

December 01, 2020

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

Re: CHPRC SAF I21-004  
Work Order: 527001  
SDG: GEL527001

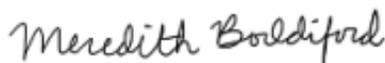
Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on November 11, 2020. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at [www.gel.com](http://www.gel.com).

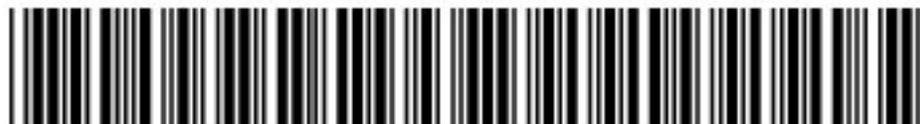
Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4505.

Sincerely,



Meredith Boddiford for  
Heather Shaffer  
Project Manager

Purchase Order: 300071 - 7H  
Chain of Custody: I21-004-170 and I21-004-171  
Enclosures



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# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company (74393)  
CHPRC SAF I21-004  
SDG: GEL527001**

**December 01, 2020**

**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 November 11, 2020, 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:

<b>Laboratory Identification</b>	<b>Sample Description</b>
527001001	B3XPF3
527001002	B3XPF4

**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 Analytical Laboratory Services for CH2M Hill Plateau Remediation Company Statement of Work, 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 data package deliverable 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.

*Meredith Boddiford*  
Dec 9 2020

Meredith Boddiford for  
Heather Shaffer  
Project Manager

**Radiochemistry**  
**Technical Case Narrative**  
**CH2M Hill Plateau Remediation Company**  
**SDG #: GEL527001**  
**Work Order #: 527001**

**SMR\_AM241\_AEA**

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**

Sample 527001002 (B3XPF4) did not meet the resolution requirement of having a full width half maximum of 100 keV or less for the tracer; however, the tracer yield requirement was met and the tracer peak is within the tracer region of interest.

**SMR\_PUISO\_AEA**

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 1204692863 (MB) was recounted due to a peak shift. The recount is reported.

**SMR\_COMMON\_GEA + SB-125CS-134K-40**

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.

**SMR\_SR\_RAD\_GPC**

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 1204692256 (B3XNT9DUP), 527001001 (B3XPF3) and 527001002 (B3XPF4) were verified by recounting at least five days from the separation date. The recounts are reported.

**SMR\_PU241\_LSC**

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 high relative percent difference/relative error ratio. The re-analysis is being reported.

#### **Miscellaneous Information**

##### **Additional Comments**

Samples 1204702576 (LCS) and 527001002 (B3XPF4) did not meet the resolution requirement of having a full width half maximum of 100 keV or less for the tracer; however, the tracer yield requirement was met and the tracer peaks are within the tracer region of interest.

#### **SMR\_C14\_LSC**

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

#### **Certification Statement**

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

# **Chain of Custody and Supporting Documentation**

CH2M Hill Plateau Remediation Company  
 C.O.C.# I21-004-170  
 Page 1 of 1

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

527001

Collector: **Lorin Kelly**  
 Telephone No.: 509-376-4650  
 SAF No.: I21-004  
 Contact/Requester: Karen Waters-Husted  
 Sampling Origin: Hanford Site  
 Project Title: AEA 1, November 2020  
 Purchase Order/Charge Code: 300071  
 Shipped To (Lab): GEL Laboratories, LLC  
 Logbook No.: HNF-N-506 117/37  
 Ice Chest No.: GWS-124  
 Method of Shipment: Commercial Carrier  
 Bill of Lading/Air Bill No.: 172030403241  
 Protocol: SURV  
 Priority: 30 Days  
 Offsite Property No.: N/A

**SPECIAL INSTRUCTIONS**

N/A  
 \*\* 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.

Sample No.	Filter	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3XPF3	N	NOV 09 2020	1035	2x1-L G/P	SMR_AM241_AEA; SMR_PU241_LSC; SMR_PUISO_AEA	6 Months	HNO3 to pH <2
B3XPF3	N	✓	↓	1x250-mL G/P	SMR_C14_LSC	6 Months	None
B3XPF3	N	✓	↓	1x1-L G/P	SMR_SR_RAD_GPC	6 Months	HNO3 to pH <2
B3XPF3	N	NOV 09 2020	1035	1x500-mL G/P	SMR_COMMON_GEA; SMR_SB-125CS-134K-40_GEA	6 Months	HNO3 to pH <2

