

6/9/2016



June 09, 2016

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

Re: CHPRC SAF F16-028
Work Order: 397347
SDG: GEL397347

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 13, 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: 304043 - 8H
Chain of Custody: F16-028-006
Enclosures

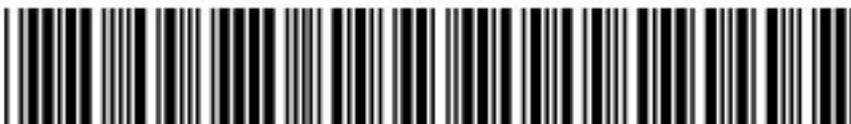


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Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF F16-028
SDG: GEL397347**

June 09, 2016

Laboratory Identification:

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

Summary

Sample receipt

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on May 13, 2016, for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

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

Sample Identification

The laboratory received the following samples:

Laboratory Identification	Sample Description
397347001	B353C9
397347002	B354J4

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.

6/9/2016

B. Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Technical Case Narrative
CH2M Hill Plateau Remediation Company (CPRC)
SDG #: GEL397347
Work Order #: 397347

Metals

Determination of Metals by ICP-MS

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

Technical Information

Sample Dilutions

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

Analyte	397347
	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.

Miscellaneous Information

Manual Integrations

Samples 1203549067 (B353C9DUP) and 397347001 (B353C9) were manually integrated to correctly position the baseline as set in the calibration standards.

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
1203549063 (Non SDG 396992001DUP)	pH	Received 09-MAY-16, out of holding 04-MAY-16
397347002 (B354J4)	pH	Received 13-MAY-16, out of holding 12-MAY-16

Radiochemistry**NP237_IE_PRECIP_AEA: COMMON**

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

Technical Information**Recounts**

Samples 1203550676 (B353C9DUP) and 397347001 (B353C9) were given additional clean-up steps and recounted in order to remove suspected interferences. The recounts are reported.

PUISO_PRECIP_AEA:COMMON

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

THISO_IE_PLATE_AEA: COMMON

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

Technical Information**Recounts**

Sample 397347001 (B353C9) was recounted due to high carrier/tracer yield. The recount is reported.

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.

Quality Control (QC) Information

QC Information

The sample and the duplicate, 1203550685 (B353C9DUP) and 397347001 (B353C9), did not meet the U-238 relative percent difference requirement; however, they do meet the relative error ratio requirement with a value of 0.907.

AMCMISO_EIE_PRECIP_AEA: COMMON

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

Technical Information

Recounts

Sample 1203550687 (MB) was recounted due to high carrier/tracer yield. The recount is 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.

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.

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.

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 1203558180 (B353C9DUP) was recounted due to results more negative than the three sigma TPU. The second count is reported.

NI63_LSC

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

Technical Information

Recounts

Sample 1203553502 (LCS) was recounted due to low 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.

TRITIUM_DIST_LSC: COMMON

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

Miscellaneous Information

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.

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

F16-028-006 PAGE 1 OF 2

CH2M Hill Plateau Remediation Company

COLLECTOR Don Brotherton
CHPRC

SAMPLING LOCATION C9414, 200-WA-1 #6

ICE CHEST NO. GWS-430

COMPANY CONTACT TODAYAK, D
TELEPHONE NO. 376-6427

PROJECT DESIGNATION 200-WA-1 Opportunistic sampling - soil

FIELD LOGBOOK NO. HNF-N-645-1-#4
ACTUAL SAMPLE DEPTH 250.5-253.0

OFFSITE PROPERTY NO. U6033

PROJECT COORDINATOR TODAYAK, D

SAF NO. F16-028

COA 200492 304043

BILL OF LADING/AIR BILL NO. 776327 127615

PRICE CODE 8H

AIR QUALITY

METHOD OF SHIPMENT FEDERAL EXPRESS

DATA TURNAROUND 30 Days / 30 Days

ORIGINAL

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	COOL <=6C	NONE	NONE	None
A=Air DL=Drum L=Liquid DS=Drum S=Solids O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	*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.	HOLDING TIME	6 Months	6 Months	6 Months	ASAP
		TYPE OF CONTAINER	G/P	G/P	G/P	G/P
		NO. OF CONTAINER(S)	1	1	1	1
		VOLUME	250ml	250ml	500ml	60ml
		SAMPLE ANALYSIS				SEE ITEM (4) IN SPECIAL INSTRUCTIONS
		SAMPLE DATE	MAY 12 2016 0737			
B353C9	SOIL		✓	✓	✓	✓
B354J4	SOIL		✓	✓	✓	✓

397347

CHAIN OF POSSESSION

SIGN/ PRINT NAMES

SPECIAL INSTRUCTIONS SEE PAGE 2 FOR ALL SPECIAL INSTRUCTIONS

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Don Brotherton CHPRC	MAY 12 2016 0830	Frank Hall CHPRC	MAY 12 2016 0830
Frank Hall CHPRC	MAY 12 2016 1400	FEDEX	
Frank Hall CHPRC		M. Kuslewski	5.13.16.0900

LABORATORY SECTION RECEIVED BY

FINAL SAMPLE DISPOSITION DISPOSAL METHOD

TITLE

DISPOSED BY

DATE/TIME

DATE/TIME

TRVL NUM = TRVL16-059

FSR ID = FSR28198

PRINTED ON 3/23/2016

A-6003-618 (REV.2)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

CH2M Hill Plateau Remediation Company

COLLECTOR Don Brotherton
CHPRC

COMPANY CONTACT
TODAK, D

TELEPHONE NO.
376-6427

PROJECT COORDINATOR
TODAK, D

PRICE CODE 8H
AIR QUALITY
METHOD OF SHIPMENT
FEDERAL EXPRESS

DATA
TURNAROUND
30 Days / 30
Days

SAMPLING LOCATION
C9414, 200-WA-1 #6

PROJECT DESIGNATION
200-WA-1 Opportunistic sampling - soil

SAF NO.
F16-028

ICE CHEST NO.
GWS-430

FIELD LOGBOOK NO.
FNF-N-045

COA
300192

ORIGINAL

SHIPPED TO
GEL Laboratories, LLC

OFFSITE PROPERTY NO.
lele33

BILL OF LADING/AIR BILL NO.
776 632712415

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; NI63_LSC: COMMON; NI29_SEP_LEPS_GS: COMMON; NI63_LSC: COMMON; PUISO_PLATE_AEA: COMMON; SRTO_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) 9045_pH (Non-Aqueous): COMMON {pH Measurement};

