

October 23, 2015

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

October 19, 2015

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

Re: CHPRC SAF F15-028  
Work Order: 381844  
SDG: GEL381844

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 25, 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,



Sarah Edwards for  
Heather Shaffer  
Project Manager

Purchase Order: 303581 - 7H  
Chain of Custody: F15-028-060  
Enclosures



Table of Contents

Case Narrative.....1

Chain of Custody and Supporting Documentation.....4

Data Review Qualifier Definitions.....8

Laboratory Certifications.....11

Metals Analysis.....13

Case Narrative.....14

Sample Data Summary.....19

Quality Control Summary.....21

General Chem Analysis.....24

Case Narrative.....25

Sample Data Summary.....30

Quality Control Summary.....32

Radiological Analysis.....35

    Sample Data Summary.....52

    Quality Control Data.....62

# Case Narrative

October 23, 2015

General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF F15-028  
SDG: GEL381844

October 19, 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 September 25, 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. 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 sample:

<b>Laboratory Identification</b>	<b>Sample Description</b>
381844001	B31TY9

**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.

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.

*Sarah M Edwards*  
October 23, 2015

Sarah Edwards for  
Heather Shaffer  
Project Manager

# **Chain of Custody and Supporting Documentation**

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		PAGE 1 OF 2	
COLLECTOR <i>David Wick</i>	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	PRICE CODE 7H	DATA TURNAROUND 30 Days / 30 Days
SAMPLING LOCATION C8797, Post Development	PROJECT DESIGNATION 100-KE Characterization Boreholes - Water	ACTUAL SAMPLE DEPTH 85.3'	SAF NO. F15-028	AIR QUALITY	
ICE CHEST NO. 6005-379	FIELD LOGBOOK NO. HNF-N-645 3-22	OFFSITE PROPERTY NO. 5987	COA 303581	METHOD OF SHIPMENT FEDERAL EXPRESS	ORIGINAL
SHIPPED TO GEL Laboratories, LLC	BILL OF LADING/AIR BILL NO. 7745 8966 2655 2012/15				
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WT=Wipe X=Other	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.	PRESERVATION Cool <=6C	HNO3 to pH <2	HNO3 to pH <2	HNO3 to pH <2
SPECIAL HANDLING AND/OR STORAGE -RADIOACTIVE TIE TO--B92317-- Set 9/2/15	HOLDING TIME 14 Days	HNO3 to pH <2	6 Months	6 Months	6 Months
	TYPE OF CONTAINER G/P	G/P	G/P	G/P	G/P
	NO. OF CONTAINER(S) 1	1	1	1	1
	VOLUME 500ml	250ml	500ml	500ml	500ml
	SAMPLE ANALYSIS 6010_METALS_ICP: COMMON (Chromium); SEE ITEM (1) IN SPECIAL INSTRUCTIONS	GAMMA_GS: COMMON;	AMONISO_EIE_PRECIP_AEA: COMMON;	C14_LSC: COMMON;	1129_SEP_LEPS_GS: COMMON;
SAMPLE NO. B31TY9	MATRIX* WATER	SAMPLE DATE SEP 23 2015	SAMPLE TIME 1317		

October 23, 2015

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM <i>David Wick</i>	DATE/TIME SEP 23 2015 1400	RECEIVED BY/STORED IN SSU #1	DATE/TIME SEP 23 2015 0800	TRVL-15-112	
RELINQUISHED BY/REMOVED FROM SSU-1	DATE/TIME SEP 26 2015 0800	RECEIVED BY/STORED IN L.D. Wall	DATE/TIME SEP 24 2015 0800	(1) 2320_ALKALINITY: COMMON {Alkalinity}; 2320_ALKALINITY: COMMON (Add-on) {Bicarbonate, Carbonate alkalinity, Hydroxylon};	
RELINQUISHED BY/REMOVED FROM L.D. Wall	DATE/TIME SEP 24 2015 1400	RECEIVED BY/STORED IN FEDEX	DATE/TIME SEP 25 2015 0900		
RELINQUISHED BY/REMOVED FROM <i>David Wick</i>	DATE/TIME SEP 25 2015 0900	RECEIVED BY/STORED IN <i>David Wick</i>	DATE/TIME SEP 25 2015 0900		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME		
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME		
PRINTED ON 8/19/2015	FSR ID = FSR1228	TRVL NUM = TRVL-15-112	A-6003-618 (REV 2)		

070

October 23, 2015

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		PAGE 2 OF 2	
COLLECTOR <i>DAVID WIGHT</i>	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	F15-028-060	PRICE CODE 7H
SAMPLING LOCATION C8797, Post Development	PROJECT DESIGNATION 100-KE Characterization Boreholes - Water	ACTUAL SAMPLE DEPTH 85.31	SAF NO. F15-028	AIR QUALITY <input type="checkbox"/>	DATA TURNAROUND 30 Days / 30 Days
ICE CHEST NO. <i>CWS-379</i>	FIELD LOGBOOK NO. <i>HNF-N-645 3-22</i>	OFFSITE PROPERTY NO. <i>5987</i>	COA 303581	METHOD OF SHIPMENT FEDERAL EXPRESS	ORIGINAL
GEL Laboratories, LLC	BILL OF LADING/AIR BILL NO. <i>17745 8966 2055</i> <i>2450</i> <i>2w, 9/24/15</i>				
MATRIX* A=Air DL=Drum L=Liquid S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS *Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	PRESERVATION HNO3 to pH <2	HOLDING TIME 6 Months	TYPE OF CONTAINER G/P	NO. OF CONTAINER(S) 1
SPECIAL HANDLING AND/OR STORAGE -RADIOACTIVE TIE TO: B32JIT <i>3264 9/12/15</i>	VOLUME 1L	SAMPLE ANALYSIS UIISO_PLATE_A EA COMMON;			
SAMPLE NO. B31TY9	MATRIX* WATER	SAMPLE DATE SEP 23 2015	SAMPLE TIME 1317	✓	