Print First and Last Name	Signature	Date/Time	Print First and Last Name	Signature	Date/Time	Matrix *
Lorin Kelly	<i>L. Kelly</i>	NOV 09 2020 1055	Tim Callaway	<i>Tim Callaway</i>	NOV 09 2020 1055	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air
SSU-1	<i>Tim Callaway</i>	NOV 09 2020 1130	Troy Bacon	<i>Troy Bacon</i>	NOV 09 2020 1130	DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
	<i>Troy Bacon</i>	NOV 10 2020 1400	Stacy Boone	<i>Stacy Boone</i>	NOV 10 2020 1400	
	<i>Troy Bacon</i>	FED EX	GEL Laboratories	<i>Stacy Boone</i>	NOV 10 2020 1010	

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

Date/Time:

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

C.O.C.# I21-004-171  
Page 1 of 1

527001

Telephone No.: 509-376-4650  
Purchase Order/Charge Code: 300071  
Ice Chest No.: GWS-124  
Bill of Lading/Air Bill No.: 77203840324  
Offsite Property No.: NA

Contact/Requester: Karen Waters-Husted  
Sampling Origin: Hanford Site  
Logbook No.: HNF-N-506 17/37  
Method of Shipment: Commercial Carrier  
Priority: 30 Days

**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
B3XPF4	N	NOV 09 2020	1035	2x1-L G/P	SMR_AM241_AEA; SMR_PU241_LSC; SMR_PUISO_AEA	6 Months	HNO3 to pH <2
B3XPF4	N	✓	✓	1x250-mL G/P	SMR_C14_LSC	6 Months	None
B3XPF4	N	✓	✓	1x1-L G/P	SMR_SR_RAD_GPC	6 Months	HNO3 to pH <2
B3XPF4	N	NOV 09 2020	1035	1x500-mL G/P	SMR_COMMON_GEA; SMR_SB-125CS-134K-40_GEA	6 Months	HNO3 to pH <2

Print First and Last Name	Signature	Date/Time	Print First and Last Name	Signature	Date/Time	Matrix *
Lorin Kelly	<i>L. Kelly</i>	NOV 09 2020 1055	Tim Callaway /CHPRC	<i>T. Callaway</i>	NOV 09 2020 1055	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air
SSU-1	<i>T. Callaway</i>	NOV 09 2020 1130	Troy Bacon /CHPRC	<i>Troy L. Bacon</i>	NOV 09 2020 1136	DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
SSU-1	<i>Troy L. Bacon</i>	NOV 10 2020 0610	FEDEX	<i>Stacy Boone</i>	NOV 10 2020 0610	
SSU-1	<i>Stacy Boone</i>	NOV 10 2020 1400	FEDEX	<i>Stacy Boone</i>	NOV 11 2020 1010	

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

Disposed By: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Printed On: 10/20/2020 FSR ID = FSR100051 A-6004-842 (REV 4)



SAMPLE RECEIPT & REVIEW FORM

Client: **CPRC** SDG/AR/COC/Work Order: **527001**

Received By: **BOONE, S** Date Received: **11/11/20**

Carrier and Tracking Number: **7720 3848 2930 i c**

Circle Applicable:  
 FedEx Express  FedEx Ground  UPS  Field Services  Courier  Other   
**7720 4526 2052 i c**

Suspected Hazard Information

Yes  No

\*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.

A) Shipped as a DOT Hazardous?  Yes  No  
 Hazard Class Shipped: \_\_\_\_\_ UN#: \_\_\_\_\_  
 If UN2910, Is the Radioactive Shipment Survey Compliant? Yes \_\_\_ No \_\_\_

B) Did the client designate the samples are to be received as radioactive?  Yes  No  
 COC notation or radioactive stickers on containers equal client designation.

C) Did the RSO classify the samples as radioactive?  Yes  No  
 Maximum Net Counts Observed\* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr  
 Classified as: Rad 1 Rad 2 Rad 3

D) Did the client designate samples are hazardous?  Yes  No  
 COC notation or hazard labels on containers equal client designation.

E) Did the RSO identify possible hazards?  Yes  No  
 If D or E is yes, select Hazards below:  
 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"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
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 #: <b>IR1-20</b> 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 Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
					Do liquid VOA vials contain acid preservation? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA ___ (If unknown, select No)
					Are liquid VOA vials free of headspace? Yes <input checked="" type="checkbox"/> No ___ NA ___ 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"/>	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"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<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"/>	Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

**7720 4030 9990 i c** **7720 3840 3241 i c** **7720 4223 5851 i c**

PM (or PMA) review: Initials CT Date 11/12/20 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.		
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 >= 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 >= 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 >= 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	
o	Analyte failed to recover within LCS limits	Radiological	Rad

