

MARCH 2, 2017

REV 0



a member of **The GEL Group** INC



PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
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gel.com

March 01, 2017

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

Re: CHPRC SAF F16-028
Work Order: 415663
SDG: GEL415663

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 03, 2017. 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: F16-028-067
Enclosures



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Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF F16-028
SDG: GEL415663**

March 01, 2017

Laboratory Identification:

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

Summary

Sample receipt

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on February 03, 2017, 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
415663001	B36M12

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.

MARCH 2, 2017

REV 0

B. Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Technical Case Narrative
CH2M Hill Plateau Remediation Company (CPRC)
SDG #: GEL415663
Work Order #: 415663

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
1203721989 (B36M12DUP)	Uranium	43.6* (0%-20%)

Technical Information

Sample Dilutions

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

Analyte	415663
	001
Uranium	2X

General Chemistry

Ion Chromatography

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB (See Below) analyzed with this SDG met the acceptance criteria. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

Sample	Analyte	Value
1203722539 (MB)	Chloride	.764 betw (.72 - 2)

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
1203728196 (B36M12DUP)	pH	Received 03-FEB-17, out of holding 01-FEB-17
415663001 (B36M12)	pH	Received 03-FEB-17, out of holding 01-FEB-17

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.

Quality Control (QC) Information

QC Information

Refer to Miscellaneous Information section.

Miscellaneous Information

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

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.

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**

Sample 1203722074 (MB) was recounted due to a suspected blank false positive. The recount is reported. Samples 1203722075 (B36M12DUP) and 415663001 (B36M12) were recounted to verify results. The recounts are reported.

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)

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

The sample and the duplicate, 1203721785 (B36M12DUP) and 415663001 (B36M12), did not meet the relative percent difference requirement for Ra-228; however, they do meet the relative error ratio requirement with a value of 1.98.

SRTOT_SEP_PRECIP_GPC: 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.

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.

TRITIUM_DIST_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.

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.

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.

Quality Control (QC) Information**QC Information**

The sample and the duplicate, 1203727698 (B36M10DUP), relative error ratio is greater than 2; however, both results are less than their respective MDCs.

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

Sample 415663001 (B36M12) was re-prepped due to high 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

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F16-028-067 PAGE 1 OF 2

CH2MHill Plateau Remediation Company
 COLLECTOR: Roger Friesz Jr. /CHPRC

COMPANY CONTACT: TODAY, D 376-6427

PROJECT COORDINATOR: TODAY, D

PRICE CODE: 8H

DATA TURNAROUND: 30 Days / 30 Days

SAMPLING LOCATION: C9567, I-006

PROJECT DESIGNATION: 200-WA-1 Opportunistic sampling - soil

AIR QUALITY:

METHOD OF SHIPMENT: FEDERAL EXPRESS

ICE CHEST NO.: GWS-350

FIELD LOGBOOK NO.: HNF-N-645 4-65

ACTUAL SAMPLE DEPTH: 256.23 - 258.73

SAF NO.: F16-028

COA: 300192

SHIPPED TO: GEL Laboratories, LLC

OFFSITE PROPERTY NO.: 2017 17512 7513

BILL OF LADING/AIR BILL NO.: 7783 3619 6233

METHOD OF SHIPMENT: ORIGINAL

415663

MATRIX*	PRESERVATION	NO. OF CONTAINER(S)	VOLUME	SAMPLE ANALYSIS	SAMPLE DATE	SAMPLE TIME	DATE/TIME
None	None	1	250mL	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	FEB 01 2017	0818	✓
None	6 Months	1	250mL	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	✓		✓
None	6 Months	1	250mL	SEE ITEM (3) IN SPECIAL INSTRUCTIONS	✓		✓
None	6 Months	1	250mL	SEE ITEM (4) IN SPECIAL INSTRUCTIONS	✓		✓
None	6 Months	1	250mL	SEE ITEM (5) IN SPECIAL INSTRUCTIONS	✓		✓

CHAIN OF POSSESSION

SIGN/ PRINT NAMES

RECEIVED BY/STORED IN

DATE/TIME

SSU-1 FEB 01 2017 1537

Troy Bacon CHPRC FEB 02 2017 0115

FEDEX FEB 02 2017 1400

Ashley Goodman FEB 23 2017 0855

1 of 72

LABORATORY SECTION RECEIVED BY

FINAL SAMPLE DISPOSITION DISPOSAL METHOD

DATE/TIME

TITLE

DISPOSED BY

DATE/TIME

SPECIAL INSTRUCTIONS

SEE PAGE 2 FOR ALL SPECIAL INSTRUCTIONS

FR ID = FSR20233

TRVL NUM = TRVL-16-060

PRINTED ON 8/11/2016

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F16-028-067	PAGE 2 OF 2
COLLECTOR	Roger Friesz Jr. /CHPRC	COMPANY CONTACT	TELEPHONE NO.	PRICE CODE	8H
SAMPLING LOCATION	C9567, I-006	PROJECT DESIGNATION	ACTUAL SAMPLE DEPTH FT	AIR QUALITY	<input type="checkbox"/>
ICE CHEST NO.	6WS-350	FIELD LOGBOOK NO.	HNF-N-645 4-65	METHOD OF SHIPMENT	FEDERAL EXPRESS
SHIPPED TO	GEL Laboratories, LLC	OFFSITE PROPERTY NO.	7517 7512 7513	BILL OF LADING/AIR BILL NO. 7783 3619 6233	

SPECIAL INSTRUCTIONS

TRVL-16-060
 (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};



SAMPLE RECEIPT & REVIEW FORM

Client: CPRC		SDG/AR/COC/Work Order: 415663	
Received By: AG		Date Received: 2/3/17	
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): 0cpm
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> Blue ice Dry ice None Other (describe) 1°C *all temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: E4092024932 Secondary Temperature Device Serial # (If Applicable):
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: B38KJ1 1 out of 5
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"/>			

Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other

16 Carrier and tracking number.
7783 3984 1327
7783 3619 6233
7783 4307 0200

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 01 March 2017

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	T104704235-17-12
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 #: GEL415663
Work Order #: 415663

Product: Determination of Metals by ICP-MS
Analytical Method: SW846 3050B/6020B
Analytical Procedure: GL-MA-E-014 REV# 28
Analytical Batch: 1636791

Preparation Method: SW846 3050B
Preparation Procedure: GL-MA-E-009 REV# 26
Preparation Batch: 1636790

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203721987	Method Blank (MB)ICP-MS
1203721988	Laboratory Control Sample (LCS)
1203721991	415663001(B36M12L) Serial Dilution (SD)
1203721989	415663001(B36M12D) Sample Duplicate (DUP)
1203721990	415663001(B36M12S) 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
1203721989 (B36M12DUP)	Uranium	43.6* (0%-20%)

Technical Information

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	415663
	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: GEL415663 GEL Work Order: 415663

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: 15 FEB 2017****Title: Data Validator**

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL415663

CONTRACT: CPRC0F16028

METHOD TYPE: SW846

SAMPLE ID: 415663001

BASIS: Dry Weight

DATE COLLECTED 01-FEB-17

CLIENT ID: B36M12

LEVEL: Low

DATE RECEIVED 03-FEB-17

MATRIX: SOIL

%SOLIDS: 93.3

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-61-1	Uranium	544	ug/kg	D*	13.2	40.1	40.1	2	MS	SKJ	02/11/17 00:54	170210-1	1636791

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1636791	1636790	SW846 3050B	0.534	g	50	mL	02/08/17	CXW4

***Analytical Methods:**

MS SW846 3050B/6020B

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: February 15, 2017

Page 1 of 2

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 415663

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1636791										
QC1203721989	415663001	DUP									
Uranium		*D	544	*D	349	ug/kg	43.6*	(0%-20%)	SKJ	02/11/17	00:58
QC1203721988	LCS										
Uranium	4900			D	5360	ug/kg		109 (80%-120%)		02/11/17	00:50
QC1203721987	MB										
Uranium				DU	12.2	ug/kg				02/11/17	00:46
QC1203721990	415663001	MS									
Uranium	5180	*D	544	D	5900	ug/kg		103 (75%-125%)		02/11/17	01:01
QC1203721991	415663001	SDILT									
Uranium		*D	2.71	D	0.544	ug/L	.295	(0%-20%)		02/11/17	01:05

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

GEL LABORATORIES LLC

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

QC Summary

Workorder: 415663

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
-----------------	------------	---------------	-------------	-----------	--------------	---------------	-------------	--------------	--------------	-------------	-------------

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.

General Chem Analysis

Case Narrative

**General Chemistry
 Technical Case Narrative
 CH2MHill Plateau Remediation Company (CPRC)
 SDG #: GEL415663
 Work Order #: 415663**

Product: Ion Chromatography**Analytical Method:** 9056_ANIONS_IC**Analytical Procedure:** GL-GC-E-086 REV# 25**Analytical Batches:** 1636984 and 1636983

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203722539	Method Blank (MB)
1203722540	Laboratory Control Sample (LCS)
1203722541	415663001(B36M12) Sample Duplicate (DUP)
1203722542	415663001(B36M12) 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**Method Blank (MB) Statement**

The MB (See Below) analyzed with this SDG met the acceptance criteria. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

Sample	Analyte	Value
1203722539 (MB)	Chloride	.764 betw (.72 - 2)

Product: pH**Analytical Method:** SW846 9045D**Analytical Procedure:** GL-GC-E-008 REV# 22**Analytical Batch:** 1639305

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203728194	Laboratory Control Sample (LCS)
1203728196	415663001(B36M12) 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
1203728196 (B36M12DUP)	pH	Received 03-FEB-17, out of holding 01-FEB-17
415663001 (B36M12)	pH	Received 03-FEB-17, out of holding 01-FEB-17

Certification Statement

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

GEL LABORATORIES LLC

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL415663 GEL Work Order: 415663

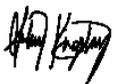
The Qualifiers in this report are defined as follows:

- 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).
- 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.
- 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:** Aubrey Kingsbury**Date:** 21 FEB 2017**Title:** Analyst I

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: February 21, 2017

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: B36M12 Project: CPRC0F16028
 Sample ID: 415663001 Client ID: CPRC001
 Matrix: SOIL
 Collect Date: 01-FEB-17 08:18
 Receive Date: 03-FEB-17
 Collector: Client
 Moisture: 6.7%

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	C	3140	770	2140	ug/Kg	9.98	1	MAR1	02/16/17	2131	1636984	1
Fluoride	B	770	363	1070	ug/Kg	9.98	1					
Nitrate-N	U	353	353	1070	ug/Kg	9.98	1					
Nitrite-N	U	353	353	1070	ug/Kg	9.98	1					
Phosphorus in phosphate	U	716	716	2140	ug/Kg	9.98	1					
Sulfate		4770	1420	4280	ug/Kg	9.98	1					

Titration and Ion Analysis												
9045_pH (Non-Aqueous):COMMON "As Received"												
pH at Temp 19.7C	X	8.81	0.010	0.100	SU		1	RXB5	02/15/17	1700	1639305	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	02/16/17	1239	1636983

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: February 21, 2017

Page 1 of 3

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 415663

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1636984										
QC1203722541	415663001	DUP									
Chloride	C	3140		2690	ug/Kg	15.5 ^		(+/-2130)	MAR1	02/16/17	22:03
Fluoride	B	770	B	740	ug/Kg	3.93 ^		(+/-1070)			
Nitrate-N	U	353	U	352	ug/Kg	N/A					
Nitrite-N	U	353	U	352	ug/Kg	N/A					
Phosphorus in phosphate	U	716	U	715	ug/Kg	N/A					
Sulfate		4770		4310	ug/Kg	10 ^		(+/-4270)			
QC1203722540	LCS										
Chloride	50000			49800	ug/Kg		99.6	(80%-120%)		02/16/17	21:00
Fluoride	25000			25200	ug/Kg		101	(80%-120%)			
Nitrate-N	25000			25000	ug/Kg		99.9	(80%-120%)			
Nitrite-N	25000			25000	ug/Kg		100	(80%-120%)			
Phosphorus in phosphate	12500			12800	ug/Kg		102	(80%-120%)			
Sulfate	100000			100000	ug/Kg		100	(80%-120%)			
QC1203722539	MB										
Chloride			B	764	ug/Kg					02/16/17	20:28