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS TRVL-15-112	
RELINQUISHED BY/REMOVED FROM <i>David Wight</i>	DATE/TIME SEP 23 2015 1430	RECEIVED BY/STORED IN SSU-1	DATE/TIME SEP 23 2015 1430		
RELINQUISHED BY/REMOVED FROM SSU-1	DATE/TIME SEP 24 2015 0800	RECEIVED BY/STORED IN L.D. Wall	DATE/TIME SEP 24 2015 0800		
RELINQUISHED BY/REMOVED FROM L.D. Wall	DATE/TIME SEP 24 2015 1400	RECEIVED BY/STORED IN FEDEX	DATE/TIME SEP 24 2015 0900		
RELINQUISHED BY/REMOVED FROM <i>Perse</i>	DATE/TIME	RECEIVED BY/STORED IN <i>M. Krusew</i>	DATE/TIME 9-25-15		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
LABORATORY SECTION	RECEIVED BY	TITLE		DATE/TIME	
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY		DATE/TIME	
PRINTED ON 8/19/2015	FSR ID = FSR1228	TRVL NUM = TRVL-15-112		A-6003-618 (REV 2)	

SAMPLE RECEIPT & REVIEW FORM

Client: <u>OPR</u>		SDG/AR/COC/Work Order:	
Received By: <u>MI</u>		Date Received: <u>9-25-15</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?			Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u>
Classified Radioactive II or III by RSO?			If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?			
Package, COC, and/or Samples marked as beryllium or asbestos containing?			If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?			Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?			

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: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius
2a	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: <u>2609214932</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:
6	Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>			If Preservation added, Lot#: Sample ID's and containers affected:
7	VOA vials contain acid preservation?	<input checked="" type="checkbox"/>			(If unknown, select No)
8	VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
9	Are Encore containers present?	<input checked="" type="checkbox"/>			(If yes, immediately deliver to Volatiles laboratory)
10	Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
11	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
12	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
13	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
14	Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>			
15	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
16	Carrier and tracking number.	<input checked="" type="checkbox"/>			Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7745 8966 2450 2C</u> <u>7745 8966 2655 2C</u> <u>7745 9102 5389 1C</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 performed
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**

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

# Laboratory Certifications

List of current GEL Certifications as of 19 October 2015

State	Certification
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	SC000122016-1
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	SC000122015-19
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# Metals Analysis

# Case Narrative

October 23, 2015

**Metals**

**Technical Case Narrative**

**CH2MHill Plateau Remediation Company (CPRC)**

**SDG #: GEL381844**

**Work Order #: 381844**

<b>Sample ID</b>	<b>Client ID</b>
381844001	B31TY9
1203402432	Method Blank (MB)ICP
1203402433	Laboratory Control Sample (LCS)
1203402436	381944001(B32BX9L) Serial Dilution (SD)
1203402434	381944001(B32BX9S) Matrix Spike (MS)
1203402435	381944001(B32BX9SD) Matrix Spike Duplicate (MSD)

**Sample Analysis**

Sample 381844 001 in this SDG was analyzed for metals on an "as received" basis.

**Method/Analysis Information**

<b>Analytical Batch:</b>	1511158
<b>Prep Batch :</b>	1511157
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 24 and GL-MA-E-006 REV# 12
<b>Analytical Method:</b>	6010_METALS_ICP
<b>Prep Method :</b>	SW846 3005A

**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 method blanks (MB) analyzed with this SDG met the acceptance criteria with the exception of sodium. However, (analyte) was greater than the MDL. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203402432 (MB).

**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: 381944001 (B32BX9).

**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.

**MS/MSD Relative Percent Difference (RPD) Statement**

The relative percent difference (RPD) obtained from the designated matrix spike duplicate (MSD) is evaluated based on acceptance criteria of 20%. The RPD values between qualifying analyte results in the MS and MSD were within the acceptance limits.

**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.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Preparation Information**

The samples in this SDG were 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.

October 23, 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: GEL381844 GEL Work Order: 381844

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

- \* Duplicate analysis not within control limits
- 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).
- 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.

**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:** 22 OCT 2015

**Title:** Data Validator

# Sample Data Summary

**METALS**  
 -1-  
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** GEL381844

**METHOD TYPE:** SW846

**SAMPLE ID:** 381844001

**CLIENT ID:** B31TY9

**CONTRACT:** CPRC0F15028

**MATRIX:** WATER

**DATE RECEIVED** 25-SEP-15

**LEVEL:** Low

<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	5.46	ug/L			P	1	1	OPTIMA3	100515B-2

**\*Analytical Methods:**

**P SW846 3005A/6010C**

# Quality Control Summary

**October 23, 2015**  
**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: October 22, 2015

Page 1 of 2

**CH2M Hill Plateau Remediation Company**

**MSIN R3-50 CHPRC**

**PO Box 1600**

**Richland, Washington**

**Contact: Mr. Scot Fitzgerald**

**Workorder: 381844**

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1511158										
QC1203402433	LCS										
Chromium	500			514	ug/L		103	(80%-120%)	HSC	10/05/15	13:29
QC1203402432	MB										
Chromium			U	ND	ug/L					10/05/15	13:26
QC1203402434	381944001	MS									
Chromium	500	23.0		521	ug/L		99.7	(75%-125%)		10/05/15	13:35
QC1203402435	381944001	MSD									
Chromium	500	23.0		523	ug/L	0.335	100	(0%-20%)		10/05/15	13:39
QC1203402436	381944001	SDILT									
Chromium		23.0	D	4.90	ug/L	6.41		(0%-10%)		10/05/15	13:42

**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

October 23, 2015

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**QC Summary**

Workorder: 381844

Page 2 of 2

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.  
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.  
\* Indicates that a Quality Control parameter was not within specifications.  
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

# General Chem Analysis

# Case Narrative

**General Chemistry  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL381844  
Work Order #: 381844**

**Method/Analysis Information**

**Product:** Alkalinity  
**Analytical Batch:** 1510607      **Method:** 2320\_ALKALINITY: COMMON + (ADD ON)

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in 2320\_ALKALINITY:

<b>Sample ID</b>	<b>Client ID</b>
381844001	B31TY9
1203400879	Method Blank (MB)
1203403531	Method Blank (MB)
1203400880	Laboratory Control Sample (LCS)
1203403532	Laboratory Control Sample (LCS)
1203400887	381815002(B326T0) Sample Duplicate (DUP)
1203400888	381844001(B31TY9) Sample Duplicate (DUP)

Sample 381844 001 in this SDG was 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-GC-E-033 REV# 11.

