



December 13, 2016

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

Re: CHPRC SAF F16-028
Work Order: 410876
SDG: GEL410876

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on November 17, 2016. 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,

B Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Purchase Order: 300192 - 8H
Chain of Custody: F16-028-044
Enclosures



Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	9
Data Review Qualifier Definitions.....	13
Laboratory Certifications.....	15
Metals Analysis.....	17
Case Narrative.....	18
Sample Data Summary.....	22
Quality Control Summary.....	24
General Chem Analysis.....	27
Case Narrative.....	28
Sample Data Summary.....	32
Quality Control Summary.....	34
Radiological Analysis.....	37
Case Narrative.....	38
Sample Data Summary.....	49
Quality Control Summary.....	63

Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF F16-028
SDG: GEL410876**

December 13, 2016

Laboratory Identification:

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

Summary

Sample receipt

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on November 17, 2016, for analysis. The sample was 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 sample:

Laboratory Identification	Sample Description
410876001	B35XW2

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, Metals 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.

12/14/2016

REV.0

B. Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL410876
Work Order #: 410876

Metals

Determination of Metals by ICP-MS

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

Duplicate Relative Percent Difference (RPD) Statement

Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203673485 (B35XW2DUP)	Uranium	32.3* (0%-20%)

Technical Information

Sample Dilutions

The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	410876
	001
Uranium	2X

General Chemistry

Ion Chromatography

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

pH

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

Holding Times

Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

Sample	Analyte	Value
1203688216 (B35XW2DUP)	pH	Received 17-NOV-16, out of holding 15-NOV-16
410876001 (B35XW2)	pH	Received 17-NOV-16, out of holding 15-NOV-16

Radiochemistry

AMCMISO_EIE_PRECIP_AEA: COMMON

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

Technical Information

Recounts

Sample 1203676946 (LCS) was recounted due to a peak shift. The recount is reported.

PUISO_PRECIP_AEA:COMMON

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

UIISO_IE_PRECIP_AEA:COMMON

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

THISO_IE_PLATE_AEA: COMMON

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this

report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

NP237_IE_PRECIP_AEA: COMMON

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

Quality Control (QC) Information

QC Information

Refer to Miscellaneous Information section.

Technical Information

Sample Re-prep/Re-analysis

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

Miscellaneous Information

Dry Weight

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

GAMMA_GS:COMMON + (Add-on)

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

I129_SEP_LEPS_GS

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

QC Information

Refer to Miscellaneous Information section. 1203677482 (Non SDG 410912001MS).

Technical Information

Recounts

Sample 1203677482 (Non SDG 410912001MS) was recounted due to low recovery. The recount is reported.

Miscellaneous Information

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.

Technical Information

Recounts

Sample 410876001 (B35XW2) was recounted due to a suspected false positive. The recount is reported.

TC99_SEP_GPC

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

C14_LSC: COMMON

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

TRITIUM_DIST_LSC: COMMON

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

Technical Information

Sample Re-prep/Re-analysis

Samples were reprepared due to spectral interference. The re-analysis is being reported.

Recounts

Sample 1203678393 (LCS) was recounted due to low recovery. The recount is reported.

NI63_LSC

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

Technical Information

Sample Re-prep/Re-analysis

Samples were re-prepped due to spectral interference. The re-analysis is being reported.

Recounts

Sample 1203680683 (LCS) was recounted due to high 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		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 410876				F16-028-044	PAGE 1 OF 2	
COLLECTOR Roger Friesz Jr. /CHPRC		COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D		PRICE CODE 8H	DATA TURNAROUND 30 Days / 30 Days	
SAMPLING LOCATION C9594, I-001		PROJECT DESIGNATION 200-WA-1 Opportunistic sampling - soil		SAF NO. F16-028	AIR QUALITY <input type="checkbox"/>			
ICE CHEST NO.		FIELD LOGBOOK NO. HNF-N-645-N pg 50	ACTUAL SAMPLE DEPTH 160.2"	COA 300192	METHOD OF SHIPMENT FEDERAL EXPRESS	ORIGINAL		
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO.		BILL OF LADING/AIR BILL NO.				
MATRIX* A=Air DL=Drum Liquids DS=Drum 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	Cool <=6C	None	None	None	None	
		HOLDING TIME	6 Months	6 Months	6 Months	None	ASAP	
		TYPE OF CONTAINER	G/P	G/P	G/P	Moisture Resistant Cont.	G/P	
		NO. OF CONTAINER(S)	1	1	1	1	1	
		VOLUME	250mL	250mL	500mL	200g	60mL	
SPECIAL HANDLING AND/OR STORAGE NA		SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS	SEE ITEM (4) IN SPECIAL INSTRUCTIONS	SEE ITEM (5) IN SPECIAL INSTRUCTIONS	
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME					
B35XW2	SOIL	11-15-16	0907	✓	✓	✓	✓	

12/14/2016

CHAIN OF POSSESSION Roger Friesz Jr. /CHPRC		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS SEE PAGE 2 FOR ALL SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM Roger Friesz Jr. /CHPRC	DATE/TIME NOV 15 2016 1515	RECEIVED BY/STORED IN SSU-1	DATE/TIME NOV 15 2016 1515		
RELINQUISHED BY/REMOVED FROM SSU-1	DATE/TIME NOV 16 2016 0900	RECEIVED BY/STORED IN Roy Shepard /CHPRC	DATE/TIME NOV 16 2016 0900		
RELINQUISHED BY/REMOVED FROM Roy Shepard /CHPRC	DATE/TIME NOV 16 2016 1400	RECEIVED BY/STORED IN FEDEX	DATE/TIME		
RELINQUISHED BY/REMOVED FROM FED EX	DATE/TIME	RECEIVED BY/STORED IN P. Dent Patricia Dent	DATE/TIME 11.17.16 0905		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		

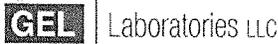
LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 410876			F16-028-044	PAGE 2 OF 2
COLLECTOR Roger Friesz Jr. /CHPRC	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D		PRICE CODE 8H	DATA TURNAROUND 30 Days / 30 Days
SAMPLING LOCATION C9594, I-001	PROJECT DESIGNATION 200-WA-1 Opportunistic sampling - soil		SAF NO. F16-028		AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO.	FIELD LOGBOOK NO. HNF-N-645-4 pg 50	ACTUAL SAMPLE DEPTH 160.2	COA 300192		METHOD OF SHIPMENT FEDERAL EXPRESS	ORIGINAL
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO.		BILL OF LADING/AIR BILL NO.		