GEL LABORATORIES LLC

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QC Summary

Workorder: 415663

Page 2 of 3

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1636984										
Fluoride			U	340	ug/Kg				MAR1	02/16/17	20:28
Nitrate-N			U	330	ug/Kg						
Nitrite-N			U	330	ug/Kg						
Phosphorus in phosphate			U	670	ug/Kg						
Sulfate			U	1330	ug/Kg						
QC1203722542 415663001 MS											
Chloride	53500	C	3140	53100	ug/Kg		93.5	(48%-145%)		02/16/17	22:35
Fluoride	26700	B	770	25000	ug/Kg		90.7	(30%-135%)			
Nitrate-N	26700	U	353	25200	ug/Kg		94.2	(70%-125%)			
Nitrite-N	26700	U	353	26500	ug/Kg		99	(70%-120%)			
Phosphorus in phosphate	13400	U	716	10600	ug/Kg		79.2	(35%-134%)			
Sulfate	107000		4770	107000	ug/Kg		95.7	(45%-162%)			
Titration and Ion Analysis											
Batch	1639305										
QC1203728196 415663001 DUP											
pH		X	8.81	X	8.80	SU	0.114	(0%-30%)	RXB5	02/15/17	17:02
QC1203728194 LCS											
pH	7.00				6.98	SU	99.7	(70%-130%)		02/15/17	16:58

Notes:

GEL LABORATORIES LLC

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QC Summary

Workorder: 415663

Page 3 of 3

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
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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 \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.
- 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 #: GEL415663
Work Order #: 415663

Product: AMCMISO_EIE_PRECIP_AEA: COMMON

Analytical Method: AMCMISO_EIE_PREC_AEA

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

Analytical Batch: 1636815

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1636657

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203722053	Method Blank (MB)
1203722054	415663001(B36M12) Sample Duplicate (DUP)
1203722055	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.

Miscellaneous Information

1. The Am-243 tracer for sample 1203722055 does not meet the resolution requirements of having a full width half maximum of 100 keV or less. 1. The tracer peak is within the Am-243 ROI and the tracer yield recovery does meet the client acceptance criteria. Reporting results.

Product: NP237_IE_PRECIP_AEA: COMMON

Analytical Method: ASTM C 1475-00 Modified

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

Analytical Batch: 1636816

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1636657

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203722056	Method Blank (MB)
1203722057	415663001(B36M12) Sample Duplicate (DUP)
1203722058	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: 1636817

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1636657

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203722063	Method Blank (MB)
1203722064	415663001(B36M12) Sample Duplicate (DUP)
1203722065	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: 1636818

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1636657

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203722066	Method Blank (MB)
1203722067	415663001(B36M12) Sample Duplicate (DUP)
1203722068	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: 1636820

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1636657

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203722074	Method Blank (MB)
1203722075	415663001(B36M12) Sample Duplicate (DUP)
1203722076	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 1203722074 (MB) was recounted due to a suspected blank false positive. The recount is reported. Samples 1203722075 (B36M12DUP) and 415663001 (B36M12) were recounted to verify results. The recounts are reported.

Product: Dry Weight

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1636657

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203721601	415663001(B36M12) 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: 1636672

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203721629	Method Blank (MB)
1203721630	415663001(B36M12) Sample Duplicate (DUP)
1203721631	415663001(B36M12) Matrix Spike (MS)
1203721632	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# 26

Analytical Batch: 1636722

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1636657

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203721784	Method Blank (MB)
1203721785	415663001(B36M12) Sample Duplicate (DUP)
1203721786	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, 1203721785 (B36M12DUP) and 415663001 (B36M12), did not meet the relative percent difference requirement for Ra-228; however, they do meet the relative error ratio requirement with a value of 1.98.

Qualifier Information

Qualifier	Reason	Analyte	Sample	Client Sample
X	Results are considered a false positive due to high counting uncertainty.	Europium-155	1203721785	B36M12(415663001DUP)

Product: SRTOT_SEP_PRECIP_GPC: COMMON

Analytical Method: SRTOT_SEP_PRECIP_GPC

Analytical Procedure: GL-RAD-A-004 REV# 18

Analytical Batch: 1639101

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1636657

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203727726	Method Blank (MB)
1203727727	415663001(B36M12) Sample Duplicate (DUP)
1203727728	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: TC99_SEP_GPC

Analytical Method: TC99_EIE_LSC

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

Analytical Batch: 1635477

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203718729	Method Blank (MB)
1203718730	415150001(B36M10) Sample Duplicate (DUP)
1203718731	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: 1636812

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203722046	Method Blank (MB)
1203722047	415150001(B36M10) Sample Duplicate (DUP)
1203722048	415150001(B36M10) Matrix Spike (MS)
1203722049	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: 1636853

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203722176	Method Blank (MB)
1203722177	415150001(B36M10) Sample Duplicate (DUP)
1203722178	415150001(B36M10) Matrix Spike (MS)
1203722179	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: NI63_LSC

Analytical Method: NI63_LSC

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

Analytical Batch: 1639089

Preparation Method: ASTM D 2216 (Modified)

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

Preparation Batch: 1636657

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
415663001	B36M12
1203727697	Method Blank (MB)
1203727698	415150001(B36M10) Sample Duplicate (DUP)
1203727699	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, 1203727698 (B36M10DUP), relative error ratio is greater than 2; however, both results are less than their respective MDCs.

