



January 13, 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: 412995
SDG: GEL412995

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on December 20, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

B Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Purchase Order: 300192 - 8H
Chain of Custody: F16-028-056
Enclosures



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January 16, 2017

Case Narrative

January 16, 2017

General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF F16-028
SDG: GEL412995

January 13, 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 December 20, 2016, for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

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

Sample Identification

The laboratory received the following sample:

Laboratory Identification	Sample Description
412995001	B35XX4

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.

January 16, 2017

B. Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

**Technical Case Narrative
CH2M Hill Plateau Remediation Company (CPRC)
SDG #: GEL412995
Work Order #: 412995**

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
1203695281 (B35XX4DUP)	Uranium	27.8* (0%-20%)

Technical Information

Sample Dilutions

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

Analyte	412995
	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
1203702219 (B35XX0DUP)	pH	Received 14-DEC-16, out of holding 12-DEC-16
412995001 (B35XX4)	pH	Received 20-DEC-16, out of holding 19-DEC-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.

Technical Information

Recounts

Sample 1203699590 (B35XX4DUP) was recounted due to a peak shift. The recount is reported.

THISO_IE_PLATE_AEA: COMMON

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

January 16, 2017

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

UIISO_IE_PRECIP_AEA:COMMON

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

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 1203696349 (LCS) was recounted due to high recovery. The recount is reported.

TC99_SEP_GPC

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

C14_LSC: COMMON

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

TRITIUM_DIST_LSC: COMMON

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.

Technical Information

Recounts

Sample 412995001 (B35XX4) was recounted to verify sample results. Recount is reported.

Certification Statement

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

Chain of Custody and Supporting Documentation

January 16, 2017

CH2M Hill Plateau Remediation Company

COLLECTOR: Dave Wight CHPRC

SAMPLING LOCATION: C9594, I-007

ICE CHEST NO.: Gws-439

SHIPPED TO: GEL Laboratories, LLC

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

COMPANY CONTACT: TODAYAK, D

TELEPHONE NO.: 376-6427

PROJECT COORDINATOR: TODAYAK, D

PRICE CODE: 8H

AIR QUALITY:

SAF NO.: F16-028

COA: JWH 12/13/16

BILL OF LADING/AIR BILL NO.: 7779 8979 8339

ACTUAL SAMPLE DEPTH: 265.5 - 266

FIELD LOGBOOK NO.: HNF-N-015-4/19 60

OFFSITE PROPERTY NO.: 7387

PROJECT COORDINATOR: TODAYAK, D

PRICE CODE: 8H

AIR QUALITY:

SAF NO.: F16-028

COA: JWH 12/13/16

BILL OF LADING/AIR BILL NO.: 7779 8979 8339

METHOD OF SHIPMENT: FEDERAL EXPRESS

PAGE 1 OF 2

DATA TURNAROUND: 30 Days / 30 Days

ORIGINAL

MATRIX*	PRESERVATION	HOLDING TIME	TYPE OF CONTAINER	NO. OF CONTAINER(S)	VOLUME	SAMPLE ANALYSIS	SAMPLE DATE	SAMPLE TIME	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	Cool <=6C	6 Months	G/P	1	250mL	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	12-19-16	0903	SOIL
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.	None	6 Months	G/P	1	250mL	SEE ITEM (2) IN SPECIAL INSTRUCTIONS			
SPECIAL HANDLING AND/OR STORAGE NA	None	6 Months	G/P	1	500mL	SEE ITEM (3) IN SPECIAL INSTRUCTIONS			
	None	6 Months	G/P	1	60mL	SEE ITEM (4) IN SPECIAL INSTRUCTIONS			
	None	ASAP	Moisture Resistant	1		SEE ITEM (5) IN SPECIAL INSTRUCTIONS			

412995

CHAIN OF POSSESSION

SIGN/ PRINT NAMES

SPECIAL INSTRUCTIONS

RELINQUISHED BY/REMOVED FROM: Dave Wight CHPRC

DATE/TIME: 12/19/16

RECEIVED BY/STORED IN: Janelle Zunker CHPRC

DATE/TIME: 12/19/16

RELINQUISHED BY/REMOVED FROM: Janelle Zunker CHPRC

DATE/TIME: 12/19/16

RECEIVED BY/STORED IN: FEDEX

DATE/TIME: 12/19/16

RELINQUISHED BY/REMOVED FROM: F&D-EX

DATE/TIME: 12/19/16

RECEIVED BY/STORED IN: F. Sant Patricia Dept 12-20-16 11:20

DATE/TIME: 12-20-16 11:20

RELINQUISHED BY/REMOVED FROM: [Blank]

DATE/TIME: [Blank]

RECEIVED BY/STORED IN: [Blank]

DATE/TIME: [Blank]

RELINQUISHED BY/REMOVED FROM: [Blank]

DATE/TIME: [Blank]

RECEIVED BY/STORED IN: [Blank]

DATE/TIME: [Blank]

RELINQUISHED BY/REMOVED FROM: [Blank]

DATE/TIME: [Blank]

RECEIVED BY/STORED IN: [Blank]

DATE/TIME: [Blank]

LABORATORY SECTION: RECEIVED BY

FINAL SAMPLE DISPOSITION: DISPOSAL METHOD

TITLE: [Blank]

DATE/TIME: [Blank]

DISPOSED BY: [Blank]

DATE/TIME: [Blank]

PRINTED ON 8/11/2016

FSR ID = FSR33075

TRVL NUM = TRVL-16-167

A-6003-618 (REV 2)

