



March 26, 2018

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

Re: CHPRC SAF S18-002
Work Order: 444659
SDG: GEL444659

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 27, 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: S18-002-209, S18-002-210, S18-002-211, S18-002-212, S18-002-287, S18-002-311 and S18-002-342
Enclosures

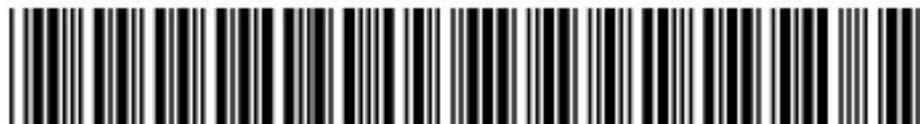


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Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF S18-002
SDG: GEL444659**

March 26, 2018

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary

Sample receipt

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on February 27, 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>
444659001	B3H5M5
444659002	B3H4D5
444659003	B3H6C9
444659004	B3H4L1
444659005	B3H4L2
444659006	B3H5B1
444659007	B3H5B2

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: General Chemistry and 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

Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL444659
Work Order #: 444659

General Chemistry

Ion Chromatography

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 Dilutions

The following samples 444659001 (B3H5M5) and 444659002 (B3H4D5) were diluted because target analyte concentrations exceeded the calibration range.

	444659	
Analyte	001	002
Sulfate	5X	5X

Miscellaneous Information

Manual Integrations

Samples 1203979731 (B3H6C9DUP), 444659001 (B3H5M5), 444659002 (B3H4D5) and 444659003 (B3H6C9) were manually integrated to correctly position the baseline as set in the calibration standards.

Radiochemistry

9310_ALPHABETA_GPC: COMMON

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

Technical Information

Gross Alpha/Beta Preparation Information

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

Recounts

Sample 1203981069 (LCS) was recounted due to high recovery. The recount is reported.

Miscellaneous Information**Additional Comments**

The matrix spike and matrix spike duplicate, 1203981067 (B3HCK3MS) and 1203981068 (B3HCK3MSD), aliquots were reduced to conserve sample volume.

SRISO_SEP_PRECIP_GPC: COMMON

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

Technical Information**Recounts**

Sample 1203981512 (LCS) was recounted due to low recovery. The recount is reported. Sample 444659007 (B3H5B2) was verified by recounting at least five days from the separation date. The recount is reported.

TRITIUM_DIST_LSC: COMMON

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

Technical Information**Recounts**

Samples 444659006 (B3H5B1) and 444659007 (B3H5B2) were recounted due to the quench number being outside the calibration range. The recounts are reported.

Miscellaneous Information**Additional Comments**

The matrix spike, 1203981672 (B3HCK3MS), aliquot was reduced to conserve sample volume.

C14_LSC: COMMON

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

Miscellaneous Information**Additional Comments**

The matrix spike, 1203981688 (B3H5B1MS), 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 1203982372 (LCS) was recounted due to low recovery. The recount is reported.

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.# S18-002-211 Page 1 of 1	
Collector: Mike Esparza /CHPRC S18-002	Contact/Requester: Karen Waters-Husted Telephone No.: 509-376-4650
Project Title: Sitewide Surv, February 2018	Sampling Origin: Hanford Site Purchase Order/Charge Code: 300071
Shipped To (Lab): GEL Laboratories, LLC	Logbook No.: HNF-N-506-97-65 Ice Chest No.: GWS-621
Protocol: SURV	Method of Shipment: Commercial Carrier Bill of Lading/Air Bill No.: 7758874312 Offsite Property No.: 9083

SPECIAL INSTRUCTIONS

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

N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3H5B1	N	W	FEB 26 2018	0832	1x1-L P	9310_ALPHABETA_GPC: COMMON	6 Months	HNO3 to pH <2
B3H5B1	N	W	FEB 26 2018	0832	1x500-mL G/P	C14_LSC: COMMON	6 Months	None
B3H5B1	N	W	FEB 26 2018	0832	1x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2
B3H5B1	N	W	FEB 26 2018	0832	1x500-mL G/P	TC99_EIE_LSC: COMMON	6 Months	HNO3 to pH <2
B3H5B1	N	W	FEB 26 2018	0832	1x250-mL P	TRITIUM_DIST_LSC: COMMON	6 Months	None

