.3	pCi/L	+/-14.1	14.1	25.0	
13967-70-9	Cesium-134	U	-0.807	pCi/L	+/-5.68	5.69	10.8	
10045-97-3	Cesium-137	U	-0.0696	pCi/L	+/-5.09	5.09	9.84	15.0
10198-40-0	Cobalt-60	U	2.14	pCi/L	+/-3.76	3.89	8.91	
14683-23-9	Europium-152	U	-0.983	pCi/L	+/-16.1	16.1	28.7	
15585-10-1	Europium-154	U	-15.2	pCi/L	+/-18.2	19.5	23.4	
14391-16-3	Europium-155	U	-5.98	pCi/L	+/-17.6	17.8	28.8	
13966-00-2	Potassium-40	U	22.2	pCi/L	+/-70.0	70.8	143	

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

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL439740
Lab Sample ID: 439740001

Client: CPRC001
Date Collected: 12/08/2017 09:37
Date Received: 12/09/2017 10:20

Project: CPRC0118003
Matrix: WATER

Client ID: B3FFJ3
Batch ID: 1725359
Run Date: 12/19/2017 09:10
Data File: E1725359R.xls
Prep Batch: 1725359
Prep Date: 12/13/2017 11:10

Method: TC99_EIE_LSC
Analyst: CXS7
Aliquot: 100 mL
Prep Method: DOE EML HASL-300, Tc-02-

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-059
Instrument: LSCGREEN
Count Time: 12.1499996185303 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99		6990	pCi/L	+/-140	788	43.8	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	33200	36300	CPM	91.3	(30%-105%)

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: GEL439740	Client: CPRC001	Project: CPRC0118003
Lab Sample ID: 439740001	Date Collected: 12/08/2017 09:37	Matrix: WATER
	Date Received: 12/09/2017 10:20	
Client ID: B3FFJ3		Prep Basis: "As Received"
Batch ID: 1725372	Method: SE79_SEP_IE_LSC	SOP Ref: GL-RAD-A-031
Run Date: 12/21/2017 06:54	Analyst: CXS7	Instrument: LSCBLUE
Data File: SE1725372R.xls	Aliquot: 0.1 L	Count Time: 20 min
Prep Batch: 1725372	Prep Method: NERC ORD	
Prep Date: 12/15/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15758-45-9	Selenium-79		53.1	pCi/L	+/-18.0	18.0	28.3	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Selenium Carrier	18.4	20.0	mg	92	(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: GEL439740	Client: CPRC001	Project: CPRC0118003
Lab Sample ID: 439740001	Date Collected: 12/08/2017 09:37	Matrix: WATER
	Date Received: 12/09/2017 10:20	
Client ID: B3FFJ3	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1725389	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 12/13/2017 17:29	Aliquot: 100.07 mL	Instrument: LSCGOLD
Data File: C1725389.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 15 min
Prep Batch: 1725389		
Prep Date: 12/12/2017 15:28		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	-0.856	pCi/L	+/-19.9	19.9	34.7	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: GEL439740
Lab Sample ID: 439740002

Client ID: B3FDW7
Batch ID: 1725111
Run Date: 12/11/2017 06:44
Data File: G439740002.CNF;1
Prep Batch: 1725111
Prep Date: 12/11/2017 06:29

Client: CPRC001
Date Collected: 12/08/2017 10:00
Date Received: 12/09/2017 10:20

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

Project: CPRC0118003
Matrix: WATER

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-013
Instrument: GAM28
Count Time: 120 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14234-35-6	Antimony-125	U	0.970	pCi/L	+/-11.8	11.8	22.2	
13967-70-9	Cesium-134	U	-0.712	pCi/L	+/-4.66	4.67	8.51	
10045-97-3	Cesium-137	U	0.889	pCi/L	+/-4.97	4.99	8.58	15.0
10198-40-0	Cobalt-60	U	-2.56	pCi/L	+/-4.87	5.01	8.74	
14683-23-9	Europium-152	U	17.1	pCi/L	+/-11.9	14.2	25.2	
15585-10-1	Europium-154	U	4.43	pCi/L	+/-11.2	11.4	24.9	
14391-16-3	Europium-155	U	0.323	pCi/L	+/-13.5	13.5	24.1	
13966-00-2	Potassium-40	U	-2.15	pCi/L	+/-59.3	59.3	121	
15065-10-8	Thorium-234	U	28.9	pCi/L	+/-320	320	328	