**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.

**Calibration Information**

The Titration and Ion analysis was performed on a manually operated buret.

**Initial Standardization**

The titrant was properly standardized

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

#### **Method Blank (MB) Statement**

The MBs analyzed with this SDG met the acceptance criteria.

#### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

#### **Quality Control (QC) Designation**

Samples 381815002 (B326T0) and 381844001 (B31TY9) were selected for QC analysis.

#### **Duplicate Relative Percent Difference (RPD) Statement**

The RPD between the sample and its duplicate met the acceptance limits.

### **Technical Information**

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

#### **Holding Times**

All samples in this SDG met the specified holding time.

#### **Sample Dilutions**

The samples in this SDG did not require dilutions.

#### **Sample Re-analysis**

The samples in this SDG did not require re-analysis.

### **Miscellaneous Information**

#### **Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document 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 SDG.

#### **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

October 23, 2015

and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**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.

October 23, 2015

**GEL LABORATORIES LLC**

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL381844 GEL Work Order: 381844

**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:** Thomas Lewis

**Date:** 21 OCT 2015

**Title:** Data Validator

# Sample Data Summary

~~October 23, 2015~~  
**GEL LABORATORIES LLC**

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

**Certificate of Analysis**

Report Date: October 21, 2015

Company : CH2MHill Plateau Remediation Company  
Address : MSIN R3-50 CHPRC  
          PO Box 1600  
          Richland, Washington 99352  
Contact: Mr. Scot Fitzgerald  
Project: CHPRC SAF F15-028

---

Client Sample ID: B31TY9	Project: CPRC0F15028
Sample ID: 381844001	Client ID: CPRC001
Matrix: WATER	
Collect Date: 23-SEP-15 13:17	
Receive Date: 25-SEP-15	
Collector: Client	

---

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis											
2320_ALKALINITY: COMMON + (ADD ON) "As Received"											
Alkalinity, Total as CaCO3		1010000	7250	10000	ug/L		AMB	09/30/15	1708	1510607	1
Bicarbonate alkalinity (CaCO3)		1010000	7250	10000	ug/L						
Carbonate alkalinity (CaCO3)	U	7250	7250	10000	ug/L						
Hydroxide alkalinity as CaCO3	U	7250	7250	10000	ug/L						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	2320_ALKALINITY	

**Notes:**

# Quality Control Summary

**October 23, 2015**  
**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: October 21, 2015

Page 1 of 2

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 381844

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Titration and Ion Analysis</b>											
Batch	1510607										
QC1203400887	381815002	DUP									
Alkalinity, Total as CaCO3		56800		57800	ug/L	1.77		(0%-20%)	AMB	09/30/15	16:19
Bicarbonate alkalinity (CaCO3)		56800		57800	ug/L	1.77		(0%-20%)			
Carbonate alkalinity (CaCO3)	U	725	U	725	ug/L	N/A					
Hydroxide alkalinity as CaCO3	U	725	U	725	ug/L	N/A					
QC1203400888	381844001	DUP									
Alkalinity, Total as CaCO3		1010000		1030000	ug/L	1.99		(0%-20%)		09/30/15	17:11
Bicarbonate alkalinity (CaCO3)		1010000		1030000	ug/L	1.99		(0%-20%)			
Carbonate alkalinity (CaCO3)	U	7250	U	7250	ug/L	N/A					
Hydroxide alkalinity as CaCO3	U	7250	U	7250	ug/L	N/A					
QC1203400880	LCS										
Alkalinity, Total as CaCO3	50000			52200	ug/L		104	(90%-110%)		09/30/15	15:25
QC1203403532	LCS										
Alkalinity, Total as CaCO3	50000			52000	ug/L		104	(90%-110%)		09/30/15	15:31
QC1203400879	MB										
Alkalinity, Total as CaCO3			U	725	ug/L					09/30/15	15:20
Bicarbonate alkalinity (CaCO3)			U	725	ug/L						
Carbonate alkalinity (CaCO3)			U	725	ug/L						
Hydroxide alkalinity as CaCO3			U	725	ug/L						
QC1203403531	MB										
Alkalinity, Total as CaCO3			U	725	ug/L					09/30/15	15:22
Bicarbonate alkalinity (CaCO3)			U	725	ug/L						
Carbonate alkalinity (CaCO3)			U	725	ug/L						
Hydroxide alkalinity as CaCO3			U	725	ug/L						

October 23, 2015

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QC Summary

Workorder: 381844

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Titration and Ion Analysis</b>											
Batch		1510607									

Notes:

The Qualifiers in this report are defined as follows:

- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- N Spike Sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.  
 ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.  
 For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

# Radiological Analysis

**October 23, 2015**  
**Radiochemistry**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL381844**  
**Work Order #: 381844**

**Method/Analysis Information**

**Product:** AMCMISO\_EIE\_PRECIP\_AEA: COMMON  
**Analytical Method:** AMCMISO\_EIE\_PREC\_AEA  
**Analytical Batch Number:** 1511226

<b>Sample ID</b>	<b>Client ID</b>
381844001	B31TY9
1203402628	Method Blank (MB)
1203402630	Laboratory Control Sample (LCS)
1203402629	381844001(B31TY9) Sample Duplicate (DUP)

Sample 381844 001 in this SDG was 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-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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 381844001 (B31TY9).

