

June 18, 2015



PO Box 30712 Charleston, SC 29417  
2040 Savage Road Charleston, SC 29407  
P 843.556.8171  
F 843.766.1178

[gel.com](http://gel.com)

June 18, 2015

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

Re: CHPRC SAF F15-027  
Work Order: 373501  
SDG: GEL373501

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 21, 2015. 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,

*Chelsea Seagle*  
Chelsea Seagle for  
Heather Shaffer  
Project Manager

Purchase Order: 303581 - 8N  
Chain of Custody: F15-027-002  
Enclosures



Table of Contents

Sample Issue Resolution.....1

Case Narrative.....3

Chain of Custody and Supporting Documentation.....6

Data Review Qualifier Definitions.....9

Laboratory Certifications.....12

Metals Analysis.....14

    Case Narrative.....15

    Sample Data Summary.....20

    Quality Control Summary.....22

Radiological Analysis.....25

    Sample Data Summary.....43

    Quality Control Data.....54

# Sample Issue Resolution

June 18, 2015

# SAMPLE ISSUE RESOLUTION

<b>SIR NUM</b>	SIR15-316
<b>REV NUM</b>	0
<b>DATE INITIATED</b>	5/21/2015

## SAMPLE EVENT INFORMATION

**SAF NUM(S)** F15-027  
**OPERABLE UNIT(S)** 100-KR-2  
**PROJECT(S)** 100-KE FSB  
**SAMPLE EVENT TITLE(S)** Characterization Boreholes in UPR-100-K-1 and 1116-KE-3 Waste Sites  
**LABORATORY** GEL Laboratories, LLC

## SAMPLING INFORMATION

**NUMBER OF SAMPLES** 1  
**SAMPLE NUMBERS** B30RB6  
**SAMPLE MATRIX** SOIL  
**COLLECTION DATE** 4/30/2015 - 4/30/2015  
**SDG NUM** GEL373501

## ISSUE BACKGROUND

**CLASS** General Laboratory Direction  
**TYPE** Clarification of Direction  
**DESCRIPTION** The SAF for F15-027 for GEL requests U ISO by Alphaspec. The COC received for F15-027-002 sample ID B30RB6 requests U by Rad ICPMS.

## DISPOSITION

**DESCRIPTION** Proposed Disposition: Please confirm the required analysis.

**JUSTIFICATION** Final Disposition: Perform the U ISO by UIISO\_IE\_PRECIP\_AEA: COMMON per the direction on the SAF for GEL. Additionally, if this situation arises for this project in the future use this SIR as authorization to run the U ISO by UIISO\_IE\_PRECIP\_AEA: COMMON and include a copy of this SIR in the applicable package.

SUBMITTED BY: Heather Shaffer DATE: 05/21/2015  
ACCEPTED BY: Scot Fitzgerald DATE: 05/21/2015

# Case Narrative

June 18, 2015

General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF F15-027  
SDG: GEL373501

June 18, 2015

**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 21, 2015, for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. Please see the attached SIR for further details.

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

**Sample Identification**

The laboratory received the following sample:

<b><u>Laboratory Identification</u></b>	<b><u>Sample Description</u></b>
373501001	B30RB6

**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: Metals and Radiochemistry.

This package, to the best of my knowledge, 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.

June 18, 2015

*Chelsea Seagle*  
Chelsea Seagle for  
Heather Shaffer  
Project Manager

# **Chain of Custody and Supporting Documentation**

June 18, 2015

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F15-027-002	PAGE 1 OF 1
COLLECTOR D. Floyd	COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR TODAK, D	PRICE CODE 8N	DATA TURNAROUND 45 Days / 45 Days
SAMPLING LOCATION C8796, Interval 1 REQ	PROJECT DESIGNATION 100-KE Characterization Boreholes - Soil		SAF NO. F15-027	AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO. DWD 5-19-15 Shipping Coordination DWS 322 #HHBA-724E-006	FIELD LOGBOOK NO. 24.4-27.5 FT	ACTUAL SAMPLE DEPTH	COA 303581	METHOD OF SHIPMENT GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO GEC 222-5 Lab Operations - DWS 5-19-15	OFFSITE PROPERTY NO. 5658		BILL OF LADING/AIR BILL NO. 7736 4962 8295		

MATRIX* A=Air DL=Drum L=Liquids DS=Drum S=Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	PRESERVATION None	HOLDING TIME None	TYPE OF CONTAINER P	NO. OF CONTAINER(S) 1	VOLUME 125mL	SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS
POSSIBLE SAMPLE HAZARDS/ REMARKS *Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.						
SPECIAL HANDLING AND/OR STORAGE						
SAMPLE NO. B30RB6	MATRIX* SOIL	SAMPLE DATE 04/30/15	SAMPLE TIME 1259			

373501

SPECIAL INSTRUCTIONS		SIGN/ PRINT NAMES	
RADSCREEN ALIQUOT TO BE SUB-SAMPLED BY LAB AND IS ON 24 HOUR TURN; ** The GKI associated with this SAF shall be provided to 222-5 laboratory prior to sample receipt. TRVL-15-037		RECEIVED BY/STORED IN SSU #2 04/30/15 1245	
(1) Moisture Content - D2216; 6010_METALS_ICP: COMMON {Chromium}; Actinides ICPMS: COMMON {Uranium-233, Uranium-234, Uranium-235, Uranium-238}; GAMMA_GS: COMMON; AMCMISO_IE_PRECIP_AEA: COMMON {Americium-241}; C14_LSC: COMMON; PUISO_IE_PRECIP_AEA: COMMON; SRTOT_SEP_PRECIP_GPC: COMMON; TRITIUM_DIST_LSC: COMMON; I129_SEP_LEPS_GS: COMMON {Iodine-129}; Rad Screen;		RECEIVED BY/STORED IN Don Bathalon DWS 5-19-15 1340	
TRVL - 15 - 037		RECEIVED BY/STORED IN M.A. White MAY 20 2015 1315	
1963 Kgs		RECEIVED BY/STORED IN FEDEX MAY 20 2015 1400	
CH2M Hill Plateau Remediation Company		RECEIVED BY/STORED IN M.A. White MAY 20 2015 1400	
LABORATORY SECTION		RECEIVED BY/STORED IN M.A. White MAY 20 2015 1400	
FINAL SAMPLE DISPOSITION		RECEIVED BY/STORED IN M.A. White MAY 20 2015 1400	
LABORATORY SECTION		RECEIVED BY/STORED IN M.A. White MAY 20 2015 1400	
FINAL SAMPLE DISPOSITION		RECEIVED BY/STORED IN M.A. White MAY 20 2015 1400	