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		FIG-028-056	PAGE 2 OF 2
COLLECTOR Dave Wight CHPRC	COMPANY CONTACT TODAK, D 376-6427	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	PRICE CODE 8H	DATA TURNAROUND 30 Days / 30 Days
SAMPLING LOCATION C9594, I-007	PROJECT DESIGNATION 200-WA-1 Opportunistic sampling - soil	SAF NO. F16-028	COA 300192	AIR QUALITY <input type="checkbox"/>	METHOD OF SHIPMENT FEDERAL EXPRESS
ICE CHEST NO. GWS-439	FIELD LOGBOOK NO. WVF-N-045-4/19 60	ACTUAL SAMPLE DEPTH 205.5 - 266	COA 300192		ORIGINAL
SHIPPED TO GEL Laboratories, LLC	OFFSITE PROPERTY NO. 7387		BILL OF LADING/AIR BILL NO. 7779 8979 8339		

SPECIAL INSTRUCTIONS

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

SAMPLE RECEIPT & REVIEW FORM

Client: <u>CPRC</u>		SDG/AR/COC/Work Order: <u>H12995</u>	
Received By: <u>P. Alut</u>		Date Received: <u>12/20/16</u>	
Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0/cpm</u>
Classified Radioactive II or III by RSO?		<input checked="" type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?		<input checked="" type="checkbox"/>	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		<input checked="" type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		<input checked="" type="checkbox"/>	

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: <u>Ice bags</u> Blue ice Dry ice <u>None</u> Other (describe) *all temperatures are recorded in Celsius <u>1°/12°c</u>
2a	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): <u>201404436</u>
3	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4	Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?			<input checked="" type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples have headspace as required?			<input checked="" type="checkbox"/>	Sample ID's and containers affected:
7	VOA vials contain acid preservation?			<input checked="" type="checkbox"/>	(If unknown, select No)
8	VOA vials free of headspace (defined as < 6mm bubble)?			<input checked="" type="checkbox"/>	Sample ID's and containers affected:
9	Are Encore containers present?			<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10	Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
11	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
12	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
13	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
14	Are sample containers identifiable as GEL provided?			<input checked="" type="checkbox"/>	
15	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
16	Carrier and tracking number.				Circle Applicable: <u>FedEx Air</u> FedEx Ground UPS Field Services Courier Other 7779 8793 8325 7779 8979 8339 7779 9565 4230

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 13 January 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	T104704235-16-11
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Metals Analysis

Case Narrative

January 16, 2017

Metals

Technical Case Narrative

CH2MHill Plateau Remediation Company (CPRC)

SDG #: GEL412995

Work Order #: 412995

Product: Determination of Metals by ICP-MS

Analytical Method: SW846 3050B/6020B

Analytical Procedure: GL-MA-E-014 REV# 28

Analytical Batch: 1626201

Preparation Method: SW846 3050B

Preparation Procedure: GL-MA-E-009 REV# 26

Preparation Batch: 1626200

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203695279	Method Blank (MB)ICP-MS
1203695280	Laboratory Control Sample (LCS)
1203695283	412995001(B35XX4L) Serial Dilution (SD)
1203695281	412995001(B35XX4D) Sample Duplicate (DUP)
1203695282	412995001(B35XX4S) 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
1203695281 (B35XX4DUP)	Uranium	27.8* (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.

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Analyte	412995
	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.

January 16, 2017

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: GEL412995 GEL Work Order: 412995

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: 12 JAN 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL412995

CONTRACT: CPRC0F16028

METHOD TYPE: SW846

SAMPLE ID: 412995001

BASIS: Dry Weight

DATE COLLECTED 19-DEC-16

CLIENT ID: B35XX4

LEVEL: Low

DATE RECEIVED 20-DEC-16

MATRIX: SOIL

%SOLIDS: 95.8

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-61-1	Uranium	822	ug/kg	D*	13.5	40.9	40.9	2	MS	SKJ	12/28/16 22:50	161228-1	1626201

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1626201	1626200	SW846 3050B	0.51	g	50	mL	12/21/16	SXW1

***Analytical Methods:**

MS SW846 3050B/6020B

Quality Control Summary

January 16, 2017

GEL LABORATORIES LLC

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

QC Summary

Report Date: January 12, 2017

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 412995

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1626201										
QC1203695281	412995001	DUP									
Uranium		*D	822	*D	621	ug/kg	27.8*	(0%-20%)	SKJ	12/28/16	22:53
QC1203695280	LCS										
Uranium	4920		D	5100	ug/kg		104	(80%-120%)		12/28/16	22:46
QC1203695279	MB										
Uranium			DU	12.1	ug/kg					12/28/16	22:42
QC1203695282	412995001	MS									
Uranium	5200	*D	822	D	5930	ug/kg	98.3	(75%-125%)		12/28/16	22:57
QC1203695283	412995001	SDILT									
Uranium		*D	4.02	D	0.850	ug/L	5.85	(0%-20%)		12/28/16	23:01

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

January 16, 2017
GEL LABORATORIES LLC

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QC Summary

Workorder: 412995

Page 2 of 2

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

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

January 16, 2017

General Chemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL412995
Work Order #: 412995

Product: Ion Chromatography

Analytical Method: 9056_ANIONS_IC

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

Analytical Batches: 1628845 and 1628843

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203701770	Method Blank (MB)
1203701771	Laboratory Control Sample (LCS)
1203701772	412995001(B35XX4) Sample Duplicate (DUP)
1203701773	412995001(B35XX4) Matrix Spike (MS)

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

Data Summary:

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

Product: pH

Analytical Method: SW846 9045D

Analytical Procedure: GL-GC-E-008 REV# 22

Analytical Batch: 1629015

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203702218	Laboratory Control Sample (LCS)
1203702219	412594001(B35XX0) 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
1203702219 (B35XX0DUP)	pH	Received 14-DEC-16, out of holding 12-DEC-16
412995001 (B35XX4)	pH	Received 20-DEC-16, out of holding 19-DEC-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.

January 16, 2017

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL412995 GEL Work Order: 412995

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).