Relinquished By: Mike Esparza /CHPRC Signature: <i>Mike Esparza</i> Date/Time: FEB 26 2018 1005	Received By: Daniel Klug /CHPRC Signature: <i>D. Klug</i> Date/Time: FEB 26 2018 1105
Relinquished By: Daniel Klug /CHPRC Signature: <i>D. Klug</i> Date/Time: FEB 26 2018 1402	Received By: FED EX Signature: <i>[Signature]</i> Date/Time: 2/27/18 0945
Relinquished By: Fed Ex Signature: <i>[Signature]</i> Date/Time:	Received By: <i>[Signature]</i> Signature: <i>[Signature]</i> Date/Time:
Relinquished By: Signature: <i>[Signature]</i> Date/Time:	Received By: Signature: <i>[Signature]</i> Date/Time:

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

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

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C. # S18-002-212 Page 1 of 1	
Collector: Mike Esparza /CHPRC	Contact/Requester: Karen Waters-Husted	Telephone No.: 509-376-4650	Purchase Order/Charge Code: 300071		
SAF No.: S18-002	Sampling Origin: Hanford Site	Logbook No.: HNF-N-506-97-05	Ice Chest No.: GWS-621	Bill of Lading/Air Bill No.: 7758874331	
Project Title: Sitewide Surv, February 2018	Method of Shipment: Commercial Carrier	Priority: 30 Days	Offsite Property No.: 9083		

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3H5B2	N	W	FEB 26 2018	0653	1x1-L P	9310_ALPHABETA_GPC: COMMON	6 Months	HNO3 to pH <2
B3H5B2	N	W	FEB 26 2018		1x500-mL G/P	C14_LSC: COMMON	6 Months	None
B3H5B2	N	W	FEB 26 2018		1x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2
B3H5B2	N	W	FEB 26 2018		1x500-mL G/P	TC99_EIE_LSC: COMMON	6 Months	HNO3 to pH <2
B3H5B2	N	W	FEB 26 2018		1x250-mL P	TRITIUM_DIST_LSC: COMMON	6 Months	None

SPECIAL INSTRUCTIONS

N/A

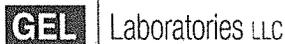
POSSIBLE SAMPLE HAZARDS/REMARK
 ** ** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1

Relinquished By: Mike Esparza /CHPRC Signature: [Signature] Date/Time: FEB 26 2018 1105	Received By: Daniel Klug /CHPRC Signature: [Signature] Date/Time: FEB 26 2018 1105
Relinquished By: Daniel Klug /CHPRC Signature: [Signature] Date/Time: FEB 26 2018 1400	Received By: [Signature] Signature: [Signature] Date/Time: 2/27/18 0915
Relinquished By: [Signature] Signature: [Signature] Date/Time:	Received By: [Signature] Signature: [Signature] Date/Time:

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

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

Printed On: 12/13/2017 FSR ID = FSR55407 A-6004-842 (REV 3)



SAMPLE RECEIPT & REVIEW FORM

HS

Client: <u>CPRC</u>		SDG/AR/COC/Work Order: <u>444659</u>		
Received By: <u>Chakeris Tarplin</u>		Date Received: <u>27 Feb 2018</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>7715 8874 3131</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> CPM/mR/Hr Classified as: <u>Rad 1</u> Rad 2 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"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
3 Samples requiring cold preservation within (0 ≤ deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: <u>Wet Ice</u> Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: <u>1°C</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" 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"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?			<input checked="" type="checkbox"/>	If Yes, Are Encores 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"/>			ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected: _____
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected: _____
12 Are sample containers identifiable as GEL provided?			<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
Comments (Use Continuation Form if needed):				

PM (or PMA) review: Initials INEM Date 02/28/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