SAMPLE RECEIPT & REVIEW FORM

Client: <u>CPRC</u>		SDG/AR/COC/Work Order: <u>373501</u>	
Received By: <u>CAS</u>		Date Received: <u>05/20/08</u> <u>05/21/15</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 bag)</u> Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius <u>2.4°C</u>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: <u>E4092024952</u> Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples (EPA 6850) have headspace as required?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
7 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
8 Are Encore containers present?	<input checked="" type="checkbox"/>			(If yes, immediately deliver to Volatiles laboratory)
9 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
10 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
11 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
12 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
13 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>			
14 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
15 Carrier and tracking number.	<input checked="" type="checkbox"/>			Circle Applicable: <u>(FedEx Air)</u> FedEx Ground UPS Field Services Courier Other <u>1130 4962 8295</u>

Comments (Use Continuation Form if needed):

# **Data Review Qualifier Definitions**

## Project Specific Qualifier Definitions for GEL Client Code: **CPRC**

Code	Status	Qualifier Definition	CofA	Department	Fraction	Additional Comments
U	Programmed	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.	Y			Includes MDA, TPU, count uncert.
J	Programmed	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	Y	Organics		Organics only
P	Programmed	Aroclor target analyte with greater than 25% difference between column analyses.	Y	Organics		PCB only
C	Manual	Analyte has been confirmed by GC/MS analysis	Y	Organics	Pesticide	IF GC/MS confirmation was attempted but unsuccessful do not qualify with C
B	Programmed	The analyte was detected in both the associated QC blank and in the sample.	Y	Organics		
E	Manual	Concentration exceeds the calibration range of the instrument	Y	Organics		Qualifier Uploaded
A	Manual	The TIC is a suspected aldol-condensation product	Y	Organics	Semi-Volatile	Uploaded with TIC
X	Programmed	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			Replaces H Hold Date In RAD replaces UI. Same usage as standard X as well.
N	Programmed	Spike Sample recovery is outside control limits.	Y			
*	Programmed	Duplicate analysis not within control limits	Y	Inorganics		
>	Programmed	Result greater than quantifiable range or greater than upper limit of the analysis range	Y	General Chemistry		
Z	Manual	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			
B	Programmed	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).	Y	Inorganics	Metals	Replaces J Estimated Value
D	Programmed	Results are reported from a diluted aliquot of sample.	Y			Dilution
E	Programmed	Reported value is estimated due to interferences. See comment in narrative.	Y	Inorganics	Metals	GEL E
M	Manual	Duplicate precision not met.	Y	Inorganics	Metals	Replaces *
o	Programmed	Analyte failed to recover within LCS limits (Organics only)	Y	Organics		
S	Manual	Reported value determined by the Method of Standard Additions (MSA)	Y	Inorganics		Not coded B/C Rarely preformed
T	Programmed	Spike and/or spike duplicate sample recovery is outside control limits.	Y	Organics		GC/MS only
W	Manual	Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.	Y	Inorganics		No GFAA in house.
B	Programmed	The associated QC sample blank has a result $\geq 2X$ the MDA and, after corrections, result is $\geq$ MDA for this sample	Y	Radiological		
Y	Manual	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			
+	Manual	Correlation coefficient for Method of Standard Additions (MSA) is < 0.995	Y	Inorganics		
B	Programmed	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).	Y	General Chemistry		Replaces J Estimated Value
C	Programmed	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.	Y	Inorganics	Metals	Replaces B Blank Detection
C	Programmed	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.	Y	General Chemistry		Replaces B Blank Detection
<	Programmed	Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide	Y	General Chemistry		for Reactive CN/S

## Project Specific Qualifier Definitions for GEL Client Code: **CPRC**

Code	Status	Qualifier Definition	CofA	Department	Fraction	Additional Comments
UX	Manual	Gamma Spectroscopy--Uncertain identification	Y	Radiological		

# Laboratory Certifications

**List of current GEL Certifications as of 18 June 2015**

<b>State</b>	<b>Certification</b>
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California	2940 Interim
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013-10
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	LA150001
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122014-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68-00485
Plant Material Permit	PDEP-12-00260
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-15-10
Utah NELAP	SC000122015-17
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# Metals Analysis

# Case Narrative

June 18, 2015

**Metals**

**Technical Case Narrative**

**CH2MHill Plateau Remediation Company (CPRC)**

**SDG #: GEL373501**

**Work Order #: 373501**

<b>Sample ID</b>	<b>Client ID</b>
373501001	B30RB6
1203323265	Method Blank (MB)ICP
1203323266	Laboratory Control Sample (LCS)
1203323269	373501001(B30RB6L) Serial Dilution (SD)
1203323267	373501001(B30RB6D) Sample Duplicate (DUP)
1203323268	373501001(B30RB6S) Matrix Spike (MS)

**Sample Analysis**

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

**Method/Analysis Information**

<b>Analytical Batch:</b>	1480421
<b>Prep Batch :</b>	1480420
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 24 and GL-MA-E-009 REV# 25
<b>Analytical Method:</b>	6010_METALS_ICP
<b>Prep Method :</b>	SW846 3050B

**Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

**System Configuration**

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard.