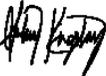
U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

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: **Aubrey Kingsbury**

Date: **10 JAN 2017**

Title: **Analyst I**

Sample Data Summary

Certificate of Analysis

Report Date: January 10, 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: B35XX4	Project: CPRC0F16028
Sample ID: 412995001	Client ID: CPRC001
Matrix: SOIL	
Collect Date: 19-DEC-16 09:03	
Receive Date: 20-DEC-16	
Collector: Client	
Moisture: 4.19%	

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		4400	709	1970	ug/Kg	9.43	1	MXL2	01/04/17	1515	1628845	1
Fluoride		1100	335	985	ug/Kg	9.43	1					
Nitrate-N	B	868	325	985	ug/Kg	9.43	1					
Nitrite-N	U	325	325	985	ug/Kg	9.43	1					
Phosphorus in phosphate	U	660	660	1970	ug/Kg	9.43	1					
Sulfate		5100	1310	3940	ug/Kg	9.43	1					

Titration and Ion Analysis

9045_pH (Non-Aqueous):COMMON "As Received"												
pH at Temp 20.6C	X	8.82	0.010	0.100	SU		1	RXB5	01/04/17	1349	1629015	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	01/04/17	1022	1628843

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9056_ANIONS_IC	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

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

Quality Control Summary

January 16, 2017

GEL LABORATORIES LLC

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

QC Summary

Report Date: January 10, 2017

Page 1 of 2

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 412995

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1628845										
QC1203701772	412995001	DUP									
Chloride		4400		4390	ug/Kg	0.313	^	(+/-1970)	MXL2	01/04/17	15:44
Fluoride		1100		1050	ug/Kg	4.31	^	(+/-985)			
Nitrate-N	B	868	B	930	ug/Kg	6.9	^	(+/-985)			
Nitrite-N	U	325	U	325	ug/Kg	N/A					
Phosphorus in phosphate	U	660	U	660	ug/Kg	N/A					
Sulfate		5100		5530	ug/Kg	8.13	^	(+/-3940)			
QC1203701771	LCS										
Chloride	49900			48900	ug/Kg			98	(80%-120%)	01/04/17	14:46
Fluoride	24900			24300	ug/Kg			97.5	(80%-120%)		
Nitrate-N	24900			24200	ug/Kg			97.1	(80%-120%)		
Nitrite-N	24900			24200	ug/Kg			97	(80%-120%)		
Phosphorus in phosphate	12500			13700	ug/Kg			110	(80%-120%)		
Sulfate	99800			99300	ug/Kg			99.5	(80%-120%)		
QC1203701770	MB										
Chloride			U	716	ug/Kg					01/04/17	14:17
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						
QC1203701773	412995001	MS									

January 16, 2017 GEL LABORATORIES LLC

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

QC Summary

Workorder: 412995

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1628845										
Chloride	48400	4400		51200	ug/Kg		96.5	(48%-145%)		01/04/17	16:13
Fluoride	24200	1100		22700	ug/Kg		89.2	(30%-135%)	MXL2		
Nitrate-N	24200	B	868	23800	ug/Kg		94.7	(70%-125%)			
Nitrite-N	24200	U	325	23300	ug/Kg		96.2	(70%-120%)			
Phosphorus in phosphate	12100	U	660	10900	ug/Kg		89.7	(35%-134%)			
Sulfate	96900		5100	101000	ug/Kg		98.6	(45%-162%)			

Titration and Ion Analysis

Batch	1629015										
QC1203702219	412594001	DUP									
pH		X	8.33	X	8.42	SU	1.07	(0%-30%)	RXB5	01/04/17	13:42
QC1203702218	LCS										
pH	7.00				6.99	SU	99.9	(70%-130%)		01/04/17	13:38

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 \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

January 16, 2017

Radiochemistry

Technical Case Narrative

CH2MHill Plateau Remediation Company (CPRC)

SDG #: GEL412995

Work Order #: 412995

Product: AMCMISO_EIE_PRECIP_AEA: COMMON

Analytical Method: AMCMISO_EIE_PREC_AEA

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

Analytical Batch: 1627990

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1626154

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203699580	Method Blank (MB)
1203699581	412995001(B35XX4) Sample Duplicate (DUP)
1203699582	Laboratory Control Sample (LCS)

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

Data Summary:

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

Product: NP237_IE_PRECIP_AEA: COMMON

Analytical Method: ASTM C 1475-00 Modified

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

Analytical Batch: 1627991

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1626154

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203699583	Method Blank (MB)
1203699584	412995001(B35XX4) Sample Duplicate (DUP)

1203699585

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: 1627993

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1626154

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203699589	Method Blank (MB)
1203699590	412995001(B35XX4) Sample Duplicate (DUP)
1203699591	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 1203699590 (B35XX4DUP) was recounted due to a peak shift. The recount is reported.

Product: THISO_IE_PLATE_AEA: COMMON

Analytical Method: THISO_IE_PRECIP_AEA

Analytical Procedure: GL-RAD-A-038 REV# 17

Analytical Batch: 1627995

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 20
Preparation Batch: 1626154

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203699592	Method Blank (MB)
1203699593	412995001(B35XX4) Sample Duplicate (DUP)
1203699594	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: 1627996

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 20
Preparation Batch: 1626154

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203699595	Method Blank (MB)
1203699596	412995001(B35XX4) Sample Duplicate (DUP)
1203699597	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.

January 16, 2017

Product: Dry Weight

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1626154

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203695163	412995001(B35XX4) 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: 1624452

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203690836	Method Blank (MB)
1203690837	412594001(B35XX0) Sample Duplicate (DUP)
1203690838	412594001(B35XX0) Matrix Spike (MS)
1203690839	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: 1626551

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1626154

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203696264	Method Blank (MB)
1203696265	412995001(B35XX4) Sample Duplicate (DUP)
1203696266	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, 1203696265 (B35XX4DUP) and 412995001 (B35XX4), did not meet the Ra226 relative percent difference requirement; however, they do meet the relative error ratio requirement with a value of 1.77.