Technical Information

Sample Re-prep/Re-analysis

Sample 415663001 (B36M12) was re-prepped due to high 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.

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: GEL415663 GEL Work Order: 415663

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.

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: Kate Gellatly

Date: 02 MAR 2017

Title: Analyst I

Sample Data Summary

**Rad
Certificate of Analysis
Sample Summary**

SDG Number: GEL415663	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 415663001	Date Collected: 02/01/2017 08:18	Matrix: SOIL
	Date Received: 02/03/2017 08:55	%Moisture: 6.7
Client ID: B36M12	Method: AMCMISO_EIE_PREC_AEA	Prep Basis: "Dry Weight Corrected"
Batch ID: 1636815	Analyst: JXH2	SOP Ref: GL-RAD-A-011
Run Date: 02/21/2017 09:30	Aliquot: 0.112 g	Instrument: 1103
Data File: S0415663001_AM.1A.gcnf	Prep Method: DOE EML HASL-300, Am-05	Count Time: 239.9998 min
Prep Batch: 1636815		Prep SOP Ref: GL-RAD-A-021
Prep Date: 02/16/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	-0.0859	pCi/g	+/-0.199	0.200	0.590	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	10.7	18.7	pCi/g	57.2	(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: GEL415663
 Lab Sample ID: 415663001

Client: CPRC001
 Date Collected: 02/01/2017 08:18
 Date Received: 02/03/2017 08:55

Project: CPRC0F16028
 Matrix: SOIL
 %Moisture: 6.7

Client ID: B36M12
 Batch ID: 1636816
 Run Date: 02/21/2017 09:13
 Data File: S0415663001_NP.1A.gcnf
 Prep Batch: 1636816
 Prep Date: 02/16/2017 00:00

Method: ASTM C 1475-00 Modified
 Analyst: JXH2
 Aliquot: 0.109 g
 Prep Method: ASTM C 1475-00 Modified

Prep Basis: "Dry Weight Corrected"
 SOP Ref: GL-RAD-A-032
 Instrument: 1043
 Count Time: 240 min
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13994-20-2	Neptunium-237	U	-0.0369	pCi/g	+/-0.167	0.167	0.420	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	1830	1960	pCi/g	93.4	(30%-105%)

Comments:

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL415663
 Lab Sample ID: 415663001

Client: CPRC001
 Date Collected: 02/01/2017 08:18
 Date Received: 02/03/2017 08:55

Project: CPRC0F16028
 Matrix: SOIL
 %Moisture: 6.7

Client ID: B36M12
 Batch ID: 1636817
 Run Date: 02/21/2017 09:31
 Data File: S0415663001_PU.1A.gcnf
 Prep Batch: 1636817
 Prep Date: 02/16/2017 00:00

Method: PUIISO_PRECIP_AEA
 Analyst: JXH2
 Aliquot: 0.112 g
 Prep Method: DOE EML HASL-300, Pu-11-

Prep Basis: "Dry Weight Corrected"
 SOP Ref: GL-RAD-A-011
 Instrument: 1107
 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	0.142	pCi/g	+/-0.226	0.226	0.312	1.00
OER-100-70	Plutonium-239/240	U	0.0721	pCi/g	+/-0.198	0.199	0.344	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	16.9	17.6	pCi/g	95.8	(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: GEL415663	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 415663001	Date Collected: 02/01/2017 08:18	Matrix: SOIL
	Date Received: 02/03/2017 08:55	%Moisture: 6.7
Client ID: B36M12		Prep Basis: "Dry Weight Corrected"
Batch ID: 1636818	Method: THISO_IE_PRECIP_AEA	SOP Ref: GL-RAD-A-038
Run Date: 02/22/2017 09:12	Analyst: JXH2	Instrument: 1038
Data File: S0415663001_TH.1A.gcnf	Aliquot: 0.112 g	Count Time: 239.9998 min
Prep Batch: 1636818	Prep Method: DOE EML HASL-300, Th-01-	Prep SOP Ref: GL-RAD-A-021
Prep Date: 02/16/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
TH-232 <small>7440-29-1</small>	Thorium-232		0.387	pCi/g	+/-0.326	0.330	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Thorium-229 Tracer	14.8	18.5	pCi/g	80.2	(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: GEL415663
Lab Sample ID: 415663001

Client: CPRC001
Date Collected: 02/01/2017 08:18
Date Received: 02/03/2017 08:55

Project: CPRC0F16028
Matrix: SOIL
%Moisture: 6.7

Client ID: B36M12
Batch ID: 1636820
Run Date: 02/28/2017 16:44
Data File: S0415663001_UU.2A.gcnf
Prep Batch: 1636820
Prep Date: 02/16/2017 00:00

Method: UIISO_IE_PRECIP_AEA
Analyst: JXH2
Aliquot: 0.112 g
Prep Method: DOE EML HASL-300, U-02-R

Prep Basis: "Dry Weight Corrected"
SOP Ref: GL-RAD-A-011
Instrument: 1013
Count Time: 119.9998 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		1.17	pCi/g	+/-0.781	0.807	0.564	1.00
15117-96-1/13982-7	Uranium-235/236	U	0.427	pCi/g	+/-0.583	0.588	0.623	1.00
7440-61-1	Uranium-238		0.796	pCi/g	+/-0.667	0.681	0.610	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	15.1	18.7	pCi/g	80.8	(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: GEL415663
 Lab Sample ID: 415663001

 Client ID: B36M12
 Batch ID: 1639101
 Run Date: 02/21/2017 15:29
 Data File: S1639101.xls
 Prep Batch: 1639101
 Prep Date: 02/20/2017 11:30

Client: CPRC001
 Date Collected: 02/01/2017 08:18
 Date Received: 02/03/2017 08:55

 Method: SRTOT_SEP_PRECIP_GPC
 Analyst: KSD1
 Aliquot: 0.321 g
 Prep Method: EPA 905.0 Modified/DOE RP5