SPECIAL INSTRUCTIONS

- (1) 6020_METALS_ICPMS: COMMON (Add-on) {Uranium}; 9056_ANIONS_IC: COMMON {Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Sulfate}; 9056_ANIONS_IC: COMMON (Add-on) {Phosphorus in phosphate};
- (2) GAMMA_GS: COMMON; GAMMA_GS: COMMON (Add-on) {Radium-226, Radium-228};
- (3) AMCMISO_IE_PRECIP_AEA: COMMON {Americium-241}; C14_LSC: COMMON; I129_SEP_LEPS_GS: COMMON; NI63_LSC: COMMON; PUISO_PLATE_AEA: COMMON; SRTOT_SEP_PRECIP_GPC: COMMON; TC99_EIE_LSC: COMMON; THISO_IE_PLATE_AEA: COMMON {Thorium-232}; UIISO_IE_PRECIP_AEA: COMMON; NP237_IE_PRECIP_AEA: COMMON; TRITIUM_DIST_LSC: COMMON;
- (4) Moisture Content - D2216 {Percent moisture (wet sample)};
- (5) 9045_pH (Non-Aqueous): COMMON {pH Measurement};

12/14/2016



SAMPLE RECEIPT & REVIEW FORM

Client: <u>CPBC</u>		SDG/AR/COC/Work Order: <u>410876</u>
Received By: <u>PLC ent</u>		Date Received: <u>11/17/16</u>
Suspected Hazard Information	Yes No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0/cpm</u>
Classified Radioactive II or III by RSO?	<input checked="" type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	<input checked="" type="checkbox"/>	
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input checked="" type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?	<input checked="" type="checkbox"/>	

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 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: <u>Ice bags</u> <u>Blue ice</u> Dry ice None Other (describe) *all temperatures are recorded in Celsius <u>1°C</u>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): <u>201404337</u>
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?			<input checked="" type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?			<input checked="" type="checkbox"/>	Sample ID's and containers affected:
7 VOA vials contain acid preservation?			<input checked="" type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?			<input checked="" type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?			<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
14 Are sample containers identifiable as GEL provided?			<input checked="" type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
16 Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7777</u> <u>3148</u> <u>2937</u> <u>7777</u> <u>2998</u> <u>8001</u> <u>7777</u> <u>2504</u> <u>5340</u> <u>7777</u> <u>2719</u> <u>8270</u>

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials BS Date 11/17/16 Page 1 of 1

Data Review Qualifier Definitions

Project Specific Qualifier Definitions for GEL Client Code: CPRC

Qualifier	Qualifier Definition	Department	Fraction
U	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.		
J	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated	Organics	
P	Aroclor target analyte with greater than 25% difference between column analyses.	Organics	
C	Analyte has been confirmed by GC/MS analysis	Organics	Pesticide
B	The analyte was detected in both the associated QC blank and in the sample.	Organics	
E	Concentration exceeds the calibration range of the instrument	Organics	
A	The TIC is a suspected aldol-condensation product	Organics	Semi-Volatile
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier		
N	Spike Sample recovery is outside control limits.		
*	Duplicate analysis not within control limits	Inorganics	
>	Result greater than quantifiable range or greater than upper limit of the analysis range	General Chemistry	
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier		
B	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).	Inorganics	Metals
D	Results are reported from a diluted aliquot of sample.		
E	Reported value is estimated due to interferences. See comment in narrative.	Inorganics	Metals
M	Duplicate precision not met.	Inorganics	Metals
o	Analyte failed to recover within LCS limits (Organics only)	Organics	
S	Reported value determined by the Method of Standard Additions (MSA)	Inorganics	
T	Spike and/or spike duplicate sample recovery is outside control limits.	Organics	
W	Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.	Inorganics	
B	The associated QC sample blank has a result $\geq 2X$ the MDA and, after corrections, result is \geq MDA for this sample	Radiological	
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier		
+	Correlation coefficient for Method of Standard Additions (MSA) is < 0.995	Inorganics	
B	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).	General Chemistry	
C	Target analyte was detected in the sample and the associated blank. The associated blank concentration is \geq EQL or is > 5% of the measured concentration and/or decision level for associated samples.	Inorganics	Metals
C	Target analyte was detected in the sample and the associated blank. The associated blank concentration is \geq EQL or is > 5% of the measured concentration and/or decision level for associated samples.	General Chemistry	
<	Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide	General Chemistry	
UX	Gamma Spectroscopy--Uncertain identification	Radiological	

Laboratory Certifications

List of current GEL Certifications as of 13 December 2016

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
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
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-16-11
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL410876
Work Order #: 410876

Product: Determination of Metals by ICP-MS
Analytical Method: 6020_METALS_ICPMS
Analytical Procedure: GL-MA-E-014 REV# 28
Analytical Batch: 1617643

Preparation Method: SW846 3050B
Preparation Procedure: GL-MA-E-009 REV# 26
Preparation Batch: 1617642

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203673483	Method Blank (MB)ICP-MS
1203673484	Laboratory Control Sample (LCS)
1203673487	410876001(B35XW2L) Serial Dilution (SD)
1203673485	410876001(B35XW2D) Sample Duplicate (DUP)
1203673486	410876001(B35XW2S) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" 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

Duplicate Relative Percent Difference (RPD) Statement

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203673485 (B35XW2DUP)	Uranium	32.3* (0%-20%)

Technical Information

Preparation/Analytical Method Verification

Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions

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. The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	410876
	001
Uranium	2X

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: GEL410876 GEL Work Order: 410876

The Qualifiers in this report are defined as follows:

* Duplicate analysis not within control limits

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: Nik-Cole Elmore****Date: 13 DEC 2016****Title: Data Validator**

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL410876

CONTRACT: CPRC0F16028

METHOD TYPE: SW846

SAMPLE ID:410876001

BASIS: Dry Weight

DATE COLLECTED 15-NOV-16

CLIENT ID: B35XW2

LEVEL: Low

DATE RECEIVED 17-NOV-16

MATRIX: SOIL

%SOLIDS: 95.6

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-61-1	Uranium	571	ug/kg	D*	13.8	41.8	41.8	2	MS	SKJ	11/22/16 00:20	161121-1	1617643

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1617643	1617642	SW846 3050B	0.501	g	50	mL	11/18/16	SXW1

***Analytical Methods:**

MS SW846 3050B/6020A

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 13, 2016

Page 1 of 2

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 410876

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1617643										
QC1203673485	410876001	DUP									
Uranium		*D	571	*D	790	ug/kg	32.3*	(0%-20%)	SKJ	11/22/16	00:24
QC1203673484	LCS										
Uranium	4600		D	4660	ug/kg		101	(80%-120%)		11/22/16	00:16
QC1203673483	MB										
Uranium			DU	13.1	ug/kg					11/22/16	00:13
QC1203673486	410876001	MS									
Uranium	5130	*D	571	D	5670	ug/kg	99.4	(75%-125%)		11/22/16	00:28
QC1203673487	410876001	SDILT									
Uranium		*D	2.73	D	0.619	ug/L	13.2	(0%-10%)		11/22/16	00:36

Notes:

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- 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.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- 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: 410876

Page 2 of 2

<u>Parmname</u>	<u>NOM</u>	<u>Sample Qual</u>	<u>QC</u>	<u>Units</u>	<u>RPD/D%</u>	<u>REC%</u>	<u>Range</u>	<u>Anlst</u>	<u>Date</u>	<u>Time</u>
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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.