Qualifier Information

Qualifier	Reason	Analyte	Sample	Client Sample
X	Data rejected due to low abundance.	Europium-154	412995001	B35XX4

Product: SRTOT_SEP_PRECIP_GPC: COMMON

Analytical Method: SRTOT_SEP_PRECIP_GPC

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

Analytical Batch: 1626581

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1626154

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203696347	Method Blank (MB)

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1203696348 412594002(B35XX2) Sample Duplicate (DUP)
1203696349 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 1203696349 (LCS) was recounted due to high recovery. The recount is reported.

Product: TC99_SEP_GPC

Analytical Method: TC99_EIE_LSC

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

Analytical Batch: 1626509

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203696126	Method Blank (MB)
1203696127	412594002(B35XX2) Sample Duplicate (DUP)
1203696128	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: 1626510

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4

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1203696129	Method Blank (MB)
1203696130	412594002(B35XX2) Sample Duplicate (DUP)
1203696131	412594002(B35XX2) Matrix Spike (MS)
1203696132	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: 1626511

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203696133	Method Blank (MB)
1203696134	412594002(B35XX2) Sample Duplicate (DUP)
1203696135	412594002(B35XX2) Matrix Spike (MS)
1203696136	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: 1627707

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1626154

January 16, 2017

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412995001	B35XX4
1203698796	Method Blank (MB)
1203698797	412995001(B35XX4) Sample Duplicate (DUP)
1203698798	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 412995001 (B35XX4) was recounted to verify sample results. Recount is reported.

Certification Statement

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

January 16, 2017

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: GEL412995 GEL Work Order: 412995

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: Heather McCarty

Date: 13 JAN 2017

Title: Analyst II

Sample Data Summary

January 16, 2017
Rad

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4		Prep Basis: "Dry Weight Corrected"
Batch ID: 1627990	Method: AMCMISO_EIE_PREC_AEA	SOP Ref: GL-RAD-A-011
Run Date: 01/07/2017 11:02	Analyst: KXB2	Instrument: 1221
Data File: S0412995001_AM.1A.gcnf	Aliquot: 0.111 g	Count Time: 240 min
Prep Batch: 1627990	Prep Method: DOE EML HASL-300, Am-05	Prep SOP Ref: GL-RAD-A-021
Prep Date: 01/05/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.196	pCi/g	+/-0.311	0.313	0.431	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	16.8	19.3	pCi/g	87.1	(30%-105%)

Comments:

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
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).
 The MDC is a sample specific MDC.

January 16, 2017
Rad

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4		Prep Basis: "Dry Weight Corrected"
Batch ID: 1627991	Method: ASTM C 1475-00 Modified	SOP Ref: GL-RAD-A-032
Run Date: 01/07/2017 13:07	Analyst: KXB2	Instrument: 1103
Data File: S0412995001_NP.1A.gcnf	Aliquot: 0.108 g	Count Time: 240 min
Prep Batch: 1627991	Prep Method: ASTM C 1475-00 Modified	Prep SOP Ref: GL-RAD-A-021
Prep Date: 01/05/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13994-20-2	Neptunium-237	U	0.0472	pCi/g	+/-0.211	0.212	0.414	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	1770	1980	pCi/g	89.4	(30%-105%)

Comments:

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 - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).
The MDC is a sample specific MDC.

January 16, 2017
Rad

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4		Prep Basis: "Dry Weight Corrected"
Batch ID: 1627993	Method: PUIISO_PRECIP_AEA	SOP Ref: GL-RAD-A-011
Run Date: 01/07/2017 11:02	Analyst: KXB2	Instrument: 1226
Data File: S0412995001_PU.1A.gcnf	Aliquot: 0.111 g	Count Time: 240 min
Prep Batch: 1627993	Prep Method: DOE EML HASL-300, Pu-11-	Prep SOP Ref: GL-RAD-A-021
Prep Date: 01/05/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	0.0434	pCi/g	+/-0.241	0.242	0.463	1.00
OER-100-70	Plutonium-239/240	U	0.147	pCi/g	+/-0.289	0.290	0.400	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	13.5	17.8	pCi/g	75.8	(30%-105%)

Comments:

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January 16, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4		Prep Basis: "Dry Weight Corrected"
Batch ID: 1627995	Method: THISO_IE_PRECIP_AEA	SOP Ref: GL-RAD-A-038
Run Date: 01/07/2017 12:42	Analyst: KXB2	Instrument: 1042
Data File: S0412995001_TH.1A.gcnf	Aliquot: 0.111 g	Count Time: 239.9998 min
Prep Batch: 1627995	Prep Method: DOE EML HASL-300, Th-01-	Prep SOP Ref: GL-RAD-A-021
Prep Date: 01/05/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
TH-232 <small>7440-29-1</small>	Thorium-232		0.685	pCi/g	+/-0.408	0.420	0.240	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Thorium-229 Tracer	16.3	18.6	pCi/g	87.5	(30%-105%)

Comments:

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January 16, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4		Prep Basis: "Dry Weight Corrected"
Batch ID: 1627996	Method: UIISO_IE_PRECIP_AEA	SOP Ref: GL-RAD-A-011
Run Date: 01/07/2017 10:13	Analyst: KXB2	Instrument: 1006
Data File: S0412995001_UU.1A.gcnf	Aliquot: 0.111 g	Count Time: 239.9998 min
Prep Batch: 1627996	Prep Method: DOE EML HASL-300, U-02-R	Prep SOP Ref: GL-RAD-A-021
Prep Date: 01/05/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 <small>13968-55-3/13966-29-5</small>	Uranium-233/234		0.513	pCi/g	+/-0.441	0.447	0.435	1.00
15117-96-1/13982-7	Uranium-235/236	U	0.292	pCi/g	+/-0.384	0.386	0.292	1.00
7440-61-1	Uranium-238		0.925	pCi/g	+/-0.558	0.575	0.377	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	15.6	18.9	pCi/g	82.4	(30%-105%)

