



a member of **The GEL Group** INC



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August 24, 2020

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

Re: CHPRC SAF F17-054
Work Order: 518958
SDG: GEL518958

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 18, 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.

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

Sincerely,

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

Heather Shaffer
Project Manager

Purchase Order: 300009
Chain of Custody: F17-054-006 and F17-054-007
Enclosures

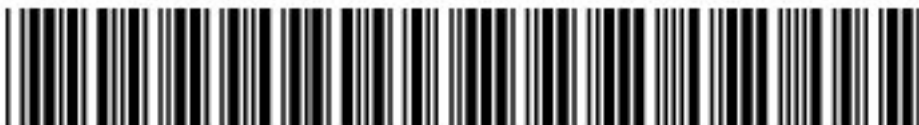


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Sample Issue Resolution

SAMPLE ISSUE RESOLUTION (SIR) REPORT		SIR Number: SIR20-0282
		Rev. Number: 0
		Date Initiated: 08/18/2020
<u>SAMPLE EVENT INFORMATION</u>		
SAF NUM(S):	F17-054	
LABORATORY:	GEL	
<u>SAMPLING INFORMATION</u>		
NUMBER OF SAMPLES:	2	
SAMPLE NUMBERS:	B3VV01, B3X6V6	
SAMPLE MATRIX:	WATER	
SDG NUM(S):	GEL518958	
<u>ISSUE BACKGROUND</u>		
CLASS:	General Laboratory Direction	
TYPE:	Clarification of Direction	
DESCRIPTION:	There is a comment on the chain of custody for these two IDs: combine contents from B3X6V6 and B3VV01 to run one set of requested analysis.	
	This is not an issue but please advise which ID you want the analysis reported under.	
<u>RESOLUTION</u>		
PROPOSED RESOLUTION:	Please report under B3VV01.	
FINAL RESOLUTION:	Please report under B3VV01.	
SUBMITTED BY:		
SHAFFER, H	_____	08/18/2020 _____
ACCEPTED BY:		
HEY, BE	_____	08/18/2020 _____

Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF F17-054
SDG: GEL518958**

August 24, 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 August 18, 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. Please see the enclosed SIR for further details on composite instructions.

Items of Note All efforts were made by the lab to meet any short hold times. Samples that were analyzed outside of the initial hold time but still within 2X hold time will be noted in the lab case narrative.

Sample Identification

The laboratory received the following samples:

Laboratory Identification	Sample Description
518958001	B3VV01
518958002	B3X6V6

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.

Heather Shaffer

Heather Shaffer
Project Manager

Radiochemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company
SDG #: GEL518958
Work Order #: 518958

GAMMA_GS: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**RDL Met**

The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1204622474 (MB)	Cesium-137	Result -624 < MDA 4170 > RDL 15 pCi/L

9310_ALPHABETA_GPC: COMMON

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information**Matrix Spike (MS) Recovery**

The Matrix Spike (See Below) did not meet recovery requirements due to the sample activity being greater than five times the spiked nominal concentration.

Sample	Analyte	Value
1204622819 (B3VV01MS)	BETA	-592* (75%-125%), but result > 5x nominal
1204622820 (B3VV01MSD)	BETA	-1570* (75%-125%), but result > 5x nominal

RDL Met

The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1204622817 (MB)	ALPHA	Result -4030 < MDA 29200 > RDL 3 pCi/L
	BETA	Result 11800 < MDA 19400 > RDL 4 pCi/L

The following detection limits were not achieved due to high sample activity.

Sample	Analyte	Value
1204622818 (B3VV01DUP)	ALPHA	Result 2900 < MDA 19500 > RDL 3 pCi/L
518958001 (B3VV01)	ALPHA	Result -1510 < MDA 18500 > RDL 3 pCi/L

Technical Information

Negative > 3 sigma TPU

Sample results were more negative than the three sigma TPU. Due to high beta activity, samples were not recounted.

Sample	Analyte	Value
1204622817 (MB)	ALPHA	Negative Result > 3 sigma value
518958001 (B3VV01)	ALPHA	Negative Result > 3 sigma value

Gross Alpha/Beta Preparation Information

None of the samples have been flamed.

Miscellaneous Information

Additional Comments

Samples were counted in alpha mode only and processed without spill over correction.

SRTOT_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.