# Laboratory Certifications

**List of current GEL Certifications as of 01 December 2020**

<b>State</b>	<b>Certification</b>
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
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	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122021-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2019-165
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-20-17
Utah NELAP	SC000122020-33
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

# Radiological Analysis

# Case Narrative

**Radiochemistry**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company**  
**SDG #: GEL527001**  
**Work Order #: 527001**

**Product:** SMR\_AM241\_AEA

**Analytical Method:** AM241CMISO\_AEA

**Analytical Procedure:** GL-RAD-A-011 REV# 28

**Analytical Batch:** 2062210

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
527001001	B3XPF3
527001002	B3XPF4
1204692860	Method Blank (MB)
1204692861	526052001(NonSDG) Sample Duplicate (DUP)
1204692862	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**

Sample 527001002 (B3XPF4) did not meet the resolution requirement of having a full width half maximum of 100 keV or less for the tracer; however, the tracer yield requirement was met and the tracer peak is within the tracer region of interest.

**Product:** SMR\_PUIISO\_AEA

**Analytical Method:** PUIISO\_AEA

**Analytical Procedure:** GL-RAD-A-011 REV# 28

**Analytical Batch:** 2062211

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
527001001	B3XPF3
527001002	B3XPF4
1204692863	Method Blank (MB)
1204692864	526052001(NonSDG) Sample Duplicate (DUP)
1204692865	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 1204692863 (MB) was recounted due to a peak shift. The recount is reported.

**Product:** SMR\_COMMON\_GEA + SB-125CS-134K-40

**Analytical Method:** GEA

**Analytical Procedure:** GL-RAD-A-013 REV# 27

**Analytical Batch:** 2061613

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
527001001	B3XPF3
527001002	B3XPF4
1204691682	Method Blank (MB)
1204691683	527001001(B3XPF3) Sample Duplicate (DUP)
1204691684	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:** SMR\_SR\_RAD\_GPC

**Analytical Method:** SR\_RAD\_GPC

**Analytical Procedure:** GL-RAD-A-004 REV# 21

**Analytical Batch:** 2061934

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
527001001	B3XPF3
527001002	B3XPF4
1204692255	Method Blank (MB)
1204692256	526663001(B3XNT9) Sample Duplicate (DUP)
1204692257	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 1204692256 (B3XNT9DUP), 527001001 (B3XPF3) and 527001002 (B3XPF4) were verified by recounting at least five days from the separation date. The recounts are reported.

**Product:** SMR\_PU241\_LSC

**Analytical Method:** PU241\_LSC

**Analytical Procedure:** GL-RAD-A-035 REV# 21

**Analytical Batch:** 2066494

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
527001001	B3XPF3
527001002	B3XPF4
1204702574	Method Blank (MB)
1204702575	526290001(NonSDG) Sample Duplicate (DUP)
1204702576	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. The re-analysis is being reported.

**Miscellaneous Information**

**Additional Comments**

Samples 1204702576 (LCS) and 527001002 (B3XPF4) did not meet the resolution requirement of having a full width half maximum of 100 keV or less for the tracer; however, the tracer yield requirement was met and the tracer peaks are within the tracer region of interest.

**Product:** SMR\_C14\_LSC

**Analytical Method:** C14\_LSC

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

**Analytical Batch:** 2064255

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
527001001	B3XPF3
527001002	B3XPF4
1204697667	Method Blank (MB)
1204697668	526767002(B3XNW9) Sample Duplicate (DUP)
1204697669	526767002(B3XNW9) Matrix Spike (MS)
1204697670	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.

**Preparation Information**

**Aliquot Reduced**

1204697669 (B3XNW9MS) Aliquot was reduced due to limited 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**

CPRC002 CH2MHill Plateau Remediation Company (74393)

Client SDG: GEL527001 GEL Work Order: 527001

**The Qualifiers in this report are defined as follows:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

**Review/Validation**

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

**Signature:** **Name:** Theresa Austin**Date:** 08 DEC 2020**Title:** Group Leader

# Sample Data Summary

GEL527001

Dec 8, 2020

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001	Client: CPRC002	Project: CPRC0121004
Lab Sample ID: 527001001	Date Collected: 11/09/2020 10:35	Matrix: WATER
	Date Received: 11/11/2020 10:10	
Client ID: B3XPF3	Method: AM241CMISO_AEA	Prep Basis: "As Received"
Batch ID: 2062210	Analyst: MXS2	SOP Ref: GL-RAD-A-011
Run Date: 11/21/2020 09:45	Aliquot: 0.4 L	Instrument: 1090
Data File: S0527001001_AM.1A.gcnf	Prep Method: DOE EML HASL-300, Am-05	Count Time: 239.9998 min
Prep Batch: 2062210		
Prep Date: 11/13/2020 23:39		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.0312	pCi/L	+/-0.0716	0.0717	0.114	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	3.99	5.54	pCi/L	71.9	(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.

