

February 20, 2018

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

Re: CHPRC SAF I18-004
Work Order: 442329
SDG: GEL442329

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on January 25, 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,



Heather Shaffer
Project Manager

Purchase Order: 300071 - 7H
Chain of Custody: I18-004-071, I18-004-084, I18-004-139 and I18-004-148
Enclosures



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Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF I18-004
SDG: GEL442329**

February 20, 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 January 25, 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:

<u>Laboratory Identification</u>	<u>Sample Description</u>
442329001	B3FPM6
442329002	B3FPT1
442329003	B3FPT8
442329004	B3FXD5

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
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL442329
Work Order #: 442329

AMCMISO_EIE_PRECIP_AEA: 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.

Quality Control (QC) Information**Tracer/Carrier Yield**

Sample, (See Below), did not meet the client tracer yield requirements, however it is less than 110 percent and does meet the GEL standard tracer yield requirements.

Sample	Analyte	Value
1203959479 (B3FPT8DUP)	Americium-243 Tracer	109* (30%-105%)

Technical Information**Recounts**

Samples 1203959479 (B3FPT8DUP) and 1203959480 (LCS) were recounted due to high carrier/tracer yield. The recounts are reported.

UIISO_IE_PRECIP_AEA: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.

Quality Control (QC) Information**Duplication Criteria between QC Sample and Duplicate Sample**

The QC Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

Sample	Analyte	Value
1203959485 (B3FPT8DUP)	Uranium-233/234	RPD 32* (0.00%-20.00%) RER 1.65 (0-2)

Technical Information**Recounts**

Sample 442329003 (B3FPT8) was recounted due to high relative percent difference/relative error ratio. The

recount is reported. Sample 1203959485 (B3FPT8DUP) was recounted due to high relative percent difference/relative error ratio and then counted again due to a peak shift. The third count is reported.

PUISO_PRECIP_AEA: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

Sample Re-prep/Re-analysis

Samples were reprepared due to low carrier/tracer yield. The re-analysis is being reported.

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.

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 1203961246 (Non SDG 442159005DUP) was recounted due to results more negative than the three sigma TPU. The second count is reported.

PU241_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

Sample Re-prep/Re-analysis

Sample 442329003 (B3FPT8) was reprepared due to low carrier/tracer yield. The re-analysis is being reported.

Recounts

Sample 1203962738 (LCS) was recounted due to low recovery. The recount is reported.

SE79_SEP_IE_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.

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.

Miscellaneous Information

Additional Comments

The matrix spike, 1203963165 (B3FPM6MS), aliquot was reduced to conserve sample volume.

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

Sample 1203963257 (Non SDG 442156001DUP) was recounted to verify sample results. Recount is 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.

Technical Information

Sample Re-prep/Re-analysis

Samples were re-prepped due to high relative percent difference/relative error ratio and high recovery. The re-analysis is being reported.

Miscellaneous Information

Additional Comments

The matrix spike, 1203965642 (B3FPD1MS), aliquot was reduced to conserve sample volume.

Certification Statement

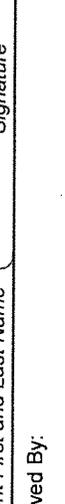
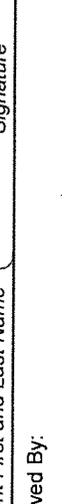
Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Chain of Custody and Supporting Documentation

CH2MHill Plateau Remediation Company		C.O.C.# I18-004-071 Page 1 of 1	
Collector: Larry Rosane IC/HRPC		Telephone No.: 509-376-4650	
SAF No.: I18-004		Purchase Order/Charge Code: 300071	
Project Title: SURV18, JANUARY 2018		Ice Chest No.: CWS-687	
Shipped To (Lab): GEL Laboratories, LLC		Bill of Lading/Air Bill No.: 771316893741	
Protocol: SURV		Offsite Property No.: 8996	
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
B3FPM6	N	1-24-18	0936
No/Type Container		Sample Analysis	
1x250-mL P		TRITIUM_DIST_LSC: COMMON	
Holding Time		Preservative	
6 Months		None	

Relinquished By: Larry Rosane IC/HRPC	JAN 24 2018	Signature	JAN 24 2018	Signature	1105	Date/Time
Print First and Last Name	Signature	Signature	Signature	Signature	Signature	Date/Time
Relinquished By: Roger Friest Jr. IC/HRPC	JAN 24 2018	Signature	JAN 24 2018	Signature	1105	Date/Time
Print First and Last Name	Signature	Signature	Signature	Signature	Signature	Date/Time
Relinquished By: Felix	JAN 24 2018	Signature	JAN 24 2018	Signature	1105	Date/Time
Print First and Last Name	Signature	Signature	Signature	Signature	Signature	Date/Time
Relinquished By:		Signature		Signature		Date/Time
Print First and Last Name	Signature	Signature	Signature	Signature	Signature	Date/Time
FINAL SAMPLE DISPOSITION			Disposal Method (e.g., Return to customer, per lab procedure, used in process):			Date/Time:

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C.# I18-004-084 Page 1 of 1
CH2MHill Plateau Remediation Company Juan Aguilar /CHPRC I18-004 SURV18, JANUARY 2018 GEL Laboratories, LLC SURV		Telephone No.: 509-376-4650 Purchase Order/Charge Code: 300071 Ice Chest No.: GWS-552 Bill of Lading/Air Bill No.: 771316894222 Offsite Property No.: 8996
CONTACT/REQUESTER: Karen Waters-Husted SAMPLING ORIGIN: Hanford Site LOGBOOK NO.: HNF-N-506-97748 METHOD OF SHIPMENT: Commercial Carrier PRIORITY: 30 Days		HOLDING TIME: 6 Months PRESERVATIVE: None
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.: B3FPT1 FILTER: N DATE: 1-24-18 TIME: 0940	NO/TYPE CONTAINER: 1x4-L G/P SAMPLE ANALYSIS: I129LL_SEP_LEPS_GS_LL: COMMON	HOLDING TIME: 6 Months PRESERVATIVE: None
SAMPLE NO.: B4FPT1 FILTER: N DATE: 1-24-18 TIME: 0940	NO/TYPE CONTAINER: 1x250-mL P SAMPLE ANALYSIS: TRITIUM_DIST_LSC: COMMON	HOLDING TIME: 6 Months PRESERVATIVE: None

Relinquished By: Juan Aguilar /CHPRC Signature:  Date/Time: JAN 24 2018 1620	Received By: Troy Bacon /CHPRC Signature:  Date/Time: JAN 24 2018 1620	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
Relinquished By: Troy Bacon /CHPRC Signature:  Date/Time: JAN 24 2018 1400	Received By: FEDEX Signature:  Date/Time: 1/25/18	
Relinquished By: FEDEX Signature:  Date/Time: 1/25/18	Received By:  Signature:  Date/Time: 1/25/18	
Relinquished By:  Signature:  Date/Time:	Received By:  Signature:  Date/Time:	
FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process):	Date/Time:

CH2M Hill Plateau Remediation Company C.O.C. # I18-004-148 Page 1 of 1		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 442329	
Collector: Larry Rosano / ICHPRC I18-004	Contact/Requester: Karen Waters-Husted Hanford Site	Telephone No.: 509-376-4650	Preservative: None
Project Title: SURV18, JANUARY 2018	Sampling Origin: Hanford Site	Purchase Order/Charge Code: 300071	Holding Time: 6 Months
Shipped To (Lab): GEL Laboratories, LLC	Logbook No.: HNF-N-506 98/30	Ice Chest No.: GWS-687	Sample Analysis: TRITIUM_DIST_LSC: COMMON
Protocol: SURV	Method of Shipment: Commercial Carrier	Bill of Lading/Air Bill No.: 771316893741	Special Instructions: SPECIAL INSTRUCTIONS N/A
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		Priority: 30 Days	Offsite Property No.: 8996

Relinquished By: Larry Rosano / ICHPRC Signature: <i>Larry Rosano</i> Date/Time: JAN 24 2018 07:20 1105	Received By: Roger Friesz Jr. / ICHPRC Signature: <i>Roger Friesz Jr.</i> Date/Time: JAN 24 2018 11:05	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
Relinquished By: Roger Friesz Jr. / ICHPRC Signature: <i>Roger Friesz Jr.</i> Date/Time: JAN 24 2018 07:00	Received By: FEDEX Signature: <i>FEDEX</i> Date/Time:	
Relinquished By: Roger Friesz Jr. / ICHPRC Signature: <i>Roger Friesz Jr.</i> Date/Time:	Received By: C. F. Friesz Jr. Signature: <i>C. F. Friesz Jr.</i> Date/Time: 1/25/18 08:55	
Relinquished By: Roger Friesz Jr. / ICHPRC Signature: <i>Roger Friesz Jr.</i> Date/Time:	Received By: Roger Friesz Jr. / ICHPRC Signature: <i>Roger Friesz Jr.</i> Date/Time:	
Relinquished By: Roger Friesz Jr. / ICHPRC Signature: <i>Roger Friesz Jr.</i> Date/Time:	Received By: Roger Friesz Jr. / ICHPRC Signature: <i>Roger Friesz Jr.</i> Date/Time:	
FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process):	Date/Time:

SAMPLE RECEIPT & REVIEW FORM

H5

Client: <u>C.P.R.C.</u>		SDG/AR/COC/Work Order: <u>440309</u>	
Received By: <u>C. TARPLIN</u>		Date Received: <u>01/25/18</u>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="radio"/> FedEx Express <input type="radio"/> FedEx Ground <input type="radio"/> UPS <input type="radio"/> Field Services <input type="radio"/> Courier <input type="radio"/> Other <u>7713 1689 4689 (16.c)</u> <u>7713 1689 3741 (2.c)</u> <u>7713 1689 4222 (16.c)</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input 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 type="checkbox"/> No <input checked="" 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> <input type="radio"/> CPM <input checked="" type="radio"/> mR/Hr Classified as: <input checked="" type="radio"/> Rad 1 <input type="radio"/> Rad 2 <input type="radio"/> Rad 3	
Is package, COC, and/or Samples marked HAZ?	Yes <input type="checkbox"/> No <input checked="" 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 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 type="checkbox"/>	<input type="checkbox"/>	
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry Ice None Other: _____ *all temperatures are recorded in Celsius TEMP: _____
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR4-17</u> Secondary Temperature Device Serial # (If Applicable): _____
5 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)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input 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 type="checkbox"/>	<input type="checkbox"/>	If Yes, Are Cores or Soil Kits present? Yes ___ No ___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes ___ No ___ N/A ___ (If unknown, select No) VOA vials free of headspace? Yes ___ No ___ N/A ___ Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: _____
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: _____
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials MTA Date 1/29/18 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 20 February 2018

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	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 Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-18-13
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 #: GEL442329
Work Order #: 442329

Product: AMCMISO_EIE_PRECIP_AEA: COMMON

Analytical Method: AMCMISO_EIE_PREC_AEA

Analytical Procedure: GL-RAD-A-011 REV# 26

Analytical Batch: 1734487

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
442329003	B3FPT8
1203959478	Method Blank (MB)
1203959479	442329003(B3FPT8) Sample Duplicate (DUP)
1203959480	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.

Quality Control (QC) Information

Tracer/Carrier Yield

Sample, (See Below), did not meet the client tracer yield requirements, however it is less than 110 percent and does meet the GEL standard tracer yield requirements.

Sample	Analyte	Value
1203959479 (B3FPT8DUP)	Americium-243 Tracer	109* (30%-105%)

Technical Information

Recounts

Samples 1203959479 (B3FPT8DUP) and 1203959480 (LCS) were recounted due to high carrier/tracer yield. The recounts are reported.

Product: UIISO_IE_PRECIP_AEA:COMMON

Analytical Method: UIISO_IE_PRECIP_AEA

Analytical Procedure: GL-RAD-A-011 REV# 26

Analytical Batch: 1734489

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
442329003	B3FPT8
1203959484	Method Blank (MB)
1203959485	442329003(B3FPT8) Sample Duplicate (DUP)
1203959486	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.

Quality Control (QC) Information

Duplication Criteria between QC Sample and Duplicate Sample

The QC Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

Sample	Analyte	Value
1203959485 (B3FPT8DUP)	Uranium-233/234	RPD 32* (0.00%-20.00%) RER 1.65 (0-2)

Technical Information

Recounts

Sample 442329003 (B3FPT8) was recounted due to high relative percent difference/relative error ratio. The recount is reported. Sample 1203959485 (B3FPT8DUP) was recounted due to high relative percent difference/relative error ratio and then counted again due to a peak shift. The third count is reported.

Product: PUIISO_PRECIP_AEA:COMMON

Analytical Method: PUIISO_PRECIP_AEA

Analytical Procedure: GL-RAD-A-011 REV# 26

Analytical Batch: 1735784

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
442329003	B3FPT8
1203962733	Method Blank (MB)
1203962734	442329003(B3FPT8) Sample Duplicate (DUP)
1203962735	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

Sample Re-prep/Re-analysis

Samples were reprepared due to low carrier/tracer yield. The re-analysis is being reported.

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: 1733809

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
442329002	B3FPT1
1203957837	Method Blank (MB)
1203957838	441685007(NonSDG) Sample Duplicate (DUP)
1203957839	441685007(NonSDG) Matrix Spike (MS)
1203957840	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: SRISO_SEP_PRECIP_GPC: COMMON

Analytical Method: SRISO_SEP_PRECIP_GPC

Analytical Procedure: GL-RAD-A-004 REV# 19

Analytical Batch: 1735174

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
442329003	B3FPT8
1203961245	Method Blank (MB)
1203961246	442159005(NonSDG) Sample Duplicate (DUP)
1203961247	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 1203961246 (Non SDG 442159005DUP) was recounted due to results more negative than the three sigma TPU. The second count is reported.

Product: PU241_IE_LSC: COMMON

Analytical Method: PU241_IE_LSC

Analytical Procedure: GL-RAD-A-035 REV# 19

Analytical Batch: 1735785

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
442329003	B3FPT8
1203962736	Method Blank (MB)
1203962737	442329003(B3FPT8) Sample Duplicate (DUP)
1203962738	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

Sample Re-prep/Re-analysis

Sample 442329003 (B3FPT8) was re-prepped due to low carrier/tracer yield. The re-analysis is being reported.

Recounts

Sample 1203962738 (LCS) was recounted due to low recovery. The recount is reported.

Product: SE79_SEP_IE_LSC: COMMON

Analytical Method: SE79_SEP_IE_LSC

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

Analytical Batch: 1734776

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
442329003	B3FPT8
1203960228	Method Blank (MB)

1203960229 441840002(B3FPD8) Sample Duplicate (DUP)
 1203960230 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: TRITIUM_DIST_LSC: COMMON

Analytical Method: TRITIUM_DIST_LSC

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

Analytical Batch: 1735946

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
442329001	B3FPM6
442329002	B3FPT1
442329004	B3FXD5
1203963163	Method Blank (MB)
1203963164	442329001(B3FPM6) Sample Duplicate (DUP)
1203963165	442329001(B3FPM6) Matrix Spike (MS)
1203963166	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, 1203963165 (B3FPM6MS), aliquot was reduced to conserve sample volume.

