

8/24/2016



August 24, 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: 402541
SDG: GEL402541

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 28, 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

Chain of Custody: F16-028-020
Enclosures



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Sample Issue Resolution

SAMPLE ISSUE RESOLUTION	SIR NUM	SIR16-587
	REV NUM	0
	DATE INITIATED	8/23/2016

SAMPLE EVENT INFORMATION

SAF NUM(S) F16-028
OPERABLE UNIT(S) 200-WA-1
PROJECT(S) 200-WA-1
SAMPLE EVENT TITLE(S) 200-WA-1 OU OPPORTUNISTIC SAMPLING C9414 AND C9567 - SOIL
LABORATORY GEL Laboratories, LLC

SAMPLING INFORMATION

NUMBER OF SAMPLES 1
SAMPLE NUMBERS B35XH7
SAMPLE MATRIX SOIL
COLLECTION DATE 7/27/2016 - 7/27/2016
SDG NUM GEL402541

ISSUE BACKGROUND

CLASS Laboratory Issue

TYPE Quality Control Failure

DESCRIPTION The QC sample for the CPRC Thorium analysis B35XH7 (402541001) has a tracer yield recovery of 112%. This is higher than the client tracer yield requirements of 30 to 105%, however it does meet the GEL standard tracer yield requirements of 15 to 125%. The Duplicate does meet the client tracer yield requirements and there is a slight hit in Th-232 that is less than the detection limit of 1 pCi/g and duplicates between the QC and DUP. All QC/client requirements were met and the detection limits were met. GEL would like to request relief to report the slightly high tracer yield recovery with a DER to address the issue.

DISPOSITION

DESCRIPTION Proposed Resolution: The lab will report and narrate the issue.

JUSTIFICATION Final Disposition: Accept proposed resolution

SUBMITTED BY: Heather Shaffer DATE: 08/23/2016

ACCEPTED BY: Scot Fitzgerald DATE: 08/23/2016

Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF F16-028
SDG: GEL402541**

August 24, 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 July 28, 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. Please refer to the enclosed SIR for further details on QC issues.

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 and DER.

Sample Identification

The laboratory received the following sample:

Laboratory Identification	Sample Description
402541001	B35XH7

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.

8/24/2016

B. Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL402541
Work Order #: 402541

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.

Technical Information

Sample Dilutions

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

Analyte	402541
	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
--------	---------	-------

1203594901 (B35XH3DUP)	pH	Received 27-JUL-16, out of holding 25-JUL-16
402541001 (B35XH7)	pH	Received 28-JUL-16, out of holding 27-JUL-16

Radiochemistry

AMCMISO_EIE_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.

NP237_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.

PUISO_PRECIP_AEA:COMMON

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

Quality Control (QC) Information

QC Information

Refer to Miscellaneous Information section.

Technical Information

Recounts

Samples 1203595755 (MB) and 402541001 (B35XH7) were recounted due to a peak shift. The recounts are reported. Sample 1203595757 (LCS) was recounted due to poor resolution. The recount is reported.

Miscellaneous Information

UIISO_IE_PRECIP_AEA:COMMON

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

applicable, with the following exceptions.

Technical Information

Recounts

The batch was recounted due to a blank result greater than the MDA. The recounts are reported with the exception of the laboratory control sample, 1203595764, which was counted again due to a high recovery and the third count is reported.

THISO_IE_PLATE_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

Sample 402541001 (B35XH7) was reprepared due to high blank activity. The re-analysis is being reported.

Recounts

Sample 402541001 (B35XH7) was given additional clean-up steps and recounted in order to remove suspected interferences. The recount is 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.

I129_SEP_LEPS_GS

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)

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.

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 1203601566 (MB) was recounted due to a suspected blank false positive. The recount is reported.

Sample 402541001 (B35XH7) was recounted due to results more negative than the three sigma TPU. The second count 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

Recounts

Samples were recounted due to low recovery. The recounts are 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 reprepared due to low recovery. The re-analysis is being 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

CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 402541				F16-028-020	PAGE 1 OF 2
COLLECTOR Chris Fulton CHPRC		COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D		PRICE CODE 8H	DATA TURNAROUND
SAMPLING LOCATION C9411, I-003		PROJECT DESIGNATION 200-WA-1 Opportunistic sampling - soil		SAF NO. F16-028		AIR QUALITY <input type="checkbox"/>	30 Days / 30 Days
ICE CHEST NO. GWS-555		FIELD LOGBOOK NO. HNF-N-645-5 / pg. 11	ACTUAL SAMPLE DEPTH ^{FT.} 175.0 TO 177.5		COA 300192	METHOD OF SHIPMENT FEDERAL EXPRESS ORIGINAL	
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO. 6873			BILL OF LADING/AIR BILL NO. 7768 59238174		
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. NA	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	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
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME				
B35XH7	SOIL	JUL 27 2016	12 41	✓	✓	✓	✓

8/24/2016

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM Chris Fulton CHPRC	DATE/TIME JUL 27 2016 1325	RECEIVED BY/STORED IN FEDEX	DATE/TIME JUL 27 2016 1325	SEE PAGE 2 FOR ALL SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM FX	DATE/TIME	RECEIVED BY/STORED IN M. Kingston	DATE/TIME 7-28-16 0900		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
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	

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F16-028-020	PAGE 2 OF 2
COLLECTOR Chris Fulton CHPRC	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D		PRICE CODE 8H	DATA TURNAROUND 30 Days / 30 Days
SAMPLING LOCATION C9411, I-003	PROJECT DESIGNATION 200-WA-1 Opportunistic sampling - soil		SAF NO. F16-028		AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO. GWS-55S	FIELD LOGBOOK NO. HNF-N-645-5, Pg. 11	ACTUAL SAMPLE DEPTH 175.0 ^{FT} to 177.5 ^{FT}	COA 300192		METHOD OF SHIPMENT FEDERAL EXPRESS	ORIGINAL
SHIPPED TO GEL Laboratories, LLC	OFFSITE PROPERTY NO. 6873		BILL OF LADING/AIR BILL NO. 7768 8923 8174			

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; PUIISO_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};