Quality Control (QC) Information

RDL Met

The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1204622822 (MB)	Total Strontium	Result -1240 < MDA 16700 > RDL 2 pCi/L

Laboratory Composite - B3VV01 and B3X6V6

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**

Samples 518958001(B3VV01) and 518958002(B3X6V6) were combined to create just 518958001(B3VV01) which amounted to 90mLs.

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

COLLECTOR <i>M. Hammer</i>		COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR SUMNER, LC	REQUIRED TAT 7 Days ORIGINAL 518958
SAMPLING LOCATION TP-SAMPLE-4		PROJECT DESIGNATION WESF TK-100 Sampling to ETF for Wastewater Disposal		SAF NO. F17-054	
ICE CHEST NO. <i>GWS-665</i>		FIELD LOGBOOK NO. <i>N/A</i>	ACTUAL SAMPLE DEPTH <i>N/A</i>	PURCHASE ORDER/CHARGE CODE 300009	METHOD OF SHIPMENT FEDERAL EXPRESS
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO. <i>N/A</i>		BILL OF LADING/AIR BILL NO. <i>7712 7806 493</i>	

MATRIX* A=Air DL=Drum L=Liquids DS=Drum S=Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.		PRESERVATION HNO3 to pH <2	
			HOLDING TIME 6 Months	
			TYPE OF CONTAINER G/P	
			NO. OF CONTAINER(S) 1	
			VOLUME <i>2x 8-11-20 @ 60ml</i>	
SPECIAL HANDLING AND/OR STORAGE N/A		SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS		

SAMPLE NO.	FILTERED	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B3VV01	N/A	WATER	3/12/20	0830	✓

RELINQUISHED BY/REMOVED FROM	DATE/TIME	SIGN/ PRINT NAMES	RECEIVED BY/STORED IN	DATE/TIME	SPECIAL INSTRUCTIONS
<i>MIKE Hammer</i>	<i>AUG 11 2020 0830</i>	<i>L. Kelly</i>	<i>L. Kelly</i>	<i>AUG 11 2020 0830</i>	TRVL-20-082 SAMPLE REROUTED FROM CRCF TO GEL LAB COMMENT: COMBINE CONTENTS FROM B3X6V6 AND B3VV01 TO RUN ONE SET OF REQUESTED ANALYSIS (1) GAMMA_GS: COMMON; 9310_ALPHABETA_GPC: COMMON {Gross alpha, Gross beta}; SRTOT_SEP_PRECIP_GPC: COMMON;
<i>Lorin Kelly</i>	<i>AUG 11 2020 0901</i>	<i>SSU-1</i>	<i>SSU-1</i>	<i>AUG 11 2020 0901</i>	
<i>SSU-1</i>	<i>AUG 17 2020 0920</i>	<i>Troy Bacon</i>	<i>Troy Bacon</i>	<i>AUG 17 2020 0920</i>	
<i>FedEx</i>	<i>AUG 17 2020 1400</i>	<i>FEDEX</i>	<i>FEDEX</i>	<i>AUG 18 2020 11:00</i>	
<i>FedEx</i>	<i>AUG 18 2020 11:00</i>	<i>Zacursham/z</i>	<i>Zacursham/z</i>	<i>AUG 18 2020 11:00</i>	

FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

GEL518958

August 25, 2020

Rev. 0

COLLECTOR <i>M. HAMMER</i>		COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR SUMNER, LC	REQUIRED TAT 7 Days ORIGINAL 518958
SAMPLING LOCATION TP-SAMPLE-5		PROJECT DESIGNATION WESF TK-100 Sampling to ETF for Wastewater Disposal		SAF NO. F17-054	
ICE CHEST NO. <i>GWS-665</i>		FIELD LOGBOOK NO. <i>N/A</i>	ACTUAL SAMPLE DEPTH <i>N/A</i>	PURCHASE ORDER/CHARGE CODE 300009	METHOD OF SHIPMENT FEDERAL EXPRESS
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO. <i>N/A</i>		BILL OF LADING/AIR BILL NO. <i>7712 7801 6493</i>	

MATRIX*
 A=Air
 DL=Drum
 L=Liquids
 DS=Drum
 S=Solids
 L=Liquid
 O=Oil
 S=Soil
 SE=Sediment
 T=Tissue
 V=Vegetation
 W=Water
 WI=Wipe
 X=Other