SAMPLE RECEIPT & REVIEW FORM

Client: <u>OPRC</u>		SDG/AR/COC/Work Order: <u>397347</u>
Received By: <u>MIC</u>		Date Received: <u>5-13-16</u>
Suspected Hazard Information	Yes <input type="checkbox"/> No <input type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</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 type="checkbox"/>	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: <u>Ice bags</u> Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius <u>2C</u>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>13046196L</u> Secondary Temperature Device Serial # (if Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7 VOA vials contain acid preservation?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
16 Carrier and tracking number.				Circle Applicable: FedEx Air <input checked="" type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <input type="checkbox"/> <u>7763 2712 7615</u>

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials DS Date 5/13/16 Page 1 of 1

Data Review Qualifier Definitions

Project Specific Qualifier Definitions for GEL Client Code: CPRC

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

Laboratory Certifications

List of current GEL Certifications as of 09 June 2016

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA160006
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-16-11
Utah NELAP	SC000122016-20
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL397347
Work Order #: 397347

Product: Determination of Metals by ICP-MS**Analytical Method:** 6020_METALS_ICPMS**Analytical Procedure:** GL-MA-E-014 REV# 28**Analytical Batch:** 1567324**Preparation Method:** SW846 3050B**Preparation Procedure:** GL-MA-E-009 REV# 26**Preparation Batch:** 1567323

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203548869	Method Blank (MB)ICP-MS
1203548870	Laboratory Control Sample (LCS)
1203548873	397347001(B353C9L) Serial Dilution (SD)
1203548871	397347001(B353C9D) Sample Duplicate (DUP)
1203548872	397347001(B353C9S) Matrix Spike (MS)

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

Data Summary:

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

Technical Information**Preparation/Analytical Method Verification**

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

Sample Dilutions

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

Analyte	397347
	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: GEL397347 GEL Work Order: 397347

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: 07 JUN 2016

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL397347

CONTRACT: CPRC0F16028

METHOD TYPE: SW846

SAMPLE ID:397347001

BASIS: Dry Weight

DATE COLLECTED 12-MAY-16

CLIENT ID: B353C9

LEVEL: Low

DATE RECEIVED 13-MAY-16

MATRIX: SOIL

%SOLIDS: 96.6

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-61-1	Uranium	1190	ug/kg	D	13.2	40	40	2	MS	SKJ	05/25/16 20:23	160525-1	1567324

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1567324	1567323	SW846 3050B	0.518	g	50	mL	05/13/16	JP1

***Analytical Methods:**

MS SW846 3050B/6020A

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: June 7, 2016

Page 1 of 2

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 397347

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1567324										
QC1203548871	397347001	DUP									
Uranium		D	1190	D	1280	ug/kg	7.57	(0%-20%)	SKJ	05/25/16	20:27
QC1203548870	LCS										
Uranium	4710			D	5020	ug/kg		107	(34%-166%)	05/25/16	20:19
QC1203548869	MB										
Uranium				DU	12.1	ug/kg				05/25/16	20:15
QC1203548872	397347001	MS									
Uranium	5110	D	1190	D	6100	ug/kg		96.1	(75%-125%)	05/25/16	20:31
QC1203548873	397347001	SDILT									
Uranium		D	5.94	D	1.17	ug/L	1.33	(0%-10%)		05/25/16	20:39

Notes:

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

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QC Summary

Workorder: 397347

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
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N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

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

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

General Chem Analysis

Case Narrative

**General Chemistry
 Technical Case Narrative
 CH2M Hill Plateau Remediation Company (CPRC)
 SDG #: GEL397347
 Work Order #: 397347**

Product: Ion Chromatography**Analytical Method:** 9056_ANIONS_IC**Analytical Procedure:** GL-GC-E-086 REV# 25**Analytical Batches:** 1567406 and 1567405

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203549065	Method Blank (MB)
1203549066	Laboratory Control Sample (LCS)
1203549067	397347001(B353C9) Sample Duplicate (DUP)
1203549068	397347001(B353C9) 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.

Miscellaneous Information**Manual Integrations**

Samples 1203549067 (B353C9DUP) and 397347001 (B353C9) were manually integrated to correctly position the baseline as set in the calibration standards.

Product: pH**Analytical Method:** SW846 9045D**Analytical Procedure:** GL-GC-E-008 REV# 21**Analytical Batch:** 1567401

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347002	B354J4
1203549062	Laboratory Control Sample (LCS)
1203549063	396992001(NonSDG) 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
1203549063 (Non SDG 396992001DUP)	pH	Received 09-MAY-16, out of holding 04-MAY-16
397347002 (B354J4)	pH	Received 13-MAY-16, out of holding 12-MAY-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.