General Chem Analysis

Case Narrative

**General Chemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL410876
Work Order #: 410876**

Product: Ion Chromatography

Analytical Method: 9056_ANIONS_IC

Analytical Procedure: GL-GC-E-086 REV# 25

Analytical Batches: 1621744 and 1621743

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203684228	Method Blank (MB)
1203684229	Laboratory Control Sample (LCS)
1203684230	410876001(B35XW2) Sample Duplicate (DUP)
1203684915	410876001(B35XW2) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

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

Product: pH**Analytical Method:** SW846 9045D**Analytical Procedure:** GL-GC-E-008 REV# 22**Analytical Batch:** 1623313

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203688215	Laboratory Control Sample (LCS)
1203688216	410876001(B35XW2) Sample Duplicate (DUP)

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**Holding Times**

Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

Sample	Analyte	Value
1203688216 (B35XW2DUP)	pH	Received 17-NOV-16, out of holding 15-NOV-16
410876001 (B35XW2)	pH	Received 17-NOV-16, out of holding 15-NOV-16

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: GEL410876 GEL Work Order: 410876

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).

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

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: 13 DEC 2016

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: December 13, 2016

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF F16-028

Client Sample ID: B35XW2 Project: CPRC0F16028
 Sample ID: 410876001 Client ID: CPRC001
 Matrix: SOIL
 Collect Date: 15-NOV-16 09:07
 Receive Date: 17-NOV-16
 Collector: Client
 Moisture: 4.41%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
9056_ANIONS_IC:COMMON + (Add-on) "Dry Weight Corrected"												
Chloride		6700	724	2010	ug/Kg	9.62	1	MXL2	12/06/16	2158	1621744	1
Fluoride	B	889	342	1010	ug/Kg	9.62	1					
Nitrate-N		2030	332	1010	ug/Kg	9.62	1					
Nitrite-N	U	332	332	1010	ug/Kg	9.62	1					
Phosphorus in phosphate	U	674	674	2010	ug/Kg	9.62	1					
Sulfate		5630	1340	4020	ug/Kg	9.62	1					

Titration and Ion Analysis

9045_pH (Non-Aqueous):COMMON "As Received"

pH at Temp 20.8C	X	9.07	0.010	0.100	SU		1	RXB5	12/13/16	1247	1623313	2
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	12/06/16	1532	1621743

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9056_ANIONS_IC	
2	SW846 9045D	

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

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 13, 2016

Page 1 of 2

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 410876

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1621744										
QC1203684230	410876001	DUP									
Chloride		6700		6610	ug/Kg	1.31	^	(+/-2020)	MXL2	12/06/16	22:27
Fluoride	B	889	B	678	ug/Kg	26.9	^	(+/-1010)			
Nitrate-N		2030		2060	ug/Kg	1.57	^	(+/-1010)			
Nitrite-N	U	332	U	334	ug/Kg	N/A					
Phosphorus in phosphate	U	674	U	677	ug/Kg	N/A					
Sulfate		5630		5960	ug/Kg	5.76	^	(+/-4040)			
QC1203684229	LCS										
Chloride	49900			48600	ug/Kg			97.5	(80%-120%)	12/06/16	21:29
Fluoride	24900			25500	ug/Kg			102	(80%-120%)		
Nitrate-N	24900			24100	ug/Kg			96.8	(80%-120%)		
Nitrite-N	24900			24600	ug/Kg			98.5	(80%-120%)		
Phosphorus in phosphate	12500			12600	ug/Kg			101	(80%-120%)		
Sulfate	99800			98100	ug/Kg			98.4	(80%-120%)		
QC1203684228	MB										
Chloride			U	715	ug/Kg					12/06/16	21:00
Fluoride			U	337	ug/Kg						
Nitrate-N			U	328	ug/Kg						
Nitrite-N			U	328	ug/Kg						
Phosphorus in phosphate			U	665	ug/Kg						
Sulfate			U	1320	ug/Kg						
QC1203684915	410876001 MS										

GEL LABORATORIES LLC

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

QC Summary

Workorder: 410876

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1621744										
Chloride	50200	6700		54800	ug/Kg		95.8	(48%-145%)		12/06/16	22:56
Fluoride	25100	B	889	24800	ug/Kg		95.5	(30%-135%)	MXL2		
Nitrate-N	25100		2030	25400	ug/Kg		93.2	(70%-125%)			
Nitrite-N	25100	U	332	24600	ug/Kg		98.1	(70%-120%)			
Phosphorus in phosphate	12500	U	674	11500	ug/Kg		91.6	(35%-134%)			
Sulfate	100000		5630	103000	ug/Kg		97.2	(45%-162%)			

Titration and Ion Analysis

Batch	1623313										
QC1203688216	410876001	DUP									
pH		X	9.07	X	9.04	SU	0.331	(0%-30%)	RXB5	12/13/16	12:50
QC1203688215	LCS										
pH	7.00				6.99	SU	99.9	(70%-130%)		12/13/16	12:45

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

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 #: GEL410876
Work Order #: 410876

Product: AMCMISO_EIE_PRECIP_AEA: COMMON
Analytical Method: AMCMISO_EIE_PREC_AEA
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1618875

Preparation Method: ASTM D 2216 (Modified)
Preparation Procedure: GL-RAD-A-021 REV# 20
Preparation Batch: 1617629

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203676944	Method Blank (MB)
1203676945	410876001(B35XW2) Sample Duplicate (DUP)
1203676946	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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 1203676946 (LCS) was recounted due to a peak shift. The recount is reported.

Product: PUIISO_PRECIP_AEA:COMMON
Analytical Method: PUIISO_PRECIP_AEA
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1618891

Preparation Method: ASTM D 2216 (Modified)
Preparation Procedure: GL-RAD-A-021 REV# 20
Preparation Batch: 1617629

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203676950	Method Blank (MB)
1203676951	410876001(B35XW2) Sample Duplicate (DUP)
1203676952	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

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

Product: UIISO_IE_PRECIP_AEA:COMMON
Analytical Method: UIISO_IE_PRECIP_AEA
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1618892

Preparation Method: ASTM D 2216 (Modified)
Preparation Procedure: GL-RAD-A-021 REV# 20
Preparation Batch: 1617629

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203676953	Method Blank (MB)
1203676954	410876001(B35XW2) Sample Duplicate (DUP)
1203676955	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

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

Product: THISO_IE_PLATE_AEA: COMMON
Analytical Method: THISO_IE_PRECIP_AEA
Analytical Procedure: GL-RAD-A-038 REV# 17

Analytical Batch: 1620079

Preparation Method: ASTM D 2216 (Modified)

Preparation Procedure: GL-RAD-A-021 REV# 20

Preparation Batch: 1617629

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203680005	Method Blank (MB)
1203680006	410876001(B35XW2) Sample Duplicate (DUP)
1203680007	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

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

Product: NP237_IE_PRECIP_AEA: COMMON

Analytical Method: ASTM C 1475-00 Modified

Analytical Procedure: GL-RAD-A-032 REV# 21

Analytical Batch: 1620593

Preparation Method: ASTM D 2216 (Modified)

Preparation Procedure: GL-RAD-A-021 REV# 20

Preparation Batch: 1617629

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203681361	Method Blank (MB)
1203681362	410876001(B35XW2) Sample Duplicate (DUP)
1203681363	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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

QC Information

All of the QC samples meet the required acceptance limits with the following exceptions: Refer to Miscellaneous Information section.