8/24/2016



SAMPLE RECEIPT & REVIEW FORM

Client: <u>ORC</u>		SDG/AR/COC/Work Order:	
Received By: <u>MK</u>		Date Received: <u>7/28/16</u>	
Suspected Hazard Information	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	*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>CPMD</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"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius <u>2C</u>
2a	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>130462462</u> Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7	VOA vials contain acid preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If unknown, select No)
8	VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
9	Are Encore containers present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10	Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
11	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
12	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
14	Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16	Carrier and tracking number.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7768 5923 2176</u>

Comments (Use Continuation Form if needed):

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 24 August 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	LA160006
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	SC000122016-20
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL402541
Work Order #: 402541

Product: Determination of Metals by ICP-MS
Analytical Method: 6020_METALS_ICPMS
Analytical Procedure: GL-MA-E-014 REV# 28
Analytical Batch: 1585705

Preparation Method: SW846 3050B
Preparation Procedure: GL-MA-E-009 REV# 26
Preparation Batch: 1585704

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203594669	Method Blank (MB)ICP-MS
1203594670	Laboratory Control Sample (LCS)
1203594673	402541001(B35XH7L) Serial Dilution (SD)
1203594671	402541001(B35XH7D) Sample Duplicate (DUP)
1203594672	402541001(B35XH7S) 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.

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 are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	402541
	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: GEL402541 GEL Work Order: 402541

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- 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: 24 AUG 2016

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL402541

CONTRACT: CPRC0F16028

METHOD TYPE: SW846

SAMPLE ID:402541001

BASIS: Dry Weight

DATE COLLECTED 27-JUL-16

CLIENT ID: B35XH7

LEVEL: Low

DATE RECEIVED 28-JUL-16

MATRIX: SOIL

%SOLIDS: 90.6

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-61-1	Uranium	1010	ug/kg	D	13.7	41.4	41.4	2	MS	SKJ	08/16/16 13:23	160816-1	1585705

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1585705	1585704	SW846 3050B	0.533	g	50	mL	07/29/16	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: August 24, 2016

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 402541

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1585705										
QC1203594671	402541001	DUP									
Uranium		D	1010	D	1020	ug/kg	0.655	(0%-20%)	SKJ	08/16/16	13:25
QC1203594670	LCS										
Uranium	4870		D		5060	ug/kg		104 (34%-166%)		08/16/16	13:22
QC1203594669	MB										
Uranium			DU		13.1	ug/kg				08/16/16	13:21
QC1203594672	402541001	MS									
Uranium	5220	D	1010	D	5710	ug/kg		90 (75%-125%)		08/16/16	13:26
QC1203594673	402541001	SDILT									
Uranium		D	4.90	D	0.884	ug/L	9.7	(0%-10%)		08/16/16	13:28

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: 402541

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	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.

General Chem Analysis

Case Narrative

**General Chemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL402541
Work Order #: 402541**

Product: Ion Chromatography

Analytical Method: 9056_ANIONS_IC

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

Analytical Batches: 1591048 and 1591047

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203608371	Method Blank (MB)
1203608372	Laboratory Control Sample (LCS)
1203608373	402541001(B35XH7) Sample Duplicate (DUP)
1203608374	402541001(B35XH7) 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# 21**Analytical Batch:** 1585798

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203594900	Laboratory Control Sample (LCS)
1203594901	402432001(B35XH3) 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
1203594901 (B35XH3DUP)	pH	Received 27-JUL-16, out of holding 25-JUL-16
402541001 (B35XH7)	pH	Received 28-JUL-16, out of holding 27-JUL-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: GEL402541 GEL Work Order: 402541

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: 22 AUG 2016

Title: Analyst I

Sample Data Summary

8/24/2016

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: August 22, 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: B35XH7 Project: CPRC0F16028
 Sample ID: 402541001 Client ID: CPRC001
 Matrix: SOIL
 Collect Date: 27-JUL-16 12:41
 Receive Date: 28-JUL-16
 Collector: Client
 Moisture: 9.45%

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	B	1850	791	2200	ug/Kg	9.95	1	MXL2	08/18/16	0610	1591048	1
Fluoride	B	680	374	1100	ug/Kg	9.95	1					
Nitrate-N		1550	363	1100	ug/Kg	9.95	1					
Nitrite-N	U	363	363	1100	ug/Kg	9.95	1					
Phosphorus in phosphate	U	736	736	2200	ug/Kg	9.95	1					
Sulfate		11900	1460	4400	ug/Kg	9.95	1					

Titration and Ion Analysis												
9045_pH (Non-Aqueous):COMMON "As Received"												
pH at Temp 23.9C	X	8.63	0.010	0.100	SU		1	RXB5	07/28/16	1936	1585798	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	08/17/16	1156	1591047

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
- 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

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

QC Summary

Report Date: August 22, 2016

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 402541

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1591048										
QC1203608373	402541001	DUP									
Chloride	B	1850	B	1670	ug/Kg	10.3	^	(+/-2200)	MXL2	08/18/16	06:40
Fluoride	B	680	B	676	ug/Kg	0.562	^	(+/-1100)			
Nitrate-N		1550		1570	ug/Kg	1.52	^	(+/-1100)			
Nitrite-N	U	363	U	364	ug/Kg	N/A					
Phosphorus in phosphate	U	736	U	738	ug/Kg	N/A					
Sulfate		11900		10800	ug/Kg	9.32	^	(+/-4410)			
QC1203608372	LCS										
Chloride		49900		47200	ug/Kg			94.7	(80%-120%)		08/18/16 05:40
Fluoride		24900		23100	ug/Kg			92.7	(80%-120%)		
Nitrate-N		24900		23700	ug/Kg			95.2	(80%-120%)		
Nitrite-N		24900		24000	ug/Kg			96.1	(80%-120%)		
Phosphorus in phosphate		12500		12400	ug/Kg			99.6	(80%-120%)		
Sulfate		99800		96700	ug/Kg			96.9	(80%-120%)		
QC1203608371	MB										
Chloride			U	716	ug/Kg						08/18/16 05:10
Fluoride			U	338	ug/Kg						
Nitrate-N			U	328	ug/Kg						
Nitrite-N			U	328	ug/Kg						
Phosphorus in phosphate			U	667	ug/Kg						
Sulfate			U	1320	ug/Kg						