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

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

**Rad
Certificate of Analysis
Sample Summary**

SDG Number: GEL439740
Lab Sample ID: 439740002

Client: CPRC001
Date Collected: 12/08/2017 10:00
Date Received: 12/09/2017 10:20

Project: CPRC0118003
Matrix: WATER

Client ID: B3FDW7
Batch ID: 1725359
Run Date: 12/19/2017 09:24
Data File: E1725359R.xls
Prep Batch: 1725359
Prep Date: 12/13/2017 11:10

Method: TC99_EIE_LSC
Analyst: CXS7
Aliquot: 100 mL
Prep Method: DOE EML HASL-300, Tc-02-

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-059
Instrument: LSCGREEN
Count Time: 15.6000003814697 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99		6730	pCi/L	+/-137	759	50.3	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	27100	36300	CPM	74.7	(30%-105%)

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: GEL439740	Client: CPRC001	Project: CPRC0118003
Lab Sample ID: 439740002	Date Collected: 12/08/2017 10:00	Matrix: WATER
	Date Received: 12/09/2017 10:20	
Client ID: B3FDW7	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1725389	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 12/13/2017 17:45	Aliquot: 101.48 mL	Instrument: LSCGOLD
Data File: C1725389.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 15 min
Prep Batch: 1725389		
Prep Date: 12/12/2017 15:28		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	4.32	pCi/L	+/-19.9	19.9	34.3	50.0

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

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

**Rad
Certificate of Analysis
Sample Summary**

SDG Number: GEL439740
Lab Sample ID: 439740003

Client ID: B3FDW8
Batch ID: 1725111
Run Date: 12/11/2017 06:45
Data File: G439740003.CNF;1
Prep Batch: 1725111
Prep Date: 12/11/2017 06:29

Client: CPRC001
Date Collected: 12/08/2017 10:00
Date Received: 12/09/2017 10:20

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

Project: CPRC0118003
Matrix: WATER

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-013
Instrument: GAM43
Count Time: 120 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14234-35-6	Antimony-125	U	-3.76	pCi/L	+/-13.4	13.5	23.4	
13967-70-9	Cesium-134	U	-2.32	pCi/L	+/-6.69	6.77	10.3	
10045-97-3	Cesium-137	U	1.29	pCi/L	+/-5.25	5.28	9.57	15.0
10198-40-0	Cobalt-60	U	1.15	pCi/L	+/-7.53	7.54	15.1	
14683-23-9	Europium-152	U	1.25	pCi/L	+/-14.9	14.9	27.5	
15585-10-1	Europium-154	U	9.77	pCi/L	+/-14.9	15.6	35.0	
14391-16-3	Europium-155	U	10.6	pCi/L	+/-15.5	16.3	29.2	
13966-00-2	Potassium-40	U	60.4	pCi/L	+/-70.4	75.8	159	
15065-10-8	Thorium-234	U	-109	pCi/L	+/-342	346	586	

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

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL439740	Client: CPRC001	Project: CPRC0118003
Lab Sample ID: 439740003	Date Collected: 12/08/2017 10:00	Matrix: WATER
	Date Received: 12/09/2017 10:20	
Client ID: B3FDW8	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1725359	Analyst: CXS7	SOP Ref: GL-RAD-A-059
Run Date: 12/19/2017 09:41	Aliquot: 100 mL	Instrument: LSCGREEN
Data File: E1725359R.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 20 min
Prep Batch: 1725359		
Prep Date: 12/13/2017 11:10		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99		2310	pCi/L	+/-65.0	264	36.9	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	33600	36300	CPM	92.5	(30%-105%)