Technical Information

Sample Re-prep/Re-analysis

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

Miscellaneous Information

1. Samples 410876001, 410910002, 410910003, and 1203681363 did not meet the client's tracer yield requirement. 1. The samples do meet GEL's standard yield requirement and meet all QC requirements. The batch was reprepared in attempt to achieve acceptable tracer yields. All sample results are non-detects. Reporting results.

Product: Dry Weight

Preparation Method: ASTM D 2216 (Modified)

Preparation Procedure: GL-RAD-A-021 REV# 20

Preparation Batch: 1617629

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203673465	410885001(NonSDG) Sample Duplicate (DUP)

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

Data Summary:

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

Product: GAMMA_GS:COMMON + (Add-on)

Analytical Method: GAMMA_GS

Analytical Procedure: GL-RAD-A-013 REV# 25

Analytical Batch: 1617780

Preparation Method: ASTM D 2216 (Modified)

Preparation Procedure: GL-RAD-A-021 REV# 20

Preparation Batch: 1617629

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2

1203673841	Method Blank (MB)
1203673842	410876001(B35XW2) Sample Duplicate (DUP)
1203673843	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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

1. RDL less than MDA: The following RDLs in sample 410910001 were not achieved: Eu-152 and Eu-154. The following RDLs in sample 410910003 were not achieved: Eu-154 and Eu-155. The following RDLs in MB 1203673841 were not achieved: Eu-154. The following RDLs in DUP 1203673842 were not achieved: Eu-154.
1. Reporting Results.

Product: I129_SEP_LEPS_GS

Analytical Method: I129_SEP_LEPS_GS

Analytical Procedure: GL-RAD-A-006 REV# 21

Analytical Batch: 1619091

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203677480	Method Blank (MB)
1203677481	410912001(NonSDG) Sample Duplicate (DUP)
1203677482	410912001(NonSDG) Matrix Spike (MS)
1203677483	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

QC Information

All of the QC samples meet the required acceptance limits with the following exceptions: Refer to Miscellaneous Information section. 1203677482 (Non SDG 410912001MS).

Technical Information

Recounts

Sample 1203677482 (Non SDG 410912001MS) was recounted due to low recovery. The recount is reported.

Miscellaneous Information

Failed Recovery for MS 1203677482 did not meet spike recovery limits for I-129 at 57.4%. The sample failed MS recovery due to sample matrix. Reporting results.

Product: SRTOT_SEP_PRECIP_GPC: COMMON

Analytical Method: SRTOT_SEP_PRECIP_GPC

Analytical Procedure: GL-RAD-A-004 REV# 17

Analytical Batch: 1618360

Preparation Method: ASTM D 2216 (Modified)

Preparation Procedure: GL-RAD-A-021 REV# 20

Preparation Batch: 1617629

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203675537	Method Blank (MB)
1203675538	410910001(B35XW4) Sample Duplicate (DUP)
1203675539	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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 410876001 (B35XW2) was recounted due to a suspected false positive. The recount is reported.

Product: TC99_SEP_GPC

Analytical Method: TC99_EIE_LSC

Analytical Procedure: GL-RAD-A-059 REV# 4

Analytical Batch: 1618013

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203674446	Method Blank (MB)
1203674447	410912001(NonSDG) Sample Duplicate (DUP)
1203674448	Laboratory Control Sample (LCS)

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

Data Summary:

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

Product: C14_LSC: COMMON

Analytical Method: C14_LSC

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

Analytical Batch: 1618025

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203674485	Method Blank (MB)
1203674486	410876001(B35XW2) Sample Duplicate (DUP)
1203674487	410876001(B35XW2) Matrix Spike (MS)
1203674488	Laboratory Control Sample (LCS)

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

Data Summary:

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

Product: TRITIUM_DIST_LSC: COMMON

Analytical Method: TRITIUM_DIST_LSC

Analytical Procedure: GL-RAD-A-002 REV# 21

Analytical Batch: 1619535

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203678390	Method Blank (MB)
1203678391	410876001(B35XW2) Sample Duplicate (DUP)
1203678392	410876001(B35XW2) Matrix Spike (MS)
1203678393	Laboratory Control Sample (LCS)

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

Data Summary:

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

Technical Information**Sample Re-prep/Re-analysis**

Samples were reprepared due to spectral interference. The re-analysis is being reported.

Recounts

Sample 1203678393 (LCS) was recounted due to low recovery. The recount is reported.

Product: NI63_LSC

Analytical Method: NI63_LSC

Analytical Procedure: GL-RAD-A-022 REV# 18

Analytical Batch: 1620328

Preparation Method: ASTM D 2216 (Modified)

Preparation Procedure: GL-RAD-A-021 REV# 20

Preparation Batch: 1617629

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
410876001	B35XW2
1203680681	Method Blank (MB)
1203680682	410876001(B35XW2) Sample Duplicate (DUP)
1203680683	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

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

Technical Information**Sample Re-prep/Re-analysis**

Samples were reprepared due to spectral interference. The re-analysis is being reported.

Recounts

Sample 1203680683 (LCS) was recounted due to high 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

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

**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL410876 GEL Work Order: 410876

The Qualifiers in this report are defined as follows:

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.

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: 14 DEC 2016****Title: Analyst I**

Sample Data Summary

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2	Method: AMCMISO_EIE_PREC_AEA	Prep Basis: "Dry Weight Corrected"
Batch ID: 1618875	Analyst: KXB2	SOP Ref: GL-RAD-A-011
Run Date: 11/30/2016 09:48	Aliquot: 0.106 g	Instrument: 1081
Data File: S0410876001_AM.1A.gcnf	Prep Method: DOE EML HASL-300, Am-05	Count Time: 239.9998 min
Prep Batch: 1618875		Prep SOP Ref: GL-RAD-A-021
Prep Date: 11/28/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.0022	pCi/g	+/-0.163	0.163	0.362	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	20.0	20.2	pCi/g	99.4	(30%-105%)

Comments:

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 The MDC is a sample specific MDC.