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

SPECIAL HANDLING AND/OR STORAGE
 N/A

PRESERVATION
 HNO3 to pH <2

HOLDING TIME
 6 Months

TYPE OF CONTAINER
 G/P

NO. OF CONTAINER(S)
 1

VOLUME
8-11-20 AT 60ml

SAMPLE ANALYSIS
 SEE ITEM (1) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	FILTERED	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B3X6V6	N/A	WATER	3/12/20	1300	✓

GEL518958

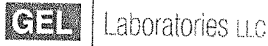
August 25, 2020

RELINQUISHED BY/REMOVED FROM	DATE/TIME	SIGN/ PRINT NAMES	RECEIVED BY/STORED IN	DATE/TIME	SPECIAL INSTRUCTIONS
<i>MIKE HAMMER</i>	<i>AUG 11 2020 0830</i>	<i>Mike Hammer</i>	<i>Lorin Kelly</i>	<i>AUG 11 2020 0830</i>	LAB COMMENT: COMBINE CONTENTS FROM B3X6V6 AND B3VV01 TO RUN ONE SET OF REQUESTED ANALYSIS (1) GAMMA_GS: COMMON; 9310_ALPHABETA_GPC: COMMON {Gross alpha, Gross.beta}; SRTOT_SEP_PRECIP_GPC: COMMON;
<i>Lorin Kelly</i>	<i>0830</i>	<i>L. Kelly</i>	<i>L. Kelly</i>	<i>0900</i>	
<i>Lorin Kelly</i>	<i>AUG 11 2020 0900</i>	<i>L. Kelly</i>	<i>SSU-1</i>	<i>AUG 11 2020 0900</i>	
<i>SSU-1</i>	<i>AUG 17 2020 0920</i>	<i>Troy Bacon</i>	<i>Troy L. Bacon</i>	<i>AUG 17 2020 0920</i>	
<i>Troy Bacon</i>	<i>AUG 17 2020 1400</i>	<i>Troy L. Bacon</i>	FEDEX		
<i>FedEx</i>			<i>Zac Washburn</i>	<i>8/18/20 11:00</i>	

FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME
PRINTED ON 8/4/2020	FSR ID = FSR95081	TRVL NUM = TRVL-20-082	A-6003-618 (REV 3)

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Rev. 0



SAMPLE RECEIPT & REVIEW FORM

Client: <u>CPAC</u>		SDG/AR/COC/Work Order: <u>518958</u>		
Received By: <u>ZKW AM</u> <u>8/16/20</u>		Date Received: <u>8/16/20</u>		
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <u>7712 7801 6493</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.		
A) Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: <u>2910</u> If UN2910, Is the Radioactive Shipment Survey Compliant? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
B) Did the client designate the samples are to be received as radioactive?	<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.		
C) Did the RSO classify the samples as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>2</u> CPM/mR/Hr Classified as: Rad 1 <input checked="" type="checkbox"/> Rad 2 <input checked="" type="checkbox"/> Rad 3 <input type="checkbox"/>		
D) Did the client designate samples are hazardous?	<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.		
E) Did the RSO identify possible hazards?	<input checked="" type="checkbox"/>	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 checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	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 checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice <input checked="" type="checkbox"/> Ice Packs <input checked="" type="checkbox"/> Dry ice <input type="checkbox"/> None <input type="checkbox"/> Other: _____ *all temperatures are recorded in Celsius TEMP: <u>0</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR3-18</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	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 checked="" 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 checked="" type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)
Comments (Use Continuation Form if needed):				

PM (or PMA) review: Initials MB Date 8/19/20 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 \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	
o	Analyte failed to recover within LCS limits	Radiological	Rad

Laboratory Certifications

List of current GEL Certifications as of 24 August 2020

State	Certification
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	SC000122020-1
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	SC000122020-32
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
CH2M Hill Plateau Remediation Company
SDG #: GEL518958
Work Order #: 518958

Product: GAMMA_GS:COMMON

Analytical Method: GEA

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

Analytical Batch: 2031042

Composite Preparation Method: GL-RAD-A-026

Composite Preparation Procedure: GL-RAD-A-026 REV# 18

Composite Preparation Batch: 2031041

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
518958001	B3VV01
1204622474	Method Blank (MB)
1204622475	518958001(B3VV01) Sample Duplicate (DUP)
1204622476	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