GEL LABORATORIES LLC

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL397347 GEL Work Order: 397347

The Qualifiers in this report are defined as follows:

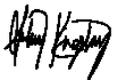
U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

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: Aubrey Kingsbury

Date: 25 MAY 2016

Title: Analyst I

Sample Data Summary

6/9/2016

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: May 25, 2016

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

Client Sample ID:	B354J4	Project:	CPRC0F16028
Sample ID:	397347002	Client ID:	CPRC001
Matrix:	SOIL		
Collect Date:	12-MAY-16 07:37		
Receive Date:	13-MAY-16		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis											
9045_pH (Non-Aqueous):COMMON "As Received"											
pH at Temp 21.2C	X	8.99	0.010	0.100	SU	1	RXB5	05/14/16	1711	1567401	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9045D	

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: May 25, 2016

Page 1 of 2

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 397347

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1567406										
QC1203549067	397347001	DUP									
Chloride		2910		2970	ug/Kg	2.15	^	(+/-2030)	MXL2	05/17/16	19:23
Fluoride		1340		1330	ug/Kg	0.951	^	(+/-1020)			
Nitrate-N	U	337	U	336	ug/Kg	N/A					
Nitrite-N	U	337	U	336	ug/Kg	N/A					
Phosphorus in phosphate	U	685	U	681	ug/Kg	N/A					
Sulfate		7670		7850	ug/Kg	2.4	^	(+/-4070)			
QC1203549066	LCS										
Chloride	49900			47600	ug/Kg			95.5	(80%-120%)	05/17/16	18:17
Fluoride	24900			24700	ug/Kg			98.8	(80%-120%)		
Nitrate-N	24900			24100	ug/Kg			96.7	(80%-120%)		
Nitrite-N	24900			24100	ug/Kg			96.6	(80%-120%)		
Phosphorus in phosphate	12500			13100	ug/Kg			105	(80%-120%)		
Sulfate	99800			97300	ug/Kg			97.5	(80%-120%)		
QC1203549065	MB										
Chloride			U	720	ug/Kg					05/17/16	17:44
Fluoride			U	340	ug/Kg						
Nitrate-N			U	330	ug/Kg						
Nitrite-N			U	330	ug/Kg						
Phosphorus in phosphate			U	670	ug/Kg						
Sulfate			U	1330	ug/Kg						
QC1203549068	397347001	MS									

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QC Summary

Workorder: 397347

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1567406										
Chloride	51200	2910		51400	ug/Kg		94.6	(48%-145%)		05/17/16	19:56
Fluoride	25600	1340		24700	ug/Kg		91	(30%-135%)	MXL2		
Nitrate-N	25600	U	337	24100	ug/Kg		94.1	(70%-125%)			
Nitrite-N	25600	U	337	24700	ug/Kg		96.5	(70%-120%)			
Phosphorus in phosphate	12800	U	685	10500	ug/Kg		80.4	(35%-134%)			
Sulfate	102000	7670		106000	ug/Kg		96.3	(45%-162%)			

Titration and Ion Analysis

Batch 1567401

QC1203549063	396992001	DUP									
pH		X	3.04	X	3.17	SU	4.19	(0%-30%)	RXB5	05/14/16	16:57
QC1203549062	LCS										
pH	7.00				7.04	SU		101	(70%-130%)		05/14/16 16:50

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

Radiochemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL397347
Work Order #: 397347

Product: NP237_IE_PRECIP_AEA: COMMON
Analytical Method: NP237_IE_PRECIP_AEA
Analytical Procedure: GL-RAD-A-032 REV# 20
Analytical Batch: 1568105

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 20
Preparation Batch: 1567201

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203550675	Method Blank (MB)
1203550676	397347001(B353C9) Sample Duplicate (DUP)
1203550677	Laboratory Control Sample (LCS)

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

Data Summary:

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

Technical Information

Recounts

Samples 1203550676 (B353C9DUP) and 397347001 (B353C9) were given additional clean-up steps and recounted in order to remove suspected interferences. The recounts are reported.

Product: PUIISO_PRECIP_AEA:COMMON
Analytical Method: PUIISO_PLATE_AEA
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1568106

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 20
Preparation Batch: 1567201

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203550678	Method Blank (MB)
1203550679	397347001(B353C9) Sample Duplicate (DUP)
1203550680	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_PLATE_AEA

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

Analytical Batch: 1568107

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1567201

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203550681	Method Blank (MB)
1203550682	397347001(B353C9) Sample Duplicate (DUP)
1203550683	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 397347001 (B353C9) was recounted due to high carrier/tracer yield. The recount is reported.

Product: UISO_IE_PRECIP_AEA:COMMON

Analytical Method: UISO_IE_PRECIP_AEA

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

Analytical Batch: 1568108

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1567201

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203550684	Method Blank (MB)
1203550685	397347001(B353C9) Sample Duplicate (DUP)
1203550686	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, 1203550685 (B353C9DUP) and 397347001 (B353C9), did not meet the U-238 relative percent difference requirement; however, they do meet the relative error ratio requirement with a value of 0.907.

Product: AMCMISO_EIE_PRECIP_AEA: COMMON

Analytical Method: AMCMISO_EIE_PREC_AEA

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

Analytical Batch: 1568109

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1567201

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203550687	Method Blank (MB)
1203550688	397347001(B353C9) Sample Duplicate (DUP)
1203550689	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 1203550687 (MB) was recounted due to high carrier/tracer yield. The recount is reported.

Product: Dry Weight

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1567201

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203548535	397347001(B353C9) Sample Duplicate (DUP)

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

Data Summary:

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

Product: GAMMA_GS:COMMON + (Add-on)

Analytical Method: GAMMA_GS

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

Analytical Batch: 1567311

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1567201

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

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

397347001	B353C9
1203548823	Method Blank (MB)
1203548824	397347001(B353C9) Sample Duplicate (DUP)
1203548825	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: I129_SEP_LEPS_GS

Analytical Method: I129_SEP_LEPS_GS

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

Analytical Batch: 1567423

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203549122	Method Blank (MB)
1203549123	397347001(B353C9) Sample Duplicate (DUP)
1203549124	397347001(B353C9) Matrix Spike (MS)
1203549125	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: SRTOT_SEP_PRECIP_GPC: COMMON

Analytical Method: SRTOT_SEP_PRECIP_GPC

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

Analytical Batch: 1570989

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1567201

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203558179	Method Blank (MB)
1203558180	397347001(B353C9) Sample Duplicate (DUP)
1203558181	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 1203558180 (B353C9DUP) was recounted due to results more negative than the three sigma TPU. The second count is reported.