**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.

**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:** PUIISO\_PLATE\_AEA:COMMON

Analytical Method: PUIISO\_PLATE\_AEA

Analytical Batch Number: 1511227

Sample ID	Client ID
381844001	B31TY9
1203402631	Method Blank (MB)
1203402633	Laboratory Control Sample (LCS)
1203402632	381844001(B31TY9) Sample Duplicate (DUP)

Sample 381844 001 in this SDG was 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-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.

**QC Information**

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

**Designated QC**

The following sample was used for QC: 381844001 (B31TY9).

**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. The following DER was generated for this SDG: DER 1457054 was generated due to Other and Peak Centroid Values Off. 1. The Pu-242 tracer peak centroid for samples 381844001, 1203402631, and 1203402632 are greater than 50 keV from the expected energy value of 4890 keV. 2. Samples 381844001, 1203402632, and 1203402633 do not meet the resolution requirement of having a full width half maximum of 100 keV or less for the Pu-242 tracer. 1. The samples do meet the tracer yield requirement, the detection limits, and their tracer peaks are within the Pu-242 region of interest. Reporting results. 2. The samples do meet the tracer yield requirement, the detection limits, and their tracer peaks are within the Pu-242 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:** UISO\_PLATE\_AEA:COMMON  
**Analytical Method:** UISO\_IE\_PRECIP\_AEA  
**Analytical Batch Number:** 1516130

<b>Sample ID</b>	<b>Client ID</b>
381844001	B31TY9
1203414493	Method Blank (MB)
1203414495	Laboratory Control Sample (LCS)
1203414494	381844001(B31TY9) Sample Duplicate (DUP)

Sample 381844 001 in this SDG was 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-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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 381844001 (B31TY9).

**Technical Information:**

**Holding Time**

October 23, 2015

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

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

Sample 381844001 (B31TY9) was reprepared due to high blank activity. The re-analysis is being reported.

**Recounts**

Sample 1203414493 (MB) was recounted due to a suspected blank false positive. 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:** GAMMA\_GS:COMMON (Cs137,Co60,Eu152,Eu154,Eu155)  
**Analytical Method:** 901.1\_GAMMA\_GS  
**Analytical Batch Number:** 1510910

<b>Sample ID</b>	<b>Client ID</b>
381844001	B31TY9
1203401765	Method Blank (MB)
1203401767	Laboratory Control Sample (LCS)
1203401766	381844001(B31TY9) Sample Duplicate (DUP)

Sample 381844 001 in this SDG was 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-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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 381844001 (B31TY9).

**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**

October 23, 2015

**Product:** I129\_SEP\_LEPS\_GS: COMMON  
Analytical Method: DOE EML HASL-300,I-01 Modified  
Analytical Batch Number: 1511784

<b>Sample ID</b>	<b>Client ID</b>
381844001	B31TY9
1203404020	Method Blank (MB)
1203404025	Laboratory Control Sample (LCS)
1203404021	381844001(B31TY9) Sample Duplicate (DUP)
1203404023	381844001(B31TY9) Matrix Spike (MS)

Sample 381844 001 in this SDG was 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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 381844001 (B31TY9).

**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:** SRTOT\_SEP\_PRECIP\_GPC: COMMON  
Analytical Method: SRTOT\_SEP\_PRECIP\_GPC  
Analytical Batch Number: 1512845

<b>Sample ID</b>	<b>Client ID</b>
381844001	B31TY9
1203406524	Method Blank (MB)
1203406526	Laboratory Control Sample (LCS)
1203406525	381844001(B31TY9) Sample Duplicate (DUP)

Sample 381844 001 in this SDG was 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-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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 381844001 (B31TY9).

**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.

**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.

**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>TRITIUM_DIST_LSC: COMMON</b>
Analytical Method:	TRITIUM_DIST_LSC
Analytical Batch Number:	1510633

<b>Sample ID</b>	<b>Client ID</b>
381844001	B31TY9
1203400956	Method Blank (MB)
1203400959	Laboratory Control Sample (LCS)
1203400957	381844001(B31TY9) Sample Duplicate (DUP)
1203400958	381844001(B31TY9) Matrix Spike (MS)

Sample 381844 001 in this SDG was 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.

**QC Information**

All of the QC samples meet the required acceptance limits with the following exceptions: The Matrix Spike 1203400958 (B31TY9MS) did not meet recovery requirements due to the sample activity being greater than five times the spiked nominal concentration.

**Designated QC**

The following sample was used for QC: 381844001 (B31TY9).

**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 low 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

October 23, 2015

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:** C14\_LSC: COMMON  
Analytical Method: C14\_LSC  
Analytical Batch Number: 1510644

<b>Sample ID</b>	<b>Client ID</b>
381844001	B31TY9
1203400987	Method Blank (MB)
1203400990	Laboratory Control Sample (LCS)
1203400988	381844001(B31TY9) Sample Duplicate (DUP)
1203400989	381844001(B31TY9) Matrix Spike (MS)

Sample 381844 001 in this SDG was 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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 381844001 (B31TY9).

**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**

The matrix spike, 1203400989 (B31TY9MS), aliquot was reduced to conserve sample volume.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** TC99\_EIE\_LSC: COMMON  
**Analytical Method:** TC99\_EIE\_LSC  
**Analytical Batch Number:** 1511443

<b>Sample ID</b>	<b>Client ID</b>
381844001	B31TY9
1203403208	Method Blank (MB)
1203403211	Laboratory Control Sample (LCS)
1203403209	381844001(B31TY9) Sample Duplicate (DUP)

Sample 381844 001 in this SDG was 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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 381844001 (B31TY9).