Product: TC99_EIE_LSC: COMMON

Analytical Method: TC99_EIE_LSC

Analytical Procedure: GL-RAD-A-059 REV# 5

Analytical Batch: 1735972

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
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442329003	B3FPT8
1203963256	Method Blank (MB)
1203963257	442156001(NonSDG) Sample Duplicate (DUP)
1203963258	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 1203963257 (Non SDG 442156001DUP) was recounted to verify sample results. Recount is reported.

Product: C14_LSC: COMMON

Analytical Method: C14_LSC

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

Analytical Batch: 1736912

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
442329003	B3FPT8
1203965640	Method Blank (MB)
1203965641	441930001(B3FPD1) Sample Duplicate (DUP)
1203965642	441930001(B3FPD1) Matrix Spike (MS)
1203965643	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

Sample Re-prep/Re-analysis

Samples were re-prepped due to high relative percent difference/relative error ratio and high recovery. The re-analysis is being reported.

Miscellaneous Information

Additional Comments

The matrix spike, 1203965642 (B3FPD1MS), 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: GEL442329 GEL Work Order: 442329

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: 16 FEB 2018

Title: Analyst II

Sample Data Summary

February 21, 2018

Revision 0

Certificate of Analysis
Sample Summary

SDG Number: GEL442329	Client: CPRC001	Project: CPRC0118004
Lab Sample ID: 442329001	Date Collected: 01/24/2018 09:26	Matrix: WATER
	Date Received: 01/25/2018 08:50	
Client ID: B3FPM6	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1735946	Analyst: BXM4	SOP Ref: GL-RAD-A-002
Run Date: 02/01/2018 17:17	Aliquot: 50 mL	Instrument: LSCYELLOW
Data File: T1735946.xls	Prep Method: EPA 906.0 Modified	Count Time: 50 min
Prep Batch: 1735946		
Prep Date: 02/01/2018 08:03		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		3350	pCi/L	+/-305	716	270	400

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

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).
The MDC is a sample specific MDC.

February 21, 2018

Revision 0

Certificate of Analysis
Sample Summary

SDG Number: GEL442329	Client: CPRC001	Project: CPRC0118004
Lab Sample ID: 442329002	Date Collected: 01/24/2018 09:40	Matrix: WATER
	Date Received: 01/25/2018 08:50	
Client ID: B3FPT1	Method: DOE EML HASL-300,I-01 Mo	Prep Basis: "As Received"
Batch ID: 1733809	Analyst: BSW1	SOP Ref: GL-RAD-A-006
Run Date: 01/29/2018 06:10	Aliquot: 1.2 L	Instrument: XRAY3
Data File: I442329002.CNF;1	Prep Method: DOE EML HASL-300,I-01 M	Count Time: 120 min
Prep Batch: 1733809		
Prep Date: 01/25/2018 11:49		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129		0.712	pCi/L	+/-0.456	0.462	0.467	1.00

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

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).
The MDC is a sample specific MDC.

February 21, 2018

Revision 0

Certificate of Analysis
Sample Summary

SDG Number: GEL442329
Lab Sample ID: 442329002

Client: CPRC001
Date Collected: 01/24/2018 09:40
Date Received: 01/25/2018 08:50

Project: CPRC0118004
Matrix: WATER

Client ID: B3FPT1
Batch ID: 1735946
Run Date: 02/01/2018 18:08
Data File: T1735946.xls
Prep Batch: 1735946
Prep Date: 02/01/2018 08:03

Method: TRITIUM_DIST_LSC
Analyst: BXM4
Aliquot: 50 mL
Prep Method: EPA 906.0 Modified

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-002
Instrument: LSCYELLOW
Count Time: 50 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		38600	pCi/L	+/-911	7520	269	400

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

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).
The MDC is a sample specific MDC.

February 21, 2018

Revision 0

**Certificate of Analysis
Sample Summary**

SDG Number: GEL442329	Client: CPRC001	Project: CPRC0118004
Lab Sample ID: 442329003	Date Collected: 01/24/2018 08:57	Matrix: WATER
	Date Received: 01/25/2018 08:50	
Client ID: B3FPT8		Prep Basis: "As Received"
Batch ID: 1734487	Method: AMCMISO_EIE_PREC_AEA	SOP Ref: GL-RAD-A-011
Run Date: 01/30/2018 13:51	Analyst: JXR5	Instrument: 1252
Data File: S0442329003_AM.1A.gcnf	Aliquot: 0.4 L	Count Time: 240 min
Prep Batch: 1734487	Prep Method: DOE EML HASL-300, Am-05	
Prep Date: 01/26/2018 22:59		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.0584	pCi/L	+/-0.0842	0.0846	0.102	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	5.31	5.24	pCi/L	101	(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.