Project: CPRC0F16028
 Matrix: SOIL
 %Moisture: 6.7

 Prep Basis: "Dry Weight Corrected"
 SOP Ref: GL-RAD-A-004
 Instrument: PICID
 Count Time: 80 min
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium	U	0.571	pCi/g	+/-1.12	1.13	1.96	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	5.50	7.75	mg	71	(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: GEL415663	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 415663001	Date Collected: 02/01/2017 08:18	Matrix: SOIL
	Date Received: 02/03/2017 08:55	%Moisture: 6.7
Client ID: B36M12		Prep Basis: "As Received"
Batch ID: 1636672	Method: I129_SEP_LEPS_GS	SOP Ref: GL-RAD-A-006
Run Date: 02/15/2017 11:10	Analyst: MJH1	Instrument: XRAY1
Data File: I415663001.CNF;1	Aliquot: 1.007 g	Count Time: 120 min
Prep Batch: 1636672	Prep Method: DOE EML HASL-300,I-01 M	
Prep Date: 02/14/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	U	-0.275	pCi/g	+/-0.362	0.383	0.643	2.00

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: GEL415663	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 415663001	Date Collected: 02/01/2017 08:18	Matrix: SOIL
	Date Received: 02/03/2017 08:55	%Moisture: 6.7
Client ID: B36M12		Prep Basis: "Dry Weight Corrected"
Batch ID: 1636722	Method: GAMMA_GS	SOP Ref: GL-RAD-A-013
Run Date: 02/28/2017 07:29	Analyst: MXR1	Instrument: GAM21
Data File: G415663001.CNF;1	Aliquot: 178.252 g	Count Time: 240 min
Prep Batch: 1636722	Prep Method: DOE HASL 300, 4.5.2.3/Ga-01	Prep SOP Ref: GL-RAD-A-021
Prep Date: 02/07/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	U	0.000235	pCi/g	+/-0.0185	0.0185	0.0322	0.100
10198-40-0	Cobalt-60	U	0.0154	pCi/g	+/-0.0157	0.0172	0.0346	0.100
14683-23-9	Europium-152	U	0.00042	pCi/g	+/-0.030	0.030	0.0554	0.100
15585-10-1	Europium-154	U	-0.00983	pCi/g	+/-0.0631	0.0633	0.116	0.100
14391-16-3	Europium-155	U	0.0204	pCi/g	+/-0.0213	0.0233	0.0461	0.100
13982-63-3	Radium-226		0.375	pCi/g	+/-0.0897	0.0961	0.056	1.00
15262-20-1	Radium-228		0.906	pCi/g	+/-0.185	0.202	0.105	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: GEL415663	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 415663001	Date Collected: 02/01/2017 08:18	Matrix: SOIL
	Date Received: 02/03/2017 08:55	%Moisture: 6.7
Client ID: B36M12		Prep Basis: "As Received"
Batch ID: 1635477	Method: TC99_EIE_LSC	SOP Ref: GL-RAD-A-059
Run Date: 02/14/2017 06:53	Analyst: LXT2	Instrument: LSCRED
Data File: E1635477.xls	Aliquot: 1.261 g	Count Time: 15 min
Prep Batch: 1635477	Prep Method: DOE EML HASL-300, Tc-02-	
Prep Date: 02/10/2017 10:17		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	-0.238	pCi/g	+/-1.98	1.98	3.48	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	16400	17800	CPM	92.3	(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: GEL415663
Lab Sample ID: 415663001

Client: CPRC001
Date Collected: 02/01/2017 08:18
Date Received: 02/03/2017 08:55

Project: CPRC0F16028
Matrix: SOIL
%Moisture: 6.7

Client ID: B36M12
Batch ID: 1636812
Run Date: 02/11/2017 04:04
Data File: T1636812.xls
Prep Batch: 1636812
Prep Date: 02/10/2017 09:11

Method: TRITIUM_DIST_LSC
Analyst: TXP3
Aliquot: 2.09 g
Prep Method: EPA 906.0 Modified

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-002
Instrument: LSCBLUE
Count Time: 15 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	-5.27	pCi/g	+/-8.07	8.07	15.5	30.0

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

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL415663	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 415663001	Date Collected: 02/01/2017 08:18	Matrix: SOIL
	Date Received: 02/03/2017 08:55	%Moisture: 6.7
Client ID: B36M12		Prep Basis: "As Received"
Batch ID: 1636853	Method: C14_LSC	SOP Ref: GL-RAD-A-003
Run Date: 02/11/2017 01:27	Analyst: TXJ1	Instrument: LSCSILVER
Data File: C1636853.xls	Aliquot: 0.504 g	Count Time: 45 min
Prep Batch: 1636853	Prep Method: EPA EERF C-01 Modified	
Prep Date: 02/10/2017 11:56		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	-0.433	pCi/g	+/-2.21	2.21	3.80	5.00

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: GEL415663
Lab Sample ID: 415663001

Client: CPRC001
Date Collected: 02/01/2017 08:18
Date Received: 02/03/2017 08:55

Project: CPRC0F16028
Matrix: SOIL
%Moisture: 6.7

Client ID: B36M12
Batch ID: 1639089
Run Date: 02/15/2017 17:28
Data File: N1639089.xls
Prep Batch: 1639089
Prep Date: 02/14/2017 10:35

Method: NI63_LSC
Analyst: CXS7
Aliquot: 0.658 g
Prep Method: DOE RESL Ni-1, Modified

Prep Basis: "Dry Weight Corrected"
SOP Ref: GL-RAD-A-022
Instrument: LSCBLUE
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	-3.24	pCi/g	+/-3.72	3.72	6.60	10.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Nickel Carrier	16.8	24.6	mg	68.3	(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: GEL415663	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 415663001	Date Collected: 02/01/2017 08:18	Matrix: SOIL
	Date Received: 02/03/2017 08:55	%Moisture: 6.7
Client ID: B36M12		Prep Basis: "As Received"
Batch ID: 1636657	Method: ASTM D 2216 (Modified)	SOP Ref: GL-OA-E-020
Run Date: 02/06/2017 05:52	Analyst: LYT1	Instrument: SP-39020004
Data File:		Count Time:
Prep Batch: 1636657		
Prep Date: 02/06/2017 05:52		