**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 relative percent difference/relative error ratio. 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.

October 23, 2015

**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.

October 23, 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: GEL381844 GEL Work Order: 381844

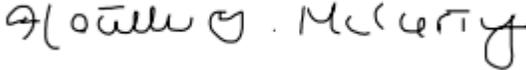
**The Qualifiers in this report are defined as follows:**

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:** Heather McCarty

**Date:** 22 OCT 2015

**Title:** Analyst II

**DATA EXCEPTION REPORT**

<b>Mo.Day Yr.</b> 14-OCT-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> Liquid	<b>Client Code:</b> CPRC
<b>Batch ID:</b> 1511227	<b>Sample Numbers:</b> See Below		

**Potentially affected work order(s)(SDG): 381844(GEL381844)**

**Application Issues:**

Other  
Peak Centroid Values Off

**Specification and Requirements  
Exception Description:**

**DER Disposition:**

1. The Pu-242 tracer peak centroid for samples 381844001, 1203402631, and 1203402632 are greater than 50 keV from the expected energy value of 4890 keV.
2. Samples 381844001, 1203402632, and 1203402633 do not meet the resolution requirement of having a full width half maximum of 100 keV or less for the Pu-242 tracer.

1. The samples do meet the tracer yield requirement, the detection limits, and their tracer peaks are within the Pu-242 region of interest. Reporting results.
2. The samples do meet the tracer yield requirement, the detection limits, and their tracer peaks are within the Pu-242 region of interest. Reporting results.

**Originator's Name:**

Melanie Aycock 14-OCT-15

**Data Validator/Group Leader:**

Scott Moreland 22-OCT-15

# Sample Data Summary

October 23, 2015  
Rad

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL381844	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 381844001	<b>Date Collected:</b> 09/23/2015 13:17	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/25/2015 09:00	
<b>Client ID:</b> B31TY9		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1511226	<b>Method:</b> AMCMISO_EIE_PREC_AEA	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 10/06/2015 11:35	<b>Analyst:</b> JXE2	<b>Instrument:</b> 1065
<b>Data File:</b> S0381844001_AM.1A.gcnf	<b>Aliquot:</b> 0.1 L	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1511226	<b>Prep Method:</b> DOE EML HASL-300, Am-05	
<b>Prep Date:</b> 10/02/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.0386	pCi/L	+/-0.214	0.214	0.411	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	19.4	21.4	pCi/L	90.8	(15%-125%)

**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).

October 23, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL381844	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 381844001	<b>Date Collected:</b> 09/23/2015 13:17	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/25/2015 09:00	
<b>Client ID:</b> B31TY9	<b>Method:</b> PUIISO_PLATE_AEA	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1511227	<b>Analyst:</b> JXE2	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 10/06/2015 11:35	<b>Aliquot:</b> 0.1 L	<b>Instrument:</b> 1077
<b>Data File:</b> S0381844001_PU.1A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, Pu-11-	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1511227		
<b>Prep Date:</b> 10/02/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	0.0383	pCi/L	+/-0.213	0.213	0.408	1.00
OER-100-70	Plutonium-239/240	U	0.0383	pCi/L	+/-0.213	0.213	0.408	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	14.4	19.7	pCi/L	73.1	(15%-125%)

**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).

October 23, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL381844	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 381844001	<b>Date Collected:</b> 09/23/2015 13:17	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/25/2015 09:00	
<b>Client ID:</b> B31TY9	<b>Method:</b> UIISO_IE_PRECIP_AEA	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1516130	<b>Analyst:</b> JXE2	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 10/20/2015 13:20	<b>Aliquot:</b> 0.1 L	<b>Instrument:</b> 1118
<b>Data File:</b> S0381844001_UU.3A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, U-02-R	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1516130		
<b>Prep Date:</b> 10/19/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 <small>13968-55-3/13966-29-5</small>	Uranium-233/234		1.18	pCi/L	+/-0.628	0.656	0.471	1.00
15117-96-1/13982-7	Uranium-235/236		0.572	pCi/L	+/-0.497	0.505	0.286	1.00
7440-61-1	Uranium-238		0.793	pCi/L	+/-0.529	0.544	0.471	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	20.0	21.2	pCi/L	94.4	(15%-125%)

**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).

October 23, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL381844	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 381844001	<b>Date Collected:</b> 09/23/2015 13:17	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/25/2015 09:00	
<b>Client ID:</b> B31TY9	<b>Method:</b> SRTOT_SEP_PRECIP_GPC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1512845	<b>Analyst:</b> KSD1	<b>SOP Ref:</b> GL-RAD-A-004
<b>Run Date:</b> 10/20/2015 11:11	<b>Aliquot:</b> 300 mL	<b>Instrument:</b> PIC1A
<b>Data File:</b> S1512845.xls	<b>Prep Method:</b> EPA 905.0 Modified/DOE RP5	<b>Count Time:</b> 60 min
<b>Prep Batch:</b> 1512845		
<b>Prep Date:</b> 10/16/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium		2870	pCi/L	+/-23.5	660	1.21	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	7.90	8.10	mg	97.5	(25%-125%)

**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).

October 23, 2015  
Rad

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL381844  
Lab Sample ID: 381844001  
  
Client ID: B31TY9  
Batch ID: 1510910  
Run Date: 10/01/2015 06:44  
Data File: G381844001.CNF;1  
Prep Batch: 1510910  
Prep Date: 09/28/2015 00:00

Client: CPRC001  
Date Collected: 09/23/2015 13:17  
Date Received: 09/25/2015 09:00  
  
Method: 901.1\_GAMMA\_GS  
Analyst: MJH1  
Aliquot: 2 L  
Prep Method: EPA 901.1

Project: CPRC0F15028  
Matrix: WATER  
  
Prep Basis: "As Received"  
SOP Ref: GL-RAD-A-013  
Instrument: GAM43  
Count Time: 120 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	U	2.26	pCi/L	+/-3.97	4.10	7.04	10.0
10198-40-0	Cobalt-60	U	0.213	pCi/L	+/-3.18	3.19	6.50	
14683-23-9	Europium-152	U	-2.45	pCi/L	+/-11.1	11.1	18.3	
15585-10-1	Europium-154	U	-2.95	pCi/L	+/-9.10	9.20	17.3	
14391-16-3	Europium-155	U	7.81	pCi/L	+/-24.6	24.8	27.9	

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).