**Calibration Information**

**Instrument Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG).

**CRDL/PQL Requirements**

The CRDL/PQL standard recoveries met the referenced advisory control limits.

**ICSA/ICSAB Statement**

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance

criteria.

**Continuing Calibration Blanks (CCB) Requirements**

All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria.

**Continuing Calibration Verification (CCV) Requirements**

All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

**Quality Control (QC) Sample Statement**

The following sample was selected as the quality control (QC) sample for this SDG: 373501001 (B30RB6).

**Matrix Spike (MS/MSD) Recovery Statement**

The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The matrix spike met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes.

**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. The relative percent differences (RPD) between the sample and its duplicate (DUP) were within acceptable limits for all applicable analytes.

**Serial Dilution % Difference Statement**

All applicable analytes in the serial dilution (SDILT) demonstrated acceptable correlation to its associated sample and met the established acceptance percent difference criteria.

**Technical Information**

**Holding Time Specifications**

GEL assigns holding times based on the associated methodology. Holding time is measured by comparison of the date and time of sample collection to the date and time of sample preparation and analysis. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP. 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**

The sample in this SDG did not require dilutions.

**Preparation Information**

The sample in this SDG was not diluted and prepared according to the cited SOP.

**Miscellaneous Information**

**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**Data Exception (DER) Documentation**

A data exception report was not required for this SDG.

**Additional Comments**

Additional comments were not required for this SDG.

**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.

June 18, 2015

**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: GEL373501 GEL Work Order: 373501

**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:** 16 JUN 2015

**Title:** Data Validator

# Sample Data Summary

METALS  
-1-  
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL373501

METHOD TYPE: SW846

SAMPLE ID: 373501001

CLIENT ID: B30RB6

CONTRACT: CPRC0F15027

MATRIX:SOIL

DATE RECEIVED 21-MAY-15

LEVEL: Low %SOLIDS: 97

<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7440-47-3	Chromium	7700	ug/kg			P	152	1	OPTIMA3	052215-1

\*Analytical Methods:

P SW846 3050B/6010C

# Quality Control Summary

June 18, 2015

GEL LABORATORIES LLC

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

QC Summary

Report Date: June 16, 2015

Page 1 of 2

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 373501

Table with columns: Parmname, NOM, Sample, Qual, QC, Units, RPD/D%, REC%, Range, Anlst, Date, Time. Rows include Metals Analysis-ICP, Batch 1480421, and various Chromium samples with their respective QC values and dates.

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

June 18, 2015

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 373501

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.

# Radiological Analysis

**June 18, 2015**  
**Radiochemistry**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL373501**  
**Work Order #: 373501**

**Method/Analysis Information**

**Product:** Alphaspec Am241 Solid  
Analytical Method: AMCMISO\_EIE\_PREC\_AEA  
Prep Method: ASTM D 2216 (Modified)  
Analytical Batch Number: 1481444  
Prep Batch Number: 1480442

<b>Sample ID</b>	<b>Client ID</b>
373501001	B30RB6
1203325949	Method Blank (MB)
1203325951	Laboratory Control Sample (LCS)
1203325950	373501001(B30RB6) Sample Duplicate (DUP)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 25.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 373501001 (B30RB6).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Recounts**

Sample 373501001 (B30RB6) was recounted due to high MDC. The recount is reported.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Manual Integration**

No manual integrations were performed on data in this batch.

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** Alphaspec Pu, Solid  
**Analytical Method:** PUIISO\_PLATE\_AEA  
**Prep Method:** ASTM D 2216 (Modified)  
**Analytical Batch Number:** 1481445  
**Prep Batch Number:** 1480442

<b>Sample ID</b>	<b>Client ID</b>
373501001	B30RB6
1203325952	Method Blank (MB)
1203325954	Laboratory Control Sample (LCS)

June 18, 2015

1203325953 373501001(B30RB6) Sample Duplicate (DUP)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 25.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volumes in this batch.

**Designated QC**

The following sample was used for QC: 373501001 (B30RB6).

**QC Information**

All of the QC samples meet the required acceptance limits with the following exceptions: Refer to Data Exception Report (DER).

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Recounts**

Samples were recounted due to high recovery. The recounts are reported.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG: DER 1421193 was generated due to Other. 1. Samples 373501001 and 1203325952 do not meet the resolution requirement of having a full width half maximum of 100 keV or less for the Pu-236 tracer. 1. The samples do meet the tracer yield requirement, the detection limits, and their tracer peaks are within the Pu-236 region of interest. Reporting results.

**Manual Integration**

No manual integrations were performed on data in this batch.

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** Alphaspec U, Solid  
Analytical Method: UIISO\_IE\_PRECIP\_AEA  
Prep Method: ASTM D 2216 (Modified)  
Analytical Batch Number: 1481446  
Prep Batch Number: 1480442

Sample ID	Client ID
373501001	B30RB6
1203325955	Method Blank (MB)
1203325957	Laboratory Control Sample (LCS)
1203325956	373501001(B30RB6) Sample Duplicate (DUP)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 25.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 373501001 (B30RB6).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required prep or reanalysis.

**Recounts**

None of the samples in this sample set were recounted.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Manual Integration**

No manual integrations were performed on data in this batch.

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

<b>Product:</b>	<b>Dry Weight-Percent Moisture</b>
Analytical Method:	ASTM D 2216 (Modified)
Analytical Batch Number:	1480442

**Sample ID    Client ID**

June 18, 2015

373501001 B30RB6  
1203323364 373501001(B30RB6) Sample Duplicate (DUP)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-020 REV# 10 and GL-RAD-A-021 REV# 20.

**Calibration Information:**

**Quality Control (QC) Information:**

**Designated QC**

The following sample was used for QC: 373501001 (B30RB6).