QC1203608374 402541001 MS

GEL LABORATORIES LLC

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QC Summary

Workorder: 402541

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1591048										
Chloride	54700	B	1850	53400	ug/Kg		94.3	(48%-145%)		08/18/16	07:10
Fluoride	27300	B	680	25100	ug/Kg		89.4	(30%-135%)	MXL2		
Nitrate-N	27300		1550	28500	ug/Kg		98.6	(70%-125%)			
Nitrite-N	27300	U	363	27000	ug/Kg		98.8	(70%-120%)			
Phosphorus in phosphate	13700	U	736	10000	ug/Kg		73.5	(35%-134%)			
Sulfate	109000		11900	117000	ug/Kg		96.4	(45%-162%)			

Titration and Ion Analysis

Batch	1585798										
QC1203594901	402432001	DUP									
pH		X	8.58	X	8.49	SU	1.05	(0%-30%)	RXB5	07/28/16	19:33
QC1203594900	LCS										
pH	7.00				6.99	SU	99.9	(70%-130%)		07/28/16	19:29

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 #: GEL402541
Work Order #: 402541

Product: AMCMISO_EIE_PRECIP_AEA: COMMON

Analytical Method: AMCMISO_EIE_PREC_AEA

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

Analytical Batch: 1586142

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1585906

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203595749	Method Blank (MB)
1203595750	402541001(B35XH7) Sample Duplicate (DUP)
1203595751	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: NP237_IE_PRECIP_AEA

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

Analytical Batch: 1586144

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1585906

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203595752	Method Blank (MB)
1203595753	402541001(B35XH7) Sample Duplicate (DUP)

1203595754 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: PUIISO_PRECIP_AEA:COMMON

Analytical Method: PUIISO_PRECIP_AEA

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

Analytical Batch: 1586145

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1585906

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203595755	Method Blank (MB)
1203595756	402541001(B35XH7) Sample Duplicate (DUP)
1203595757	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

Samples 1203595755 (MB) and 402541001 (B35XH7) were recounted due to a peak shift. The recounts are reported. Sample 1203595757 (LCS) was recounted due to poor resolution. The recount is reported.

Miscellaneous Information

1. Sample 1203595757 does not meet the resolution requirement of having a full width half maximum of 100 keV or less for the Pu-242 tracer. 1. The sample does meet the tracer yield requirement, the detection limits, and its tracer peak is within the Pu-242 region of interest. Reporting results.

Product: UISO_IE_PRECIP_AEA:COMMON
Analytical Method: UISO_IE_PRECIP_AEA
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1586148

Preparation Method: ASTM D 2216 (Modified)
Preparation Procedure: GL-RAD-A-021 REV# 20
Preparation Batch: 1585906

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203595762	Method Blank (MB)
1203595763	402541001(B35XH7) Sample Duplicate (DUP)
1203595764	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

The batch was recounted due to a blank result greater than the MDA. The recounts are reported with the exception of the laboratory control sample, 1203595764, which was counted again due to a high recovery and the third count is reported.

Product: THISO_IE_PLATE_AEA: COMMON
Analytical Method: THISO_IE_PRECIP_AEA
Analytical Procedure: GL-RAD-A-038 REV# 17
Analytical Batch: 1591218

Preparation Method: ASTM D 2216 (Modified)
Preparation Procedure: GL-RAD-A-021 REV# 20
Preparation Batch: 1585906

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203608804	Method Blank (MB)
1203608805	402541001(B35XH7) Sample Duplicate (DUP)
1203608806	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

Sample 402541001 (B35XH7) was repped due to high blank activity. The re-analysis is being reported.

Recounts

Sample 402541001 (B35XH7) was given additional clean-up steps and recounted in order to remove suspected interferences. The recount is reported.

Miscellaneous Information

1. The QC Sample 402541001 did not meet the client tracer yield requirements of 30 to 105%. 1. The sample did meet the GEL standard tracer yield requirements of 15 to 125%. The Duplicate 1203608805 did meet the client tracer yield requirements and the Th-232 results met the duplication criteria. Client granted relief, reporting results.

Product: Dry Weight

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1585906

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203595123	402541001(B35XH7) 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: I129_SEP_LEPS_GS

Analytical Method: I129_SEP_LEPS_GS

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

Analytical Batch: 1585659

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203594530	Method Blank (MB)
1203594531	402432001(B35XH3) Sample Duplicate (DUP)
1203594532	402432001(B35XH3) Matrix Spike (MS)
1203594533	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: GAMMA_GS:COMMON + (Add-on)

Analytical Method: GAMMA_GS

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

Analytical Batch: 1586000

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1585906

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203595400	Method Blank (MB)
1203595401	402541001(B35XH7) Sample Duplicate (DUP)
1203595402	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: The sample and the duplicate, 1203595401 (B35XH7DUP) and 402541001 (B35XH7), relative error ratio is greater than two for Eu-154; however, both results are less than their respective MDCs.

Product: SRTOT_SEP_PRECIP_GPC: COMMON

Analytical Method: SRTOT_SEP_PRECIP_GPC

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

Analytical Batch: 1588469

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1585906

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203601566	Method Blank (MB)
1203601567	402432002(B35XH5) Sample Duplicate (DUP)
1203601568	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 1203601566 (MB) was recounted due to a suspected blank false positive. The recount is reported.

Sample 402541001 (B35XH7) was recounted due to results more negative than the three sigma TPU. The second count is reported.

Product: TC99_SEP_GPC

Analytical Method: TC99_EIE_LSC

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

Analytical Batch: 1588132

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
------------------------------	--

402541001	B35XH7
1203600560	Method Blank (MB)
1203600561	402432001(B35XH3) Sample Duplicate (DUP)
1203600562	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: 1588489

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203601657	Method Blank (MB)
1203601658	402432001(B35XH3) Sample Duplicate (DUP)
1203601659	402432001(B35XH3) Matrix Spike (MS)
1203601660	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: 1588517

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203601770	Method Blank (MB)
1203601771	402432001(B35XH3) Sample Duplicate (DUP)

1203601772 402432001(B35XH3) Matrix Spike (MS)
 1203601773 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 were recounted due to low recovery. The recounts are reported.