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: GEL439740	Client: CPRC001	Project: CPRC0118003
Lab Sample ID: 439740003	Date Collected: 12/08/2017 10:00	Matrix: WATER
	Date Received: 12/09/2017 10:20	
Client ID: B3FDW8	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1725389	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 12/13/2017 18:01	Aliquot: 101.34 mL	Instrument: LSCGOLD
Data File: C1725389.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 15 min
Prep Batch: 1725389		
Prep Date: 12/12/2017 15:28		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	-3.83	pCi/L	+/-19.6	19.6	34.3	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: GEL439740	Client: CPRC001	Project: CPRC0118003
Lab Sample ID: 439740004	Date Collected: 12/07/2017 13:24	Matrix: WATER
	Date Received: 12/09/2017 10:20	
Client ID: B3FF96	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1725359	Analyst: CXS7	SOP Ref: GL-RAD-A-059
Run Date: 12/19/2017 10:02	Aliquot: 100 mL	Instrument: LSCGREEN
Data File: E1725359R.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 20 min
Prep Batch: 1725359		
Prep Date: 12/13/2017 11:10		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99		2310	pCi/L	+/-66.3	264	38.3	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	32300	36300	CPM	89.1	(30%-105%)

Comments:

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: GEL439740	Client: CPRC001	Project: CPRC0118003
Lab Sample ID: 439740005	Date Collected: 12/08/2017 10:00	Matrix: WATER
	Date Received: 12/09/2017 10:20	
Client ID: B3FDW9	Method: SE79_SEP_IE_LSC	Prep Basis: "As Received"
Batch ID: 1725372	Analyst: CXS7	SOP Ref: GL-RAD-A-031
Run Date: 12/20/2017 18:45	Aliquot: 0.1 L	Instrument: LSCBLUE
Data File: SE1725372R.xls	Prep Method: NERC ORD	Count Time: 30 min
Prep Batch: 1725372		
Prep Date: 12/15/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15758-45-9	Selenium-79	U	23.8	pCi/L	+/-17.0	17.1	28.3	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Selenium Carrier	15.3	20.0	mg	76.5	(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: GEL439740	Client: CPRC001	Project: CPRC0118003
Lab Sample ID: 439740006	Date Collected: 12/08/2017 10:00	Matrix: WATER
	Date Received: 12/09/2017 10:20	
Client ID: B3FDX0	Method: SE79_SEP_IE_LSC	Prep Basis: "As Received"
Batch ID: 1725372	Analyst: CXS7	SOP Ref: GL-RAD-A-031
Run Date: 12/21/2017 07:15	Aliquot: 0.1 L	Instrument: LSCBLUE
Data File: SE1725372R.xls	Prep Method: NERC ORD	Count Time: 20 min
Prep Batch: 1725372		
Prep Date: 12/15/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15758-45-9	Selenium-79		27.4	pCi/L	+/-15.9	15.9	26.0	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Selenium Carrier	20.0	20.0	mg	100	(40%-110%)

Comments:

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: GEL439740	Client: CPRC001	Project: CPRC0118003
Lab Sample ID: 439740007	Date Collected: 12/07/2017 13:24	Matrix: WATER
	Date Received: 12/09/2017 10:20	
Client ID: B3FM80		Prep Basis: "As Received"
Batch ID: 1725372	Method: SE79_SEP_IE_LSC	SOP Ref: GL-RAD-A-031
Run Date: 12/20/2017 19:48	Analyst: CXS7	Instrument: LSCBLUE
Data File: SE1725372R.xls	Aliquot: 0.1 L	Count Time: 30 min
Prep Batch: 1725372	Prep Method: NERC ORD	
Prep Date: 12/15/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15758-45-9	Selenium-79	U	19.2	pCi/L	+/-17.8	17.8	29.7	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Selenium Carrier	14.6	20.0	mg	73	(40%-110%)

Comments:

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

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 21, 2017

Page 1 of 4

Client : CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352
Contact: Mr. Scot Fitzgerald
Workorder: 439740

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1725111								
QC1203935596	MB								
Antimony-125			U	11.2	pCi/L			BSW1	12/11/1706:55
				Uncert: +/-11.8					
				TPU: +/-12.9					
Cesium-134			U	2.37	pCi/L				
				Uncert: +/-4.64					
				TPU: +/-4.76					
Cesium-137			U	4.86	pCi/L				
				Uncert: +/-5.30					
				TPU: +/-5.32					
Cobalt-60			U	0.0969	pCi/L				
				Uncert: +/-3.53					
				TPU: +/-3.53					
Europium-152			U	4.73	pCi/L				
				Uncert: +/-10.4					
				TPU: +/-10.6					
Europium-154			U	-2.54	pCi/L				
				Uncert: +/-9.59					
				TPU: +/-9.66					
Europium-155			U	10.4	pCi/L				
				Uncert: +/-14.5					
				TPU: +/-15.3					
Potassium-40			U	6.01	pCi/L				
				Uncert: +/-55.7					
				TPU: +/-55.7					
Thorium-234			U	101	pCi/L				
				Uncert: +/-180					
				TPU: +/-187					
QC1203935597	439581002	DUP							
Antimony-125		U	3.27	U	-0.79	pCi/L			12/11/1708:49
			Uncert: +/-16.3		+/-12.5		RPD: 0	N/A	
			TPU: +/-16.4		+/-12.5		RER: 0.385	(0-2)	
Cesium-134		U	12.4	U	7.99	pCi/L			
			Uncert: +/-12.9		+/-5.65		RPD: 0	N/A	
			TPU: +/-14.1		+/-6.74		RER: 0.55	(0-2)	
Cesium-137		U	-3.01	U	-0.788	pCi/L			
			Uncert: +/-7.26		+/-5.36		RPD: 0	N/A	
			TPU: +/-7.39		+/-5.37		RER: 0.477	(0-2)	
Cobalt-60		U	2.12	U	-2.84	pCi/L			
			Uncert: +/-6.57		+/-5.22		RPD: 0	N/A	
			TPU: +/-6.64		+/-5.38		RER: 1.14	(0-2)	
Europium-152		U	8.07	U	-6.94	pCi/L			
			Uncert: +/-17.3		+/-14.9		RPD: 0	N/A	
			TPU: +/-17.7		+/-15.3		RER: 1.26	(0-2)	
Europium-154		U	9.82	U	-5.92	pCi/L			

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1725111								
		Uncert:	+/-17.0	+/-15.8					
		TPU:	+/-17.6	+/-16.0		RPD: 0	N/A		
						RER: 1.3	(0-2)		
Europium-155		U	14.7	U	16.1	pCi/L			
		Uncert:	+/-13.3	+/-16.4		RPD: 0	N/A		
		TPU:	+/-14.9	+/-18.0		RER: 0.118	(0-2)		
Potassium-40		U	80.1	U	-18.6	pCi/L			
		Uncert:	+/-104	+/-62.9		RPD: 0	N/A		
		TPU:	+/-104	+/-63.5		RER: 1.59	(0-2)		
Thorium-234		U	138	U	209	pCi/L			
		Uncert:	+/-207	+/-315		RPD: 0	N/A		
		TPU:	+/-210	+/-319		RER: 0.366	(0-2)		
QC1203935598	LCS								
Americium-241	1.10E+05			100000	pCi/L	REC: 91	(80%-120%)		12/11/1708:50
		Uncert:		+/-1410					
		TPU:		+/-8280					
Antimony-125			U	-42.3	pCi/L				
		Uncert:		+/-494					
		TPU:		+/-494					
Cesium-134			U	79.2	pCi/L				
		Uncert:		+/-238					
		TPU:		+/-241					
Cesium-137	41600			43600	pCi/L	REC: 105	(80%-120%)		
		Uncert:		+/-897					
		TPU:		+/-3850					
Cobalt-60	35700			36000	pCi/L	REC: 101	(80%-120%)		
		Uncert:		+/-995					
		TPU:		+/-3070					
Europium-152			U	-200	pCi/L				
		Uncert:		+/-431					
		TPU:		+/-441					
Europium-154			U	492	pCi/L				
		Uncert:		+/-370					
		TPU:		+/-433					
Europium-155			U	-44.9	pCi/L				
		Uncert:		+/-337					
		TPU:		+/-337					
Potassium-40			U	26.0	pCi/L				
		Uncert:		+/-587					
		TPU:		+/-587					
Thorium-234			U	-3130	pCi/L				
		Uncert:		+/-2990					
		TPU:		+/-3380					
Rad Liquid Scintillation									
Batch	1725359								
QC1203936390	MB								
Technetium-99			U	-0.0833	pCi/L			CXS7	12/18/1711:25
		Uncert:		+/-23.2					
		TPU:		+/-23.2					
**Technetium-99m Tracer	36300			31700	CPM	REC: 87	(30%-105%)		