Product: NI63_LSC

Analytical Method: NI63_LSC

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

Analytical Batch: 1569163

Preparation Method: Dry Soil Prep

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

Preparation Batch: 1567201

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203553500	Method Blank (MB)
1203553501	397347001(B353C9) Sample Duplicate (DUP)
1203553502	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 1203553502 (LCS) was recounted due to low recovery. The recount is reported.

Product: TC99_SEP_GPC

Analytical Method: TC99_EIE_LSC

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

Analytical Batch: 1569183

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203553565	Method Blank (MB)
1203553566	397347001(B353C9) Sample Duplicate (DUP)
1203553567	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: 1569869

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203555247	Method Blank (MB)
1203555248	397347001(B353C9) Sample Duplicate (DUP)
1203555249	397347001(B353C9) Matrix Spike (MS)
1203555250	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: 1570119

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
397347001	B353C9
1203555879	Method Blank (MB)
1203555880	397347001(B353C9) Sample Duplicate (DUP)
1203555881	397347001(B353C9) Matrix Spike (MS)
1203555882	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.

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: GEL397347 GEL Work Order: 397347

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Theresa Austin

Date: 09 JUN 2016

Title: Group Leader

Sample Data Summary

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL397347
Lab Sample ID: 397347001

Client: CPRC001
Date Collected: 05/12/2016 07:37
Date Received: 05/13/2016 09:00

Project: CPRC0F16028
Matrix: SOIL
%Moisture: 3.4

Client ID: B353C9
Batch ID: 1568105
Run Date: 05/20/2016 09:36
Data File: S0397347001_NP.2A.gcnf
Prep Batch: 1568105
Prep Date: 05/17/2016 00:00

Method: NP237_IE_PRECIP_AEA
Analyst: MXS2
Aliquot: 0.107 g
Prep Method: ASTM C 1476-00 Modified

Prep Basis: "Dry Weight Corrected"
SOP Ref: GL-RAD-A-032
Instrument: 1048
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	0.114	pCi/g	+/-0.273	0.273	0.494	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	1960	1880	pCi/g	105	(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: GEL397347
Lab Sample ID: 397347001

Client: CPRC001
Date Collected: 05/12/2016 07:37
Date Received: 05/13/2016 09:00

Project: CPRC0F16028
Matrix: SOIL
%Moisture: 3.4

Client ID: B353C9
Batch ID: 1568106
Run Date: 05/19/2016 09:25
Data File: S0397347001_PU.1A.gcnf
Prep Batch: 1568106
Prep Date: 05/17/2016 00:00

Method: PUIISO_PLATE_AEA
Analyst: MXS2
Aliquot: 0.109 g
Prep Method: DOE EML HASL-300, Pu-11-

Prep Basis: "Dry Weight Corrected"
SOP Ref: GL-RAD-A-011
Instrument: 1085
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	0.0902	pCi/g	+/-0.308	0.308	0.571	1.00
OER-100-70	Plutonium-239/240	U	0.00694	pCi/g	+/-0.319	0.319	0.700	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	11.0	18.1	pCi/g	60.7	(30%-105%)

Comments:

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL397347
Lab Sample ID: 397347001

Client: CPRC001
Date Collected: 05/12/2016 07:37
Date Received: 05/13/2016 09:00

Project: CPRC0F16028
Matrix: SOIL
%Moisture: 3.4

Client ID: B353C9
Batch ID: 1568107
Run Date: 06/01/2016 13:58
Data File: S0397347001_TH.2A.gcnf
Prep Batch: 1568107
Prep Date: 05/17/2016 00:00

Method: THISO_IE_PLATE_AEA
Analyst: MXS2
Aliquot: 0.11 g
Prep Method: DOE EML HASL-300, Th-01-

Prep Basis: "Dry Weight Corrected"
SOP Ref: GL-RAD-A-038
Instrument: 1204
Count Time: 240 min
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
TH-232 <small>7440-29-1</small>	Thorium-232		0.476	pCi/g	+/-0.384	0.391	0.281	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Thorium-229 Tracer	17.3	18.5	pCi/g	93.6	(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: GEL397347
Lab Sample ID: 397347001

Client: CPRC001
Date Collected: 05/12/2016 07:37
Date Received: 05/13/2016 09:00

Project: CPRC0F16028
Matrix: SOIL
%Moisture: 3.4

Client ID: B353C9
Batch ID: 1568108
Run Date: 05/19/2016 09:23
Data File: S0397347001_UU.1A.gcnf
Prep Batch: 1568108
Prep Date: 05/17/2016 00:00

Method: UIISO_IE_PRECIP_AEA
Analyst: MXS2
Aliquot: 0.109 g
Prep Method: DOE EML HASL-300, U-02-R

Prep Basis: "Dry Weight Corrected"
SOP Ref: GL-RAD-A-011
Instrument: 1116
Count Time: 240 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	U	0.294	pCi/g	+/-0.358	0.360	0.480	1.00
15117-96-1/13982-7	Uranium-235/236	U	-0.0864	pCi/g	+/-0.200	0.201	0.593	1.00
7440-61-1	Uranium-238		0.801	pCi/g	+/-0.496	0.509	0.219	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	17.8	19.2	pCi/g	92.8	(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: GEL397347	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 397347001	Date Collected: 05/12/2016 07:37	Matrix: SOIL
	Date Received: 05/13/2016 09:00	%Moisture: 3.4
Client ID: B353C9		Prep Basis: "Dry Weight Corrected"
Batch ID: 1568109	Method: AMCMISO_EIE_PREC_AEA	SOP Ref: GL-RAD-A-011
Run Date: 05/19/2016 09:25	Analyst: MXS2	Instrument: 1087
Data File: S0397347001_AM.1A.gcnf	Aliquot: 0.109 g	Count Time: 240 min
Prep Batch: 1568109	Prep Method: DOE EML HASL-300, Am-05	Prep SOP Ref: GL-RAD-A-021
Prep Date: 05/17/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	-0.0526	pCi/g	+/-0.178	0.178	0.462	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	18.4	19.1	pCi/g	96.7	(30%-105%)