Data Review Qualifier Definitions

Project Specific Qualifier Definitions for GEL Client Code: CPRC

Qualifier	Qualifier Definition	Department	Fraction
U	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.		
J	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated	Organics	
P	Aroclor target analyte with greater than 25% difference between column analyses.	Organics	
C	Analyte has been confirmed by GC/MS analysis	Organics	Pesticide
B	The analyte was detected in both the associated QC blank and in the sample.	Organics	
E	Concentration exceeds the calibration range of the instrument	Organics	
A	The TIC is a suspected aldol-condensation product	Organics	Semi-Volatile
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier		
N	Spike Sample recovery is outside control limits.		
*	Duplicate analysis not within control limits	Inorganics	
>	Result greater than quantifiable range or greater than upper limit of the analysis range	General Chemistry	
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier		
B	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).	Inorganics	Metals
D	Results are reported from a diluted aliquot of sample.		
E	Reported value is estimated due to interferences. See comment in narrative.	Inorganics	Metals
M	Duplicate precision not met.	Inorganics	Metals
o	Analyte failed to recover within LCS limits (Organics only)	Organics	
S	Reported value determined by the Method of Standard Additions (MSA)	Inorganics	
T	Spike and/or spike duplicate sample recovery is outside control limits.	Organics	
W	Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.	Inorganics	
B	The analyte was detected in the associated method blank \geq MDC or $>$ 5% sample activity.	Radiological	
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier		
+	Correlation coefficient for Method of Standard Additions (MSA) is < 0.995	Inorganics	
B	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).	General Chemistry	
C	Target analyte was detected in the sample and the associated blank. The associated blank concentration is \geq EQL or is $>$ 5% of the measured concentration and/or decision level for associated samples.	Inorganics	Metals
C	Target analyte was detected in the sample and the associated blank. The associated blank concentration is \geq EQL or is $>$ 5% of the measured concentration and/or decision level for associated samples.	General Chemistry	
<	Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide	General Chemistry	
UX	Gamma Spectroscopy--Uncertain identification	Radiological	

Laboratory Certifications

List of current GEL Certifications as of 26 March 2018

State	Certification
Alaska	17-018
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-18-13
Utah NELAP	SC000122017-25
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

General Chem Analysis

Case Narrative

**General Chemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL444659
Work Order #: 444659**

Product: Ion Chromatography**Analytical Method:** 9056_ANIONS_IC**Analytical Procedure:** GL-GC-E-086 REV# 25**Analytical Batch:** 1742588

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
444659001	B3H5M5
444659002	B3H4D5
444659003	B3H6C9
1203979729	Method Blank (MB)
1203979730	Laboratory Control Sample (LCS)
1203979731	444659003(B3H6C9) Sample Duplicate (DUP)
1203979732	444659003(B3H6C9) Post Spike (PS)

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 Dilutions**

The following samples 444659001 (B3H5M5) and 444659002 (B3H4D5) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	444659	
	001	002
Sulfate	5X	5X

Miscellaneous Information**Manual Integrations**

Samples 1203979731 (B3H6C9DUP), 444659001 (B3H5M5), 444659002 (B3H4D5) and 444659003 (B3H6C9) were manually integrated to correctly position the baseline as set in the calibration standards.

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: GEL444659 GEL Work Order: 444659

The Qualifiers in this report are defined as follows:

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).

D Results are reported from a diluted aliquot of sample.

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: Kristen Mizzell

Date: 21 MAR 2018

Title: Team Leader

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 21, 2018

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF S18-002

Client Sample ID: B3H5M5 Project: CPRC0S18002
 Sample ID: 444659001 Client ID: CPRC001
 Matrix: WATER
 Collect Date: 26-FEB-18 12:05
 Receive Date: 27-FEB-18
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
9056_ANIONS_IC: COMMON "As Received"												
Chloride		5150	67.0	200	ug/L		1	JXH5	02/27/18	1128	1742588	1
Fluoride	B	99.2	33.0	500	ug/L		1					
Nitrate-N		1750	33.0	250	ug/L		1					
Nitrite-N	B	34.5	33.0	250	ug/L		1					
Sulfate	D	44700	665	2000	ug/L		5	JXH5	02/27/18	2116	1742588	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9056_ANIONS_IC	
2	9056_ANIONS_IC	

Notes:

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
 DL: Detection Limit PF: Prep Factor
 MDA: Minimum Detectable Activity RL: Reporting Limit
 MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 21, 2018