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2		Prep Basis: "Dry Weight Corrected"
Batch ID: 1618891	Method: PUIISO_PRECIP_AEA	SOP Ref: GL-RAD-A-011
Run Date: 11/30/2016 09:48	Analyst: KXB2	Instrument: 1067
Data File: S0410876001_PU.1A.gcnf	Aliquot: 0.106 g	Count Time: 239.9998 min
Prep Batch: 1618891	Prep Method: DOE EML HASL-300, Pu-11-	Prep SOP Ref: GL-RAD-A-021
Prep Date: 11/28/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	-0.13	pCi/g	+/-0.324	0.324	0.777	1.00
OER-100-70	Plutonium-239/240	U	0.179	pCi/g	+/-0.258	0.259	0.311	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	18.2	18.6	pCi/g	98	(30%-105%)

Comments:

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Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2		Prep Basis: "Dry Weight Corrected"
Batch ID: 1618892	Method: UIISO_IE_PRECIP_AEA	SOP Ref: GL-RAD-A-011
Run Date: 11/30/2016 09:30	Analyst: KXB2	Instrument: 1004
Data File: S0410876001_UU.1A.gcnf	Aliquot: 0.106 g	Count Time: 240 min
Prep Batch: 1618892	Prep Method: DOE EML HASL-300, U-02-R	Prep SOP Ref: GL-RAD-A-021
Prep Date: 11/28/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 <small>13968-55-3/13966-29-5</small>	Uranium-233/234		0.653	pCi/g	+/-0.430	0.438	0.447	1.00
15117-96-1/13982-7	Uranium-235/236	U	0.0542	pCi/g	+/-0.203	0.203	0.342	1.00
7440-61-1	Uranium-238		0.563	pCi/g	+/-0.377	0.384	0.277	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	20.8	19.8	pCi/g	105	(30%-105%)

Comments:

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- 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: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2		Prep Basis: "Dry Weight Corrected"
Batch ID: 1620079	Method: THISO_IE_PRECIP_AEA	SOP Ref: GL-RAD-A-038
Run Date: 12/10/2016 10:34	Analyst: JXH2	Instrument: 1044
Data File: S0410876001_TH.1A.gcnf	Aliquot: 0.106 g	Count Time: 240 min
Prep Batch: 1620079	Prep Method: DOE EML HASL-300, Th-01-	Prep SOP Ref: GL-RAD-A-021
Prep Date: 12/07/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
TH-232 <small>7440-29-1</small>	Thorium-232		0.607	pCi/g	+/-0.388	0.397	0.346	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Thorium-229 Tracer	18.1	19.5	pCi/g	92.8	(30%-105%)

Comments:

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- 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: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2		Prep Basis: "Dry Weight Corrected"
Batch ID: 1620593	Method: ASTM C 1475-00 Modified	SOP Ref: GL-RAD-A-032
Run Date: 12/01/2016 23:41	Analyst: KXB2	Instrument: 1243
Data File: S0410876001_NP.2A.gcnf	Aliquot: 0.106 g	Count Time: 240 min
Prep Batch: 1620593	Prep Method: ASTM C 1475-00 Modified	Prep SOP Ref: GL-RAD-A-021
Prep Date: 12/01/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13994-20-2	Neptunium-237	U	0.00512	pCi/g	+/-0.235	0.235	0.517	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	2230	2020	pCi/g	111 *	(30%-105%)

Comments:

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- 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: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2	Method: SRTOT_SEP_PRECIP_GPC	Prep Basis: "Dry Weight Corrected"
Batch ID: 1618360	Analyst: BXF1	SOP Ref: GL-RAD-A-004
Run Date: 12/05/2016 12:02	Aliquot: 0.339 g	Instrument: PIC1B
Data File: S1618360r1.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 1618360		Prep SOP Ref: GL-RAD-A-021
Prep Date: 12/01/2016 16:50		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium	U	0.0613	pCi/g	+/-0.527	0.528	0.963	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	8.10	7.75	mg	105	(40%-110%)

Comments:

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- 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: GEL410876
 Lab Sample ID: 410876001
 Client ID: B35XW2
 Batch ID: 1617780
 Run Date: 12/12/2016 09:04
 Data File: G410876001.CNF;1
 Prep Batch: 1617780
 Prep Date: 11/21/2016 00:00

Client: CPRC001
 Date Collected: 11/15/2016 09:07
 Date Received: 11/17/2016 09:05
 Method: GAMMA_GS
 Analyst: MXR1
 Aliquot: 160.249 g
 Prep Method: DOE HASL 300, 4.5.2.3/Ga-01

Project: CPRC0F16028
 Matrix: SOIL
 %Moisture: 4.4
 Prep Basis: "Dry Weight Corrected"
 SOP Ref: GL-RAD-A-013
 Instrument: GAM16
 Count Time: 120 min
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	U	0.00229	pCi/g	+/-0.0227	0.0228	0.0423	0.100
10198-40-0	Cobalt-60	U	0.00398	pCi/g	+/-0.0202	0.0203	0.0364	0.100
14683-23-9	Europium-152	U	0.0111	pCi/g	+/-0.0518	0.052	0.102	0.100
15585-10-1	Europium-154	U	0.0377	pCi/g	+/-0.0631	0.0654	0.124	0.100
14391-16-3	Europium-155	U	0.0331	pCi/g	+/-0.0597	0.0616	0.116	0.100
13982-63-3	Radium-226		0.599	pCi/g	+/-0.117	0.119	0.0789	1.00
15262-20-1	Radium-228		0.908	pCi/g	+/-0.207	0.212	0.152	3.00

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

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 - 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: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2		Prep Basis: "As Received"
Batch ID: 1619091	Method: I129_SEP_LEPS_GS	SOP Ref: GL-RAD-A-006
Run Date: 11/29/2016 10:59	Analyst: MJH1	Instrument: XRAY3
Data File: I410876001.CNF;1	Aliquot: 1.005 g	Count Time: 60 min
Prep Batch: 1619091	Prep Method: DOE EML HASL-300,I-01 M	
Prep Date: 11/28/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	NU	0.347	pCi/g	+/-0.532	0.556	1.22	2.00

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

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.
 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: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2		Prep Basis: "As Received"
Batch ID: 1618013	Method: TC99_EIE_LSC	SOP Ref: GL-RAD-A-059
Run Date: 11/27/2016 11:52	Analyst: GXR1	Instrument: LSCSILVER
Data File: E1618013.xls	Aliquot: 1.244 g	Count Time: 30 min
Prep Batch: 1618013	Prep Method: DOE EML HASL-300, Tc-02-	
Prep Date: 11/23/2016 15:16		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	0.016	pCi/g	+/-1.36	1.36	2.36	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	21500	23400	CPM	91.9	(30%-105%)

Comments:

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The MDC is a sample specific MDC.