Comments:

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January 16, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4	Method: SRTOT_SEP_PRECIP_GPC	Prep Basis: "Dry Weight Corrected"
Batch ID: 1626581	Analyst: BXF1	SOP Ref: GL-RAD-A-004
Run Date: 01/05/2017 16:31	Aliquot: 0.315 g	Instrument: PIC7A
Data File: S1626581r2.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 1626581		Prep SOP Ref: GL-RAD-A-021
Prep Date: 01/04/2017 09:30		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium	U	0.641	pCi/g	+/-0.851	0.867	1.45	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	7.10	7.75	mg	91.6	(40%-110%)

Comments:

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January 16, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4		Prep Basis: "As Received"
Batch ID: 1624452	Method: I129_SEP_LEPS_GS	SOP Ref: GL-RAD-A-006
Run Date: 12/27/2016 12:10	Analyst: MJH1	Instrument: XRAY5
Data File: I412995001.CNF;1	Aliquot: 1.011 g	Count Time: 60 min
Prep Batch: 1624452	Prep Method: DOE EML HASL-300,I-01 M	
Prep Date: 12/23/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	U	-0.0906	pCi/g	+/-0.467	0.468	1.13	2.00

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

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January 16, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4		Prep Basis: "Dry Weight Corrected"
Batch ID: 1626551	Method: GAMMA_GS	SOP Ref: GL-RAD-A-013
Run Date: 01/12/2017 05:43	Analyst: RXF2	Instrument: GAM30
Data File: G412995001.CNF;1	Aliquot: 123.258 g	Count Time: 240 min
Prep Batch: 1626551	Prep Method: DOE HASL 300, 4.5.2.3/Ga-01	Prep SOP Ref: GL-RAD-A-021
Prep Date: 12/22/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	U	-0.00105	pCi/g	+/-0.0132	0.0132	0.0217	0.100
10198-40-0	Cobalt-60	U	-0.00256	pCi/g	+/-0.0155	0.0156	0.0271	0.100
14683-23-9	Europium-152	U	-0.00638	pCi/g	+/-0.0366	0.0367	0.0681	0.100
15585-10-1	Europium-154	UX	0.00	pCi/g	+/-0.0638	0.079	0.0918	0.100
14391-16-3	Europium-155	U	0.0327	pCi/g	+/-0.0379	0.0408	0.0709	0.100
13982-63-3	Radium-226		0.504	pCi/g	+/-0.0824	0.0919	0.0446	1.00
15262-20-1	Radium-228		0.630	pCi/g	+/-0.132	0.158	0.100	3.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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January 16, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4		Prep Basis: "As Received"
Batch ID: 1626509	Method: TC99_EIE_LSC	SOP Ref: GL-RAD-A-059
Run Date: 01/02/2017 12:04	Analyst: LXT2	Instrument: LSCGOLD
Data File: E1626509.xls	Aliquot: 1.584 g	Count Time: 20 min
Prep Batch: 1626509	Prep Method: DOE EML HASL-300, Tc-02-	
Prep Date: 12/27/2016 13:05		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	-0.60	pCi/g	+/-1.30	1.30	2.30	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	57000	58600	CPM	97.2	(30%-105%)

Comments:

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January 16, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4		Prep Basis: "As Received"
Batch ID: 1626510	Method: C14_LSC	SOP Ref: GL-RAD-A-003
Run Date: 01/06/2017 05:49	Analyst: TXJ1	Instrument: LSCBROWN
Data File: C1626510.xls	Aliquot: 0.542 g	Count Time: 45 min
Prep Batch: 1626510	Prep Method: EPA EERF C-01 Modified	
Prep Date: 01/05/2017 15:54		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	-1.52	pCi/g	+/-2.14	2.14	3.72	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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January 16, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1626511	Analyst: TXJ1	SOP Ref: GL-RAD-A-002
Run Date: 01/06/2017 17:55	Aliquot: 1.269 g	Instrument: LSCGREEN
Data File: T1626511.xls	Prep Method: EPA 906.0 Modified	Count Time: 15 min
Prep Batch: 1626511		
Prep Date: 01/05/2017 15:44		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	-4.76	pCi/g	+/-12.4	12.4	23.3	30.0

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

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The MDC is a sample specific MDC.

January 16, 2017
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**Certificate of Analysis
Sample Summary**

SDG Number: GEL412995	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 412995001	Date Collected: 12/19/2016 09:03	Matrix: SOIL
	Date Received: 12/20/2016 10:00	%Moisture: 4.2
Client ID: B35XX4		Prep Basis: "Dry Weight Corrected"
Batch ID: 1627707	Method: NI63_LSC	SOP Ref: GL-RAD-A-022
Run Date: 12/30/2016 08:42	Analyst: MYM1	Instrument: LSCTEAL
Data File: N1627707R.xls	Aliquot: 0.725 g	Count Time: 15 min
Prep Batch: 1627707	Prep Method: DOE RESL Ni-1, Modified	Prep SOP Ref: GL-RAD-A-021
Prep Date: 12/28/2016 10:07		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
NI-63	Nickel-63	U	-2.13	pCi/g	+/-4.13	4.13	7.46	10.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Nickel Carrier	19.1	24.6	mg	77.7	(40%-110%)

Comments:

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The MDC is a sample specific MDC.