GEL527001

Dec 8, 2020

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001	Client: CPRC002	Project: CPRC0121004
Lab Sample ID: 527001001	Date Collected: 11/09/2020 10:35	Matrix: WATER
	Date Received: 11/11/2020 10:10	
Client ID: B3XPF3	Method: PUIISO_AEA	Prep Basis: "As Received"
Batch ID: 2062211	Analyst: MXS2	SOP Ref: GL-RAD-A-011
Run Date: 11/18/2020 13:48	Aliquot: 0.4 L	Instrument: 1090
Data File: S0527001001_PU.1A.gcnf	Prep Method: DOE EML HASL-300, Pu-11-	Count Time: 239.9998 min
Prep Batch: 2062211		
Prep Date: 11/13/2020 23:39		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13981-16-3	Plutonium-238	U	-0.0149	pCi/L	+/-0.0345	0.0346	0.102	1.00
OER-100-70	Plutonium-239/240	U	-0.0186	pCi/L	+/-0.0353	0.0354	0.109	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	4.49	4.80	pCi/L	93.7	(30%-105%)

**Comments:**

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Dec 8, 2020

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001	Client: CPRC002	Project: CPRC0121004
Lab Sample ID: 527001001	Date Collected: 11/09/2020 10:35	Matrix: WATER
	Date Received: 11/11/2020 10:10	
Client ID: B3XPF3	Method: PU241_LSC	Prep Basis: "As Received"
Batch ID: 2066494	Analyst: MXS2	SOP Ref: GL-RAD-A-035
Run Date: 11/29/2020 09:34	Aliquot: 0.4 L	Instrument: LSCMOCHA
Data File: PU2066494.xls	Prep Method: DOE EML HASL-300, Pu-11-	Count Time: 90 min
Prep Batch: 2066494		
Prep Date: 11/24/2020 12:53		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14119-32-5	Plutonium-241	U	5.86	pCi/L	+/-5.90	6.04	9.88	25.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	4.53	4.80	pCi/L	94.4	(30%-105%)

**Comments:**

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GEL527001

Dec 9, 2020

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001	Client: CPRC002	Project: CPRC0121004
Lab Sample ID: 527001001	Date Collected: 11/09/2020 10:35	Matrix: WATER
	Date Received: 11/11/2020 10:10	
Client ID: B3XPF3	Method: SR_RAD_GPC	Prep Basis: "As Received"
Batch ID: 2061934	Analyst: JXC9	SOP Ref: GL-RAD-A-004
Run Date: 11/21/2020 14:29	Aliquot: 300 mL	Instrument: PIC5B
Data File: S2061934r1.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 2061934		
Prep Date: 11/13/2020 10:11		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90		17.6	pCi/L	+/-1.65	4.37	0.898	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	3.90	4.67	mg	83.6	(40%-110%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001  
 Lab Sample ID: 527001001  
 Client ID: B3XPF3  
 Batch ID: 2061613  
 Run Date: 11/12/2020 17:14  
 Data File: G527001001.CNF;1  
 Prep Batch: 2061613  
 Prep Date: 11/12/2020 11:12

Client: CPRC002  
 Date Collected: 11/09/2020 10:35  
 Date Received: 11/11/2020 10:10  
 Method: GEA  
 Analyst: MXR1  
 Aliquot: 0.5 L  
 Prep Method: EPA 901.1

Project: CPRC0121004  
 Matrix: WATER  
 Prep Basis: "As Received"  
 SOP Ref: GL-RAD-A-013  
 Instrument: GAM07  
 Count Time: 120 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14234-35-6	Antimony-125	U	6.37	pCi/L	+/-12.6	13.0	25.1	
13967-70-9	Cesium-134	U	0.989	pCi/L	+/-4.35	4.38	8.83	
10045-97-3	Cesium-137	U	-2.96	pCi/L	+/-4.90	5.08	8.36	15.0
10198-40-0	Cobalt-60	U	5.15	pCi/L	+/-4.77	5.33	11.9	
14683-23-9	Europium-152	U	22.6	pCi/L	+/-15.7	18.8	22.8	
15585-10-1	Europium-154	U	-6.39	pCi/L	+/-12.1	12.4	22.1	
14391-16-3	Europium-155	U	-7.47	pCi/L	+/-14.1	14.5	23.8	
13966-00-2	Potassium-40	U	52.4	pCi/L	+/-68.3	68.5	94.0	

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.