**Rad
Certificate of Analysis
Sample Summary**

SDG Number: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2		Prep Basis: "As Received"
Batch ID: 1618025	Method: C14_LSC	SOP Ref: GL-RAD-A-003
Run Date: 12/01/2016 13:02	Analyst: TXJ1	Instrument: LSCBLUE
Data File: C1618025.xls	Aliquot: 0.54 g	Count Time: 45 min
Prep Batch: 1618025	Prep Method: EPA EERF C-01 Modified	
Prep Date: 11/30/2016 16:10		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	1.04	pCi/g	+/-2.09	2.10	3.55	5.00

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

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- 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: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2		Prep Basis: "As Received"
Batch ID: 1619535	Method: TRITIUM_DIST_LSC	SOP Ref: GL-RAD-A-002
Run Date: 11/29/2016 18:46	Analyst: TXP3	Instrument: LSCMOCHA
Data File: T1619535.xls	Aliquot: 1.12 g	Count Time: 20 min
Prep Batch: 1619535	Prep Method: EPA 906.0 Modified	
Prep Date: 11/29/2016 13:07		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	1.53	pCi/g	+/-12.4	12.4	22.1	30.0

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

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- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).
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Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2		Prep Basis: "Dry Weight Corrected"
Batch ID: 1620328	Method: NI63_LSC	SOP Ref: GL-RAD-A-022
Run Date: 12/01/2016 22:03	Analyst: CXS7	Instrument: LSCGOLD
Data File: N1620328.xls	Aliquot: 1.03 g	Count Time: 40 min
Prep Batch: 1620328	Prep Method: DOE RESL Ni-1, Modified	Prep SOP Ref: GL-RAD-A-021
Prep Date: 11/30/2016 15:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
NI-63	Nickel-63	U	-1.01	pCi/g	+/-2.24	2.24	3.90	10.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Nickel Carrier	17.5	24.6	mg	71.2	(40%-110%)

Comments:

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- 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: GEL410876	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 410876001	Date Collected: 11/15/2016 09:07	Matrix: SOIL
	Date Received: 11/17/2016 09:05	%Moisture: 4.4
Client ID: B35XW2		Prep Basis: "As Received"
Batch ID: 1617629	Method: ASTM D 2216 (Modified)	SOP Ref: GL-OA-E-020
Run Date: 11/18/2016 08:01	Analyst: LYT1	Instrument: SP-39020004
Data File:		Count Time:
Prep Batch: 1617629		
Prep Date: 11/18/2016 08:01		

CAS No.	Parmname	Qual	Result	Units	MDC		
%MOISTURE	Moisture		4.41	percent	+/-		
Surrogate/Tracer recovery		Result	Nominal	Units	Recovery%	Acceptable Limits	

Comments:

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

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 14, 2016

Page 1 of 7

Client : CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352
Contact: Mr. Scot Fitzgerald
Workorder: 410876

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1618875								
QC1203676944	MB								
Americium-241			U	-0.0126	pCi/g			KXB2	11/30/1609:48
				Uncert: +/-0.109					
				TPU: +/-0.109					
**Americium-243 Tracer	19.1			18.3	pCi/g	REC: 96	(30%-105%)		
				Uncert: +/-1.95					
				TPU: +/-3.04					
QC1203676945	410876001	DUP							
Americium-241		U	0.0022	U	0.0271	pCi/g			11/30/1609:48
			Uncert: +/-0.163		+/-0.151		RPD: 0	N/A	
			TPU: +/-0.163		+/-0.151		RER: 0.22	(0-2)	
**Americium-243 Tracer	19.1	20.0		19.7	pCi/g	REC: 103	(30%-105%)		
				Uncert: +/-2.05					
				TPU: +/-3.21					
QC1203676946	LCS								
Americium-241				17.6	pCi/g	REC: 105	(80%-120%)		11/30/1616:21
				Uncert: +/-2.22					
				TPU: +/-3.34					
**Americium-243 Tracer	19.1			18.5	pCi/g	REC: 97	(30%-105%)		
				Uncert: +/-2.25					
				TPU: +/-3.43					
Batch	1618891								
QC1203676950	MB								
Plutonium-238			U	-0.0148	pCi/g			KXB2	11/30/1609:48
				Uncert: +/-0.222					
				TPU: +/-0.223					
Plutonium-239/240			U	0.077	pCi/g				
				Uncert: +/-0.263					
				TPU: +/-0.263					
**Plutonium-242 Tracer	17.6			15.4	pCi/g	REC: 87	(30%-105%)		
				Uncert: +/-2.25					
				TPU: +/-3.34					
QC1203676951	410876001	DUP							
Plutonium-238		U	-0.13	U	0.0331	pCi/g			11/30/1609:48
			Uncert: +/-0.324		+/-0.184		RPD: 0	N/A	
			TPU: +/-0.324		+/-0.184		RER: 0.856	(0-2)	
Plutonium-239/240		U	0.179	U	0.145	pCi/g			
			Uncert: +/-0.258		+/-0.257		RPD: 0	N/A	
			TPU: +/-0.259		+/-0.257		RER: 0.181	(0-2)	
**Plutonium-242 Tracer	17.6	18.2		14.5	pCi/g	REC: 83	(30%-105%)		
				Uncert: +/-2.16					
				TPU: +/-3.23					
QC1203676952	LCS								
Plutonium-238			U	0.213	pCi/g				11/30/1609:48
				Uncert: +/-0.230					

GEL LABORATORIES LLC

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

QC Summary

Workorder: 410876

Page 2 of 7

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1618891								
Plutonium-239/240	17.6	TPU:		+/-0.231					
		Uncert:		15.6	pCi/g	REC: 89	(80%-120%)		
		TPU:		+/-1.69					
**Plutonium-242 Tracer	17.6	TPU:		+/-2.48					
		Uncert:		18.5	pCi/g	REC: 105	(30%-105%)		
		TPU:		+/-1.79					
		TPU:		+/-2.72					
Batch	1618892								
QC1203676953	MB								
Uranium-233/234			U	0.0557	pCi/g			KXB2	11/30/1609:30
		Uncert:		+/-0.250					
		TPU:		+/-0.250					
Uranium-235/236			U	-0.0207	pCi/g				
		Uncert:		+/-0.178					
		TPU:		+/-0.179					
Uranium-238			U	-0.0167	pCi/g				
		Uncert:		+/-0.144					
		TPU:		+/-0.145					
**Uranium-232 Tracer	18.7			16.3	pCi/g	REC: 87	(30%-105%)		
		Uncert:		+/-2.25					
		TPU:		+/-3.47					
QC1203676954	410876001	DUP							
Uranium-233/234				0.653	pCi/g				11/30/1609:30
		Uncert:		+/-0.430		RPD: 24	(0% - 100%)		
		TPU:		+/-0.438		RER: 0.501	(0-2)		
Uranium-235/236		U	U	0.0542	pCi/g				
		Uncert:		+/-0.203		RPD: 0	N/A		
		TPU:		+/-0.203		RER: 0.476	(0-2)		
Uranium-238				0.563	pCi/g				
		Uncert:		+/-0.377		RPD: 12	(0% - 100%)		
		TPU:		+/-0.384		RER: 0.244	(0-2)		
**Uranium-232 Tracer	18.7			20.8	pCi/g	REC: 103	(30%-105%)		
		Uncert:		+/-2.10					
		TPU:		+/-3.32					
QC1203676955	LCS								
Uranium-233/234				23.3	pCi/g				
		Uncert:		+/-2.31					
		TPU:		+/-3.90					
Uranium-235/236				1.68	pCi/g				
		Uncert:		+/-0.704					
		TPU:		+/-0.740					
Uranium-238	24.0			28.9	pCi/g	REC: 120	(80%-120%)		
		Uncert:		+/-2.57					
		TPU:		+/-4.67					
**Uranium-232 Tracer	18.7			17.3	pCi/g	REC: 93	(30%-105%)		
		Uncert:		+/-2.10					
		TPU:		+/-3.28					
Batch	1620079								
QC1203680005	MB								