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** Gamma Cs137,Co60,Eu152,Eu154,E155  
**Analytical Method:** GAMMA\_GS  
**Prep Method:** ASTM D 2216 (Modified)  
**Analytical Batch Number:** 1480783  
**Prep Batch Number:** 1480442

**Sample ID**    **Client ID**  
373501001    B30RB6  
1203324320    Method Blank (MB)

June 18, 2015

1203324323 Laboratory Control Sample (LCS)  
1203324322 373501001(B30RB6) Sample Duplicate (DUP)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-013 REV# 25.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 373501001 (B30RB6).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Recounts**

None of the samples in this sample set were recounted.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

June 18, 2015

Additional comments were not required for this sample set.

**Qualifier Information**

Qualifier	Reason	Analyte	Sample	Client Sample
X	Data rejected due to low abundance.	Europium-154	373501001	B30RB6
			1203324322	B30RB6(373501001DUP)

**Method/Analysis Information**

**Product:** Gamma I129, Solid  
Analytical Method: I129LL\_SEP\_LEPS\_GS  
Analytical Batch Number: 1481121

Sample ID	Client ID
373501001	B30RB6
1203325142	Method Blank (MB)
1203325145	Laboratory Control Sample (LCS)
1203325143	373501001(B30RB6) Sample Duplicate (DUP)
1203325144	373501001(B30RB6) Matrix Spike (MS)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-006 REV# 21.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 373501001 (B30RB6).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Recounts**

None of the samples in this sample set were recounted.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

<b>Product:</b>	<b>GFPC, Sr90, solid</b>
Analytical Method:	SRISO_SEP_PRECIP_GPC
Prep Method:	ASTM D 2216 (Modified)
Analytical Batch Number:	1482396
Prep Batch Number:	1480442

June 18, 2015

Sample ID	Client ID
373501001	B30RB6
1203328502	Method Blank (MB)
1203328504	Laboratory Control Sample (LCS)
1203328503	373501001(B30RB6) Sample Duplicate (DUP)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-004 REV# 17.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 373501001 (B30RB6).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

**Recounts**

None of the samples in this sample set were recounted.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** Liquid Scint C14, Solid  
Analytical Method: C14\_LSC  
Analytical Batch Number: 1483444

<b>Sample ID</b>	<b>Client ID</b>
373501001	B30RB6
1203331211	Method Blank (MB)
1203331214	Laboratory Control Sample (LCS)
1203331212	373501001(B30RB6) Sample Duplicate (DUP)
1203331213	373501001(B30RB6) Matrix Spike (MS)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-003 REV# 15.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 373501001 (B30RB6).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Recounts**

None of the samples in this sample set were recounted.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** LSC, Tritium Dist, Solid  
**Analytical Method:** TRITIUM\_DIST\_LSC  
**Analytical Batch Number:** 1483456

<b>Sample ID</b>	<b>Client ID</b>
373501001	B30RB6
1203331254	Method Blank (MB)
1203331257	Laboratory Control Sample (LCS)
1203331255	373501001(B30RB6) Sample Duplicate (DUP)
1203331256	373501001(B30RB6) Matrix Spike (MS)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-002 REV# 21.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 373501001 (B30RB6).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Recounts**

Sample 373501001 (B30RB6) was recounted due to high MDC. The recount is reported.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** Liquid Scint Tc99, Solid  
**Analytical Method:** TC99\_EIE\_LSC  
**Analytical Batch Number:** 1483494

<b>Sample ID</b>	<b>Client ID</b>
373501001	B30RB6
1203331383	Method Blank (MB)
1203331386	Laboratory Control Sample (LCS)
1203331385	373501001(B30RB6) Sample Duplicate (DUP)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-059 REV# 3.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 373501001 (B30RB6).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Recounts**

Samples were recounted due to the quench number being outside the calibration range. The recounts are reported.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**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.

June 18, 2015

**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: GEL373501 GEL Work Order: 373501

**The Qualifiers in this report are defined as follows:**

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

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

**Review/Validation**

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

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

**Signature:**



**Name: Kate Gellatly**

**Date: 16 JUN 2015**

**Title: Analyst I**

**DATA EXCEPTION REPORT**

<b>Mo.Day Yr.</b> 16-JUN-15	<b>Division:</b> Radiochemistry	<b>Quality Criteria:</b> SOP	<b>Type:</b> Process
<b>Instrument Type:</b> ALPHA SPECTROMETER	<b>Test / Method:</b> DOE EML HASL-300, Pu-11-RC Modified	<b>Matrix Type:</b> Solid	<b>Client Code:</b> CPRC
<b>Batch ID:</b> 1481445	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 373501(GEL373501)</b>			
<b>Application Issues:</b> Other			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
1. Samples 373501001 and 1203325952 do not meet the resolution requirement of having a full width half maximum of 100 keV or less for the Pu-236 tracer.		1. The samples do meet the tracer yield requirement, the detection limits, and their tracer peaks are within the Pu-236 region of interest. Reporting results.	

**Originator's Name:**  
Melanie Aycock      16-JUN-15

**Data Validator/Group Leader:**  
Scott Moreland      16-JUN-15

# Sample Data Summary

June 18, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL373501	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15027
<b>Lab Sample ID:</b> 373501001	<b>Date Collected:</b> 04/30/2015 10:30	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 05/21/2015 08:50	<b>%Moisture:</b> 3
<b>Client ID:</b> B30RB6	<b>Method:</b> AMCMISO_EIE_PREC_AEA	<b>Prep Basis:</b> Dry Weight
<b>Batch ID:</b> 1481444	<b>Analyst:</b> JXR1	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 06/15/2015 15:30	<b>Aliquot:</b> 0.103 g	<b>Instrument:</b> 1256
<b>Data File:</b> S0373501001_AM.2A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, Am-05	<b>Count Time:</b> 720 min
<b>Prep Batch:</b> 1481444		<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 06/11/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.270	pCi/g	+/-0.408	0.410	0.620	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	6.56	20.8	pCi/g	31.6	(15%-125%)