CAS No.	Parmname	Qual	Result	Units	MDC	
%MOISTURE	Moisture		6.70	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

GEL LABORATORIES LLC

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QC Summary

Report Date: March 2, 2017
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Client : CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352
Contact: Mr. Scot Fitzgerald
Workorder: 415663

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1636815								
QC1203722053	MB								
Americium-241			U	0.210	pCi/g			JXH2	02/21/1709:30
				Uncert: +/-0.412					
				TPU: +/-0.413					
**Americium-243 Tracer	18.7			8.12	pCi/g	REC: 43	(30%-105%)		
				Uncert: +/-2.94					
				TPU: +/-4.35					
QC1203722054	415663001	DUP							
Americium-241		U	-0.0859	U	0.194	pCi/g			
			Uncert: +/-0.199		+/-0.343	RPD: 0	N/A		
			TPU: +/-0.200		+/-0.344	RER: 1.38	(0-2)		
**Americium-243 Tracer	20.0	10.7		12.4	pCi/g	REC: 62	(30%-105%)		
			Uncert: +/-2.53		+/-2.55				
			TPU: +/-3.79		+/-3.85				
QC1203722055	LCS								
Americium-241				17.6		15.4	pCi/g	REC: 88	(80%-120%)
				Uncert: +/-2.03					
				TPU: +/-2.93					
**Americium-243 Tracer	18.7			14.3	pCi/g	REC: 76	(30%-105%)		
				Uncert: +/-2.24					
				TPU: +/-3.40					
Batch	1636816								
QC1203722056	MB								
Neptunium-237			U	-0.0824	pCi/g			JXH2	02/21/1709:13
				Uncert: +/-0.116					
				TPU: +/-0.116					
**Americium-243 Tracer	1960			1970	pCi/g	REC: 101	(30%-105%)		
QC1203722057	415663001	DUP							
Neptunium-237		U	-0.0369	U	-0.228	pCi/g			
			Uncert: +/-0.167		+/-0.237	RPD: 0	N/A		
			TPU: +/-0.167		+/-0.237	RER: 1.29	(0-2)		
**Americium-243 Tracer	2040	1830		1510	pCi/g	REC: 74	(30%-105%)		
QC1203722058	LCS								
Neptunium-237				41.0		42.5	pCi/g	REC: 104	(80%-120%)
				Uncert: +/-2.81					
				TPU: +/-5.41					
**Americium-243 Tracer	1960			1980	pCi/g	REC: 101	(30%-105%)		
Batch	1636817								
QC1203722063	MB								
Plutonium-238			U	0.0158	pCi/g			JXH2	02/21/1709:31
				Uncert: +/-0.165					
				TPU: +/-0.166					
Plutonium-239/240			U	-0.0249	pCi/g				
				Uncert: +/-0.172					

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QC Summary

Workorder: 415663

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1636817								
**Plutonium-242 Tracer	17.6	TPU:		+/-0.172					
		Uncert:		15.0	pCi/g	REC:	85 (30%-105%)		
		TPU:		+/-1.97					
				+/-2.96					
QC1203722064 415663001 DUP									
Plutonium-238		U	0.142	U	0.0937				
		Uncert:	+/-0.226		+/-0.184	RPD:	0 N/A		
		TPU:	+/-0.226		+/-0.185	RER:	0.324 (0-2)		
Plutonium-239/240		U	0.0721	U	0.017				
		Uncert:	+/-0.198		+/-0.194	RPD:	0 N/A		
		TPU:	+/-0.199		+/-0.194	RER:	0.388 (0-2)		
**Plutonium-242 Tracer	18.8		16.9		17.3	pCi/g	REC:	92 (30%-105%)	
		Uncert:	+/-1.96		+/-1.96				
		TPU:	+/-2.95		+/-2.98				
QC1203722065 LCS									
Plutonium-238				U	0.217	pCi/g			
		Uncert:			+/-0.239				
		TPU:			+/-0.241				
Plutonium-239/240	17.6				18.3	pCi/g	REC:	103 (80%-120%)	
		Uncert:			+/-1.96				
		TPU:			+/-2.98				
**Plutonium-242 Tracer	17.6				16.8	pCi/g	REC:	95 (30%-105%)	
		Uncert:			+/-1.92				
		TPU:			+/-2.90				
Batch	1636818								
QC1203722066 MB									
Thorium-232				U	-0.00722	pCi/g		JXH2	02/22/1709:12
		Uncert:			+/-0.116				
		TPU:			+/-0.116				
**Thorium-229 Tracer	18.5				16.8	pCi/g	REC:	91 (30%-105%)	
		Uncert:			+/-2.03				
		TPU:			+/-3.31				
QC1203722067 415663001 DUP									
Thorium-232			0.387		0.562	pCi/g			
		Uncert:	+/-0.326		+/-0.405	RPD:	37 (0% - 100%)		
		TPU:	+/-0.330		+/-0.414	RER:	0.648 (0-2)		
**Thorium-229 Tracer	19.2		14.8		15.8	pCi/g	REC:	82 (30%-105%)	
		Uncert:	+/-2.05		+/-2.20				
		TPU:	+/-3.33		+/-3.55				
QC1203722068 LCS									
Thorium-232	17.7				18.4	pCi/g	REC:	104 (80%-120%)	
		Uncert:			+/-2.04				
		TPU:			+/-3.32				
**Thorium-229 Tracer	18.5				15.4	pCi/g	REC:	83 (30%-105%)	
		Uncert:			+/-2.05				
		TPU:			+/-3.34				
Batch	1636820								
QC1203722074 MB									
Uranium-233/234				U	0.679	pCi/g		JXH2	03/01/1712:06
		Uncert:			+/-0.706				