GEL LABORATORIES LLC

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

QC Summary

Workorder: 410876

Page 3 of 7

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1620079								
Thorium-232			U	0.0901	pCi/g			JXH2	12/10/1610:34
				Uncert: +/-0.224					
				TPU: +/-0.225					
**Thorium-229 Tracer	19.5			17.4	pCi/g	REC: 89	(30%-105%)		
				Uncert: +/-2.21					
				TPU: +/-3.58					
QC1203680006	410876001	DUP							
Thorium-232		0.607		1.24	pCi/g				12/10/1610:35
				Uncert: +/-0.388		RPD: 69	(0% - 100%)		
				TPU: +/-0.397		RER: 1.67	(0-2)		
**Thorium-229 Tracer	19.7	18.1		18.8	pCi/g	REC: 95	(30%-105%)		
				Uncert: +/-2.03					
				TPU: +/-3.36					
QC1203680007	LCS								
Thorium-232		18.7		19.2	pCi/g	REC: 102	(80%-120%)		12/10/1610:36
				Uncert: +/-2.33					
				TPU: +/-3.70					
**Thorium-229 Tracer	19.5			18.5	pCi/g	REC: 95	(30%-105%)		
				Uncert: +/-2.35					
				TPU: +/-3.76					
Batch	1620593								
QC1203681361	MB								
Neptunium-237			U	-0.114	pCi/g			KXB2	12/01/1622:20
				Uncert: +/-0.197					
				TPU: +/-0.197					
**Americium-243 Tracer	1660			1590	pCi/g	REC: 96	(30%-105%)		
QC1203681362	410876001	DUP							
Neptunium-237		U	0.00512	U	-0.0805				12/01/1622:20
				Uncert: +/-0.235		RPD: 0	N/A		
				TPU: +/-0.235		RER: 0.598	(0-2)		
**Americium-243 Tracer	2040	2230		2150	pCi/g	REC: 105	(30%-105%)		
QC1203681363	LCS								
Neptunium-237		34.6		35.0	pCi/g	REC: 101	(80%-120%)		12/01/1622:20
				Uncert: +/-2.65					
				TPU: +/-4.65					
**Americium-243 Tracer	1660			1790	pCi/g	REC: 108*	(30%-105%)		
Rad Gamma Spec									
Batch	1617780								
QC1203673841	MB								
Cesium-137			U	-0.00163	pCi/g			MXR1	12/12/1609:08
				Uncert: +/-0.0225					
				TPU: +/-0.0225					
Cobalt-60			U	-0.0171	pCi/g				
				Uncert: +/-0.0196					
				TPU: +/-0.0211					
Europium-152			U	-0.00341	pCi/g				
				Uncert: +/-0.0466					
				TPU: +/-0.0466					
Europium-154			U	0.00853	pCi/g				

GEL LABORATORIES LLC

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

QC Summary

Workorder: 410876

Page 4 of 7

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1617780								
		Uncert:		+/-0.0745					
		TPU:		+/-0.0746					
Europium-155			U	-0.013	pCi/g				
		Uncert:		+/-0.0357					
		TPU:		+/-0.0362					
Radium-226			U	0.0128	pCi/g				
		Uncert:		+/-0.0512					
		TPU:		+/-0.0515					
Radium-228			U	0.0255	pCi/g				
		Uncert:		+/-0.074					
		TPU:		+/-0.0749					
QC1203673842	410876001	DUP							
Cesium-137		U	0.00229	U	0.0029	pCi/g			12/13/1608:35
		Uncert:	+/-0.0227		+/-0.0257		RPD: 0	N/A	
		TPU:	+/-0.0228		+/-0.0257		RER: 0.0345	(0-2)	
Cobalt-60		U	0.00398	U	0.0432	pCi/g			
		Uncert:	+/-0.0202		+/-0.0357		RPD: 0	N/A	
		TPU:	+/-0.0203		+/-0.0406		RER: 1.69	(0-2)	
Europium-152		U	0.0111	U	-0.066	pCi/g			
		Uncert:	+/-0.0518		+/-0.061		RPD: 0	N/A	
		TPU:	+/-0.052		+/-0.068		RER: 1.76	(0-2)	
Europium-154		U	0.0377	U	0.0513	pCi/g			
		Uncert:	+/-0.0631		+/-0.0752		RPD: 0	N/A	
		TPU:	+/-0.0654		+/-0.0787		RER: 0.261	(0-2)	
Europium-155		U	0.0331	U	0.000659	pCi/g			
		Uncert:	+/-0.0597		+/-0.0725		RPD: 0	N/A	
		TPU:	+/-0.0616		+/-0.0725		RER: 0.667	(0-2)	
Radium-226			0.599		0.588	pCi/g			
		Uncert:	+/-0.117		+/-0.129		RPD: 2	(0% - 20%)	
		TPU:	+/-0.119		+/-0.132		RER: 0.131	(0-2)	
Radium-228			0.908		0.988	pCi/g			
		Uncert:	+/-0.207		+/-0.239		RPD: 8	(0% - 20%)	
		TPU:	+/-0.212		+/-0.245		RER: 0.484	(0-2)	
QC1203673843	LCS								
Americium-241		489			554	pCi/g	REC: 113	(80%-120%)	12/12/1610:30
		Uncert:			+/-3.69				
		TPU:			+/-40.5				
Cesium-137		179			193	pCi/g	REC: 108	(80%-120%)	
		Uncert:			+/-2.35				
		TPU:			+/-8.62				
Cobalt-60		158			157	pCi/g	REC: 99	(80%-120%)	
		Uncert:			+/-2.47				
		TPU:			+/-6.27				
Europium-152			U		0.401	pCi/g			
		Uncert:			+/-0.856				
		TPU:			+/-0.876				
Europium-154			U		0.142	pCi/g			
		Uncert:			+/-0.608				
		TPU:			+/-0.611				
Europium-155			U		0.0936	pCi/g			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 410876