Comments:

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL397347
 Lab Sample ID: 397347001
 Client ID: B353C9
 Batch ID: 1570989
 Run Date: 06/06/2016 17:21
 Data File: S1570989r1.xls
 Prep Batch: 1570989
 Prep Date: 06/03/2016 00:00

Client: CPRC001
 Date Collected: 05/12/2016 07:37
 Date Received: 05/13/2016 09:00
 Method: SRTOT_SEP_PRECIP_GPC
 Analyst: KSD1
 Aliquot: 0.382 g
 Prep Method: EPA 905.0 Modified/DOE RP5

Project: CPRC0F16028
 Matrix: SOIL
 %Moisture: 3.4
 Prep Basis: "Dry Weight Corrected"
 SOP Ref: GL-RAD-A-004
 Instrument: PIC4C
 Count Time: 60 min
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium	U	-0.243	pCi/g	+/-0.636	0.636	1.29	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	6.60	7.77	mg	85	(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

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SDG Number: GEL397347
 Lab Sample ID: 397347001
 Client ID: B353C9
 Batch ID: 1567311
 Run Date: 06/07/2016 07:08
 Data File: G397347001.CNF;1
 Prep Batch: 1567311
 Prep Date: 05/17/2016 00:00

Client: CPRC001
 Date Collected: 05/12/2016 07:37
 Date Received: 05/13/2016 09:00
 Method: GAMMA_GS
 Analyst: MXR1
 Aliquot: 146.362 g
 Prep Method: DOE HASL 300, 4.5.2.3/Ga-01

Project: CPRC0F16028
 Matrix: SOIL
 %Moisture: 3.4
 Prep Basis: "Dry Weight Corrected"
 SOP Ref: GL-RAD-A-013
 Instrument: GAM22
 Count Time: 120 min
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	U	0.0131	pCi/g	+/-0.0243	0.0251	0.0406	0.100
10198-40-0	Cobalt-60	U	-0.00731	pCi/g	+/-0.0212	0.0215	0.0384	0.100
14683-23-9	Europium-152	U	-0.0375	pCi/g	+/-0.0884	0.090	0.0999	0.100
15585-10-1	Europium-154	U	-0.0615	pCi/g	+/-0.0707	0.0761	0.117	0.100
14391-16-3	Europium-155	U	-0.0158	pCi/g	+/-0.0659	0.0663	0.118	0.100
13982-63-3	Radium-226		0.296	pCi/g	+/-0.0761	0.0802	0.0824	1.00
15262-20-1	Radium-228		0.550	pCi/g	+/-0.186	0.195	0.142	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: GEL397347	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 397347001	Date Collected: 05/12/2016 07:37	Matrix: SOIL
	Date Received: 05/13/2016 09:00	%Moisture: 3.4
Client ID: B353C9		Prep Basis: "As Received"
Batch ID: 1567423	Method: I129_SEP_LEPS_GS	SOP Ref: GL-RAD-A-006
Run Date: 06/02/2016 14:08	Analyst: MJH1	Instrument: XRAY4
Data File: I397347001.CNF;1	Aliquot: 1.01 g	Count Time: 60 min
Prep Batch: 1567423	Prep Method: DOE EML HASL-300,I-01 M	
Prep Date: 05/25/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	U	-0.107	pCi/g	+/-0.520	0.523	1.02	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL397347
 Lab Sample ID: 397347001

Client: CPRC001
 Date Collected: 05/12/2016 07:37
 Date Received: 05/13/2016 09:00

Project: CPRC0F16028
 Matrix: SOIL
 %Moisture: 3.4

Client ID: B353C9
 Batch ID: 1569163
 Run Date: 06/07/2016 17:10
 Data File: N1569163.xls
 Prep Batch: 1569163
 Prep Date: 06/06/2016 15:10

Method: NI63_LSC
 Analyst: CXS7
 Aliquot: 0.817 g
 Prep Method: DOE RESL Ni-1, Modified

Prep Basis: "Dry Weight Corrected"
 SOP Ref: GL-RAD-A-022
 Instrument: LSCYELLOW
 Count Time: 20 min
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
NI-63	Nickel-63	U	0.269	pCi/g	+/-2.97	2.97	5.19	10.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Nickel Carrier	16.4	24.4	mg	67.2	(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: GEL397347	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 397347001	Date Collected: 05/12/2016 07:37	Matrix: SOIL
	Date Received: 05/13/2016 09:00	%Moisture: 3.4
Client ID: B353C9		Prep Basis: "As Received"
Batch ID: 1569183	Method: TC99_EIE_LSC	SOP Ref: GL-RAD-A-059
Run Date: 06/05/2016 17:29	Analyst: MYM1	Instrument: LSCGOLD
Data File: E1569183.xls	Aliquot: 1.289 g	Count Time: 20 min
Prep Batch: 1569183	Prep Method: DOE EML HASL-300, Tc-02-	
Prep Date: 05/31/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	0.253	pCi/g	+/-1.66	1.66	2.86	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	26800	28400	CPM	94.2	(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: GEL397347	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 397347001	Date Collected: 05/12/2016 07:37	Matrix: SOIL
	Date Received: 05/13/2016 09:00	%Moisture: 3.4
Client ID: B353C9		Prep Basis: "As Received"
Batch ID: 1569869	Method: TRITIUM_DIST_LSC	SOP Ref: GL-RAD-A-002
Run Date: 06/03/2016 03:10	Analyst: TXJ1	Instrument: LSCSILVER
Data File: T1569869.xls	Aliquot: 1.32 g	Count Time: 45 min
Prep Batch: 1569869	Prep Method: EPA 906.0 Modified	
Prep Date: 06/01/2016 12:29		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	-0.424	pCi/g	+/-5.95	5.95	10.7	30.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL397347	Client: CPRC001	Project: CPRC0F16028
Lab Sample ID: 397347001	Date Collected: 05/12/2016 07:37	Matrix: SOIL
	Date Received: 05/13/2016 09:00	%Moisture: 3.4
Client ID: B353C9		Prep Basis: "As Received"
Batch ID: 1570119	Method: C14_LSC	SOP Ref: GL-RAD-A-003
Run Date: 06/08/2016 19:58	Analyst: TXJ1	Instrument: LSCRED
Data File: C1570119.xls	Aliquot: 0.52 g	Count Time: 45 min
Prep Batch: 1570119	Prep Method: EPA EERF C-01 Modified	
Prep Date: 06/01/2016 16:06		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	0.253	pCi/g	+/-1.82	1.82	3.13	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