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QC Summary

Workorder: 415663

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1636820								
Uranium-235/236		TPU:		+/-0.718					
			U	0.0507	pCi/g				
		Uncert:		+/-0.514					
Uranium-238		TPU:		+/-0.515					
			U	0.404	pCi/g				
		Uncert:		+/-0.577					
**Uranium-232 Tracer	18.7	TPU:		+/-0.582	pCi/g	REC:	85 (30%-105%)		
		Uncert:		+/-3.28					
		TPU:		+/-4.84					
QC1203722075 415663001 DUP									
Uranium-233/234			1.17 U	0.297	pCi/g				02/28/1716:44
		Uncert:	+/-0.781	+/-0.491		RPD:	50 (0% - 100%)		
		TPU:	+/-0.807	+/-0.493		RER:	1.81 (0-2)		
Uranium-235/236		U	0.427 U	0.557	pCi/g				
		Uncert:	+/-0.583	+/-0.675		RPD:	0 N/A		
		TPU:	+/-0.588	+/-0.682		RER:	0.285 (0-2)		
Uranium-238			0.796	0.728	pCi/g				
		Uncert:	+/-0.667	+/-0.644		RPD:	9 (0% - 100%)		
**Uranium-232 Tracer	19.9	TPU:	+/-0.681	+/-0.656	pCi/g	REC:	0.14 (0-2)		
			15.1	17.6		REC:	88 (30%-105%)		
		Uncert:	+/-2.98	+/-3.12					
		TPU:	+/-4.43	+/-4.66					
QC1203722076 LCS									
Uranium-233/234				22.5	pCi/g				02/21/1709:15
		Uncert:		+/-2.35					
		TPU:		+/-3.90					
Uranium-235/236				1.28	pCi/g				
		Uncert:		+/-0.659					
		TPU:		+/-0.683					
Uranium-238	24.0			25.2	pCi/g	REC:	105 (80%-120%)		
		Uncert:		+/-2.50					
		TPU:		+/-4.29					
**Uranium-232 Tracer	18.7			15.8	pCi/g	REC:	85 (30%-105%)		
		Uncert:		+/-2.18					
		TPU:		+/-3.38					
Rad Gamma Spec									
Batch	1636672								
QC1203721629 MB									
Iodine-129			U	-0.28	pCi/g			MJH1	02/15/1714:04
		Uncert:		+/-0.501					
		TPU:		+/-0.517					
QC1203721630 415663001 DUP									
Iodine-129		U	-0.275 U	0.190	pCi/g				02/15/1714:05
		Uncert:	+/-0.362	+/-0.484		RPD:	0 N/A		
		TPU:	+/-0.383	+/-0.492		RER:	1.46 (0-2)		
QC1203721631 415663001 MS									
Iodine-129	41.2	U	-0.275	31.5	pCi/g	REC:	77 (75%-125%)		02/15/1715:51
		Uncert:	+/-0.362	+/-2.36					
		TPU:	+/-0.383	+/-3.93					

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1636672								
QC1203721632	LCS								
Iodine-129	41.2			41.7	pCi/g	REC: 101	(80%-120%)		02/15/1715:52
	Uncert:			+/-2.51					
	TPU:			+/-4.83					
Batch	1636722								
QC1203721784	MB								
Cesium-137			U	-7.26E-05	pCi/g			MXR1	02/28/1707:30
	Uncert:			+/-0.00781					
	TPU:			+/-0.00781					
Cobalt-60			U	0.00232	pCi/g				
	Uncert:			+/-0.00852					
	TPU:			+/-0.00859					
Europium-152			U	0.0305	pCi/g				
	Uncert:			+/-0.0226					
	TPU:			+/-0.0266					
Europium-154			U	-0.00465	pCi/g				
	Uncert:			+/-0.0217					
	TPU:			+/-0.0218					
Europium-155			U	0.00489	pCi/g				
	Uncert:			+/-0.0188					
	TPU:			+/-0.019					
Radium-226			U	-0.0165	pCi/g				
	Uncert:			+/-0.024					
	TPU:			+/-0.0252					
Radium-228			U	0.0205	pCi/g				
	Uncert:			+/-0.0499					
	TPU:			+/-0.0508					
QC1203721785	415663001	DUP							
Cesium-137		U 0.000235	U	-0.000367	pCi/g				02/28/1711:37
	Uncert:	+/-0.0185		+/-0.0127		RPD: 0	N/A		
	TPU:	+/-0.0185		+/-0.0127		RER: 0.0526	(0-2)		
Cobalt-60		U 0.0154	U	0.00043	pCi/g				
	Uncert:	+/-0.0157		+/-0.0142		RPD: 0	N/A		
	TPU:	+/-0.0172		+/-0.0142		RER: 1.31	(0-2)		
Europium-152		U 0.00042	U	-0.00468	pCi/g				
	Uncert:	+/-0.030		+/-0.0298		RPD: 0	N/A		
	TPU:	+/-0.030		+/-0.0299		RER: 0.236	(0-2)		
Europium-154		U -0.00983	U	-0.00667	pCi/g				
	Uncert:	+/-0.0631		+/-0.0437		RPD: 0	N/A		
	TPU:	+/-0.0633		+/-0.0438		RER: 0.0804	(0-2)		
Europium-155		U 0.0204	UX	0.00	pCi/g				
	Uncert:	+/-0.0213		+/-0.0775		RPD: 48	N/A		
	TPU:	+/-0.0233		+/-0.0778		RER: 1.33	(0-2)		
Radium-226		0.375		0.321	pCi/g				
	Uncert:	+/-0.0897		+/-0.0631		RPD: 15	(0% - 20%)		
	TPU:	+/-0.0961		+/-0.0687		RER: 0.891	(0-2)		
Radium-228		0.906		0.647	pCi/g				
	Uncert:	+/-0.185		+/-0.133		RPD: 33*	(0% - 20%)		
	TPU:	+/-0.202		+/-0.158		RER: 1.98	(0-2)		
QC1203721786	LCS								