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF S18-002

Client Sample ID: B3H4D5 Project: CPRC0S18002
 Sample ID: 444659002 Client ID: CPRC001
 Matrix: WATER
 Collect Date: 26-FEB-18 10:55
 Receive Date: 27-FEB-18
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
9056_ANIONS_IC: COMMON "As Received"												
Chloride		6520	67.0	200	ug/L		1	JXH5	02/27/18	1159	1742588	1
Fluoride	B	166	33.0	500	ug/L		1					
Nitrate-N		2320	33.0	250	ug/L		1					
Nitrite-N	B	38.3	33.0	250	ug/L		1					
Sulfate	D	58700	665	2000	ug/L		5	JXH5	02/27/18	2147	1742588	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9056_ANIONS_IC	
2	9056_ANIONS_IC	

Notes:

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
 DL: Detection Limit PF: Prep Factor
 MDA: Minimum Detectable Activity RL: Reporting Limit
 MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 21, 2018

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF S18-002

Client Sample ID: B3H6C9 Project: CPRC0S18002
 Sample ID: 444659003 Client ID: CPRC001
 Matrix: WATER
 Collect Date: 26-FEB-18 11:22
 Receive Date: 27-FEB-18
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
9056_ANIONS_IC: COMMON "As Received"												
Chloride		2240	67.0	200	ug/L		1	JXH5	02/27/18	1230	1742588	1
Fluoride	B	83.9	33.0	500	ug/L		1					
Nitrate-N		580	33.0	250	ug/L		1					
Nitrite-N	B	34.5	33.0	250	ug/L		1					
Sulfate		14300	133	500	ug/L		1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9056_ANIONS_IC	

Notes:

Column headers are defined as follows:

- DF: Dilution Factor
- DL: Detection Limit
- MDA: Minimum Detectable Activity
- MDC: Minimum Detectable Concentration
- Lc/LC: Critical Level
- PF: Prep Factor
- RL: Reporting Limit
- SQL: Sample Quantitation Limit

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: March 21, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 444659

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1742588										
QC1203979731	444659003	DUP									
Chloride		2240		2250	ug/L	0.129		(0%-20%)	JXH5	02/27/18	14:03
Fluoride	B	83.9	B	102	ug/L	19.1	^	(+/-500)			
Nitrate-N		580		582	ug/L	0.31	^	(+/-250)			
Nitrite-N	B	34.5	B	33.5	ug/L	2.94	^	(+/-250)			
Sulfate		14300		14300	ug/L	0.13		(0%-20%)			
QC1203979730	LCS										
Chloride	5000			4810	ug/L			96.2 (80%-120%)		02/27/18	16:37
Fluoride	2500			2560	ug/L			102 (80%-120%)			
Nitrate-N	2500			2470	ug/L			98.8 (80%-120%)			
Nitrite-N	2500			2510	ug/L			100 (80%-120%)			
Sulfate	10000			10000	ug/L			100 (80%-120%)			
QC1203979729	MB										
Chloride			U	67.0	ug/L					02/27/18	16:06
Fluoride			U	33.0	ug/L						
Nitrate-N			U	33.0	ug/L						

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QC Summary

Workorder: 444659

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1742588										
Nitrite-N			U	33.0	ug/L				JXH5	02/27/18	16:06
Sulfate			U	133	ug/L						
QC1203979732	444659003 PS										
Chloride	5.00	2.24		7.37	mg/L		103	(75%-125%)		02/27/18	14:33
Fluoride	2.50	B	0.0839	2.69	mg/L		104	(75%-125%)			
Nitrate-N	2.50		0.580	3.10	mg/L		101	(75%-125%)			
Nitrite-N	2.50	B	0.0345	2.52	mg/L		99.3	(75%-125%)			
Sulfate	10.0	14.3		25.6	mg/L		113	(75%-125%)			

Notes:

The Qualifiers in this report are defined as follows:

- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- 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).
- 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.
- 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.
- 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

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QC Summary

Workorder: 444659

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
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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.

^ 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.

* Indicates that a Quality Control parameter was not within specifications.

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.