February 21, 2018

Revision 0

Certificate of Analysis
Sample Summary

SDG Number: GEL442329	Client: CPRC001	Project: CPRC0118004
Lab Sample ID: 442329003	Date Collected: 01/24/2018 08:57	Matrix: WATER
	Date Received: 01/25/2018 08:50	
Client ID: B3FPT8	Method: UIISO_IE_PRECIP_AEA	Prep Basis: "As Received"
Batch ID: 1734489	Analyst: JXR5	SOP Ref: GL-RAD-A-011
Run Date: 02/10/2018 11:24	Aliquot: 0.4 L	Instrument: 1139
Data File: S0442329003_UU.2A.gcnf	Prep Method: DOE EML HASL-300, U-02-R	Count Time: 240 min
Prep Batch: 1734489		
Prep Date: 01/29/2018 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 <small>13968-55-3/13966-29-5</small>	Uranium-233/234		2.05	pCi/L	+/-0.421	0.518	0.191	1.00
15117-96-1/13982-7	Uranium-235/236		0.133	pCi/L	+/-0.128	0.130	0.0799	1.00
7440-61-1	Uranium-238		1.04	pCi/L	+/-0.299	0.336	0.132	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	4.46	5.23	pCi/L	85.4	(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.

February 21, 2018

Revision 0

**Certificate of Analysis
Sample Summary**

SDG Number: GEL442329	Client: CPRC001	Project: CPRC0118004
Lab Sample ID: 442329003	Date Collected: 01/24/2018 08:57	Matrix: WATER
	Date Received: 01/25/2018 08:50	
Client ID: B3FPT8	Method: PUIISO_PRECIP_AEA	Prep Basis: "As Received"
Batch ID: 1735784	Analyst: JXR5	SOP Ref: GL-RAD-A-011
Run Date: 02/02/2018 09:01	Aliquot: 0.4 L	Instrument: 1069
Data File: S0442329003_PU.2A.gcnf	Prep Method: DOE EML HASL-300, Pu-11-	Count Time: 239.9998 min
Prep Batch: 1735784		
Prep Date: 01/31/2018 21:19		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	0.0183	pCi/L	+/-0.0515	0.0516	0.055	1.00
OER-100-70	Plutonium-239/240	U	-0.0044	pCi/L	+/-0.0379	0.038	0.0879	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	3.80	4.93	pCi/L	77.1	(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.

February 21, 2018

Revision 0

Certificate of Analysis
Sample Summary

SDG Number: GEL442329	Client: CPRC001	Project: CPRC0118004
Lab Sample ID: 442329003	Date Collected: 01/24/2018 08:57	Matrix: WATER
	Date Received: 01/25/2018 08:50	
Client ID: B3FPT8	Method: PU241_IE_LSC	Prep Basis: "As Received"
Batch ID: 1735785	Analyst: JXR5	SOP Ref: GL-RAD-A-035
Run Date: 02/06/2018 05:30	Aliquot: 0.4 L	Instrument: LSCSILVER
Data File: PU1735785r.xls	Prep Method: DOE EML HASL-300, Pu-11-	Count Time: 45 min
Prep Batch: 1735785		
Prep Date: 01/31/2018 21:19		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14119-32-5	Plutonium-241	U	-1.72	pCi/L	+/-9.33	9.33	16.2	25.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	3.80	4.93	pCi/L	77.1	(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.

February 21, 2018

Revision 0

Certificate of Analysis
Sample Summary

SDG Number: GEL442329	Client: CPRC001	Project: CPRC0118004
Lab Sample ID: 442329003	Date Collected: 01/24/2018 08:57	Matrix: WATER
	Date Received: 01/25/2018 08:50	
Client ID: B3FPT8	Method: SRISO_SEP_PRECIP_GPC	Prep Basis: "As Received"
Batch ID: 1735174	Analyst: KSD1	SOP Ref: GL-RAD-A-004
Run Date: 01/31/2018 13:59	Aliquot: 300 mL	Instrument: PIC9C
Data File: S1735174c1.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 1735174		
Prep Date: 01/30/2018 09:22		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90	U	0.579	pCi/L	+/-0.847	0.851	1.46	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	3.80	4.30	mg	88.4	(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.

February 21, 2018

Revision 0

Certificate of Analysis
Sample Summary

SDG Number: GEL442329
Lab Sample ID: 442329003

Client: CPRC001
Date Collected: 01/24/2018 08:57
Date Received: 01/25/2018 08:50

Project: CPRC0118004
Matrix: WATER

Client ID: B3FPT8
Batch ID: 1734776
Run Date: 02/07/2018 13:56
Data File: SE1734776.xls
Prep Batch: 1734776
Prep Date: 02/05/2018 00:00

Method: SE79_SEP_IE_LSC
Analyst: CXS7
Aliquot: 0.1 L
Prep Method: NERC ORD

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-031
Instrument: LSCBLUE
Count Time: 20 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15758-45-9	Selenium-79	U	-8.43	pCi/L	+/-13.9	13.9	24.5	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Selenium Carrier	21.9	20.0	mg	110	(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.