RDL Met

The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1204622474 (MB)	Cesium-137	Result -624 < MDA 4170 > RDL 15 pCi/L

Product: 9310_ALPHABETA_GPC: COMMON

Analytical Method: ALPHABETA_GPC

Analytical Procedure: GL-RAD-A-001 REV# 20

Analytical Batch: 2031189

Composite Preparation Method: GL-RAD-A-026

Composite Preparation Procedure: GL-RAD-A-026 REV# 18

Composite Preparation Batch: 2031041

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
518958001	B3VV01
1204622817	Method Blank (MB)
1204622818	518958001(B3VV01) Sample Duplicate (DUP)
1204622819	518958001(B3VV01) Matrix Spike (MS)
1204622820	518958001(B3VV01) Matrix Spike Duplicate (MSD)
1204622821	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

Matrix Spike (MS) Recovery

The Matrix Spike (See Below) did not meet recovery requirements due to the sample activity being greater than five times the spiked nominal concentration.

Sample	Analyte	Value
1204622819 (B3VV01MS)	BETA	-592* (75%-125%), but result > 5x nominal
1204622820 (B3VV01MSD)	BETA	-1570* (75%-125%), but result > 5x nominal

RDL Met

The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1204622817 (MB)	ALPHA	Result -4030 < MDA 29200 > RDL 3 pCi/L
	BETA	Result 11800 < MDA 19400 > RDL 4 pCi/L

The following detection limits were not achieved due to high sample activity.

Sample	Analyte	Value
1204622818 (B3VV01DUP)	ALPHA	Result 2900 < MDA 19500 > RDL 3 pCi/L
518958001 (B3VV01)	ALPHA	Result -1510 < MDA 18500 > RDL 3 pCi/L

Technical Information

Negative > 3 sigma TPU

Sample results were more negative than the three sigma TPU. Due to high beta activity, samples were not recounted.

Sample	Analyte	Value
1204622817 (MB)	ALPHA	Negative Result > 3 sigma value
518958001 (B3VV01)	ALPHA	Negative Result > 3 sigma value

Gross Alpha/Beta Preparation Information

None of the samples have been flamed.

Miscellaneous Information**Additional Comments**

Samples were counted in alpha mode only and processed without spill over correction.

Product: SRTOT_SEP_PRECIP_GPC: COMMON

Analytical Method: SR_RAD_GPC

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

Analytical Batch: 2031190

Composite Preparation Method: GL-RAD-A-026

Composite Preparation Procedure: GL-RAD-A-026 REV# 18

Composite Preparation Batch: 2031041

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
518958001	B3VV01
1204622822	Method Blank (MB)
1204622823	518958001(B3VV01) Sample Duplicate (DUP)
1204622824	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**RDL Met**

The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
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1204622822 (MB)	Total Strontium	Result -1240 < MDA 16700 > RDL 2 pCi/L
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Product: Laboratory Composite - B3VV01 and B3X6V6

Composite Preparation Method: GL-RAD-A-026

Composite Preparation Procedure: GL-RAD-A-026 REV# 18

Composite Preparation Batch: 2031041

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
518958001	B3VV01
518958002	B3X6V6

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

Samples 518958001(B3VV01) and 518958002(B3X6V6) were combined to create just 518958001(B3VV01) which amounted to 90mLs.

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.

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL518958 GEL Work Order: 518958


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: 24 AUG 2020****Title: Group Leader**

Sample Data Summary

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL518958	Client: CPRC001	Project: CPRC0F17054
Lab Sample ID: 518958001	Date Collected: 03/12/2020 08:30	Matrix: WATER
	Date Received: 08/18/2020 11:00	
Client ID: B3VV01		Prep Basis: "As Received"
Batch ID: 2031042	Method: GEA	SOP Ref: GL-RAD-A-013
Run Date: 08/19/2020 05:53	Analyst: JXB7	Instrument: GAM34
Data File: G518958001.CNF;1	Aliquot: 0.02 L	Count Time: 120 min
Prep Batch: 2031041		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137		3.08E+08	pCi/L	+/-4.81E+05	2.96E+07	63800	15.0
10198-40-0	Cobalt-60	U	-132	pCi/L	+/-3060	3070	6670	
14683-23-9	Europium-152	U	-4950	pCi/L	+/-1.95E+05	1.95E+05	3.03E+05	
15585-10-1	Europium-154	U	4440	pCi/L	+/-6400	6720	14700	
14391-16-3	Europium-155	U	-32900	pCi/L	+/-1.43E+05	1.44E+05	2.36E+05	