Product: NI63_LSC

Analytical Method: NI63_LSC

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

Analytical Batch: 1591683

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1585906

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402541001	B35XH7
1203609943	Method Blank (MB)
1203609944	402432001(B35XH3) Sample Duplicate (DUP)
1203609945	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 re-prepped due to low recovery. The re-analysis is being reported.

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: GEL402541 GEL Work Order: 402541

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Theresa Austin

Date: 24 AUG 2016

Title: Group Leader

Sample Data Summary

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL402541	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 402541001	Date Collected: 07/27/2016 12:41	Matrix: SOIL
	Date Received: 07/28/2016 09:00	%Moisture: 9.4
Client ID: B35XH7		Prep Basis: "Dry Weight Corrected"
Batch ID: 1586142	Method: AMCMISO_EIE_PREC_AEA	SOP Ref: GL-RAD-A-011
Run Date: 08/04/2016 15:23	Analyst: MXS2	Instrument: 1218
Data File: S0402541001_AM.1A.gcnf	Aliquot: 0.106 g	Count Time: 240 min
Prep Batch: 1586142	Prep Method: DOE EML HASL-300, Am-05	Prep SOP Ref: GL-RAD-A-021
Prep Date: 08/03/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.105	pCi/g	+/-0.394	0.395	0.663	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	10.3	20.2	pCi/g	51.3	(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: GEL402541	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 402541001	Date Collected: 07/27/2016 12:41	Matrix: SOIL
	Date Received: 07/28/2016 09:00	%Moisture: 9.4
Client ID: B35XH7		Prep Basis: "Dry Weight Corrected"
Batch ID: 1586144	Method: NP237_IE_PRECIP_AEA	SOP Ref: GL-RAD-A-032
Run Date: 08/04/2016 15:23	Analyst: MXS2	Instrument: 1188
Data File: S0402541001_NP.1A.gcnf	Aliquot: 0.107 g	Count Time: 240 min
Prep Batch: 1586144	Prep Method: ASTM C 1476-00 Modified	Prep SOP Ref: GL-RAD-A-021
Prep Date: 08/03/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13994-20-2	Neptunium-237	U	-0.0973	pCi/g	+/-0.326	0.326	0.783	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	1720	1880	pCi/g	91.3	(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: GEL402541
Lab Sample ID: 402541001

Client: CPRC001
Date Collected: 07/27/2016 12:41
Date Received: 07/28/2016 09:00

Project: CPRC0F16028
Matrix: SOIL
%Moisture: 9.4

Client ID: B35XH7
Batch ID: 1586145
Run Date: 08/18/2016 14:06
Data File: S0402541001_PU.2A.gcnf
Prep Batch: 1586145
Prep Date: 08/03/2016 00:00

Method: PUIISO_PRECIP_AEA
Analyst: MXS2
Aliquot: 0.106 g
Prep Method: DOE EML HASL-300, Pu-11-

Prep Basis: "Dry Weight Corrected"
SOP Ref: GL-RAD-A-011
Instrument: 1100
Count Time: 240 min
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	0.231	pCi/g	+/-0.525	0.527	0.902	1.00
OER-100-70	Plutonium-239/240	U	-0.0874	pCi/g	+/-0.395	0.396	0.996	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	8.21	18.6	pCi/g	44.2	(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: GEL402541
Lab Sample ID: 402541001

Client: CPRC001
Date Collected: 07/27/2016 12:41
Date Received: 07/28/2016 09:00

Project: CPRC0F16028
Matrix: SOIL
%Moisture: 9.4

Client ID: B35XH7
Batch ID: 1586148
Run Date: 08/18/2016 15:11
Data File: S0402541001_UU.2B.gcnf
Prep Batch: 1586148
Prep Date: 08/03/2016 00:00

Method: UIISO_IE_PRECIP_AEA
Analyst: MXS2
Aliquot: 0.106 g
Prep Method: DOE EML HASL-300, U-02-R

Prep Basis: "Dry Weight Corrected"
SOP Ref: GL-RAD-A-011
Instrument: 1149
Count Time: 120 min
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 <small>13968-55-3/13966-29-5</small>	Uranium-233/234		1.78	pCi/g	+/-1.30	1.36	1.13	1.00
15117-96-1/13982-7	Uranium-235/236	U	-0.031	pCi/g	+/-0.513	0.516	1.09	1.00
7440-61-1	Uranium-238	U	0.994	pCi/g	+/-1.01	1.03	0.983	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	13.1	19.7	pCi/g	66.5	(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: GEL402541
 Lab Sample ID: 402541001

Client: CPRC001
 Date Collected: 07/27/2016 12:41
 Date Received: 07/28/2016 09:00

Project: CPRC0F16028
 Matrix: SOIL
 %Moisture: 9.4

Client ID: B35XH7
 Batch ID: 1591218
 Run Date: 08/22/2016 23:14
 Data File: S0402541001_TH.3A.gcnf
 Prep Batch: 1591218
 Prep Date: 08/17/2016 00:00

Method: THISO_IE_PRECIP_AEA
 Analyst: MXS2
 Aliquot: 0.105 g
 Prep Method: DOE EML HASL-300, Th-01-