October 23, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL381844	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 381844001	<b>Date Collected:</b> 09/23/2015 13:17	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/25/2015 09:00	
<b>Client ID:</b> B31TY9	<b>Prep Basis:</b> "As Received"	
<b>Batch ID:</b> 1511784	<b>Method:</b> DOE EML HASL-300,I-01 Mo	<b>SOP Ref:</b> GL-RAD-A-006
<b>Run Date:</b> 10/08/2015 10:54	<b>Analyst:</b> MJH1	<b>Instrument:</b> XRAY1
<b>Data File:</b> I381844001.CNF;2	<b>Aliquot:</b> 0.2 L	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1511784	<b>Prep Method:</b> DOE EML HASL-300,I-01 M	
<b>Prep Date:</b> 10/02/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	U	0.406	pCi/L	+/-1.96	1.97	3.47	5.00

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

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

October 23, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL381844	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 381844001	<b>Date Collected:</b> 09/23/2015 13:17	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/25/2015 09:00	
<b>Client ID:</b> B31TY9	<b>Method:</b> TRITIUM_DIST_LSC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1510633	<b>Analyst:</b> GXR1	<b>SOP Ref:</b> GL-RAD-A-002
<b>Run Date:</b> 10/03/2015 06:51	<b>Aliquot:</b> 50 mL	<b>Instrument:</b> LSCORANGE
<b>Data File:</b> T1510633R.xls	<b>Prep Method:</b> EPA 906.0 Modified	<b>Count Time:</b> 15.02965 min
<b>Prep Batch:</b> 1510633		
<b>Prep Date:</b> 09/29/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		11500	pCi/L	+/-727	2340	185	100

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).

October 23, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL381844	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 381844001	<b>Date Collected:</b> 09/23/2015 13:17	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/25/2015 09:00	
<b>Client ID:</b> B31TY9	<b>Method:</b> C14_LSC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1510644	<b>Analyst:</b> TXJ1	<b>SOP Ref:</b> GL-RAD-A-003
<b>Run Date:</b> 10/15/2015 19:06	<b>Aliquot:</b> 300 mL	<b>Instrument:</b> LSCYELLOW
<b>Data File:</b> C1510644.xls	<b>Prep Method:</b> EPA EERF C-01 Modified	<b>Count Time:</b> 13.5500001907349 min
<b>Prep Batch:</b> 1510644		
<b>Prep Date:</b> 10/15/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14		1550	pCi/L	+/-31.4	290	7.68	5.00

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

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

October 23, 2015  
Rad

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL381844	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 381844001	<b>Date Collected:</b> 09/23/2015 13:17	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/25/2015 09:00	
<b>Client ID:</b> B31TY9	<b>Method:</b> TC99_EIE_LSC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1511443	<b>Analyst:</b> GXR1	<b>SOP Ref:</b> GL-RAD-A-059
<b>Run Date:</b> 10/22/2015 07:42	<b>Aliquot:</b> 200 mL	<b>Instrument:</b> LSCGOLD
<b>Data File:</b> E1511443r2.xls	<b>Prep Method:</b> DOE EML HASL-300, Tc-02-	<b>Count Time:</b> 45 min
<b>Prep Batch:</b> 1511443		
<b>Prep Date:</b> 10/15/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	12.0	pCi/L	+/-7.40	7.52	12.2	15.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	37300	37900	CPM	98.5	(15%-125%)

**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).

# Quality Control Data

# GEL LABORATORIES LLC

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## QC Summary

Report Date: October 22, 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:** 381844

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1511226								
QC1203402628	MB								
Americium-241			U	0.161	pCi/L			JXE2	10/06/1511:35
				Uncert: +/-0.321					
				TPU: +/-0.321					
**Americium-243 Tracer	21.4			18.5	pCi/L	REC: 87	(15%-125%)		
				Uncert: +/-2.54					
				TPU: +/-3.78					
QC1203402629	381844001	DUP							
Americium-241		U	0.0386	U	0.310	pCi/L			
				Uncert: +/-0.214	+/-0.295	RPD: 0	N/A		
				TPU: +/-0.214	+/-0.297	RER: 1.45	(0-2)		
**Americium-243 Tracer	21.4	19.4		21.8	pCi/L	REC: 102	(15%-125%)		
				Uncert: +/-2.46	+/-2.14				
				TPU: +/-3.67	+/-3.25				
QC1203402630	LCS								
Americium-241				19.7		23.2	pCi/L		
				Uncert: +/-2.39					
				TPU: +/-3.66					
**Americium-243 Tracer	21.4			18.3	pCi/L	REC: 86	(15%-125%)		
				Uncert: +/-2.28					
				TPU: +/-3.43					
Batch	1511227								
QC1203402631	MB								
Plutonium-238			U	0.0786	pCi/L			JXE2	10/06/1511:35
				Uncert: +/-0.221					
				TPU: +/-0.221					
Plutonium-239/240			U	0.101	pCi/L				
				Uncert: +/-0.277					
				TPU: +/-0.277					
**Plutonium-242 Tracer	19.7			14.2	pCi/L	REC: 72	(15%-125%)		
				Uncert: +/-2.45					
				TPU: +/-3.63					
QC1203402632	381844001	DUP							
Plutonium-238		U	0.0383	U	-0.0326	pCi/L			
				Uncert: +/-0.213	+/-0.144	RPD: 0	N/A		
				TPU: +/-0.213	+/-0.145	RER: 0.54	(0-2)		
Plutonium-239/240		U	0.0383	U	-0.0326	pCi/L			
				Uncert: +/-0.213	+/-0.144	RPD: 0	N/A		
				TPU: +/-0.213	+/-0.145	RER: 0.54	(0-2)		
**Plutonium-242 Tracer	19.7	14.4		15.9	pCi/L	REC: 81	(15%-125%)		
				Uncert: +/-2.37	+/-2.28				
				TPU: +/-3.52	+/-3.40				
QC1203402633	LCS								
Plutonium-238			U	-0.0179	pCi/L				
				Uncert: +/-0.155					