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL444659
Work Order #: 444659

Product: 9310_ALPHABETA_GPC: COMMON

Analytical Method: 9310_ALPHABETA_GPC

Analytical Procedure: GL-RAD-A-001 REV# 19

Analytical Batch: 1743142

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
444659006	B3H5B1
444659007	B3H5B2
1203981065	Method Blank (MB)
1203981066	444578004(B3HCK3) Sample Duplicate (DUP)
1203981067	444578004(B3HCK3) Matrix Spike (MS)
1203981068	444578004(B3HCK3) Matrix Spike Duplicate (MSD)
1203981069	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

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

Technical Information

Gross Alpha/Beta Preparation Information

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

Recounts

Sample 1203981069 (LCS) was recounted due to high recovery. The recount is reported.

Miscellaneous Information

Additional Comments

The matrix spike and matrix spike duplicate, 1203981067 (B3HCK3MS) and 1203981068 (B3HCK3MSD), aliquots were reduced to conserve sample volume.

Product: SRISO_SEP_PRECIP_GPC: COMMON

Analytical Method: SRISO_SEP_PRECIP_GPC

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

Analytical Batch: 1743372

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
444659006	B3H5B1
444659007	B3H5B2
1203981510	Method Blank (MB)
1203981511	444749004(B3HC75) Sample Duplicate (DUP)
1203981512	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 1203981512 (LCS) was recounted due to low recovery. The recount is reported. Sample 444659007 (B3H5B2) was verified by recounting at least five days from the separation date. The recount is reported.

Product: TRITIUM_DIST_LSC: COMMON

Analytical Method: TRITIUM_DIST_LSC

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

Analytical Batch: 1743472

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
444659006	B3H5B1
444659007	B3H5B2
1203981670	Method Blank (MB)
1203981671	444578004(B3HCK3) Sample Duplicate (DUP)
1203981672	444578004(B3HCK3) Matrix Spike (MS)
1203981673	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 444659006 (B3H5B1) and 444659007 (B3H5B2) were recounted due to the quench number being outside the calibration range. The recounts are reported.

Miscellaneous Information**Additional Comments**

The matrix spike, 1203981672 (B3HCK3MS), aliquot was reduced to conserve sample volume.

Product: C14_LSC: COMMON

Analytical Method: C14_LSC

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

Analytical Batch: 1743478

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
444659006	B3H5B1
444659007	B3H5B2
1203981686	Method Blank (MB)
1203981687	444659006(B3H5B1) Sample Duplicate (DUP)
1203981688	444659006(B3H5B1) Matrix Spike (MS)
1203981689	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, 1203981688 (B3H5B1MS), 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: 1743792

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
444659004	B3H4L1
444659005	B3H4L2
444659006	B3H5B1

444659007	B3H5B2
1203982370	Method Blank (MB)
1203982371	444659004(B3H4L1) Sample Duplicate (DUP)
1203982372	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 1203982372 (LCS) was recounted due to low recovery. The recount is reported.

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

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL444659 GEL Work Order: 444659

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: Kate Gellatly****Date: 26 MAR 2018****Title: Analyst I**

Sample Data Summary

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659004	Date Collected: 02/26/2018 07:45	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H4L1	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1743792	Analyst: CXS7	SOP Ref: GL-RAD-A-059
Run Date: 03/20/2018 13:06	Aliquot: 100 mL	Instrument: LSCMOCHA
Data File: E1743792R3.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 20 min
Prep Batch: 1743792		
Prep Date: 03/15/2018 13:27		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	28.8	pCi/L	+/-22.4	22.6	37.0	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	4.59E+05	4.82E+05	CPM	95.2	(30%-105%)

Comments:

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

**Rad
Certificate of Analysis
Sample Summary**

SDG Number: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659005	Date Collected: 02/26/2018 08:46	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H4L2	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1743792	Analyst: CXS7	SOP Ref: GL-RAD-A-059
Run Date: 03/20/2018 13:28	Aliquot: 100 mL	Instrument: LSCMOCHA
Data File: E1743792R3.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 20 min
Prep Batch: 1743792		
Prep Date: 03/15/2018 13:27		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	12.8	pCi/L	+/-21.0	21.1	35.7	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	4.69E+05	4.82E+05	CPM	97.2	(30%-105%)