Prep Basis: "Dry Weight Corrected"
 SOP Ref: GL-RAD-A-038
 Instrument: 1037
 Count Time: 240 min
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
TH-232 <small>7440-29-1</small>	Thorium-232		0.561	pCi/g	+/-0.334	0.342	0.298	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Thorium-229 Tracer	21.6	19.3	pCi/g	112 *	(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: GEL402541	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 402541001	Date Collected: 07/27/2016 12:41	Matrix: SOIL
	Date Received: 07/28/2016 09:00	%Moisture: 9.4
Client ID: B35XH7		Prep Basis: "Dry Weight Corrected"
Batch ID: 1588469	Method: SRTOT_SEP_PRECIP_GPC	SOP Ref: GL-RAD-A-004
Run Date: 08/23/2016 13:51	Analyst: KSD1	Instrument: PIC7B
Data File: S1588469r2.xls	Aliquot: 0.334 g	Count Time: 60 min
Prep Batch: 1588469	Prep Method: EPA 905.0 Modified/DOE RP5	Prep SOP Ref: GL-RAD-A-021
Prep Date: 08/19/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium	U	-0.344	pCi/g	+/-0.365	0.365	0.842	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	7.30	7.37	mg	99.1	(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: GEL402541	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 402541001	Date Collected: 07/27/2016 12:41	Matrix: SOIL
	Date Received: 07/28/2016 09:00	%Moisture: 9.4
Client ID: B35XH7		Prep Basis: "As Received"
Batch ID: 1585659	Method: I129_SEP_LEPS_GS	SOP Ref: GL-RAD-A-006
Run Date: 08/22/2016 11:30	Analyst: MJH1	Instrument: XRAY3
Data File: I402541001.CNF;1	Aliquot: 1.224 g	Count Time: 56.6 min
Prep Batch: 1585659	Prep Method: DOE EML HASL-300,I-01 M	
Prep Date: 08/19/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	U	-0.345	pCi/g	+/-0.581	0.603	1.02	2.00

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: GEL402541
 Lab Sample ID: 402541001

 Client ID: B35XH7
 Batch ID: 1586000
 Run Date: 08/23/2016 05:53
 Data File: G402541001.CNF;1
 Prep Batch: 1586000
 Prep Date: 08/02/2016 00:00

Client: CPRC001
 Date Collected: 07/27/2016 12:41
 Date Received: 07/28/2016 09:00

 Method: GAMMA_GS
 Analyst: MXR1
 Aliquot: 125.877 g
 Prep Method: DOE HASL 300, 4.5.2.3/Ga-01

Project: CPRC0F16028
 Matrix: SOIL
 %Moisture: 9.4

 Prep Basis: "Dry Weight Corrected"
 SOP Ref: GL-RAD-A-013
 Instrument: GAM18
 Count Time: 240 min
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	U	0.00225	pCi/g	+/-0.0195	0.0196	0.0348	0.100
10198-40-0	Cobalt-60	U	0.00585	pCi/g	+/-0.0244	0.0246	0.0378	0.100
14683-23-9	Europium-152	U	0.0352	pCi/g	+/-0.0737	0.0754	0.0947	0.100
15585-10-1	Europium-154	U	0.0497	pCi/g	+/-0.0738	0.0772	0.118	0.100
14391-16-3	Europium-155	U	0.0954	pCi/g	+/-0.0781	0.0784	0.103	0.100
13982-63-3	Radium-226		0.916	pCi/g	+/-0.0951	0.103	0.0718	1.00
15262-20-1	Radium-228		0.995	pCi/g	+/-0.152	0.160	0.131	3.00

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: GEL402541	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 402541001	Date Collected: 07/27/2016 12:41	Matrix: SOIL
	Date Received: 07/28/2016 09:00	%Moisture: 9.4
Client ID: B35XH7		Prep Basis: "As Received"
Batch ID: 1588132	Method: TC99_EIE_LSC	SOP Ref: GL-RAD-A-059
Run Date: 08/17/2016 08:53	Analyst: CXS7	Instrument: LSCGOLD
Data File: E1588132.xls	Aliquot: 1.26 g	Count Time: 20 min
Prep Batch: 1588132	Prep Method: DOE EML HASL-300, Tc-02-	
Prep Date: 08/11/2016 13:02		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	-2.19	pCi/g	+/-2.14	2.14	3.86	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	23500	31800	CPM	73.9	(30%-105%)

Comments:

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL402541	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 402541001	Date Collected: 07/27/2016 12:41	Matrix: SOIL
	Date Received: 07/28/2016 09:00	%Moisture: 9.4
Client ID: B35XH7		Prep Basis: "As Received"
Batch ID: 1588489	Method: C14_LSC	SOP Ref: GL-RAD-A-003
Run Date: 08/18/2016 08:11	Analyst: TXJ1	Instrument: LSCYELLOW
Data File: C1588489.xls	Aliquot: 0.56 g	Count Time: 45 min
Prep Batch: 1588489	Prep Method: EPA EERF C-01 Modified	
Prep Date: 08/17/2016 16:16		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	0.261	pCi/g	+/-1.57	1.57	2.70	5.00

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: GEL402541	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 402541001	Date Collected: 07/27/2016 12:41	Matrix: SOIL
	Date Received: 07/28/2016 09:00	%Moisture: 9.4
Client ID: B35XH7		Prep Basis: "As Received"
Batch ID: 1588517	Method: TRITIUM_DIST_LSC	SOP Ref: GL-RAD-A-002
Run Date: 08/18/2016 01:15	Analyst: TXJ1	Instrument: LSCGOLD
Data File: T1588517R3.xls	Aliquot: 1.37 g	Count Time: 60 min
Prep Batch: 1588517	Prep Method: EPA 906.0 Modified	
Prep Date: 08/15/2016 15:12		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	-4.48	pCi/g	+/-6.81	6.81	12.3	30.0

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: GEL402541
 Lab Sample ID: 402541001

Client: CPRC001
 Date Collected: 07/27/2016 12:41
 Date Received: 07/28/2016 09:00

Project: CPRC0F16028
 Matrix: SOIL
 %Moisture: 9.4

Client ID: B35XH7
 Batch ID: 1591683
 Run Date: 08/23/2016 13:00
 Data File: N1591683.xls
 Prep Batch: 1591683
 Prep Date: 08/22/2016 09:39

Method: NI63_LSC
 Analyst: CXS7
 Aliquot: 0.505 g
 Prep Method: DOE RESL Ni-1, Modified

Prep Basis: "Dry Weight Corrected"
 SOP Ref: GL-RAD-A-022
 Instrument: LSCBROWN
 Count Time: 30 min
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
NI-63	Nickel-63	U	-2.83	pCi/g	+/-3.55	3.55	6.40	10.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Nickel Carrier	19.0	24.6	mg	77.3	(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: GEL402541	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 402541001	Date Collected: 07/27/2016 12:41	Matrix: SOIL
	Date Received: 07/28/2016 09:00	%Moisture: 9.4
Client ID: B35XH7		Prep Basis: "As Received"
Batch ID: 1585906	Method: ASTM D 2216 (Modified)	SOP Ref: GL-OA-E-020
Run Date: 07/29/2016 06:52	Analyst: LYT1	Instrument: SP-39020004
Data File:		Count Time:
Prep Batch: 1585906		
Prep Date: 07/29/2016 06:52		

CAS No.	Parmname	Qual	Result	Units	MDC		
%MOISTURE	Moisture		9.45	percent	+/-		
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.