~~October 23, 2015~~  
**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 381844

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1511227								
Plutonium-239/240	19.7	TPU:		+/-0.155					
		Uncert:		17.7	pCi/L	REC: 90	(80%-120%)		
		TPU:		+/-2.27					
**Plutonium-242 Tracer	19.7	TPU:		+/-3.27					
		Uncert:		14.6	pCi/L	REC: 74	(15%-125%)		
		TPU:		+/-2.38					
		TPU:		+/-3.54					
Batch	1516130								
QC1203414493	MB								
Uranium-233/234			U	0.238	pCi/L			JXE2	10/21/1515:30
		Uncert:		+/-0.497					
		TPU:		+/-0.499					
Uranium-235/236			U	0.494	pCi/L				
		Uncert:		+/-0.706					
		TPU:		+/-0.713					
Uranium-238			U	0.417	pCi/L				
		Uncert:		+/-0.570					
		TPU:		+/-0.576					
**Uranium-232 Tracer	21.1			21.2	pCi/L	REC: 100	(15%-125%)		
		Uncert:		+/-3.47					
		TPU:		+/-5.44					
QC1203414494	381844001	DUP							
Uranium-233/234		1.18		1.84	pCi/L				10/20/1513:20
		Uncert:	+/-0.628	+/-0.779		RPD: 44	(0% - 100%)		
		TPU:	+/-0.656	+/-0.836		RER: 1.22	(0-2)		
Uranium-235/236		0.572	U	0.300	pCi/L				
		Uncert:	+/-0.497	+/-0.395		RPD: 63	(0% - 100%)		
		TPU:	+/-0.505	+/-0.398		RER: 0.83	(0-2)		
Uranium-238		0.793		1.34	pCi/L				
		Uncert:	+/-0.529	+/-0.676		RPD: 51	(0% - 100%)		
		TPU:	+/-0.544	+/-0.711		RER: 1.19	(0-2)		
**Uranium-232 Tracer	21.2	20.0		20.9	pCi/L	REC: 99	(15%-125%)		
		Uncert:	+/-2.52	+/-2.58					
		TPU:	+/-4.26	+/-4.34					
QC1203414495	LCS								
Uranium-233/234				25.8	pCi/L				10/20/1513:20
		Uncert:		+/-2.71					
		TPU:		+/-4.95					
Uranium-235/236				2.28	pCi/L				
		Uncert:		+/-0.912					
		TPU:		+/-0.983					
Uranium-238	26.9			28.8	pCi/L	REC: 107	(80%-120%)		
		Uncert:		+/-2.86					
		TPU:		+/-5.44					
**Uranium-232 Tracer	21.1			21.8	pCi/L	REC: 103	(15%-125%)		
		Uncert:		+/-2.46					
		TPU:		+/-4.19					
<b>Rad Gamma Spec</b>									
Batch	1510910								

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

## QC Summary

Workorder: 381844

Page 3 of 6

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1510910								
QC1203401765	MB								
Cesium-137			U	0.579	pCi/L			MJH1	10/01/1506:50
				Uncert: +/-3.12					
				TPU: +/-3.13					
Cobalt-60			U	1.73	pCi/L				
				Uncert: +/-2.77					
				TPU: +/-2.88					
Europium-152			U	11.4	pCi/L				
				Uncert: +/-8.44					
				TPU: +/-9.94					
Europium-154			U	-2.43	pCi/L				
				Uncert: +/-7.49					
				TPU: +/-7.58					
Europium-155			U	-0.356	pCi/L				
				Uncert: +/-7.31					
				TPU: +/-7.32					
QC1203401766	381844001	DUP							
Cesium-137		U	2.26	U	-2.1	pCi/L			10/01/1508:56
				Uncert: +/-3.97	+/-3.21		RPD: 0	N/A	
				TPU: +/-4.10	+/-3.35		RER: 1.61	(0-2)	
Cobalt-60		U	0.213	U	-0.161	pCi/L			
				Uncert: +/-3.18	+/-1.99		RPD: 0	N/A	
				TPU: +/-3.19	+/-1.99		RER: 0.195	(0-2)	
Europium-152		U	-2.45	U	0.556	pCi/L			
				Uncert: +/-11.1	+/-8.51		RPD: 0	N/A	
				TPU: +/-11.1	+/-8.51		RER: 0.42	(0-2)	
Europium-154		U	-2.95	U	8.06	pCi/L			
				Uncert: +/-9.10	+/-7.57		RPD: 0	N/A	
				TPU: +/-9.20	+/-8.42		RER: 1.73	(0-2)	
Europium-155		U	7.81	U	12.1	pCi/L			
				Uncert: +/-24.6	+/-12.7		RPD: 0	N/A	
				TPU: +/-24.8	+/-13.8		RER: 0.296	(0-2)	
QC1203401767	LCS								
Americium-241		34400			36900	pCi/L	REC: 107	(80%-120%)	10/01/1507:41
					Uncert: +/-949				
					TPU: +/-3010				
Cesium-137		13700			14200	pCi/L	REC: 104	(80%-120%)	
					Uncert: +/-303				
					TPU: +/-1180				
Cobalt-60		14900			14700	pCi/L	REC: 99	(80%-120%)	
					Uncert: +/-339				
					TPU: +/-1370				
Europium-152			U		-20.8	pCi/L			
					Uncert: +/-185				
					TPU: +/-186				
Europium-154			U		-9.65	pCi/L			
					Uncert: +/-114				
					TPU: +/-114				
Europium-155			U		-144	pCi/L			
					Uncert: +/-215				