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1636722								
Americium-241	489			497	pCi/g	REC: 102	(80%-120%)		
	Uncert:			+/-6.28					
	TPU:			+/-36.9					
Cesium-137	178			186	pCi/g	REC: 105	(80%-120%)		
	Uncert:			+/-2.99					
	TPU:			+/-8.50					
Cobalt-60	153			148	pCi/g	REC: 96	(80%-120%)		
	Uncert:			+/-3.21					
	TPU:			+/-6.30					
Europium-152			U	-0.704	pCi/g				
	Uncert:			+/-1.30					
	TPU:			+/-1.34					
Europium-154			U	0.390	pCi/g				
	Uncert:			+/-0.826					
	TPU:			+/-0.845					
Europium-155			U	-0.53	pCi/g				
	Uncert:			+/-1.03					
	TPU:			+/-1.06					
Radium-226			U	0.403	pCi/g				
	Uncert:			+/-0.912					
	TPU:			+/-0.930					
Radium-228			U	-1.21	pCi/g				
	Uncert:			+/-2.72					
	TPU:			+/-2.78					
Rad Gas Flow									
Batch	1639101								
QC1203727726	MB								
Total Strontium			U	-4.37	pCi/g			KSD1	02/21/1715:28
	Uncert:			+/-0.664					
	TPU:			+/-0.664					
**Strontium Carrier	7.75			6.40	mg	REC: 83	(40%-110%)		
QC1203727727	415663001	DUP							
Total Strontium	U	0.571	U	0.763	pCi/g				02/21/1715:29
	Uncert:	+/-1.12		+/-1.15		RPD: 0	N/A		
	TPU:	+/-1.13		+/-1.16		RER: 0.232	(0-2)		
**Strontium Carrier	7.75	5.50		5.00	mg	REC: 65	(40%-110%)		
QC1203727728	LCS								
Total Strontium	68.6			65.3	pCi/g	REC: 95	(80%-120%)		02/21/1715:29
	Uncert:			+/-4.17					
	TPU:			+/-17.1					
**Strontium Carrier	7.75			6.40	mg	REC: 83	(40%-110%)		
Rad Liquid Scintillation									
Batch	1635477								
QC1203718729	MB								
Technetium-99			U	1.22	pCi/g			LXT2	02/14/1707:10
	Uncert:			+/-1.99					
	TPU:			+/-2.00					
**Technetium-99m Tracer	17800			16800	CPM	REC: 94	(30%-105%)		
QC1203718730	415150001	DUP							

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Liquid Scintillation									
Batch	1635477								
Techneium-99		U	1.98	U	2.77	pCi/g			
		Uncert:	+/-2.12		+/-2.06		RPD: 0	N/A	
		TPU:	+/-2.14		+/-2.08		RER: 0.522	(0-2)	
**Techneium-99m Tracer	17800		16400		16900	CPM	REC: 95	(30%-105%)	
QC1203718731	LCS								
Techneium-99		68.3			66.1	pCi/g	REC: 97	(80%-120%)	02/14/1707:43
		Uncert:			+/-3.85				
		TPU:			+/-8.52				
**Techneium-99m Tracer	17800				17100	CPM	REC: 96	(30%-105%)	
Batch	1636812								
QC1203722046	MB								
Tritium				U	-5.48	pCi/g		TXP3	02/11/1704:20
		Uncert:			+/-7.75				
		TPU:			+/-7.75				
QC1203722047	415150001	DUP							
Tritium		U	-1.1	U	3.00	pCi/g			02/11/1704:37
		Uncert:	+/-8.35		+/-8.72		RPD: 0	N/A	
		TPU:	+/-8.35		+/-8.74		RER: 0.666	(0-2)	
QC1203722048	415150001	MS							
Tritium		55.8	U	-1.1	51.1	pCi/g	REC: 92	(75%-125%)	02/11/1704:53
		Uncert:			+/-8.35				
		TPU:			+/-16.8				
QC1203722049	LCS								
Tritium		53.8			45.7	pCi/g	REC: 85	(80%-120%)	02/11/1705:09
		Uncert:			+/-11.5				
		TPU:			+/-15.5				
Batch	1636853								
QC1203722176	MB								
Carbon-14				U	-1.53	pCi/g		TXJ1	02/11/1703:30
		Uncert:			+/-2.14				
		TPU:			+/-2.14				
QC1203722177	415150001	DUP							
Carbon-14		U	-0.337	U	1.42	pCi/g			02/11/1704:17
		Uncert:	+/-2.17		+/-2.20		RPD: 0	N/A	
		TPU:	+/-2.17		+/-2.20		RER: 1.11	(0-2)	
QC1203722178	415150001	MS							
Carbon-14		149	U	-0.337	140	pCi/g	REC: 94	(75%-125%)	02/11/1705:04
		Uncert:			+/-2.17				
		TPU:			+/-11.2				
QC1203722179	LCS								
Carbon-14		145			140	pCi/g	REC: 97	(80%-120%)	02/11/1705:51
		Uncert:			+/-4.36				
		TPU:			+/-11.2				
Batch	1639089								
QC1203727697	MB								
Nickel-63				U	-4.29	pCi/g		CXS7	02/15/1718:32
		Uncert:			+/-4.01				
		TPU:			+/-4.01				
**Nickel Carrier	24.6				15.3	mg	REC: 62	(40%-110%)	
QC1203727698	415150001	DUP							

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Liquid Scintillation										
Batch	1639089									
Nickel-63		U	-5.83	U	3.15	pCi/g				
		Uncert:	+/-4.70		+/-4.72		RPD:	0	N/A	
		TPU:	+/-4.70		+/-4.76		RER:	2.63	(0-2)	
**Nickel Carrier	24.6		15.7		17.2	mg	REC:	70	(40%-110%)	
QC1203727699	LCS									
Nickel-63	204				198	pCi/g	REC:	97	(80%-120%) 02/15/1719:37	
		Uncert:			+/-8.03					
		TPU:			+/-37.4					
**Nickel Carrier	24.6				16.1	mg	REC:	66	(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.