Quality Control Summary

8/24/2016

GEL LABORATORIES LLC

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

QC Summary

Report Date: August 24, 2016

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Client : CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington 99352

Contact: Mr. Scot Fitzgerald

Workorder: 402541

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1586142								
QC1203595749	MB								
Americium-241			U	0.0671	pCi/g			MXS2	08/04/1615:24
				Uncert: +/-0.252					
				TPU: +/-0.252					
**Americium-243 Tracer	20.2			16.3	pCi/g	REC: 81	(30%-105%)		
				Uncert: +/-2.61					
				TPU: +/-3.94					
QC1203595750	402541001	DUP							
Americium-241		U	0.105	U	0.198	pCi/g			08/04/1615:24
				Uncert: +/-0.394	+/-0.545	RPD: 0	N/A		
				TPU: +/-0.395	+/-0.546	RER: 0.27	(0-2)		
**Americium-243 Tracer	21.0		10.3		9.81	pCi/g	REC: 47	(30%-105%)	
				Uncert: +/-3.27	+/-3.52				
				TPU: +/-4.82	+/-5.18				
QC1203595751	LCS								
Americium-241					15.9	pCi/g	REC: 86	(80%-120%)	08/04/1615:24
					Uncert: +/-2.23				
					TPU: +/-3.17				
**Americium-243 Tracer	20.2				16.6	pCi/g	REC: 82	(30%-105%)	
					Uncert: +/-2.49				
					TPU: +/-3.78				
Batch	1586144								
QC1203595752	MB								
Neptunium-237			U	-0.0347	pCi/g			MXS2	08/04/1615:23
				Uncert: +/-0.153					
				TPU: +/-0.154					
**Americium-243 Tracer	1880				1770	pCi/g	REC: 94	(30%-105%)	
QC1203595753	402541001	DUP							
Neptunium-237		U	-0.0973	U	-0.10	pCi/g			08/04/1615:23
				Uncert: +/-0.326	+/-0.232	RPD: 0	N/A		
				TPU: +/-0.326	+/-0.232	RER: 0.0132	(0-2)		
**Americium-243 Tracer	1910		1720		1350	pCi/g	REC: 70	(30%-105%)	
QC1203595754	LCS								
Neptunium-237					42.7	pCi/g	REC: 102	(80%-120%)	08/04/1615:23
					Uncert: +/-3.90				
					TPU: +/-6.19				
**Americium-243 Tracer	1880				1360	pCi/g	REC: 72	(30%-105%)	
Batch	1586145								
QC1203595755	MB								
Plutonium-238			U	-0.0805	pCi/g			MXS2	08/18/1614:06
				Uncert: +/-0.187					
				TPU: +/-0.187					
Plutonium-239/240			U	-0.0335	pCi/g				
				Uncert: +/-0.313					

8/24/2016

GEL LABORATORIES LLC

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

QC Summary

Workorder: 402541

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1586145								
**Plutonium-242 Tracer		TPU:		+/-0.313					
	18.6			11.6	pCi/g	REC: 63	(30%-105%)		
		Uncert:		+/-2.46					
		TPU:		+/-3.64					
QC1203595756 402541001 DUP									
Plutonium-238		U	0.231	U	0.227				08/04/1615:23
		Uncert:	+/-0.525		+/-0.446	RPD: 0	N/A		
		TPU:	+/-0.527		+/-0.448	RER: 0.0127	(0-2)		
Plutonium-239/240		U	-0.0874	U	0.237				
		Uncert:	+/-0.395		+/-0.597	RPD: 0	N/A		
		TPU:	+/-0.396		+/-0.598	RER: 0.887	(0-2)		
**Plutonium-242 Tracer	19.3		8.21		12.1	pCi/g	REC: 63	(30%-105%)	
		Uncert:	+/-3.07		+/-3.12				
		TPU:	+/-4.47		+/-4.55				
QC1203595757 LCS									
Plutonium-238				U	0.141	pCi/g			08/18/1614:06
		Uncert:			+/-0.324				
		TPU:			+/-0.325				
Plutonium-239/240	18.6				18.6	pCi/g	REC: 100	(80%-120%)	
		Uncert:			+/-2.59				
		TPU:			+/-3.83				
**Plutonium-242 Tracer	18.6				10.9	pCi/g	REC: 59	(30%-105%)	
		Uncert:			+/-2.60				
		TPU:			+/-3.83				
Batch	1586148								
QC1203595762 MB									
Uranium-233/234				U	0.263	pCi/g		MXS2	08/18/1615:11
		Uncert:			+/-0.550				
		TPU:			+/-0.553				
Uranium-235/236				U	0.373	pCi/g			
		Uncert:			+/-0.677				
		TPU:			+/-0.681				
Uranium-238				U	0.0642	pCi/g			
		Uncert:			+/-0.455				
		TPU:			+/-0.456				
**Uranium-232 Tracer	19.6				16.3	pCi/g	REC: 83	(30%-105%)	
		Uncert:			+/-3.51				
		TPU:			+/-5.17				
QC1203595763 402541001 DUP									
Uranium-233/234			1.78	U	0.344	pCi/g			08/18/1615:11
		Uncert:	+/-1.30		+/-0.668	RPD: 64	(0% - 100%)		
		TPU:	+/-1.36		+/-0.671	RER: 1.86	(0-2)		
Uranium-235/236		U	-0.031	U	0.425	pCi/g			
		Uncert:	+/-0.513		+/-0.825	RPD: 0	N/A		
		TPU:	+/-0.516		+/-0.830	RER: 0.914	(0-2)		
Uranium-238		U	0.994		1.12	pCi/g			
		Uncert:	+/-1.01		+/-1.02	RPD: 12	(0% - 100%)		
		TPU:	+/-1.03		+/-1.04	RER: 0.174	(0-2)		
**Uranium-232 Tracer	20.4		13.1		15.3	pCi/g	REC: 75	(30%-105%)	
		Uncert:	+/-3.99		+/-3.94				