Comments:

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

Rad
Certificate of Analysis
Sample Summary

Page 1 of 1

SDG Number: GEL444659
 Lab Sample ID: 444659006

Client: CPRC001
 Date Collected: 02/26/2018 08:32
 Date Received: 02/27/2018 09:15

Project: CPRC0S18002
 Matrix: WATER

Client ID: B3H5B1
 Batch ID: 1743142
 Run Date: 03/08/2018 16:58
 Data File: AB1743142r1.xls
 Prep Batch: 1743142
 Prep Date: 03/07/2018 14:25

Method: 9310_ALPHABETA_GPC
 Analyst: BXG2
 Aliquot: 150 mL
 Prep Method: EPA 900.0/SW846 9310

Prep Basis: "As Received"
 SOP Ref: GL-RAD-A-001
 Instrument: LB4100C2
 Count Time: 500 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha ALPHA	U	-0.0587	pCi/L	+/-0.360	0.360	0.683	3.00
12587-47-2	Beta BETA	U	0.189	pCi/L	+/-0.656	0.657	1.13	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: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659006	Date Collected: 02/26/2018 08:32	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H5B1	Method: SRISO_SEP_PRECIP_GPC	Prep Basis: "As Received"
Batch ID: 1743372	Analyst: KSD1	SOP Ref: GL-RAD-A-004
Run Date: 03/08/2018 14:11	Aliquot: 300 mL	Instrument: PIC3D
Data File: S1743372r2.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 1743372		
Prep Date: 03/07/2018 11:05		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90	U	0.0703	pCi/L	+/-0.641	0.641	1.25	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.

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659006	Date Collected: 02/26/2018 08:32	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H5B1	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1743472	Analyst: MXH8	SOP Ref: GL-RAD-A-002
Run Date: 03/07/2018 20:47	Aliquot: 50 mL	Instrument: LSCBLUE
Data File: T1743472R.xls	Prep Method: EPA 906.0 Modified	Count Time: 50 min
Prep Batch: 1743472		
Prep Date: 03/05/2018 07:33		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	-57.3	pCi/L	+/-193	193	343	400

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659006	Date Collected: 02/26/2018 08:32	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H5B1	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1743478	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 03/05/2018 12:02	Aliquot: 100.34 mL	Instrument: LSCGOLD
Data File: C1743478.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 15 min
Prep Batch: 1743478		
Prep Date: 03/02/2018 13:46		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	-0.852	pCi/L	+/-19.4	19.4	33.8	50.0

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

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659006	Date Collected: 02/26/2018 08:32	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H5B1	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1743792	Analyst: CXS7	SOP Ref: GL-RAD-A-059
Run Date: 03/20/2018 13:49	Aliquot: 100 mL	Instrument: LSCMOCHA
Data File: E1743792R3.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 20 min
Prep Batch: 1743792		
Prep Date: 03/15/2018 13:27		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	5.24	pCi/L	+/-21.8	21.8	37.5	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	4.50E+05	4.82E+05	CPM	93.4	(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.

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659007	Date Collected: 02/26/2018 09:53	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H5B2		Prep Basis: "As Received"
Batch ID: 1743142	Method: 9310_ALPHABETA_GPC	SOP Ref: GL-RAD-A-001
Run Date: 03/08/2018 16:58	Analyst: BXG2	Instrument: LB4100C3
Data File: AB1743142r1.xls	Aliquot: 150 mL	Count Time: 500 min
Prep Batch: 1743142	Prep Method: EPA 900.0/SW846 9310	
Prep Date: 03/07/2018 14:25		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha <i>ALPHA</i>		2.91	pCi/L	+/-0.939	1.08	1.10	3.00
12587-47-2	Beta <i>BETA</i>		158	pCi/L	+/-2.80	26.8	1.31	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: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659007	Date Collected: 02/26/2018 09:53	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H5B2		Prep Basis: "As Received"
Batch ID: 1743372	Method: SRISO_SEP_PRECIP_GPC	SOP Ref: GL-RAD-A-004
Run Date: 03/13/2018 12:05	Analyst: KSD1	Instrument: PIC1C
Data File: S1743372r2.xls	Aliquot: 300 mL	Count Time: 60 min
Prep Batch: 1743372	Prep Method: EPA 905.0 Modified/DOE RP5	
Prep Date: 03/07/2018 11:05		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90		43.6	pCi/L	+/-2.31	7.24	0.641	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	4.10	4.30	mg	95.3	(40%-110%)