Quality Control Summary

January 16, 2017 GEL LABORATORIES LLC

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

QC Summary

Report Date: January 13, 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: 412995

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1627990								
QC1203699580	MB								
Americium-241			U	0.0666	pCi/g			KXB2	01/07/1711:02
				Uncert:					
				TPU:					
**Americium-243 Tracer	19.3			20.0	pCi/g	REC: 104	(30%-105%)		
				Uncert:					
				TPU:					
QC1203699581	412995001	DUP							
Americium-241		U	0.196	U	0.294	pCi/g			01/07/1711:02
				Uncert:	+/-0.311			RPD: 0	N/A
				TPU:	+/-0.313			RER: 0.412	(0-2)
**Americium-243 Tracer	20.5	16.8		18.4	pCi/g	REC: 90	(30%-105%)		
				Uncert:	+/-2.39				
				TPU:	+/-3.62				
QC1203699582	LCS								
Americium-241				17.7	pCi/g	REC: 90	(80%-120%)		01/07/1711:02
				Uncert:					
				TPU:					
**Americium-243 Tracer	19.3			19.0	pCi/g	REC: 99	(30%-105%)		
				Uncert:					
				TPU:					
Batch	1627991								
QC1203699583	MB								
Neptunium-237			U	-0.193	pCi/g			KXB2	01/07/1713:07
				Uncert:					
				TPU:					
**Americium-243 Tracer	1980			1960	pCi/g	REC: 99	(30%-105%)		
QC1203699584	412995001	DUP							
Neptunium-237		U	0.0472	U	-0.0443	pCi/g			
				Uncert:	+/-0.211			RPD: 0	N/A
				TPU:	+/-0.212			RER: 0.573	(0-2)
**Americium-243 Tracer	2100	1770		2150	pCi/g	REC: 102	(30%-105%)		
QC1203699585	LCS								
Neptunium-237				41.3	pCi/g	REC: 111	(80%-120%)		
				Uncert:					
				TPU:					
**Americium-243 Tracer	1980			1950	pCi/g	REC: 99	(30%-105%)		
Batch	1627993								
QC1203699589	MB								
Plutonium-238			U	0.228	pCi/g			KXB2	01/07/1711:02
				Uncert:					
				TPU:					
Plutonium-239/240			U	0.0891	pCi/g				
				Uncert:					
				TPU:					
				Uncert:					

QC Summary

Workorder: 412995

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1627993								
**Plutonium-242 Tracer	17.8	TPU:		+/-0.344					
		Uncert:		14.0	pCi/g	REC: 79	(30%-105%)		
		TPU:		+/-2.39					
				+/-3.53					
QC1203699590 412995001 DUP									
Plutonium-238		U	0.0434	U	0.180				01/11/1714:01
		Uncert:	+/-0.241	+/-0.353		RPD: 0	N/A		
		TPU:	+/-0.242	+/-0.354		RER: 0.623	(0-2)		
Plutonium-239/240		U	0.147	U	0.204				
		Uncert:	+/-0.289	+/-0.350		RPD: 0	N/A		
		TPU:	+/-0.290	+/-0.351		RER: 0.246	(0-2)		
**Plutonium-242 Tracer	19.0		13.5		12.9	pCi/g	REC: 68	(30%-105%)	
		Uncert:	+/-2.41	+/-2.75					
		TPU:	+/-3.55	+/-4.04					
QC1203699591 LCS									
Plutonium-238				U	0.0748	pCi/g			01/07/1711:02
		Uncert:		+/-0.256					
		TPU:		+/-0.256					
Plutonium-239/240	17.8				17.0	pCi/g	REC: 95	(80%-120%)	
		Uncert:		+/-2.18					
		TPU:		+/-3.20					
**Plutonium-242 Tracer	17.8				16.2	pCi/g	REC: 91	(30%-105%)	
		Uncert:		+/-2.22					
		TPU:		+/-3.30					
Batch	1627995								
QC1203699592 MB									
Thorium-232				U	0.257	pCi/g		KXB2	01/07/1712:42
		Uncert:		+/-0.269					
		TPU:		+/-0.271					
**Thorium-229 Tracer	18.6				16.5	pCi/g	REC: 88	(30%-105%)	
		Uncert:		+/-2.00					
		TPU:		+/-3.28					
QC1203699593 412995001 DUP									
Thorium-232			0.685		0.675	pCi/g			
		Uncert:	+/-0.408	+/-0.394		RPD: 1	(0% - 100%)		
		TPU:	+/-0.420	+/-0.405		RER: 0.0323	(0-2)		
**Thorium-229 Tracer	18.6		16.3		16.9	pCi/g	REC: 91	(30%-105%)	
		Uncert:	+/-2.05	+/-1.97					
		TPU:	+/-3.34	+/-3.24					
QC1203699594 LCS									
Thorium-232	17.9				17.8	pCi/g	REC: 100	(80%-120%)	
		Uncert:		+/-2.01					
		TPU:		+/-3.23					
**Thorium-229 Tracer	18.6				15.1	pCi/g	REC: 81	(30%-105%)	
		Uncert:		+/-2.06					
		TPU:		+/-3.35					
Batch	1627996								
QC1203699595 MB									
Uranium-233/234				U	0.257	pCi/g		KXB2	01/07/1710:13
		Uncert:		+/-0.326					