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1586148								
QC1203595764	LCS	TPU:	+/-5.84	+/-5.78					
Uranium-233/234				25.2	pCi/g				08/20/1615:59
		Uncert:		+/-2.00					
		TPU:		+/-3.56					
Uranium-235/236				1.47	pCi/g				
		Uncert:		+/-0.559					
		TPU:		+/-0.584					
Uranium-238	25.4			26.6	pCi/g	REC: 105	(80%-120%)		
		Uncert:		+/-2.05					
		TPU:		+/-3.72					
**Uranium-232 Tracer	19.6			15.8	pCi/g	REC: 80	(30%-105%)		
		Uncert:		+/-1.77					
		TPU:		+/-2.91					
Batch	1591218								
QC1203608804	MB								
Thorium-232			U	0.0369	pCi/g			MXS2	08/19/1609:15
		Uncert:		+/-0.167					
		TPU:		+/-0.167					
**Thorium-229 Tracer	19.3			18.0	pCi/g	REC: 93	(30%-105%)		
		Uncert:		+/-2.10					
		TPU:		+/-3.43					
QC1203608805	402541001	DUP							
Thorium-232		0.561	U	0.414	pCi/g				
		Uncert:	+/-0.334	+/-0.378		RPD: 28	(0% - 100%)		
		TPU:	+/-0.342	+/-0.383		RER: 0.561	(0-2)		
**Thorium-229 Tracer	20.1	21.6		19.5	pCi/g	REC: 97	(30%-105%)		
		Uncert:	+/-1.81	+/-2.30					
		TPU:	+/-3.09	+/-3.71					
QC1203608806	LCS								
Thorium-232		18.9		17.4	pCi/g	REC: 92	(80%-120%)		
		Uncert:		+/-2.09					
		TPU:		+/-3.27					
**Thorium-229 Tracer	19.3			17.6	pCi/g	REC: 91	(30%-105%)		
		Uncert:		+/-2.21					
		TPU:		+/-3.57					
Rad Gamma Spec									
Batch	1585659								
QC1203594530	MB								
Iodine-129			U	-0.191	pCi/g			MJH1	08/22/1612:30
		Uncert:		+/-0.373					
		TPU:		+/-0.383					
QC1203594531	402432001	DUP							
Iodine-129		U	0.435	U	0.0841				08/22/1612:30
		Uncert:	+/-0.415	+/-0.357		RPD: 0	N/A		
		TPU:	+/-0.461	+/-0.359		RER: 1.18	(0-2)		
QC1203594532	402432001	MS							
Iodine-129		31.9	U	0.435	pCi/g	REC: 105	(75%-125%)		08/22/1613:08
		Uncert:	+/-0.415	+/-3.62					
		TPU:	+/-0.461	+/-4.89					

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1585659								
QC1203594533	LCS								
Iodine-129	26.3			27.8	pCi/g	REC: 106	(80%-120%)		08/22/1613:08
	Uncert:			+/-3.37					
	TPU:			+/-4.37					
Batch	1586000								
QC1203595400	MB								
Cesium-137			U	0.00452	pCi/g			MXR1	08/23/1605:53
	Uncert:			+/-0.0167					
	TPU:			+/-0.0168					
Cobalt-60			U	0.00776	pCi/g				
	Uncert:			+/-0.0185					
	TPU:			+/-0.0185					
Europium-152			U	0.0144	pCi/g				
	Uncert:			+/-0.0452					
	TPU:			+/-0.0457					
Europium-154			U	0.0273	pCi/g				
	Uncert:			+/-0.0376					
	TPU:			+/-0.0395					
Europium-155			U	-0.0155	pCi/g				
	Uncert:			+/-0.0421					
	TPU:			+/-0.0427					
Radium-226			U	-0.0141	pCi/g				
	Uncert:			+/-0.0446					
	TPU:			+/-0.045					
Radium-228			U	-0.0129	pCi/g				
	Uncert:			+/-0.074					
	TPU:			+/-0.0742					
QC1203595401	402541001	DUP							
Cesium-137		U	0.00225	U	-0.0104	pCi/g			08/23/1611:07
	Uncert:	+/-0.0195		+/-0.0201		RPD: 0	N/A		
	TPU:	+/-0.0196		+/-0.0207		RER: 0.869	(0-2)		
Cobalt-60		U	0.00585	U	-0.00188	pCi/g			
	Uncert:	+/-0.0244		+/-0.0196		RPD: 0	N/A		
	TPU:	+/-0.0246		+/-0.0197		RER: 0.481	(0-2)		
Europium-152		U	0.0352	U	-0.0357	pCi/g			
	Uncert:	+/-0.0737		+/-0.0498		RPD: 0	N/A		
	TPU:	+/-0.0754		+/-0.0524		RER: 1.51	(0-2)		
Europium-154		U	0.0497	U	-0.0647	pCi/g			
	Uncert:	+/-0.0738		+/-0.0657		RPD: 0	N/A		
	TPU:	+/-0.0772		+/-0.0719		RER: 2.13	(0-2)		
Europium-155		U	0.0954	U	0.064	pCi/g			
	Uncert:	+/-0.0781		+/-0.068		RPD: 0	N/A		
	TPU:	+/-0.0784		+/-0.0682		RER: 0.593	(0-2)		
Radium-226			0.916		0.939	pCi/g			
	Uncert:	+/-0.0951		+/-0.0887		RPD: 3	(0% - 20%)		
	TPU:	+/-0.103		+/-0.0975		RER: 0.324	(0-2)		
Radium-228			0.995		1.18	pCi/g			
	Uncert:	+/-0.152		+/-0.166		RPD: 17	(0% - 20%)		
	TPU:	+/-0.160		+/-0.176		RER: 1.51	(0-2)		
QC1203595402	LCS								