**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).

June 18, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL373501	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15027
<b>Lab Sample ID:</b> 373501001	<b>Date Collected:</b> 04/30/2015 10:30	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 05/21/2015 08:50	<b>%Moisture:</b> 3
<b>Client ID:</b> B30RB6	<b>Method:</b> PUIISO_PLATE_AEA	<b>Prep Basis:</b> Dry Weight
<b>Batch ID:</b> 1481445	<b>Analyst:</b> JXR1	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 06/15/2015 15:25	<b>Aliquot:</b> 0.103 g	<b>Instrument:</b> 1103
<b>Data File:</b> S0373501001_PU.2A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, Pu-11-	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1481445		<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 06/11/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13981-16-3	Plutonium-238	U	0.273	pCi/g	+/-0.322	0.325	0.348	1.00
OER-100-70	Plutonium-239/240	U	0.186	pCi/g	+/-0.330	0.332	0.537	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-236 Tracer	10.9	14.5	pCi/g	75.0	(15%-125%)

**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).

June 18, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL373501	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15027
<b>Lab Sample ID:</b> 373501001	<b>Date Collected:</b> 04/30/2015 10:30	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 05/21/2015 08:50	<b>%Moisture:</b> 3
<b>Client ID:</b> B30RB6	<b>Method:</b> UIISO_IE_PRECIP_AEA	<b>Prep Basis:</b> Dry Weight
<b>Batch ID:</b> 1481446	<b>Analyst:</b> JXR1	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 06/13/2015 12:36	<b>Aliquot:</b> 0.103 g	<b>Instrument:</b> 1002
<b>Data File:</b> S0373501001_UU.1A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, U-02-R	<b>Count Time:</b> 239.9998 min
<b>Prep Batch:</b> 1481446		<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 06/11/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 13968-55-3/139	Uranium-233/234		0.786	pCi/g	+/-0.471	0.487	0.430	1.00
15117-96-1/13982	Uranium-235/236	U	0.0789	pCi/g	+/-0.270	0.270	0.500	1.00
7440-61-1	Uranium-238		0.599	pCi/g	+/-0.401	0.412	0.294	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	21.8	20.6	pCi/g	106	(15%-125%)

**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).

June 18, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL373501	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15027
<b>Lab Sample ID:</b> 373501001	<b>Date Collected:</b> 04/30/2015 10:30	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 05/21/2015 08:50	<b>%Moisture:</b> 3
<b>Client ID:</b> B30RB6	<b>Method:</b> SRISO_SEP_PRECIP_GPC	<b>Prep Basis:</b> Dry Weight
<b>Batch ID:</b> 1482396	<b>Analyst:</b> KSD1	<b>SOP Ref:</b> GL-RAD-A-004
<b>Run Date:</b> 06/13/2015 17:01	<b>Aliquot:</b> 1.278 g	<b>Instrument:</b> PIC3D
<b>Data File:</b> S1482396.xls	<b>Prep Method:</b> EPA 905.0 Modified/DOE RP5	<b>Count Time:</b> 60 min
<b>Prep Batch:</b> 1482396		<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 06/10/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90	U	0.244	pCi/g	+/-0.183	0.188	0.283	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	6.70	8.10	mg	82.7	(25%-125%)

**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).

June 18, 2015

Page 1 of 1

**Certificate of Analysis**  
**Sample Summary**

SDG Number: GEL373501  
Lab Sample ID: 373501001  
  
Client ID: B30RB6  
Batch ID: 1480783  
Run Date: 05/27/2015 15:35  
Data File: G373501001.CNF;1  
Prep Batch: 1480783  
Prep Date: 05/27/2015 00:00

Client: CPRC001  
Date Collected: 04/30/2015 10:30  
Date Received: 05/21/2015 08:50  
  
Method: GAMMA\_GS  
Analyst: MXR1  
Aliquot: 40.891 g  
Prep Method: DOE HASL 300, 4.5.2.3/Ga-01

Project: CPRC0F15027  
Matrix: SOIL  
%Moisture: 3  
  
Prep Basis: Dry Weight  
SOP Ref: GL-RAD-A-013  
Instrument: GAM20  
Count Time: 720 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137		0.341	pCi/g	+/-0.0377	0.0484	0.0341	0.100
10198-40-0	Cobalt-60		0.0766	pCi/g	+/-0.043	0.0437	0.0322	0.050
14683-23-9	Europium-152		2.17	pCi/g	+/-0.0927	0.215	0.0787	0.100
15585-10-1	Europium-154	X	0.244	pCi/g	+/-0.107	0.155	0.145	0.100
14391-16-3	Europium-155	U	-0.0108	pCi/g	+/-0.0439	0.0442	0.077	0.100

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.

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).

June 18, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL373501	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15027
<b>Lab Sample ID:</b> 373501001	<b>Date Collected:</b> 04/30/2015 10:30	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 05/21/2015 08:50	<b>%Moisture:</b> 3
<b>Client ID:</b> B30RB6		<b>Prep Basis:</b> Dry Weight
<b>Batch ID:</b> 1481121	<b>Method:</b> I129LL_SEP_LEPS_GS	<b>SOP Ref:</b> GL-RAD-A-006
<b>Run Date:</b> 06/02/2015 05:40	<b>Analyst:</b> MJH1	<b>Instrument:</b> XRAY6
<b>Data File:</b> I373501001.CNF;1	<b>Aliquot:</b> 1.271 g	<b>Count Time:</b> 30 min
<b>Prep Batch:</b> 1481121	<b>Prep Method:</b> DOE EML HASL-300,I-01 M	
<b>Prep Date:</b> 06/01/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	U	0.509	pCi/g	+/-0.661	0.702	2.18	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.
  - 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).