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

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: June 9, 2016

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Client : CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington 99352

Contact: Mr. Scot Fitzgerald

Workorder: 397347

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1568105								
QC1203550675	MB								
Neptunium-237			U	-0.0323	pCi/g			MXS2	05/18/1615:02
				Uncert:					
				TPU:					
**Americium-243 Tracer	1880			1910	pCi/g	REC: 102	(30%-105%)		
QC1203550676	397347001	DUP							
Neptunium-237		U	0.114	U	0.0599				05/20/1609:26
				Uncert:	+/-0.273			RPD: 0	N/A
				TPU:	+/-0.273			RER: 0.275	(0-2)
**Americium-243 Tracer	1950		1960		1830	pCi/g	REC: 94	(30%-105%)	
QC1203550677	LCS								
Neptunium-237					46.1	pCi/g	REC: 111	(80%-120%)	05/18/1615:02
				Uncert:	+/-3.44				
				TPU:	+/-6.08				
**Americium-243 Tracer	1880				1860	pCi/g	REC: 99	(30%-105%)	
Batch	1568106								
QC1203550678	MB								
Plutonium-238			U	-0.0534	pCi/g			MXS2	05/19/1609:25
				Uncert:	+/-0.161				
				TPU:	+/-0.162				
Plutonium-239/240			U		0.317	pCi/g			
				Uncert:	+/-0.363				
				TPU:	+/-0.365				
**Plutonium-242 Tracer	18.1				12.4	pCi/g	REC: 69	(30%-105%)	
				Uncert:	+/-2.29				
				TPU:	+/-3.40				
QC1203550679	397347001	DUP							
Plutonium-238		U	0.0902	U	0.0955	pCi/g			
				Uncert:	+/-0.308			RPD: 0	N/A
				TPU:	+/-0.308			RER: 0.0257	(0-2)
Plutonium-239/240		U	0.00694	U	0.227	pCi/g			
				Uncert:	+/-0.319			RPD: 0	N/A
				TPU:	+/-0.319			RER: 0.928	(0-2)
**Plutonium-242 Tracer	19.1		11.0		15.6	pCi/g	REC: 81	(30%-105%)	
				Uncert:	+/-2.47				
				TPU:	+/-3.64				
QC1203550680	LCS								
Plutonium-238			U	-0.0463	pCi/g				
				Uncert:	+/-0.140				
				TPU:	+/-0.140				
Plutonium-239/240					18.5	pCi/g	REC: 102	(80%-120%)	
				Uncert:	+/-2.15				
				TPU:	+/-3.23				
**Plutonium-242 Tracer	18.1				14.4	pCi/g	REC: 80	(30%-105%)	

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QC Summary

Workorder: 397347

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1568106								
				Uncert:					
				TPU:					
Batch	1568107								
QC1203550681	MB								
Thorium-232			U	0.0194	pCi/g			MXS2	05/19/1609:25
				Uncert:					
				TPU:					
**Thorium-229 Tracer		18.5		19.1	pCi/g	REC: 103	(30%-105%)		
				Uncert:					
				TPU:					
QC1203550682	397347001	DUP							
Thorium-232			0.476	0.657	pCi/g				05/19/1609:25
			Uncert:	+/-0.384		RPD: 32	(0% - 100%)		
			TPU:	+/-0.391		RER: 0.601	(0-2)		
**Thorium-229 Tracer		19.2	17.3	19.4	pCi/g	REC: 101	(30%-105%)		
			Uncert:	+/-2.23					
			TPU:	+/-3.55					
QC1203550683	LCS								
Thorium-232		18.1		17.2	pCi/g	REC: 95	(80%-120%)		
				Uncert:					
				TPU:					
**Thorium-229 Tracer		18.5		17.3	pCi/g	REC: 94	(30%-105%)		
				Uncert:					
				TPU:					
Batch	1568108								
QC1203550684	MB								
Uranium-233/234			U	-0.017	pCi/g			MXS2	05/19/1609:38
				Uncert:					
				TPU:					
Uranium-235/236			U	-0.0252	pCi/g				
				Uncert:					
				TPU:					
Uranium-238			U	-0.0611	pCi/g				
				Uncert:					
				TPU:					
**Uranium-232 Tracer		19.1		15.4	pCi/g	REC: 81	(30%-105%)		
				Uncert:					
				TPU:					
QC1203550685	397347001	DUP							
Uranium-233/234			U	0.294	pCi/g				05/19/1609:23
				Uncert:		RPD: 41	(0% - 100%)		
				TPU:		RER: 1.34	(0-2)		
Uranium-235/236			U	-0.0864	pCi/g				
				Uncert:		RPD: 0	N/A		
				TPU:		RER: 0.918	(0-2)		
Uranium-238				0.801	pCi/g				
				Uncert:		RPD: 38*	(0% - 20%)		
				TPU:		RER: 0.907	(0-2)		
**Uranium-232 Tracer		20.3	17.8	18.3	pCi/g	REC: 90	(30%-105%)		
			Uncert:	+/-2.33					
				+/-2.49					