GEL527001

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001	Client: CPRC002	Project: CPRC0121004
Lab Sample ID: 527001001	Date Collected: 11/09/2020 10:35	Matrix: WATER
	Date Received: 11/11/2020 10:10	
Client ID: B3XPF3	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 2064255	Analyst: EW3	SOP Ref: GL-RAD-A-003
Run Date: 11/30/2020 18:39	Aliquot: 100 mL	Instrument: LSCBLUE
Data File: C2064255.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 15 min
Prep Batch: 2064255		
Prep Date: 11/30/2020 09:08		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14		45.4	pCi/L	+/-18.1	20.0	27.9	50.0

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

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001	Client: CPRC002	Project: CPRC0121004
Lab Sample ID: 527001002	Date Collected: 11/09/2020 10:35	Matrix: WATER
	Date Received: 11/11/2020 10:10	
Client ID: B3XPF4	Method: AM241CMISO_AEA	Prep Basis: "As Received"
Batch ID: 2062210	Analyst: MXS2	SOP Ref: GL-RAD-A-011
Run Date: 11/21/2020 09:45	Aliquot: 0.4 L	Instrument: 1091
Data File: S0527001002_AM.1A.gcnf	Prep Method: DOE EML HASL-300, Am-05	Count Time: 239.9998 min
Prep Batch: 2062210		
Prep Date: 11/13/2020 23:39		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.0111	pCi/L	+/-0.0778	0.0778	0.160	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	4.33	5.54	pCi/L	78.1	(30%-105%)

**Comments:**

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001	Client: CPRC002	Project: CPRC0121004
Lab Sample ID: 527001002	Date Collected: 11/09/2020 10:35	Matrix: WATER
	Date Received: 11/11/2020 10:10	
Client ID: B3XPF4	Method: PUIISO_AEA	Prep Basis: "As Received"
Batch ID: 2062211	Analyst: MXS2	SOP Ref: GL-RAD-A-011
Run Date: 11/18/2020 13:48	Aliquot: 0.4 L	Instrument: 1091
Data File: S0527001002_PU.1A.gcnf	Prep Method: DOE EML HASL-300, Pu-11-	Count Time: 239.9998 min
Prep Batch: 2062211		
Prep Date: 11/13/2020 23:39		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13981-16-3	Plutonium-238	U	0.0275	pCi/L	+/-0.0623	0.0624	0.107	1.00
OER-100-70	Plutonium-239/240	U	-0.0274	pCi/L	+/-0.0682	0.0682	0.168	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	4.47	4.80	pCi/L	93.1	(30%-105%)

**Comments:**

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GEL527001

Dec 8, 2020

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001	Client: CPRC002	Project: CPRC0121004
Lab Sample ID: 527001002	Date Collected: 11/09/2020 10:35	Matrix: WATER
	Date Received: 11/11/2020 10:10	
Client ID: B3XPF4	Method: PU241_LSC	Prep Basis: "As Received"
Batch ID: 2066494	Analyst: MXS2	SOP Ref: GL-RAD-A-035
Run Date: 11/29/2020 11:06	Aliquot: 0.4 L	Instrument: LSCMOCHA
Data File: PU2066494.xls	Prep Method: DOE EML HASL-300, Pu-11-	Count Time: 90 min
Prep Batch: 2066494		
Prep Date: 11/24/2020 12:53		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14119-32-5	Plutonium-241	U	6.80	pCi/L	+/-7.17	7.34	12.0	25.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	3.73	4.80	pCi/L	77.8	(30%-105%)

**Comments:**

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GEL527001

Dec 9, 2020

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001	Client: CPRC002	Project: CPRC0121004
Lab Sample ID: 527001002	Date Collected: 11/09/2020 10:35	Matrix: WATER
	Date Received: 11/11/2020 10:10	
Client ID: B3XPF4	Method: SR_RAD_GPC	Prep Basis: "As Received"
Batch ID: 2061934	Analyst: JXC9	SOP Ref: GL-RAD-A-004
Run Date: 11/21/2020 14:29	Aliquot: 300 mL	Instrument: PIC5C
Data File: S2061934r1.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 2061934		
Prep Date: 11/13/2020 10:11		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90		15.4	pCi/L	+/-1.60	3.89	0.957	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	3.70	4.67	mg	79.3	(40%-110%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
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GEL527001

Dec 8, 2020

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001  
 Lab Sample ID: 527001002  
  