June 18, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL373501	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15027
<b>Lab Sample ID:</b> 373501001	<b>Date Collected:</b> 04/30/2015 10:30	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 05/21/2015 08:50	<b>%Moisture:</b> 3
<b>Client ID:</b> B30RB6		<b>Prep Basis:</b> Dry Weight
<b>Batch ID:</b> 1483444	<b>Method:</b> C14_LSC	<b>SOP Ref:</b> GL-RAD-A-003
<b>Run Date:</b> 06/11/2015 19:38	<b>Analyst:</b> EXK2	<b>Instrument:</b> LSCBLUE
<b>Data File:</b> C1483444.xls	<b>Aliquot:</b> 0.5607 g	<b>Count Time:</b> 30 min
<b>Prep Batch:</b> 1483444	<b>Prep Method:</b> EPA EERF C-01 Modified	
<b>Prep Date:</b> 06/11/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	-2.87	pCi/g	+/-2.36	2.36	4.23	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.
  - 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).

June 18, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL373501	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15027
<b>Lab Sample ID:</b> 373501001	<b>Date Collected:</b> 04/30/2015 10:30	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 05/21/2015 08:50	<b>%Moisture:</b> 3
<b>Client ID:</b> B30RB6		<b>Prep Basis:</b> As Received
<b>Batch ID:</b> 1483456	<b>Method:</b> TRITIUM_DIST_LSC	<b>SOP Ref:</b> GL-RAD-A-002
<b>Run Date:</b> 06/11/2015 10:54	<b>Analyst:</b> GXR1	<b>Instrument:</b> LSCGOLD
<b>Data File:</b> T1483456R.xls	<b>Aliquot:</b> 1.03 g	<b>Count Time:</b> 30 min
<b>Prep Batch:</b> 1483456	<b>Prep Method:</b> EPA 906.0 Modified	
<b>Prep Date:</b> 06/09/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	-17.9	pCi/g	+/-13.4	13.4	26.1	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.
  - 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).

June 18, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL373501	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15027
<b>Lab Sample ID:</b> 373501001	<b>Date Collected:</b> 04/30/2015 10:30	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 05/21/2015 08:50	<b>%Moisture:</b> 3
<b>Client ID:</b> B30RB6		<b>Prep Basis:</b> Dry Weight
<b>Batch ID:</b> 1483494	<b>Method:</b> TC99_EIE_LSC	<b>SOP Ref:</b> GL-RAD-A-059
<b>Run Date:</b> 06/15/2015 12:23	<b>Analyst:</b> MYM1	<b>Instrument:</b> LSCORANGE
<b>Data File:</b> E1483494R.xls	<b>Aliquot:</b> 2.086 g	<b>Count Time:</b> 60.01237 min
<b>Prep Batch:</b> 1483494	<b>Prep Method:</b> DOE EML HASL-300, Tc-02-	
<b>Prep Date:</b> 06/09/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	0.145	pCi/g	+/-0.254	0.255	0.435	1.5

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	5.88E+05	6.14E+05	CPM	95.8	(15%-125%)

**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).

June 18, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL373501	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15027
<b>Lab Sample ID:</b> 373501001	<b>Date Collected:</b> 04/30/2015 10:30	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 05/21/2015 08:50	<b>%Moisture:</b> 3
<b>Client ID:</b> B30RB6		<b>Prep Basis:</b> As Received
<b>Batch ID:</b> 1480442	<b>Method:</b> ASTM D 2216 (Modified)	<b>SOP Ref:</b> GL-OA-E-020
<b>Run Date:</b> 05/26/2015 11:52	<b>Analyst:</b> DRS1	<b>Instrument:</b> BALHD2000D
<b>Data File:</b>		<b>Count Time:</b>
<b>Prep Batch:</b> 1480442		
<b>Prep Date:</b> 05/26/2015 11:52		

CAS No.	Parmname	Qual	Result	Units	MDC	
	Moisture		3.04	percent +/-		
<b>Surrogate/Tracer recovery</b>		<b>Result</b>	<b>Nominal</b>	<b>Units</b>	<b>Recovery%</b>	<b>Acceptable Limits</b>

**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).

# Quality Control Data

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: June 16, 2015  
Page 1 of 6

**Client :** CH2MHill Plateau Remediation Company  
**MSIN R3-50 CHPRC**  
**PO Box 1600**  
**Richland, Washington 99352**  
**Contact: Mr. Scot Fitzgerald**  
**Workorder: 373501**

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1481444								
QC1203325949	MB								
Americium-241			U	0.143	pCi/g			JXR1	06/13/1512:36
				Uncert: +/-0.227					
				TPU: +/-0.228					
**Americium-243 Tracer	20.0			18.9	pCi/g	REC: 95	(15%-125%)		
				Uncert: +/-2.08					
				TPU: +/-3.16					
QC1203325950	373501001	DUP							
Americium-241		U	0.270	U	0.104	pCi/g			
				Uncert: +/-0.408		RPD: 0	N/A		
				TPU: +/-0.410		RER: 0.522	(0-2)		
**Americium-243 Tracer	20.0		6.56		8.00	pCi/g	REC: 40	(15%-125%)	
				Uncert: +/-2.45					
				TPU: +/-3.66					
QC1203325951	LCS								
Americium-241					16.5	pCi/g	REC: 90	(80%-120%)	
				Uncert: +/-2.05					
				TPU: +/-2.92					
**Americium-243 Tracer	20.0				18.1	pCi/g	REC: 91	(15%-125%)	
				Uncert: +/-2.25					
				TPU: +/-3.38					
Batch	1481445								
QC1203325952	MB								
Plutonium-238			U	0.322	pCi/g			JXR1	06/15/1515:25
				Uncert: +/-0.376					
				TPU: +/-0.380					
Plutonium-239/240			U	0.150	pCi/g				
				Uncert: +/-0.359					
				TPU: +/-0.360					
**Plutonium-236 Tracer	13.6				10.4	pCi/g	REC: 77	(15%-125%)	
				Uncert: +/-1.93					
				TPU: +/-2.84					
QC1203325953	373501001	DUP							
Plutonium-238		U	0.273		0.351	pCi/g			
				Uncert: +/-0.322		RPD: 1	(0% - 100%)		
				TPU: +/-0.325		RER: 0.333	(0-2)		
Plutonium-239/240		U	0.186	U	0.199	pCi/g			
				Uncert: +/-0.330		RPD: 0	N/A		
				TPU: +/-0.332		RER: 0.0627	(0-2)		
**Plutonium-236 Tracer	14.0		10.9		12.0	pCi/g	REC: 86	(15%-125%)	
				Uncert: +/-2.05					
				TPU: +/-3.02					
QC1203325954	LCS								
Plutonium-238					0.380	pCi/g			
				Uncert: +/-0.345					