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

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL518958
 Lab Sample ID: 518958001

Client: CPRC001
 Date Collected: 03/12/2020 08:30
 Date Received: 08/18/2020 11:00

Project: CPRC0F17054
 Matrix: WATER

Client ID: B3VV01
 Batch ID: 2031189
 Run Date: 08/19/2020 05:12
 Data File: AB2031189.xls
 Prep Batch: 2031041

Method: ALPHABETA_GPC
 Analyst: JXB7
 Aliquot: 0.1 mL

Prep Basis: "As Received"
 SOP Ref: GL-RAD-A-001
 Instrument: LB4100F1
 Count Time: 5 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha ALPHA	U	-1510	pCi/L	+/-458	749	18500	3.00
12587-47-2	Beta BETA		3.75E+08	pCi/L	+/-1.58E+06	6.08E+07	22500	4.00

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

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL518958	Client: CPRC001	Project: CPRC0F17054
Lab Sample ID: 518958001	Date Collected: 03/12/2020 08:30	Matrix: WATER
	Date Received: 08/18/2020 11:00	
Client ID: B3VV01	Method: SR_RAD_GPC	Prep Basis: "As Received"
Batch ID: 2031190	Analyst: JXB7	SOP Ref: GL-RAD-A-004
Run Date: 08/19/2020 11:40	Aliquot: 0.1 mL	Instrument: LB4100H1
Data File: S2031190.xls		Count Time: 10 min
Prep Batch: 2031041		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium		3.24E+07	pCi/L	+/-4.03E+05	7.52E+06	20200	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	3.60	4.48	mg	80.4	(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.

Quality Control Summary

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QC Summary

Report Date: August 20, 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: 518958

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
High Rad Testing									
Batch	2031042								
QC1204622474	MB								
Cesium-137			U	-624	pCi/L			JXB7	08/19/2010:00
				Uncert: +/-2150					
				TPU: +/-2170					
Cobalt-60			U	854	pCi/L				
				Uncert: +/-3610					
				TPU: +/-3630					
Europium-152			U	-896	pCi/L				
				Uncert: +/-7530					
				TPU: +/-7540					
Europium-154			U	-2780	pCi/L				
				Uncert: +/-7170					
				TPU: +/-7290					
Europium-155			U	6140	pCi/L				
				Uncert: +/-7210					
				TPU: +/-7750					
QC1204622475	518958001	DUP							
Cesium-137		3.08E+08		3.09E+08	pCi/L				08/19/2007:56
		Uncert: +/-4.81E+05		+/-4.81E+05		RPD: 0	(0%-20%)		
		TPU: +/-2.96E+07		+/-2.96E+07		RER: 0.0421	(0-2)		
Cobalt-60		U -132	U	2660	pCi/L				
		Uncert: +/-3060		+/-3410		RPD: 0	N/A		
		TPU: +/-3070		+/-3630		RER: 1.15	(0-2)		
Europium-152		U -4950	U	-1.05E+05	pCi/L				
		Uncert: +/-1.95E+05		+/-1.76E+05		RPD: 0	N/A		
		TPU: +/-1.95E+05		+/-1.82E+05		RER: 0.733	(0-2)		
Europium-154		U 4440	U	-78.9	pCi/L				
		Uncert: +/-6400		+/-5210		RPD: 0	N/A		
		TPU: +/-6720		+/-5210		RER: 1.04	(0-2)		
Europium-155		U -32900	U	-66200	pCi/L				
		Uncert: +/-1.43E+05		+/-1.44E+05		RPD: 0	N/A		
		TPU: +/-1.44E+05		+/-1.47E+05		RER: 0.317	(0-2)		
QC1204622476	LCS								
Americium-241		6.22E+06		6.80E+06	pCi/L	REC: 109	(80%-120%)		08/19/2011:20
		Uncert: +/-2.23E+05		+/-7.57E+05					
		TPU: +/-7.57E+05							
Cesium-137		1.92E+06		1.93E+06	pCi/L	REC: 101	(80%-120%)		
		Uncert: +/-76800		+/-2.01E+05					
		TPU: +/-2.01E+05							
Cobalt-60		1.11E+06		1.23E+06	pCi/L	REC: 111	(80%-120%)		
		Uncert: +/-74500		+/-1.30E+05					
		TPU: +/-1.30E+05							
Europium-152			U	20100	pCi/L				
		Uncert: +/-35400		+/-36500					
		TPU: +/-36500							