Page 5 of 7

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1617780								
				Uncert:		+/-0.637			
				TPU:		+/-0.639			
Radium-226			U		pCi/g	-0.145			
				Uncert:		+/-0.624			
				TPU:		+/-0.628			
Radium-228			U		pCi/g	0.628			
				Uncert:		+/-1.98			
				TPU:		+/-2.00			
Batch	1619091								
QC1203677480	MB								
Iodine-129			U		pCi/g	0.0517		MJH1	11/29/1612:21
				Uncert:		+/-0.602			
				TPU:		+/-0.602			
QC1203677481	410912001	DUP							
Iodine-129		NU	0.649	U	pCi/g	0.370			11/29/1612:21
				Uncert:		+/-0.663		RPD: 0	N/A
				TPU:		+/-0.728		RER: 0.578	(0-2)
QC1203677482	410912001	MS							
Iodine-129		41.7	NU	0.649	N	24.6	pCi/g	REC: 57*	(75%-125%)
				Uncert:		+/-0.663			
				TPU:		+/-0.728			
QC1203677483	LCS								
Iodine-129		41.4			pCi/g	33.7	REC: 82	(80%-120%)	11/29/1612:22
				Uncert:		+/-8.19			
				TPU:		+/-8.90			
Rad Gas Flow									
Batch	1618360								
QC1203675537	MB								
Total Strontium			U		pCi/g	-2.94		BXF1	12/03/1620:35
				Uncert:		+/-0.410			
				TPU:		+/-0.410			
**Strontium Carrier		7.75			mg	7.30	REC: 94	(40%-110%)	
QC1203675538	410910001	DUP							
Total Strontium		U	0.00966	U	pCi/g	0.807			12/03/1620:37
				Uncert:		+/-0.521		RPD: 0	N/A
				TPU:		+/-0.522		RER: 1.58	(0-2)
**Strontium Carrier		7.75	8.30		mg	6.20	REC: 80	(40%-110%)	
QC1203675539	LCS								
Total Strontium		60.0			pCi/g	63.9	REC: 107	(80%-120%)	12/03/1620:37
				Uncert:		+/-3.23			
				TPU:		+/-16.5			
**Strontium Carrier		7.75			mg	6.70	REC: 87	(40%-110%)	
Rad Liquid Scintillation									
Batch	1618013								
QC1203674446	MB								
Technetium-99			U		pCi/g	-0.797		GXR1	11/27/1614:01
				Uncert:		+/-1.54			
				TPU:		+/-1.54			
**Technetium-99m Tracer		23400			CPM	18100	REC: 77	(30%-105%)	

GEL LABORATORIES LLC

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

QC Summary

Workorder: 410876

Page 6 of 7

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Liquid Scintillation									
Batch	1618013								
QC1203674447	410912001	DUP							
Technetium-99		2.74E+05		2.39E+05	pCi/g				11/27/1614:32
		Uncert:	+/-5250	+/-3680		RPD:	13 (0% - 20%)		
		TPU:	+/-31900	+/-27700		RER:	1.6 (0-2)		
**Technetium-99m Tracer	23400	12500		13500	CPM	REC:	58 (30%-105%)		
QC1203674448	LCS								
Technetium-99		67.0		60.1	pCi/g	REC:	90 (80%-120%)		11/27/1614:34
		Uncert:		+/-2.52					
		TPU:		+/-7.36					
**Technetium-99m Tracer	23400			23300	CPM	REC:	100 (30%-105%)		
Batch	1618025								
QC1203674485	MB								
Carbon-14			U	-1.24	pCi/g			TXJ1	12/01/1616:56
		Uncert:		+/-1.96					
		TPU:		+/-1.96					
QC1203674486	410876001	DUP							
Carbon-14		U	1.04	U	0.733	pCi/g			12/01/1617:43
		Uncert:	+/-2.09	+/-2.09		RPD:	0 N/A		
		TPU:	+/-2.10	+/-2.09		RER:	0.204 (0-2)		
QC1203674487	410876001	MS							
Carbon-14		135	U	1.04	132	pCi/g	REC:	98 (75%-125%)	12/01/1618:30
		Uncert:	+/-2.09	+/-6.94					
		TPU:	+/-2.10	+/-12.0					
QC1203674488	LCS								
Carbon-14		135		143	pCi/g	REC:	106 (80%-120%)		12/01/1618:46
		Uncert:		+/-7.17					
		TPU:		+/-12.8					
Batch	1619535								
QC1203678390	MB								
Tritium			U	-0.357	pCi/g			TXP3	11/29/1617:00
		Uncert:		+/-11.3					
		TPU:		+/-11.3					
QC1203678391	410876001	DUP							
Tritium		U	1.53	U	18.9	pCi/g			11/29/1616:39
		Uncert:	+/-12.4	+/-15.0		RPD:	0 N/A		
		TPU:	+/-12.4	+/-15.6		RER:	1.71 (0-2)		
QC1203678392	410876001	MS							
Tritium		98.2	U	1.53	95.2	pCi/g	REC:	97 (75%-125%)	11/29/1616:18
		Uncert:	+/-12.4	+/-17.6					
		TPU:	+/-12.4	+/-27.8					
QC1203678393	LCS								
Tritium		93.9		98.2	pCi/g	REC:	105 (80%-120%)		11/30/1606:32
		Uncert:		+/-19.8					
		TPU:		+/-29.8					
Batch	1620328								
QC1203680681	MB								
Nickel-63			U	-1.2	pCi/g			CXS7	12/02/1602:45
		Uncert:		+/-2.06					
		TPU:		+/-2.06					
**Nickel Carrier	24.6			17.2	mg	REC:	70 (40%-110%)		

GEL LABORATORIES LLC

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

QC Summary

Workorder: 410876

Page 7 of 7

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Liquid Scintillation									
Batch	1620328								
QC1203680682	410876001	DUP							
Nickel-63		U	-1.01	U	-1.6	pCi/g			12/02/1603:27
		Uncert:	+/-2.24		+/-2.70		RPD: 0	N/A	
		TPU:	+/-2.24		+/-2.70		RER: 0.329	(0-2)	
**Nickel Carrier	24.6		17.5		14.9	mg	REC: 61	(40%-110%)	
QC1203680683	LCS								
Nickel-63	120				143	pCi/g	REC: 119	(80%-120%)	12/02/1607:42
		Uncert:			+/-7.45				
		TPU:			+/-27.3				
**Nickel Carrier	24.6				17.4	mg	REC: 71	(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:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- < 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 associated QC sample blank has a result >= 2X the MDA and, after corrections, result is >= MDA for this sample
- 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.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- 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
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- 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.