Comments:

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659007	Date Collected: 02/26/2018 09:53	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H5B2	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1743472	Analyst: MXH8	SOP Ref: GL-RAD-A-002
Run Date: 03/07/2018 21:39	Aliquot: 50 mL	Instrument: LSCBLUE
Data File: T1743472R.xls	Prep Method: EPA 906.0 Modified	Count Time: 50 min
Prep Batch: 1743472		
Prep Date: 03/05/2018 07:33		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		630	pCi/L	+/-193	228	291	400

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659007	Date Collected: 02/26/2018 09:53	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H5B2	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1743478	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 03/05/2018 12:19	Aliquot: 100.9 mL	Instrument: LSCGOLD
Data File: C1743478.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 15 min
Prep Batch: 1743478		
Prep Date: 03/02/2018 13:46		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14		205	pCi/L	+/-26.3	46.3	33.6	50.0

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

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL444659	Client: CPRC001	Project: CPRC0S18002
Lab Sample ID: 444659007	Date Collected: 02/26/2018 09:53	Matrix: WATER
	Date Received: 02/27/2018 09:15	
Client ID: B3H5B2	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1743792	Analyst: CXS7	SOP Ref: GL-RAD-A-059
Run Date: 03/20/2018 14:10	Aliquot: 100 mL	Instrument: LSCMOCHA
Data File: E1743792R3.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 20 min
Prep Batch: 1743792		
Prep Date: 03/15/2018 13:27		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	19.6	pCi/L	+/-22.3	22.4	37.5	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	4.47E+05	4.82E+05	CPM	92.7	(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.

Quality Control Summary

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QC Summary

Report Date: March 26, 2018
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Client : CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352
Contact: Mr. Scot Fitzgerald
Workorder: 444659

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gas Flow									
Batch	1743142								
QC1203981065	MB								
Alpha			U	-1.3	pCi/L			BXG2	03/08/1816:48
				Uncert: +/-0.446					
				TPU: +/-0.446					
Beta			U	-0.0957	pCi/L				
				Uncert: +/-0.646					
				TPU: +/-0.646					
QC1203981066	444578004	DUP							
Alpha		4.97		4.79	pCi/L				
				Uncert: +/-1.30		RPD: 4 (0% - 100%)			
				TPU: +/-1.56		RER: 0.153 (0-2)			
Beta		7.20		7.34	pCi/L				
				Uncert: +/-0.977		RPD: 2 (0%-20%)			
				TPU: +/-1.55		RER: 0.128 (0-2)			
QC1203981067	444578004	MS							
Alpha		242		4.97	pCi/L	REC: 105 (75%-125%)			03/08/1816:47
				Uncert: +/-1.30					
				TPU: +/-1.56					
Beta		941		7.20	pCi/L	REC: 101 (75%-125%)			
				Uncert: +/-0.977					
				TPU: +/-1.55					
QC1203981068	444578004	MSD							
Alpha		242		4.97	pCi/L	REC: 97 (75%-125%)			03/08/1816:47
				Uncert: +/-1.30		RPD: 7 (0%-20%)			
				TPU: +/-1.56		RER: 0.496 (0-2)			
Beta		941		7.20	pCi/L	REC: 84 (75%-125%)			
				Uncert: +/-0.977		RPD: 18 (0%-20%)			
				TPU: +/-1.55		RER: 1.52 (0-2)			
QC1203981069	LCS								
Alpha		80.6		79.0	pCi/L	REC: 98 (80%-120%)			03/09/1807:56
				Uncert: +/-7.68					
				TPU: +/-15.6					
Beta		314		335	pCi/L	REC: 107 (80%-120%)			
				Uncert: +/-11.8					
				TPU: +/-56.1					
Batch	1743372								
QC1203981510	MB								
Strontium-90			U	-0.14	pCi/L			KSD1	03/08/1814:11
				Uncert: +/-0.545					
				TPU: +/-0.545					
**Strontium Carrier		4.30		4.20	mg	REC: 98 (40%-110%)			
QC1203981511	444749004	DUP							
Strontium-90		U	0.150	U	-0.446	pCi/L			03/08/1814:11
				Uncert: +/-0.533		RPD: 0 N/A			
				TPU: +/-0.534		RER: 1.36 (0-2)			