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1586000								
Americium-241	489			562	pCi/g	REC: 115	(80%-120%)		
	Uncert:			+/-12.8					
	TPU:			+/-45.4					
Cesium-137	180			180	pCi/g	REC: 100	(80%-120%)		
	Uncert:			+/-3.40					
	TPU:			+/-15.2					
Cobalt-60	164			155	pCi/g	REC: 94	(80%-120%)		
	Uncert:			+/-3.87					
	TPU:			+/-12.6					
Europium-152			U	0.842	pCi/g				
	Uncert:			+/-1.87					
	TPU:			+/-1.91					
Europium-154			U	-0.373	pCi/g				
	Uncert:			+/-1.19					
	TPU:			+/-1.20					
Europium-155			U	-1.04	pCi/g				
	Uncert:			+/-1.45					
	TPU:			+/-1.53					
Radium-226			U	-0.295	pCi/g				
	Uncert:			+/-1.28					
	TPU:			+/-1.29					
Radium-228			U	-1.63	pCi/g				
	Uncert:			+/-3.87					
	TPU:			+/-3.94					
Rad Gas Flow									
Batch	1588469								
QC1203601566	MB								
Total Strontium			U	-0.201	pCi/g			KSD1	08/23/1610:51
	Uncert:			+/-0.299					
	TPU:			+/-0.299					
**Strontium Carrier	7.37			6.60	mg	REC: 90	(40%-110%)		
QC1203601567	402432002	DUP							
Total Strontium	U	-0.276	U	0.387	pCi/g				08/22/1617:24
	Uncert:	+/-0.533		+/-0.827		RPD: 0	N/A		
	TPU:	+/-0.533		+/-0.833		RER: 1.31	(0-2)		
**Strontium Carrier	7.37	7.10		7.00	mg	REC: 95	(40%-110%)		
QC1203601568	LCS								
Total Strontium	45.3			47.3	pCi/g	REC: 104	(80%-120%)		08/22/1617:24
	Uncert:			+/-2.65					
	TPU:			+/-12.2					
**Strontium Carrier	7.37			6.80	mg	REC: 92	(40%-110%)		
Rad Liquid Scintillation									
Batch	1588132								
QC1203600560	MB								
Technetium-99			U	-0.696	pCi/g			CXS7	08/17/1610:41
	Uncert:			+/-1.85					
	TPU:			+/-1.85					
**Technetium-99m Tracer	31800			25200	CPM	REC: 79	(30%-105%)		
QC1203600561	402432001	DUP							

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Liquid Scintillation									
Batch	1588132								
Technetium-99		U	-1.53	U	-1.6	pCi/g			
		Uncert:	+/-1.90		+/-2.01		RPD: 0	N/A	
		TPU:	+/-1.90		+/-2.01		RER: 0.0483	(0-2)	
**Technetium-99m Tracer	31800		27400		24100	CPM	REC: 76	(30%-105%)	
QC1203600562	LCS								
Technetium-99	62.0				74.0	pCi/g	REC: 119	(80%-120%)	08/17/1611:24
		Uncert:			+/-3.82				
		TPU:			+/-9.33				
**Technetium-99m Tracer	31800				24300	CPM	REC: 76	(30%-105%)	
Batch	1588489								
QC1203601657	MB								
Carbon-14				U	1.69	pCi/g		TXJ1	08/18/1612:03
		Uncert:			+/-1.47				
		TPU:			+/-1.48				
QC1203601658	402432001	DUP							
Carbon-14		U	1.23	U	0.652	pCi/g			08/18/1612:49
		Uncert:	+/-1.59		+/-1.45		RPD: 0	N/A	
		TPU:	+/-1.59		+/-1.45		RER: 0.525	(0-2)	
QC1203601659	402432001	MS							
Carbon-14	133	U	1.23		133	pCi/g	REC: 100	(75%-125%)	08/18/1613:35
		Uncert:	+/-1.59		+/-3.91				
		TPU:	+/-1.59		+/-10.6				
QC1203601660	LCS								
Carbon-14	124				127	pCi/g	REC: 102	(80%-120%)	08/18/1614:21
		Uncert:			+/-3.68				
		TPU:			+/-10.0				
Batch	1588517								
QC1203601770	MB								
Tritium				U	-3.78	pCi/g		TXJ1	08/18/1607:38
		Uncert:			+/-6.87				
		TPU:			+/-6.87				
QC1203601771	402432001	DUP							
Tritium		U	-5.81	U	0.214	pCi/g			08/18/1608:40
		Uncert:	+/-7.41		+/-7.65		RPD: 0	N/A	
		TPU:	+/-7.41		+/-7.65		RER: 1.11	(0-2)	
QC1203601772	402432001	MS							
Tritium	84.0	U	-5.81		73.0	pCi/g	REC: 87	(75%-125%)	08/18/1609:43
		Uncert:	+/-7.41		+/-10.3				
		TPU:	+/-7.41		+/-19.5				
QC1203601773	LCS								
Tritium	83.7				67.2	pCi/g	REC: 80	(80%-120%)	08/18/1610:45
		Uncert:			+/-9.64				
		TPU:			+/-18.0				
Batch	1591683								
QC1203609943	MB								
Nickel-63				U	-0.199	pCi/g		CXS7	08/23/1615:39
		Uncert:			+/-3.02				
		TPU:			+/-3.02				
**Nickel Carrier	24.6				20.7	mg	REC: 84	(40%-110%)	
QC1203609944	402432001	DUP							

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Liquid Scintillation										
Batch	1591683									
Nickel-63		U	0.607	U	-0.434	pCi/g				
		Uncert:	+/-3.98		+/-3.75		RPD:	0	N/A	
		TPU:	+/-3.98		+/-3.75		RER:	0.373	(0-2)	
**Nickel Carrier	24.6		17.4		19.3	mg	REC:	79	(40%-110%)	
QC1203609945	LCS									
Nickel-63	230				218	pCi/g	REC:	95	(80%-120%)	
		Uncert:			+/-8.03					08/23/1616:43
		TPU:			+/-41.1					
**Nickel Carrier	24.6				20.1	mg	REC:	82	(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 $\geq 2X$ the MDA and, after corrections, result is \geq MDA for this sample
- 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.
- 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.