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QC Summary

Workorder: 397347

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1568108								
QC1203550686	LCS	TPU:	+/-3.59	+/-3.84					
Uranium-233/234				25.8	pCi/g				05/19/1609:23
		Uncert:		+/-2.77					
		TPU:		+/-4.66					
Uranium-235/236				0.855	pCi/g				
		Uncert:		+/-0.591					
		TPU:		+/-0.604					
Uranium-238	24.7			28.7	pCi/g	REC: 116	(80%-120%)		
		Uncert:		+/-2.92					
		TPU:		+/-5.09					
**Uranium-232 Tracer	19.1			16.8	pCi/g	REC: 88	(30%-105%)		
		Uncert:		+/-2.39					
		TPU:		+/-3.67					
Batch	1568109								
QC1203550687	MB								
Americium-241			U	-0.0505	pCi/g			MXS2	05/26/1615:35
		Uncert:		+/-0.152					
		TPU:		+/-0.153					
**Americium-243 Tracer	19.1			19.1	pCi/g	REC: 100	(30%-105%)		
		Uncert:		+/-2.26					
		TPU:		+/-3.44					
QC1203550688	397347001	DUP							
Americium-241		U	-0.0526	U	-0.0927	pCi/g			05/19/1609:25
		Uncert:	+/-0.178		+/-0.211		RPD: 0	N/A	
		TPU:	+/-0.178		+/-0.211		RER: 0.285	(0-2)	
**Americium-243 Tracer	20.2		18.4		19.2	pCi/g	REC: 95	(30%-105%)	
		Uncert:	+/-2.04		+/-2.26				
		TPU:	+/-3.16		+/-3.47				
QC1203550689	LCS								
Americium-241				17.0	pCi/g	REC: 94	(80%-120%)		
		Uncert:		+/-1.86					
		TPU:		+/-2.79					
**Americium-243 Tracer	19.1			18.8	pCi/g	REC: 98	(30%-105%)		
		Uncert:		+/-1.95					
		TPU:		+/-3.05					
Rad Gamma Spec									
Batch	1567311								
QC1203548823	MB								
Cesium-137			U	0.00017	pCi/g			MXR1	06/07/1607:08
		Uncert:		+/-0.0219					
		TPU:		+/-0.0219					
Cobalt-60			U	-0.0155	pCi/g				
		Uncert:		+/-0.0186					
		TPU:		+/-0.0199					
Europium-152			U	-0.0194	pCi/g				
		Uncert:		+/-0.0579					
		TPU:		+/-0.0586					
Europium-154			U	-0.0308	pCi/g				

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QC Summary

Workorder: 397347

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1567311								
		Uncert:		+/-0.0616					
		TPU:		+/-0.0632					
Europium-155			U	0.0046	pCi/g				
		Uncert:		+/-0.0576					
		TPU:		+/-0.0577					
Radium-226			U	-0.00111	pCi/g				
		Uncert:		+/-0.0521					
		TPU:		+/-0.0521					
Radium-228			U	0.0693	pCi/g				
		Uncert:		+/-0.107					
		TPU:		+/-0.112					
QC1203548824 397347001 DUP									
Cesium-137		U	0.0131	U	0.015	pCi/g			06/07/1609:16
		Uncert:	+/-0.0243		+/-0.0205		RPD: 0	N/A	
		TPU:	+/-0.0251		+/-0.0217		RER: 0.112	(0-2)	
Cobalt-60		U	-0.00731	U	0.00545	pCi/g			
		Uncert:	+/-0.0212		+/-0.0228		RPD: 0	N/A	
		TPU:	+/-0.0215		+/-0.023		RER: 0.795	(0-2)	
Europium-152		U	-0.0375	U	-0.0295	pCi/g			
		Uncert:	+/-0.0884		+/-0.0572		RPD: 0	N/A	
		TPU:	+/-0.090		+/-0.0588		RER: 0.146	(0-2)	
Europium-154		U	-0.0615	U	-0.0395	pCi/g			
		Uncert:	+/-0.0707		+/-0.0714		RPD: 0	N/A	
		TPU:	+/-0.0761		+/-0.0737		RER: 0.407	(0-2)	
Europium-155		U	-0.0158	U	0.00957	pCi/g			
		Uncert:	+/-0.0659		+/-0.0578		RPD: 0	N/A	
		TPU:	+/-0.0663		+/-0.0579		RER: 0.566	(0-2)	
Radium-226			0.296		0.351	pCi/g			
		Uncert:	+/-0.0761		+/-0.0794		RPD: 17	(0% - 100%)	
		TPU:	+/-0.0802		+/-0.0845		RER: 0.924	(0-2)	
Radium-228			0.550		0.539	pCi/g			
		Uncert:	+/-0.186		+/-0.159		RPD: 2	(0% - 100%)	
		TPU:	+/-0.195		+/-0.181		RER: 0.0752	(0-2)	
QC1203548825 LCS									
Americium-241		489			533	pCi/g	REC: 109	(80%-120%)	06/07/1607:09
		Uncert:			+/-4.98				
		TPU:			+/-40.5				
Cesium-137		181			185	pCi/g	REC: 102	(80%-120%)	
		Uncert:			+/-3.11				
		TPU:			+/-15.0				
Cobalt-60		169			159	pCi/g	REC: 95	(80%-120%)	
		Uncert:			+/-3.38				
		TPU:			+/-13.7				
Europium-152			U		-1.53	pCi/g			
		Uncert:			+/-1.59				
		TPU:			+/-1.74				
Europium-154			U		-0.0121	pCi/g			
		Uncert:			+/-1.01				
		TPU:			+/-1.01				
Europium-155			U		-1.05	pCi/g			