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Liquid Scintillation									
Batch	1725359								
QC1203936391	439419001	DUP							
Technetium-99		U	2.77	U	3.90	pCi/L			12/18/1711:51
			Uncert:	+/-20.4	+/-23.4	RPD:	0	N/A	
			TPU:	+/-20.4	+/-23.4	RER:	0.0709	(0-2)	
**Technetium-99m Tracer	36300		35400		31200	CPM	REC:	86	(30%-105%)
QC1203936392	LCS								
Technetium-99		888			812	pCi/L	REC:	91	(80%-120%)
			Uncert:		+/-42.1				12/18/1712:18
			TPU:		+/-99.5				
**Technetium-99m Tracer	36300				32100	CPM	REC:	88	(30%-105%)
Batch	1725372								
QC1203936426	MB								
Selenium-79				U	16.1	pCi/L		CXS7	12/20/1723:30
			Uncert:		+/-14.3				
			TPU:		+/-14.3				
**Selenium Carrier	20.0				18.1	mg	REC:	91	(40%-110%)
QC1203936427	439740001	DUP							
Selenium-79			53.1		37.4	pCi/L			12/21/1708:41
			Uncert:	+/-18.0	+/-17.3	RPD:	35	(0% - 100%)	
			TPU:	+/-18.0	+/-17.3	RER:	1.23	(0-2)	
**Selenium Carrier	20.0		18.4		18.7	mg	REC:	94	(40%-110%)
QC1203936428	LCS								
Selenium-79		6020			5450	pCi/L	REC:	91	(80%-120%)
			Uncert:		+/-109				12/21/1709:02
			TPU:		+/-157				
**Selenium Carrier	20.0				19.7	mg	REC:	99	(40%-110%)
Batch	1725389								
QC1203936475	MB								
Carbon-14				U	-0.525	pCi/L		BXM4	12/13/1718:34
			Uncert:		+/-19.5				
			TPU:		+/-19.5				
QC1203936476	439740001	DUP							
Carbon-14		U	-0.856	U	1.37	pCi/L			12/13/1718:50
			Uncert:	+/-19.9	+/-19.9	RPD:	0	N/A	
			TPU:	+/-19.9	+/-19.9	RER:	0.155	(0-2)	
QC1203936477	439740001	MS							
Carbon-14		3680	U	-0.856	3430	pCi/L	REC:	93	(75%-125%)
			Uncert:	+/-19.9	+/-191				12/13/1719:06
			TPU:	+/-19.9	+/-665				
QC1203936478	LCS								
Carbon-14		738			630	pCi/L	REC:	85	(80%-120%)
			Uncert:		+/-37.1				12/13/1719:23
			TPU:		+/-123				

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 associated QC sample blank has a result $\geq 2X$ the MDA and, after corrections, result is \geq MDA for this sample

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
D										
N										
U										
UX										
X										
Y										
Z										

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.