 Client ID: B3XPF4  
 Batch ID: 2061613  
 Run Date: 11/12/2020 17:14  
 Data File: G527001002.CNF;1  
 Prep Batch: 2061613  
 Prep Date: 11/12/2020 11:12

Client: CPRC002  
 Date Collected: 11/09/2020 10:35  
 Date Received: 11/11/2020 10:10  
  
 Method: GEA  
 Analyst: MXR1  
 Aliquot: 0.5 L  
 Prep Method: EPA 901.1

Project: CPRC0121004  
 Matrix: WATER  
  
 Prep Basis: "As Received"  
 SOP Ref: GL-RAD-A-013  
 Instrument: GAM11  
 Count Time: 120 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14234-35-6	Antimony-125	U	8.23	pCi/L	+/-11.3	12.0	23.1	
13967-70-9	Cesium-134	U	1.38	pCi/L	+/-5.30	5.33	10.2	
10045-97-3	Cesium-137	U	2.62	pCi/L	+/-8.44	8.45	8.80	15.0
10198-40-0	Cobalt-60	U	1.45	pCi/L	+/-5.54	5.58	11.4	
14683-23-9	Europium-152	U	-0.458	pCi/L	+/-11.3	11.3	21.4	
15585-10-1	Europium-154	U	3.39	pCi/L	+/-12.8	12.9	27.2	
14391-16-3	Europium-155	U	6.91	pCi/L	+/-13.1	13.5	24.7	
13966-00-2	Potassium-40	U	-32.5	pCi/L	+/-60.5	62.3	110	

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

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GEL527001

Dec 9, 2020

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**Certificate of Analysis  
Sample Summary**

SDG Number: GEL527001  
Lab Sample ID: 527001002

Client: CPRC002  
Date Collected: 11/09/2020 10:35  
Date Received: 11/11/2020 10:10

Project: CPRC0121004  
Matrix: WATER

Client ID: B3XPF4  
Batch ID: 2064255  
Run Date: 11/30/2020 18:55  
Data File: C2064255.xls  
Prep Batch: 2064255  
Prep Date: 11/30/2020 09:08

Method: C14\_LSC  
Analyst: EW3  
Aliquot: 100 mL  
Prep Method: EPA EERF C-01 Modified

Prep Basis: "As Received"  
SOP Ref: GL-RAD-A-003  
Instrument: LSCBLUE  
Count Time: 15 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14		39.5	pCi/L	+/-17.8	19.3	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.  
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# Quality Control Summary

QC Summary

Report Date: December 8, 2020  
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Client : CH2MHill Plateau Remediation Company  
MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352  
Contact: Mr. Scot Fitzgerald  
Workorder: 527001

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	2062210								
QC1204692860 MB									
Americium-241			U	0.00515	pCi/L			MXS2	11/21/2009:45
				Uncert: +/-0.0538					
				TPU: +/-0.0539					
**Americium-243 Tracer	5.54			4.95	pCi/L	REC: 89	(30%-105%)		
				Uncert: +/-0.625					
				TPU: +/-0.956					
QC1204692861 526052001 DUP									
Americium-241		U	-0.0263	U	-0.0616	pCi/L			
			Uncert: +/-0.0498		+/-0.0639		RPD: 0	N/A	
			TPU: +/-0.0499		+/-0.0640		RER: 0.851	(0-2)	
**Americium-243 Tracer	5.54		3.70		4.37	pCi/L	REC: 79	(30%-105%)	
			Uncert: +/-0.682		+/-0.627				
			TPU: +/-1.03		+/-0.959				
QC1204692862 LCS									
Americium-241					5.05	pCi/L	REC: 102	(80%-120%)	11/21/2010:52
					Uncert: +/-0.707				
					TPU: +/-1.03				
**Americium-243 Tracer	5.54				4.13	pCi/L	REC: 75	(30%-105%)	
					Uncert: +/-0.736				
					TPU: +/-1.10				
Batch	2062211								
QC1204692863 MB									
Plutonium-238			U	0.0118	pCi/L			MXS2	11/19/2012:58
				Uncert: +/-0.0653					
				TPU: +/-0.0654					
Plutonium-239/240			U	-0.0922	pCi/L				
				Uncert: +/-0.0632					
				TPU: +/-0.0633					
**Plutonium-242 Tracer	4.80				3.26	pCi/L	REC: 68	(30%-105%)	
					Uncert: +/-0.653				
					TPU: +/-0.961				
QC1204692864 526052001 DUP									
Plutonium-238		U	0.00120	U	-0.0132	pCi/L			11/18/2013:48
			Uncert: +/-0.0552		+/-0.0595		RPD: 0	N/A	
			TPU: +/-0.0553		+/-0.0596		RER: 0.346	(0-2)	
Plutonium-239/240		U	-0.00661	U	0.00155	pCi/L			
			Uncert: +/-0.0456		+/-0.0711		RPD: 0	N/A	
			TPU: +/-0.0457		+/-0.0712		RER: 0.189	(0-2)	
**Plutonium-242 Tracer	4.80		4.14		3.58	pCi/L	REC: 75	(30%-105%)	
			Uncert: +/-0.528		+/-0.604				
			TPU: +/-0.792		+/-0.894				
QC1204692865 LCS									
Plutonium-238			U	0.0205	pCi/L				11/18/2013:48
				Uncert: +/-0.0700					