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QC Summary

Workorder: 444659

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gas Flow									
Batch	1743372								
**Strontium Carrier	4.30	4.30		4.20	mg	REC: 98	(40%-110%)		
QC1203981512 LCS									
Strontium-90	78.4			65.3	pCi/L	REC: 83	(80%-120%)		03/09/1807:34
	Uncert:			+/-3.74					
	TPU:			+/-10.9					
**Strontium Carrier	4.30			3.70	mg	REC: 86	(40%-110%)		
Rad Liquid Scintillation									
Batch	1743472								
QC1203981670 MB									
Tritium			U	-12	pCi/L			MXH8	03/05/1817:31
	Uncert:			+/-161					
	TPU:			+/-161					
QC1203981671 444578004 DUP									
Tritium		1670		1640	pCi/L				03/05/1818:23
	Uncert:	+/-239		+/-232		RPD: 2	(0%-20%)		
	TPU:	+/-401		+/-392		RER: 0.114	(0-2)		
QC1203981672 444578004 MS									
Tritium	5160	1670		6600	pCi/L	REC: 96	(75%-125%)		03/05/1819:15
	Uncert:	+/-239		+/-574					
	TPU:	+/-401		+/-1400					
QC1203981673 LCS									
Tritium	2570			2440	pCi/L	REC: 95	(80%-120%)		03/05/1820:07
	Uncert:			+/-259					
	TPU:			+/-538					
Batch	1743478								
QC1203981686 MB									
Carbon-14			U	-6.55	pCi/L			BXM4	03/05/1812:51
	Uncert:			+/-19.0					
	TPU:			+/-19.0					
QC1203981687 444659006 DUP									
Carbon-14		U -0.852	U	0.0569	pCi/L				03/05/1813:08
	Uncert:	+/-19.4		+/-19.4		RPD: 0	N/A		
	TPU:	+/-19.4		+/-19.4		RER: 0.0649	(0-2)		
QC1203981688 444659006 MS									
Carbon-14	3710	U -0.852		3400	pCi/L	REC: 92	(75%-125%)		03/05/1813:24
	Uncert:	+/-19.4		+/-189					
	TPU:	+/-19.4		+/-659					
QC1203981689 LCS									
Carbon-14	744			708	pCi/L	REC: 95	(80%-120%)		03/05/1813:40
	Uncert:			+/-38.5					
	TPU:			+/-137					
Batch	1743792								
QC1203982370 MB									
Technetium-99			U	25.1	pCi/L			CXS7	03/20/1819:20
	Uncert:			+/-22.0					
	TPU:			+/-22.2					
**Technetium-99m Tracer	4.82E+05			4.54E+05	CPM	REC: 94	(30%-105%)		
QC1203982371 444659004 DUP									
Technetium-99		U 28.8	U	11.4	pCi/L				03/20/1819:42

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QC Summary

Workorder: 444659

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Liquid Scintillation										
Batch	1743792									
		Uncert:	+/-22.4	+/-21.2						
		TPU:	+/-22.6	+/-21.2		RPD:	0	N/A		
						RER:	1.1	(0-2)		
**Technetium-99m Tracer	4.82E+05	4.59E+05		4.68E+05	CPM	REC:	97	(30%-105%)		
QC1203982372 LCS										
Technetium-99	1780			1430	pCi/L	REC:	80	(80%-120%)		03/23/1822:29
		Uncert:		+/-63.9						
		TPU:		+/-170						
**Technetium-99m Tracer	4.82E+05			4.59E+05	CPM	REC:	95	(30%-105%)		

Notes:

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

The Qualifiers in this report are defined as follows:

- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- 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).
- B The analyte was detected in the associated method blank >= MDC or >5% sample activity.
- 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.
- 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.