February 21, 2018

Revision 0

Certificate of Analysis
Sample Summary

SDG Number: GEL442329	Client: CPRC001	Project: CPRC0118004
Lab Sample ID: 442329003	Date Collected: 01/24/2018 08:57	Matrix: WATER
	Date Received: 01/25/2018 08:50	
Client ID: B3FPT8	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1735972	Analyst: CXS7	SOP Ref: GL-RAD-A-059
Run Date: 02/13/2018 06:11	Aliquot: 100 mL	Instrument: LSCGOLD
Data File: E1735972R.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 15 min
Prep Batch: 1735972		
Prep Date: 02/08/2018 15:24		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	15.4	pCi/L	+/-25.9	25.9	44.0	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	38000	38500	CPM	98.7	(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.

February 21, 2018

Revision 0

Certificate of Analysis
Sample Summary

SDG Number: GEL442329	Client: CPRC001	Project: CPRC0118004
Lab Sample ID: 442329003	Date Collected: 01/24/2018 08:57	Matrix: WATER
	Date Received: 01/25/2018 08:50	
Client ID: B3FPT8	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1736912	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 02/07/2018 14:04	Aliquot: 100.22 mL	Instrument: LSCRED
Data File: C1736912.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 15 min
Prep Batch: 1736912		
Prep Date: 02/06/2018 14:28		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	-1.93	pCi/L	+/-15.8	15.8	27.9	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.

February 21, 2018

Revision 0

Certificate of Analysis
Sample Summary

SDG Number: GEL442329	Client: CPRC001	Project: CPRC0118004
Lab Sample ID: 442329004	Date Collected: 01/24/2018 07:20	Matrix: WATER
	Date Received: 01/25/2018 08:50	
Client ID: B3FXD5	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1735946	Analyst: BXM4	SOP Ref: GL-RAD-A-002
Run Date: 02/01/2018 19:00	Aliquot: 50 mL	Instrument: LSCYELLOW
Data File: T1735946.xls	Prep Method: EPA 906.0 Modified	Count Time: 50 min
Prep Batch: 1735946		
Prep Date: 02/01/2018 08:03		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	69.9	pCi/L	+/-161	161	279	400

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.

Quality Control Summary

QC Summary

Report Date: February 16, 2018
 Page 1 of 5

Client : CH2MHill Plateau Remediation Company
 MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
Contact: Mr. Scot Fitzgerald
Workorder: 442329

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1734487								
QC1203959478	MB								
Americium-241			U	0.00992	pCi/L			JXR5	01/30/1813:51
				Uncert: +/-0.0551					
				TPU: +/-0.0552					
**Americium-243 Tracer	5.24			5.17	pCi/L	REC: 99	(30%-105%)		
				Uncert: +/-0.619					
				TPU: +/-0.942					
QC1203959479	442329003	DUP							
Americium-241		U	0.0584	U	0.0198	pCi/L			02/10/1812:22
				Uncert: +/-0.0842	+/-0.0557	RPD: 0	N/A		
				TPU: +/-0.0846	+/-0.0557	RER: 0.748	(0-2)		
**Americium-243 Tracer	5.24		5.31	5.70	pCi/L	REC: 109*	(30%-105%)		
				Uncert: +/-0.652	+/-0.628				
				TPU: +/-0.985	+/-0.954				
QC1203959480	LCS								
Americium-241				4.92		5.11	pCi/L	REC: 104	(80%-120%)
				Uncert: +/-0.626					02/10/1812:22
				TPU: +/-0.940					
**Americium-243 Tracer	5.24			5.04	pCi/L	REC: 96	(30%-105%)		
				Uncert: +/-0.632					
				TPU: +/-0.958					
Batch	1734489								
QC1203959484	MB								
Uranium-233/234			U	0.039	pCi/L			JXR5	01/30/1809:03
				Uncert: +/-0.0826					
				TPU: +/-0.083					
Uranium-235/236			U	0.0625	pCi/L				
				Uncert: +/-0.0901					
				TPU: +/-0.0905					
Uranium-238			U	0.000733	pCi/L				
				Uncert: +/-0.0544					
				TPU: +/-0.0544					
**Uranium-232 Tracer	5.23			4.48	pCi/L	REC: 86	(30%-105%)		
				Uncert: +/-0.617					
				TPU: +/-0.952					
QC1203959485	442329003	DUP							
Uranium-233/234			2.05	1.49	pCi/L				02/12/1810:28
				Uncert: +/-0.421	+/-0.366	RPD: 32*	(0%-20%)		
				TPU: +/-0.518	+/-0.428	RER: 1.65	(0-2)		
Uranium-235/236			0.133	0.158	pCi/L				
				Uncert: +/-0.128	+/-0.144	RPD: 17	(0% - 100%)		
				TPU: +/-0.130	+/-0.146	RER: 0.254	(0-2)		
Uranium-238			1.04	1.12	pCi/L				
				Uncert: +/-0.299	+/-0.315	RPD: 8	(0%-20%)		
				TPU: +/-0.336	+/-0.356	RER: 0.336	(0-2)		

QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1734489								
**Uranium-232 Tracer	5.23	4.46		4.15	pCi/L	REC: 79	(30%-105%)		
	Uncert:	+/-0.662		+/-0.674					
	TPU:	+/-1.01		+/-1.03					
QC1203959486 LCS Uranium-233/234				6.52	pCi/L				01/30/1809:03
	Uncert:			+/-0.698					
	TPU:			+/-1.15					
Uranium-235/236				0.550	pCi/L				
	Uncert:			+/-0.230					
	TPU:			+/-0.243					
Uranium-238	6.75			6.55	pCi/L	REC: 97	(80%-120%)		
	Uncert:			+/-0.700					
	TPU:			+/-1.15					
**Uranium-232 Tracer	5.23			4.46	pCi/L	REC: 85	(30%-105%)		
	Uncert:			+/-0.626					
	TPU:			+/-0.964					
Batch	1735784								
QC1203962733 MB Plutonium-238			U	-0.00405	pCi/L			JXR5	02/02/1809:01
	Uncert:			+/-0.035					
	TPU:			+/-0.035					
Plutonium-239/240			U	-0.00338	pCi/L				
	Uncert:			+/-0.0507					
	TPU:			+/-0.0507					
**Plutonium-242 Tracer	4.93			4.29	pCi/L	REC: 87	(30%-105%)		
	Uncert:			+/-0.567					
	TPU:			+/-0.847					
QC1203962734 442329003 DUP Plutonium-238		U 0.0183	U	0.00	pCi/L				02/02/1809:01
	Uncert:	+/-0.0515		+/-0.0529		RPD: 0	N/A		
	TPU:	+/-0.0516		+/-0.0531		RER: 0.485	(0-2)		
Plutonium-239/240		U -0.0044	U	-0.0189	pCi/L				
	Uncert:	+/-0.0379		+/-0.0571		RPD: 0	N/A		
	TPU:	+/-0.038		+/-0.0572		RER: 0.414	(0-2)		
**Plutonium-242 Tracer	4.93	3.80		2.79	pCi/L	REC: 57	(30%-105%)		
	Uncert:	+/-0.591		+/-0.709					
	TPU:	+/-0.879		+/-1.04					
QC1203962735 LCS Plutonium-238			U	0.0121	pCi/L				02/02/1809:01
	Uncert:			+/-0.0675					
	TPU:			+/-0.0676					
Plutonium-239/240	4.94			4.76	pCi/L	REC: 96	(80%-120%)		
	Uncert:			+/-0.658					
	TPU:			+/-0.958					
**Plutonium-242 Tracer	4.93			3.59	pCi/L	REC: 73	(30%-105%)		
	Uncert:			+/-0.668					
	TPU:			+/-0.983					
Batch	1735785								
QC1203962736 MB Plutonium-241			U	-1.92	pCi/L			JXR5	02/06/1806:17

QC Summary

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Alpha Spec										
Batch	1735785									
				Uncert:		+/-8.25				
				TPU:		+/-8.25				
**Plutonium-242 Tracer	4.93			4.29	pCi/L	REC: 87	(30%-105%)			
				Uncert:		+/-0.567				
				TPU:		+/-0.847				
QC1203962737 442329003 DUP										
Plutonium-241		U	-1.72	U	2.20					02/06/1807:04
				Uncert:	+/-9.33	+/-13.0		RPD: 0	N/A	
				TPU:	+/-9.33	+/-13.0		RER: 0.48	(0-2)	
**Plutonium-242 Tracer	4.93		3.80	2.79	pCi/L	REC: 57	(30%-105%)			
				Uncert:	+/-0.591	+/-0.709				
				TPU:	+/-0.879	+/-1.04				
QC1203962738 LCS										
Plutonium-241	178			148	pCi/L	REC: 83	(80%-120%)			02/07/1804:29
				Uncert:		+/-22.7				
				TPU:		+/-39.3				
**Plutonium-242 Tracer	4.93			3.55	pCi/L	REC: 72	(30%-105%)			
				Uncert:		+/-0.637				
				TPU:		+/-0.941				
Rad Gamma Spec										
Batch	1733809									
QC1203957837 MB										
Iodine-129				U	0.270	pCi/L		BSW1		01/29/1806:11
				Uncert:		+/-0.404				
				TPU:		+/-0.423				
QC1203957838 441685007 DUP										
Iodine-129		U	-0.272	U	-0.242	pCi/L				01/29/1806:40
				Uncert:	+/-0.462	+/-0.407		RPD: 0	N/A	
				TPU:	+/-0.479	+/-0.422		RER: 0.0928	(0-2)	
QC1203957839 441685007 MS										
Iodine-129	34.7	U	-0.272		33.2	pCi/L	REC: 97	(75%-125%)		01/29/1807:24
				Uncert:	+/-0.462	+/-3.12				
				TPU:	+/-0.479	+/-4.55				
QC1203957840 LCS										
Iodine-129	34.7				36.6	pCi/L	REC: 106	(80%-120%)		01/29/1808:18
				Uncert:		+/-4.18				
				TPU:		+/-5.55				
Rad Gas Flow										
Batch	1735174									
QC1203961245 MB										
Strontium-90				U	-0.275	pCi/L		KSD1		01/31/1813:59
				Uncert:		+/-0.649				
				TPU:		+/-0.649				
**Strontium Carrier	4.30			4.00	mg	REC: 93	(40%-110%)			
QC1203961246 442159005 DUP										
Strontium-90		U	-0.394	U	0.422	pCi/L				01/31/1817:47
				Uncert:	+/-0.516	+/-0.782		RPD: 0	N/A	
				TPU:	+/-0.516	+/-0.785		RER: 1.7	(0-2)	
**Strontium Carrier	4.30		4.00	3.80	mg	REC: 88	(40%-110%)			
QC1203961247 LCS										