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 373501

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1481445								
Plutonium-239/240	18.4	TPU:		+/-0.349					
		Uncert:		17.6	pCi/g	REC: 95	(80%-120%)		
		TPU:		+/-2.12					
**Plutonium-236 Tracer	13.6	TPU:		+/-3.36					
		Uncert:		11.1	pCi/g	REC: 82	(15%-125%)		
		TPU:		+/-1.86					
Batch	1481446								
QC1203325955	MB								
Uranium-233/234			U	0.295	pCi/g			JXR1	06/13/1512:36
		Uncert:		+/-0.316					
		TPU:		+/-0.319					
Uranium-235/236			U	0.0521	pCi/g				
		Uncert:		+/-0.195					
		TPU:		+/-0.196					
Uranium-238			U	0.00222	pCi/g				
		Uncert:		+/-0.164					
		TPU:		+/-0.165					
**Uranium-232 Tracer	19.8			20.1	pCi/g	REC: 101	(15%-125%)		
		Uncert:		+/-2.07					
		TPU:		+/-3.69					
QC1203325956	373501001	DUP							
Uranium-233/234		0.786	U	0.431	pCi/g				
		Uncert:		+/-0.471		RPD: 39	(0% - 100%)		
		TPU:		+/-0.487		RER: 1.08	(0-2)		
Uranium-235/236		U	0.0789	U	0.128	pCi/g			
		Uncert:		+/-0.270		RPD: 0	N/A		
		TPU:		+/-0.270		RER: 0.242	(0-2)		
Uranium-238		0.599		0.633	pCi/g				
		Uncert:		+/-0.401		RPD: 6	(0% - 100%)		
		TPU:		+/-0.412		RER: 0.109	(0-2)		
**Uranium-232 Tracer	19.9	21.8		19.9	pCi/g	REC: 100	(15%-125%)		
		Uncert:		+/-2.23					
		TPU:		+/-3.91					
QC1203325957	LCS								
Uranium-233/234				26.0	pCi/g				
		Uncert:		+/-2.31					
		TPU:		+/-4.55					
Uranium-235/236				1.55	pCi/g				
		Uncert:		+/-0.642					
		TPU:		+/-0.683					
Uranium-238	25.4			27.3	pCi/g	REC: 108	(80%-120%)		
		Uncert:		+/-2.36					
		TPU:		+/-4.75					
**Uranium-232 Tracer	19.8			19.8	pCi/g	REC: 100	(15%-125%)		
		Uncert:		+/-2.03					
		TPU:		+/-3.64					
<b>Rad Gamma Spec</b>									
Batch	1480783								

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 373501

Page 3 of 6

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1480783								
QC1203324320	MB								
Cesium-137			U	0.000968	pCi/g			MXR1	05/28/1508:08
				Uncert: +/-0.017					
				TPU: +/-0.017					
Cobalt-60			U	-0.00728	pCi/g				
				Uncert: +/-0.0146					
				TPU: +/-0.015					
Europium-152			U	0.00185	pCi/g				
				Uncert: +/-0.0424					
				TPU: +/-0.0424					
Europium-154			U	-0.0114	pCi/g				
				Uncert: +/-0.0395					
				TPU: +/-0.0398					
Europium-155			U	-0.0158	pCi/g				
				Uncert: +/-0.0395					
				TPU: +/-0.0402					
QC1203324322	373501001	DUP							
Cesium-137		0.341		0.311	pCi/g				05/28/1509:40
		Uncert: +/-0.0377		+/-0.0393		RPD: 9 (0% - 20%)			
		TPU: +/-0.0484		+/-0.054		RER: 0.822 (0-2)			
Cobalt-60		0.0766		0.0973	pCi/g				
		Uncert: +/-0.043		+/-0.0326		RPD: 24 (0% - 100%)			
		TPU: +/-0.0437		+/-0.0338		RER: 0.734 (0-2)			
Europium-152		2.17		2.05	pCi/g				
		Uncert: +/-0.0927		+/-0.101		RPD: 6 (0% - 20%)			
		TPU: +/-0.215		+/-0.203		RER: 0.783 (0-2)			
Europium-154		X 0.244	X	0.241	pCi/g				
		Uncert: +/-0.107		+/-0.0993		RPD: 1 (0% - 100%)			
		TPU: +/-0.155		+/-0.149		RER: 0.021 (0-2)			
Europium-155		U -0.0108	U	0.0605	pCi/g				
		Uncert: +/-0.0439		+/-0.0598		RPD: 0 N/A			
		TPU: +/-0.0442		+/-0.0601		RER: 1.87 (0-2)			
QC1203324323	LCS								
Americium-241		490		488	pCi/g	REC: 100 (80%-120%)			05/28/1507:20
		Uncert: +/-5.58		+/-62.8					
Cesium-137		185		181	pCi/g	REC: 98 (80%-120%)			
		Uncert: +/-3.77		+/-14.7					
		TPU: +/-14.7							
Cobalt-60		192		178	pCi/g	REC: 93 (80%-120%)			
		Uncert: +/-4.29		+/-14.3					
		TPU: +/-14.3							
Europium-152			U	0.332	pCi/g				
		Uncert: +/-1.80		+/-1.81					
		TPU: +/-1.81							
Europium-154			U	-0.0714	pCi/g				
		Uncert: +/-1.22		+/-1.22					
		TPU: +/-1.22							
Europium-155			U	-0.222	pCi/g				
		Uncert: +/-1.34							