QC Summary

Workorder: 412995

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1627996								
Uranium-235/236		TPU:		+/-0.328					
			U	0.116	pCi/g				
		Uncert:		+/-0.318					
Uranium-238		TPU:		+/-0.319					
			U	0.257	pCi/g				
		Uncert:		+/-0.326					
**Uranium-232 Tracer	18.9	TPU:		+/-0.328					
				16.4	pCi/g	REC:	87	(30%-105%)	
		Uncert:		+/-2.32					
		TPU:		+/-3.57					
QC1203699596	412995001	DUP							
Uranium-233/234			0.513	0.978	pCi/g				
		Uncert:	+/-0.441	+/-0.603		RPD:	62	(0% - 100%)	
		TPU:	+/-0.447	+/-0.619		RER:	1.19	(0-2)	
Uranium-235/236		U	0.292	0.340	pCi/g				
		Uncert:	+/-0.384	+/-0.401		RPD:	39	N/A	
		TPU:	+/-0.386	+/-0.404		RER:	0.17	(0-2)	
Uranium-238			0.925	1.05	pCi/g				
		Uncert:	+/-0.558	+/-0.578		RPD:	12	(0% - 100%)	
		TPU:	+/-0.575	+/-0.596		RER:	0.285	(0-2)	
**Uranium-232 Tracer	20.2		15.6	15.3	pCi/g	REC:	76	(30%-105%)	
		Uncert:	+/-2.40	+/-2.42					
		TPU:	+/-3.67	+/-3.74					
QC1203699597	LCS								
Uranium-233/234				25.2	pCi/g				
		Uncert:		+/-2.49					
		TPU:		+/-4.24					
Uranium-235/236				2.35	pCi/g				
		Uncert:		+/-0.862					
		TPU:		+/-0.919					
Uranium-238	24.3			24.3	pCi/g	REC:	100	(80%-120%)	
		Uncert:		+/-2.45					
		TPU:		+/-4.12					
**Uranium-232 Tracer	18.9			15.7	pCi/g	REC:	83	(30%-105%)	
		Uncert:		+/-2.16					
		TPU:		+/-3.36					
Rad Gamma Spec									
Batch	1624452								
QC1203690836	MB								
Iodine-129			U	0.106	pCi/g			MJH1	12/27/1612:10
		Uncert:		+/-0.238					
		TPU:		+/-0.243					
QC1203690837	412594001	DUP							
Iodine-129		U	0.336	-0.0619	pCi/g				12/27/1612:19
		Uncert:	+/-0.652	+/-0.452		RPD:	0	N/A	
		TPU:	+/-0.653	+/-0.453		RER:	0.982	(0-2)	
QC1203690838	412594001	MS							
Iodine-129	41.4	U	0.336	38.2	pCi/g	REC:	92	(75%-125%)	12/27/1612:19
		Uncert:	+/-0.652	+/-4.43					
		TPU:	+/-0.653	+/-5.80					

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1624452								
QC1203690839	LCS								
Iodine-129	41.2			33.7	pCi/g	REC: 82 (80%-120%)			12/28/1606:05
	Uncert:			+/-4.83					
	TPU:			+/-5.87					
Batch	1626551								
QC1203696264	MB								
Cesium-137			U	0.000512	pCi/g			RXF2	01/12/1705:49
	Uncert:			+/-0.0118					
	TPU:			+/-0.0118					
Cobalt-60			U	-0.000656	pCi/g				
	Uncert:			+/-0.0167					
	TPU:			+/-0.0167					
Europium-152			U	-0.000479	pCi/g				
	Uncert:			+/-0.0321					
	TPU:			+/-0.0321					
Europium-154			U	-0.0125	pCi/g				
	Uncert:			+/-0.0315					
	TPU:			+/-0.032					
Europium-155			U	-0.00151	pCi/g				
	Uncert:			+/-0.0347					
	TPU:			+/-0.0347					
Radium-226			U	-0.0318	pCi/g				
	Uncert:			+/-0.0351					
	TPU:			+/-0.038					
Radium-228			U	0.0608	pCi/g				
	Uncert:			+/-0.0759					
	TPU:			+/-0.0809					
QC1203696265	412995001	DUP							
Cesium-137		U -0.00105	U	-0.00942	pCi/g				01/12/1710:00
	Uncert:	+/-0.0132		+/-0.0155		RPD: 0	N/A		
	TPU:	+/-0.0132		+/-0.0161		RER: 0.788	(0-2)		
Cobalt-60		U -0.00256	U	-0.00263	pCi/g				
	Uncert:	+/-0.0155		+/-0.0171		RPD: 0	N/A		
	TPU:	+/-0.0156		+/-0.0171		RER: 0.00525	(0-2)		
Europium-152		U -0.00638	U	0.00126	pCi/g				
	Uncert:	+/-0.0366		+/-0.0445		RPD: 0	N/A		
	TPU:	+/-0.0367		+/-0.0445		RER: 0.26	(0-2)		
Europium-154		UX 0.00	U	0.00709	pCi/g				
	Uncert:	+/-0.0638		+/-0.0509		RPD: 0	N/A		
	TPU:	+/-0.079		+/-0.051		RER: 1.97	(0-2)		
Europium-155		U 0.0327	U	-0.00522	pCi/g				
	Uncert:	+/-0.0379		+/-0.0487		RPD: 0	N/A		
	TPU:	+/-0.0408		+/-0.0488		RER: 1.17	(0-2)		
Radium-226		0.504		0.389	pCi/g				
	Uncert:	+/-0.0824		+/-0.0796		RPD: 26*	(0% - 20%)		
	TPU:	+/-0.0919		+/-0.0877		RER: 1.77	(0-2)		
Radium-228		0.630		0.669	pCi/g				
	Uncert:	+/-0.132		+/-0.151		RPD: 6	(0% - 20%)		
	TPU:	+/-0.158		+/-0.170		RER: 0.332	(0-2)		
QC1203696266	LCS								