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gas Flow									
Batch	1735174								
Strontium-90	78.6			83.8	pCi/L	REC: 107	(80%-120%)		
	Uncert:			+/-4.51					
	TPU:			+/-13.9					
**Strontium Carrier	4.30			4.00	mg	REC: 93	(40%-110%)		
Rad Liquid Scintillation									
Batch	1734776								
QC1203960228	MB								
Selenium-79			U	-5.02	pCi/L			CXS7	02/07/1814:17
	Uncert:			+/-19.0					
	TPU:			+/-19.0					
**Selenium Carrier	20.0			16.3	mg	REC: 82	(40%-110%)		
QC1203960229	441840002	DUP							
Selenium-79		U	-15.5	U	-14.2				02/07/1814:39
	Uncert:		+/-16.1		+/-18.7	RPD: 0	N/A		
	TPU:		+/-16.1		+/-18.7	RER: 0.106	(0-2)		
**Selenium Carrier	20.0		18.7		16.2	mg	REC: 81	(40%-110%)	
QC1203960230	LCS								
Selenium-79	5480			5640	pCi/L	REC: 103	(80%-120%)		02/07/1815:00
	Uncert:			+/-114					
	TPU:			+/-163					
**Selenium Carrier	20.0			17.8	mg	REC: 89	(40%-110%)		
Batch	1735946								
QC1203963163	MB								
Tritium			U	52.1	pCi/L			BXM4	02/02/1803:53
	Uncert:			+/-156					
	TPU:			+/-156					
QC1203963164	442329001	DUP							
Tritium			3350		3520	pCi/L			02/02/1804:44
	Uncert:		+/-305		+/-318	RPD: 5	(0%-20%)		
	TPU:		+/-716		+/-750	RER: 0.309	(0-2)		
QC1203963165	442329001	MS							
Tritium	4330		3350		8010	pCi/L	REC: 108	(75%-125%)	02/02/1805:35
	Uncert:		+/-305		+/-653				
	TPU:		+/-716		+/-1680				
QC1203963166	LCS								
Tritium	2160			1860	pCi/L	REC: 86	(80%-120%)		02/02/1806:26
	Uncert:			+/-244					
	TPU:			+/-434					
Batch	1735972								
QC1203963256	MB								
Technetium-99			U	-35.7	pCi/L			CXS7	02/13/1807:17
	Uncert:			+/-23.4					
	TPU:			+/-23.4					
**Technetium-99m Tracer	38500			36900	CPM	REC: 96	(30%-105%)		
QC1203963257	442156001	DUP							
Technetium-99			147		114	pCi/L			02/13/1815:19
	Uncert:		+/-27.8		+/-27.7	RPD: 25	(0% - 100%)		
	TPU:		+/-32.2		+/-30.5	RER: 1.45	(0-2)		
**Technetium-99m Tracer	38500		38900		36600	CPM	REC: 95	(30%-105%)	

QC Summary

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Liquid Scintillation										
Batch	1735972									
QC1203963258	LCS									
Technetium-99	888			749	pCi/L	REC: 84	(80%-120%)		02/13/1807:51	
	Uncert:			+/-48.2						
	TPU:			+/-96.1						
**Technetium-99m Tracer	38500			35500	CPM	REC: 92	(30%-105%)			
Batch	1736912									
QC1203965640	MB									
Carbon-14			U	-7.58	pCi/L			BXM4	02/07/1814:53	
	Uncert:			+/-15.4						
	TPU:			+/-15.4						
QC1203965641	441930001	DUP								
Carbon-14		U	13.4	U	-3.22				02/07/1815:09	
	Uncert:	+/-16.6		+/-15.7		RPD: 0	N/A			
	TPU:	+/-16.7		+/-15.7		RER: 1.42	(0-2)			
QC1203965642	441930001	MS								
Carbon-14	3630	U	13.4		3470	pCi/L	REC: 96	(75%-125%)	02/07/1815:25	
	Uncert:	+/-16.6		+/-185						
	TPU:	+/-16.7		+/-670						
QC1203965643	LCS									
Carbon-14	744			649	pCi/L	REC: 87	(80%-120%)		02/07/1815:41	
	Uncert:			+/-36.6						
	TPU:			+/-126						

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.