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 373501

Page 4 of 6

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1480783								
		TPU:		+/-1.35					
Batch	1481121								
QC1203325142	MB								
Iodine-129			U	-0.139	pCi/g			MJH1	06/02/1505:41
		Uncert:		+/-0.269					
		TPU:		+/-0.276					
QC1203325143	373501001	DUP							
Iodine-129		U	0.509	U	-0.103	pCi/g			06/02/1505:43
		Uncert:	+/-0.661		+/-1.13		RPD: 0	N/A	
		TPU:	+/-0.702		+/-1.13		RER: 0.902	(0-2)	
QC1203325144	373501001	MS							
Iodine-129		39.8	U	0.509	34.4	pCi/g	REC: 86 (75%-125%)		06/02/1506:14
		Uncert:	+/-0.661		+/-5.00				
		TPU:	+/-0.702		+/-6.07				
QC1203325145	LCS								
Iodine-129		32.7			29.1	pCi/g	REC: 89 (80%-120%)		06/02/1506:15
		Uncert:			+/-5.59				
		TPU:			+/-6.30				
<b>Rad Gas Flow</b>									
Batch	1482396								
QC1203328502	MB								
Strontium-90			U	-0.178	pCi/g			KSD1	06/13/1517:01
		Uncert:		+/-0.119					
		TPU:		+/-0.119					
**Strontium Carrier		8.10			7.20	mg	REC: 89 (25%-125%)		
QC1203328503	373501001	DUP							
Strontium-90		U	0.244	U	0.115	pCi/g			06/13/1517:01
		Uncert:	+/-0.183		+/-0.331		RPD: 0	N/A	
		TPU:	+/-0.188		+/-0.331		RER: 0.659	(0-2)	
**Strontium Carrier		8.10		6.70	7.00	mg	REC: 86 (25%-125%)		
QC1203328504	LCS								
Strontium-90		17.1			18.2	pCi/g	REC: 106 (80%-120%)		06/13/1517:01
		Uncert:			+/-0.988				
		TPU:			+/-3.38				
**Strontium Carrier		8.10			7.20	mg	REC: 89 (25%-125%)		
<b>Rad Liquid Scintillation</b>									
Batch	1483444								
QC1203331211	MB								
Carbon-14			U	-2.15	pCi/g			EXK2	06/11/1520:11
		Uncert:		+/-2.13					
		TPU:		+/-2.13					
QC1203331212	373501001	DUP							
Carbon-14		U	-2.87	U	-1.04	pCi/g			06/11/1520:43
		Uncert:	+/-2.36		+/-2.16		RPD: 0	N/A	
		TPU:	+/-2.36		+/-2.16		RER: 1.12	(0-2)	
QC1203331213	373501001	MS							
Carbon-14		124	U	-2.87	116	pCi/g	REC: 94 (75%-125%)		06/11/1521:14
		Uncert:	+/-2.36		+/-4.58				
		TPU:	+/-2.36		+/-9.71				

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 373501

Page 5 of 6

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Liquid Scintillation</b>									
Batch	1483444								
QC1203331214	LCS								
Carbon-14	121			119	pCi/g	REC: 98 (80%-120%)			06/11/1521:46
	Uncert:			+/-4.57					
	TPU:			+/-9.88					
Batch	1483456								
QC1203331254	MB								
Tritium			U	-0.0482	pCi/g			GXR1	06/10/1513:16
	Uncert:			+/-15.5					
	TPU:			+/-15.5					
QC1203331255	373501001	DUP							
Tritium		U	-17.9	U	-5.86	pCi/g			06/10/1513:38
	Uncert:	+/-13.4		+/-15.2		RPD: 0	N/A		
	TPU:	+/-13.4		+/-15.2		RER: 1.17	(0-2)		
QC1203331256	373501001	MS							
Tritium	85.4	U	-17.9		106	pCi/g	REC: 124 (75%-125%)		06/10/1513:59
	Uncert:	+/-13.4		+/-24.5					
	TPU:	+/-13.4		+/-34.3					
QC1203331257	LCS								
Tritium	77.6			87.3	pCi/g	REC: 112 (80%-120%)			06/10/1514:21
	Uncert:			+/-21.3					
	TPU:			+/-29.1					
Batch	1483494								
QC1203331383	MB								
Technetium-99			U	-0.131	pCi/g			MYM1	06/15/1513:25
	Uncert:			+/-0.221					
	TPU:			+/-0.221					
**Technetium-99m Tracer	6.14E+05			5.98E+05	CPM	REC: 98 (15%-125%)			
QC1203331385	373501001	DUP							
Technetium-99		U	0.145	U	0.0232	pCi/g			06/15/1516:30
	Uncert:	+/-0.254		+/-0.236		RPD: 0	N/A		
	TPU:	+/-0.255		+/-0.236		RER: 0.691	(0-2)		
**Technetium-99m Tracer	6.14E+05		5.88E+05		5.83E+05	CPM	REC: 95 (15%-125%)		
QC1203331386	LCS								
Technetium-99	39.0			37.8	pCi/g	REC: 97 (80%-120%)			06/15/1517:33
	Uncert:			+/-2.06					
	TPU:			+/-4.78					
**Technetium-99m Tracer	6.14E+05			6.03E+05	CPM	REC: 98 (15%-125%)			

**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
- 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.

### QC Summary

Workorder: 373501

Page 6 of 6

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
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.