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1626551								
Americium-241	489			501	pCi/g	REC: 102	(80%-120%)		
	Uncert:			+/-6.86					
	TPU:			+/-37.3					
Cesium-137	178			192	pCi/g	REC: 108	(80%-120%)		
	Uncert:			+/-3.28					
	TPU:			+/-8.85					
Cobalt-60	156			149	pCi/g	REC: 96	(80%-120%)		
	Uncert:			+/-3.29					
	TPU:			+/-6.39					
Europium-152			U	-0.722	pCi/g				
	Uncert:			+/-1.32					
	TPU:			+/-1.36					
Europium-154			U	0.742	pCi/g				
	Uncert:			+/-1.09					
	TPU:			+/-1.14					
Europium-155			U	-0.955	pCi/g				
	Uncert:			+/-1.17					
	TPU:			+/-1.25					
Radium-226			U	-0.0716	pCi/g				
	Uncert:			+/-0.953					
	TPU:			+/-0.954					
Radium-228			U	-0.911	pCi/g				
	Uncert:			+/-2.74					
	TPU:			+/-2.77					
Rad Gas Flow									
Batch	1626581								
QC1203696347	MB								
Total Strontium			U	0.151	pCi/g			BXF1	01/05/1716:31
	Uncert:			+/-0.611					
	TPU:			+/-0.613					
**Strontium Carrier	7.75			7.40	mg	REC: 96	(40%-110%)		
QC1203696348	412594002	DUP							
Total Strontium		U	-0.594	U	0.478	pCi/g			01/05/1716:31
	Uncert:		+/-0.974		+/-0.757		RPD: 0	N/A	
	TPU:		+/-0.974		+/-0.767		RER: 1.7	(0-2)	
**Strontium Carrier	7.75		7.10		7.10	mg	REC: 92	(40%-110%)	
QC1203696349	LCS								
Total Strontium	70.2			71.6	pCi/g	REC: 102	(80%-120%)		01/06/1713:24
	Uncert:			+/-3.62					
	TPU:			+/-18.9					
**Strontium Carrier	7.75			7.50	mg	REC: 97	(40%-110%)		
Rad Liquid Scintillation									
Batch	1626509								
QC1203696126	MB								
Technetium-99			U	-0.0362	pCi/g			LXT2	01/02/1712:25
	Uncert:			+/-1.30					
	TPU:			+/-1.30					
**Technetium-99m Tracer	58600			57800	CPM	REC: 99	(30%-105%)		
QC1203696127	412594002	DUP							

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Liquid Scintillation									
Batch	1626509								
Technetium-99		U	-0.882	U	0.438	pCi/g			
		Uncert:	+/-1.42		+/-1.41		RPD: 0	N/A	
		TPU:	+/-1.42		+/-1.41		RER: 1.29	(0-2)	
**Technetium-99m Tracer	58600		55200		57200	CPM	REC: 98	(30%-105%)	
QC1203696128	LCS								
Technetium-99		54.4			50.5	pCi/g	REC: 93	(80%-120%)	01/02/1713:09
		Uncert:			+/-2.59				
		TPU:			+/-6.35				
**Technetium-99m Tracer	58600				57900	CPM	REC: 99	(30%-105%)	
Batch	1626510								
QC1203696129	MB								
Carbon-14				U	-1.25	pCi/g		TXJ1	01/06/1706:36
		Uncert:			+/-2.10				
		TPU:			+/-2.10				
QC1203696130	412594002	DUP							
Carbon-14		U	0.504	U	-1.53	pCi/g			01/06/1707:23
		Uncert:	+/-2.14		+/-2.11		RPD: 0	N/A	
		TPU:	+/-2.14		+/-2.11		RER: 1.33	(0-2)	
QC1203696131	412594002	MS							
Carbon-14		137	U	0.504	132	pCi/g	REC: 96	(75%-125%)	01/06/1708:10
		Uncert:	+/-2.14		+/-6.76				
		TPU:	+/-2.14		+/-11.9				
QC1203696132	LCS								
Carbon-14		136			132	pCi/g	REC: 97	(80%-120%)	01/06/1708:26
		Uncert:			+/-6.73				
		TPU:			+/-11.8				
Batch	1626511								
QC1203696133	MB								
Tritium				U	-4.75	pCi/g		TXJ1	01/06/1718:11
		Uncert:			+/-12.3				
		TPU:			+/-12.3				
QC1203696134	412594002	DUP							
Tritium		U	-1.74	U	4.58	pCi/g			01/06/1718:27
		Uncert:	+/-12.4		+/-12.6		RPD: 0	N/A	
		TPU:	+/-12.4		+/-12.7		RER: 0.699	(0-2)	
QC1203696135	412594002	MS							
Tritium		92.1	U	-1.74	74.1	pCi/g	REC: 80	(75%-125%)	01/06/1718:43
		Uncert:	+/-12.4		+/-18.3				
		TPU:	+/-12.4		+/-24.8				
QC1203696136	LCS								
Tritium		90.3			78.8	pCi/g	REC: 87	(80%-120%)	01/06/1719:00
		Uncert:			+/-18.3				
		TPU:			+/-25.6				
Batch	1627707								
QC1203698796	MB								
Nickel-63				U	4.24	pCi/g		MYM1	12/29/1609:41
		Uncert:			+/-3.78				
		TPU:			+/-3.86				
**Nickel Carrier	24.6				19.3	mg	REC: 79	(40%-110%)	
QC1203698797	412995001	DUP							

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Liquid Scintillation										
Batch	1627707									
Nickel-63		U	-2.13	U	0.475	pCi/g				
		Uncert:	+/-4.13		+/-3.48		RPD:	0	N/A	
		TPU:	+/-4.13		+/-3.49		RER:	0.946	(0-2)	
**Nickel Carrier	24.6		19.1		19.9	mg	REC:	81	(40%-110%)	
QC1203698798	LCS									
Nickel-63	186				179	pCi/g	REC:	96	(80%-120%) 12/29/1610:14	
		Uncert:			+/-8.99					
		TPU:			+/-34.1					
**Nickel Carrier	24.6				19.7	mg	REC:	80	(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.