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QC Summary

Workorder: 518958

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
High Rad Testing										
Batch	2031042									
Europium-154			U	-3300	pCi/L					
				Uncert: +/-15600						
				TPU: +/-15600						
Europium-155			U	4640	pCi/L					
				Uncert: +/-34500						
				TPU: +/-34500						
Batch	2031189									
QC1204622817	MB									
Alpha			U	-4030	pCi/L			JXB7	08/19/2005:12	
				Uncert: +/-868						
				TPU: +/-1210						
Beta			U	11800	pCi/L					
				Uncert: +/-12200						
				TPU: +/-12400						
QC1204622818	518958001	DUP								
Alpha		U	-1510	U	2900	pCi/L				08/19/2005:12
				Uncert: +/-458	+/-8010		RPD: 0	N/A		
				TPU: +/-749	+/-8030		RER: 1.07	(0-2)		
Beta				3.75E+08	3.60E+08	pCi/L				
				Uncert: +/-1.58E+06	+/-1.58E+06		RPD: 4	(0%-20%)		
				TPU: +/-6.08E+07	+/-5.84E+07		RER: 0.355	(0-2)		
QC1204622819	518958001	MS								
Alpha	2.51E+05	U	-1510		2.52E+05	pCi/L	REC: 101	(75%-125%)		
				Uncert: +/-458	+/-63600					
				TPU: +/-749	+/-76100					
Beta	8.75E+05		3.75E+08		3.70E+08	pCi/L	REC: N/A			
				Uncert: +/-1.58E+06	+/-1.60E+06					
				TPU: +/-6.08E+07	+/-6.00E+07					
QC1204622820	518958001	MSD								
Alpha	2.51E+05	U	-1510		2.96E+05	pCi/L	REC: 118	(75%-125%)		
				Uncert: +/-458	+/-64600		RPD: 16	(0%-20%)		
				TPU: +/-749	+/-81100		RER: 0.774	(0-2)		
Beta	8.75E+05		3.75E+08		3.61E+08	pCi/L	REC: N/A			
				Uncert: +/-1.58E+06	+/-1.53E+06		RPD: 2	(0%-20%)		
				TPU: +/-6.08E+07	+/-5.86E+07		RER: 0.201	(0-2)		
QC1204622821	LCS									
Alpha	2.51E+05				2.91E+05	pCi/L	REC: 116	(80%-120%)		08/19/2005:12
				Uncert: +/-65700						
				TPU: +/-81900						
Beta	8.75E+05				9.54E+05	pCi/L	REC: 109	(80%-120%)		
				Uncert: +/-81000						
				TPU: +/-1.74E+05						
Batch	2031190									
QC1204622822	MB									
Total Strontium			U	-1240	pCi/L			JXB7	08/19/2011:40	
				Uncert: +/-7350						
				TPU: +/-7360						
**Strontium Carrier	4.48			3.60	mg	REC: 80	(40%-110%)			
QC1204622823	518958001	DUP								
Total Strontium			3.24E+07		3.95E+07	pCi/L				08/19/2011:40

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QC Summary

Workorder: 518958

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
High Rad Testing										
Batch	2031190									
		Uncert:	+/-4.03E+05	+/-4.47E+05						
		TPU:	+/-7.52E+06	+/-9.14E+06		RPD:	20 (0%-20%)			
						RER:	1.17 (0-2)			
*Strontium Carrier	4.48		3.60	3.30	mg	REC:	74 (40%-110%)			
QC1204622824	LCS									
Total Strontium	2.22E+05			2.60E+05	pCi/L	REC:	117 (80%-120%)		08/19/2011	40
		Uncert:		+/-38900						
		TPU:		+/-71500						
*Strontium Carrier	4.48			3.20	mg	REC:	72 (40%-110%)			

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.
- 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.