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1567311								
				Uncert:		+/-1.08			
				TPU:		+/-1.19			
Radium-226			U	0.0661	pCi/g				
				Uncert:		+/-1.09			
				TPU:		+/-1.09			
Radium-228			U	2.40	pCi/g				
				Uncert:		+/-3.29			
				TPU:		+/-3.48			
Batch	1567423								
QC1203549122	MB								
Iodine-129			U	-0.302	pCi/g			MJH1	06/02/1614:14
				Uncert:		+/-0.418			
				TPU:		+/-0.441			
QC1203549123	397347001	DUP							
Iodine-129			U	-0.107	U	0.275			06/02/1614:31
				Uncert:	+/-0.520	+/-0.583	RPD: 0	N/A	
				TPU:	+/-0.523	+/-0.597	RER: 0.941	(0-2)	
QC1203549124	397347001	MS							
Iodine-129			U	-0.107	33.4	pCi/g	REC: 85	(75%-125%)	06/02/1614:31
				Uncert:	+/-0.520	+/-4.92			
				TPU:	+/-0.523	+/-5.93			
QC1203549125	LCS								
Iodine-129				39.3	36.9	pCi/g	REC: 94	(80%-120%)	06/02/1615:06
				Uncert:	+/-4.23				
				TPU:	+/-5.60				
Rad Gas Flow									
Batch	1570989								
QC1203558179	MB								
Total Strontium			U	-0.134	pCi/g			KSD1	06/06/1617:23
				Uncert:		+/-0.484			
				TPU:		+/-0.484			
**Strontium Carrier				7.77	6.90	mg	REC: 89	(40%-110%)	
QC1203558180	397347001	DUP							
Total Strontium			U	-0.243	U	-0.279			06/07/1609:35
				Uncert:	+/-0.636	+/-0.443	RPD: 0	N/A	
				TPU:	+/-0.636	+/-0.443	RER: 0.0928	(0-2)	
**Strontium Carrier				7.77	6.60	mg	REC: 91	(40%-110%)	
QC1203558181	LCS								
Total Strontium				46.7	49.2	pCi/g	REC: 105	(80%-120%)	06/06/1617:23
				Uncert:	+/-2.98				
				TPU:	+/-12.8				
**Strontium Carrier				7.77	6.20	mg	REC: 80	(40%-110%)	
Rad Liquid Scintillation									
Batch	1569163								
QC1203553500	MB								
Nickel-63			U	-0.349	pCi/g			CXS7	06/07/1617:53
				Uncert:		+/-2.92			
				TPU:		+/-2.92			
**Nickel Carrier				24.4	16.6	mg	REC: 68	(40%-110%)	

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Liquid Scintillation									
Batch	1569163								
QC1203553501	397347001	DUP							
Nickel-63		U	0.269	U	-3.05	pCi/g			06/07/1618:14
		Uncert:	+/-2.97		+/-3.15		RPD:	0	N/A
		TPU:	+/-2.97		+/-3.15		RER:	1.5	(0-2)
**Nickel Carrier	24.4		16.4		16.5	mg	REC:	68	(40%-110%)
QC1203553502	LCS								
Nickel-63		165			133	pCi/g	REC:	80	(80%-120%)
		Uncert:			+/-6.59				06/08/1610:52
		TPU:			+/-25.3				
**Nickel Carrier	24.4				17.2	mg	REC:	70	(40%-110%)
Batch	1569183								
QC1203553565	MB								
Technetium-99				U	-0.0384	pCi/g		MYM1	06/05/1618:12
		Uncert:			+/-1.58				
		TPU:			+/-1.58				
**Technetium-99m Tracer	28400				27700	CPM	REC:	97	(30%-105%)
QC1203553566	397347001	DUP							
Technetium-99		U	0.253	U	0.278	pCi/g			06/05/1618:34
		Uncert:	+/-1.66		+/-1.74		RPD:	0	N/A
		TPU:	+/-1.66		+/-1.74		RER:	0.0198	(0-2)
**Technetium-99m Tracer	28400		26800		26600	CPM	REC:	94	(30%-105%)
QC1203553567	LCS								
Technetium-99		66.8			61.4	pCi/g	REC:	92	(80%-120%)
		Uncert:			+/-3.13				06/05/1618:56
		TPU:			+/-7.72				
**Technetium-99m Tracer	28400				28500	CPM	REC:	100	(30%-105%)
Batch	1569869								
QC1203555247	MB								
Tritium				U	0.354	pCi/g		TXJ1	06/02/1623:52
		Uncert:			+/-0.301				
		TPU:			+/-0.311				
QC1203555248	397347001	DUP							
Tritium		U	-0.424	U	2.88	pCi/g			06/03/1605:31
		Uncert:	+/-5.95		+/-6.28		RPD:	0	N/A
		TPU:	+/-5.95		+/-6.31		RER:	0.747	(0-2)
QC1203555249	397347001	MS							
Tritium		91.6	U	-0.424	91.6	pCi/g	REC:	100	(75%-125%)
		Uncert:			+/-10.7				06/03/1606:18
		TPU:			+/-23.4				
QC1203555250	LCS								
Tritium		5.78			6.10	pCi/g	REC:	106	(80%-120%)
		Uncert:			+/-0.690				06/03/1607:05
		TPU:			+/-1.55				
Batch	1570119								
QC1203555879	MB								
Carbon-14				U	1.87	pCi/g		TXJ1	06/08/1621:31
		Uncert:			+/-1.80				
		TPU:			+/-1.81				
QC1203555880	397347001	DUP							
Carbon-14		U	0.253	U	1.48	pCi/g			06/08/1622:17

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Liquid Scintillation										
Batch	1570119									
		Uncert:	+/-1.82	+/-1.79						
		TPU:	+/-1.82	+/-1.79		RPD:	0	N/A		
						RER:	0.944	(0-2)		
QC1203555881	397347001	MS								
Carbon-14	146	U	0.253	148	pCi/g	REC:	101	(75%-125%)	06/08/1623:04	
		Uncert:	+/-1.82	+/-4.47						
		TPU:	+/-1.82	+/-11.8						
QC1203555882	LCS									
Carbon-14	140			142	pCi/g	REC:	101	(80%-120%)	06/08/1623:50	
		Uncert:		+/-4.30						
		TPU:		+/-11.3						

Notes:

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

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- B The associated QC sample blank has a result $\geq 2X$ the MDA and, after corrections, result is \geq MDA for this sample
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is \geq EQC 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.