QC Summary

Workorder: 527001

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	2062211								
Plutonium-239/240	5.01	TPU:		+/-0.0701					
		Uncert:		4.78	pCi/L	REC: 95.3	(80%-120%)		
		TPU:		+/-0.608					
**Plutonium-242 Tracer	4.80	TPU:		+/-0.899					
		Uncert:		3.74	pCi/L	REC: 78	(30%-105%)		
		TPU:		+/-0.610					
Batch	2066494								
QC1204702574	MB								
Plutonium-241			U	-3.12	pCi/L			MXS2	11/29/2012:38
		Uncert:		+/-6.19					
		TPU:		+/-6.19					
**Plutonium-242 Tracer	4.80			4.18	pCi/L	REC: 87	(30%-105%)		
		Uncert:		+/-0.739					
		TPU:		+/-1.08					
QC1204702575	526290001	DUP							
Plutonium-241		U	3.25	U	4.88				11/29/2014:09
		Uncert:	+/-5.96		+/-6.73	RPD: 0	N/A		
		TPU:	+/-6.00		+/-6.83	RER: 0.35	(0-2)		
**Plutonium-242 Tracer	4.80		4.46		3.98	pCi/L	REC: 83	(30%-105%)	
		Uncert:	+/-0.603		+/-0.745				
		TPU:	+/-0.892		+/-1.09				
QC1204702576	LCS								
Plutonium-241	196			229	pCi/L	REC: 117	(80%-120%)		11/29/2015:41
		Uncert:		+/-9.89					
		TPU:		+/-54.1					
**Plutonium-242 Tracer	4.80			4.30	pCi/L	REC: 90	(30%-105%)		
		Uncert:		+/-0.733					
		TPU:		+/-1.07					
<b>Rad Gamma Spec</b>									
Batch	2061613								
QC1204691682	MB								
Antimony-125			U	-4.42	pCi/L			MXR1	11/12/2017:15
		Uncert:		+/-12.8					
		TPU:		+/-12.9					
Cesium-134			U	3.75	pCi/L				
		Uncert:		+/-4.09					
		TPU:		+/-4.44					
Cesium-137			U	4.22	pCi/L				
		Uncert:		+/-4.64					
		TPU:		+/-5.03					
Cobalt-60			U	-1.94	pCi/L				
		Uncert:		+/-6.25					
		TPU:		+/-6.31					
Europium-152			U	-8.07	pCi/L				
		Uncert:		+/-12.9					
		TPU:		+/-13.4					
Europium-154			U	-9.00	pCi/L				
		Uncert:		+/-13.9					

QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	2061613								
Europium-155		TPU:		+/-14.5					
			U	-2.19	pCi/L				
		Uncert:		+/-14.7					
Potassium-40		TPU:		+/-14.7					
			U	10.8	pCi/L				
		Uncert:		+/-72.4					
		TPU:		+/-72.6					
QC1204691683	527001001	DUP							
Antimony-125		U	6.37	U	10.7	pCi/L			11/12/2019:19
		Uncert:	+/-12.6		+/-13.5		RPD: 0	N/A	
		TPU:	+/-13.0		+/-14.4		RER: 0.438	(0-2)	
Cesium-134		U	0.989	U	2.38	pCi/L			
		Uncert:	+/-4.35		+/-4.01		RPD: 0	N/A	
		TPU:	+/-4.38		+/-4.16		RER: 0.452	(0-2)	
Cesium-137		U	-2.96	U	0.538	pCi/L			
		Uncert:	+/-4.90		+/-4.54		RPD: 0	N/A	
		TPU:	+/-5.08		+/-4.54		RER: 1.01	(0-2)	
Cobalt-60		U	5.15	U	2.45	pCi/L			
		Uncert:	+/-4.77		+/-4.63		RPD: 0	N/A	
		TPU:	+/-5.33		+/-4.77		RER: 0.74	(0-2)	
Europium-152		U	22.6	U	2.96	pCi/L			
		Uncert:	+/-15.7		+/-10.3		RPD: 0	N/A	
		TPU:	+/-18.8		+/-10.4		RER: 1.79	(0-2)	
Europium-154		U	-6.39	U	-6.66	pCi/L			
		Uncert:	+/-12.1		+/-10.8		RPD: 0	N/A	
		TPU:	+/-12.4		+/-11.2		RER: 0.0311	(0-2)	
Europium-155		U	-7.47	U	3.99	pCi/L			
		Uncert:	+/-14.1		+/-13.8		RPD: 0	N/A	
		TPU:	+/-14.5		+/-13.9		RER: 1.12	(0-2)	
Potassium-40		U	52.4	U	-22.1	pCi/L			
		Uncert:	+/-68.3		+/-48.8		RPD: 0	N/A	
		TPU:	+/-68.5		+/-49.9		RER: 1.72	(0-2)	
QC1204691684	LCS								
Americium-241	1.09E+05			1.25E+05	pCi/L	REC: 114	(80%-120%)		11/12/2017:16
		Uncert:		+/-3290					
		TPU:		+/-12500					
Antimony-125				U	-60.8	pCi/L			
		Uncert:			+/-400				
		TPU:			+/-401				
Cesium-134				U	-171	pCi/L			
		Uncert:			+/-143				
		TPU:			+/-163				
Cesium-137	38900			40700	pCi/L	REC: 105	(80%-120%)		
		Uncert:		+/-758					
		TPU:		+/-3500					
Cobalt-60	24300			25600	pCi/L	REC: 105	(80%-120%)		
		Uncert:		+/-757					
		TPU:		+/-2500					
Europium-152				U	-91.0	pCi/L			
		Uncert:			+/-359				

**QC Summary**

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	2061613								
Europium-154		TPU:		+/-361					
			U	-132	pCi/L				
		Uncert:		+/-207					
		TPU:		+/-216					
Europium-155			U	155	pCi/L				
		Uncert:		+/-388					
		TPU:		+/-394					
Potassium-40			U	60.4	pCi/L				
		Uncert:		+/-420					
		TPU:		+/-421					
<b>Rad Gas Flow</b>									
Batch	2061934								
QC1204692255	MB								
Strontium-90			U	-0.880	pCi/L			JXC9	11/16/2014:11
		Uncert:		+/-0.859					
		TPU:		+/-0.859					
*Strontium Carrier		4.67		3.70	mg	REC:	79 (40%-110%)		
QC1204692256	526663001	DUP							
Strontium-90		6.16		6.58	pCi/L				11/21/2014:28
		Uncert:	+/-1.11	+/-1.25		RPD:	7 (0%-20%)		
		TPU:	+/-1.81	+/-1.97		RER:	0.306 (0-2)		
*Strontium Carrier		4.67	3.70	3.50	mg	REC:	75 (40%-110%)		
QC1204692257	LCS								
Strontium-90		72.5		79.9	pCi/L	REC:	110 (80%-120%)		11/16/2014:11
		Uncert:		+/-4.82					
		TPU:		+/-19.2					
*Strontium Carrier		4.67		3.80	mg	REC:	82 (40%-110%)		
<b>Rad Liquid Scintillation</b>									
Batch	2064255								
QC1204697667	MB								
Carbon-14			U	16.8	pCi/L			EW3	11/30/2019:52
		Uncert:		+/-16.7					
		TPU:		+/-17.0					
QC1204697668	526767002	DUP							
Carbon-14		49.7		62.9	pCi/L				11/30/2020:09
		Uncert:	+/-18.4	+/-18.9		RPD:	23 (0% - 100%)		
		TPU:	+/-20.5	+/-22.2		RER:	0.853 (0-2)		
QC1204697669	526767002	MS							
Carbon-14		5030	49.7	4830	pCi/L	REC:	95 (75%-125%)		11/30/2020:25
		Uncert:	+/-18.4	+/-257					
		TPU:	+/-20.5	+/-934					
QC1204697670	LCS								
Carbon-14		755		763	pCi/L	REC:	101 (80%-120%)		11/30/2020:41
		Uncert:		+/-39.3					
		TPU:		+/-147					

**Notes:**

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

The Qualifiers in this report are defined as follows:

### QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
B	The analyte was detected in the associated method blank $\geq$ MDC or $>5\%$ sample activity.									
D	Results are reported from a diluted aliquot of sample.									
E	Reported value is estimated due to interferences. See comment in narrative.									
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									
o	Analyte failed to recover within LCS limits									

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.