~~October 23, 2015~~  
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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**QC Summary**

**Workorder: 381844**

Page 4 of 6

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1510910								
		TPU:		+/-225					
Batch	1511784								
QC1203404020	MB								
Iodine-129			U	-0.179	pCi/L			MJH1	10/08/1510:55
		Uncert:		+/-0.429					
		TPU:		+/-0.437					
QC1203404021	381844001	DUP							
Iodine-129		U	0.406	U	0.736				10/08/1510:57
		Uncert:	+/-1.96		+/-1.43	RPD: 0	N/A		
		TPU:	+/-1.97		+/-1.47	RER: 0.264	(0-2)		
QC1203404023	381844001	MS							
Iodine-129		208	U	0.406	203	pCi/L	REC: 98 (75%-125%)		10/08/1515:28
		Uncert:	+/-1.96		+/-17.4				
		TPU:	+/-1.97		+/-27.0				
QC1203404025	LCS								
Iodine-129		52.0			45.0	pCi/L	REC: 87 (80%-120%)		10/08/1515:28
		Uncert:			+/-6.84				
		TPU:			+/-8.24				
<b>Rad Gas Flow</b>									
Batch	1512845								
QC1203406524	MB								
Total Strontium			U	0.100	pCi/L			KSD1	10/20/1511:11
		Uncert:		+/-0.795					
		TPU:		+/-0.796					
**Strontium Carrier		8.10			8.20	mg	REC: 101 (25%-125%)		
QC1203406525	381844001	DUP							
Total Strontium				2870	2590	pCi/L			10/20/1511:11
		Uncert:	+/-23.5		+/-21.7	RPD: 10	(0% - 20%)		
		TPU:	+/-660		+/-610	RER: 0.599	(0-2)		
**Strontium Carrier		8.10		7.90	8.30	mg	REC: 102 (25%-125%)		
QC1203406526	LCS								
Total Strontium		72.3			70.5	pCi/L	REC: 97 (80%-120%)		10/20/1511:13
		Uncert:			+/-3.73				
		TPU:			+/-16.7				
**Strontium Carrier		8.10			7.70	mg	REC: 95 (25%-125%)		
<b>Rad Liquid Scintillation</b>									
Batch	1510633								
QC1203400956	MB								
Tritium			U	11.0	pCi/L			GXR1	10/03/1500:32
		Uncert:		+/-43.3					
		TPU:		+/-43.3					
QC1203400957	381844001	DUP							
Tritium				11500	11800	pCi/L			10/03/1507:09
		Uncert:	+/-727		+/-749	RPD: 3	(0% - 20%)		
		TPU:	+/-2340		+/-2400	RER: 0.173	(0-2)		
QC1203400958	381844001	MS							
Tritium		1800		11500	12400	pCi/L	REC: N/A		10/03/1507:27
		Uncert:	+/-727		+/-764				
		TPU:	+/-2340		+/-2520				

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

## QC Summary

Workorder: 381844

Page 5 of 6

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Liquid Scintillation</b>									
Batch	1510633								
QC1203400959	LCS								
Tritium	1800			1630	pCi/L	REC: 91 (80%-120%)			10/03/1507:44
	Uncert:			+/-287					
	TPU:			+/-426					
Batch	1510644								
QC1203400987	MB								
Carbon-14			U	1.33	pCi/L			TXJ1	10/16/1502:37
	Uncert:			+/-1.97					
	TPU:			+/-1.98					
QC1203400988	381844001	DUP							
Carbon-14		1550		1670	pCi/L				10/16/1504:39
	Uncert:	+/-31.4		+/-33.6		RPD: 7 (0% - 20%)			
	TPU:	+/-290		+/-311		RER: 0.515 (0-2)			
QC1203400989	381844001	MS							
Carbon-14	1510	1550		3150	pCi/L	REC: 106 (75%-125%)			10/16/1504:53
	Uncert:	+/-31.4		+/-106					
	TPU:	+/-290		+/-595					
QC1203400990	LCS								
Carbon-14	252			254	pCi/L	REC: 101 (80%-120%)			10/16/1505:09
	Uncert:			+/-12.6					
	TPU:			+/-48.8					
Batch	1511443								
QC1203403208	MB								
Technetium-99			U	-5.07	pCi/L			GXR1	10/22/1509:06
	Uncert:			+/-4.74					
	TPU:			+/-4.74					
**Technetium-99m Tracer	37900			35900	CPM	REC: 95 (15%-125%)			
QC1203403209	381844001	DUP							
Technetium-99		U	12.0	11.2	pCi/L				10/22/1509:55
	Uncert:	+/-7.40		+/-5.31		RPD: 7 (0% - 100%)			
	TPU:	+/-7.52		+/-5.46		RER: 0.166 (0-2)			
**Technetium-99m Tracer	37900	37300		35600	CPM	REC: 94 (15%-125%)			
QC1203403211	LCS								
Technetium-99	287			270	pCi/L	REC: 94 (80%-120%)			10/22/1510:44
	Uncert:			+/-9.67					
	TPU:			+/-31.5					
**Technetium-99m Tracer	37900			34700	CPM	REC: 92 (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
- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- B The associated QC sample blank has a result >= 2X the MDA and, after corrections, result is >= MDA for this sample

## QC Summary

Workorder: 381844

Page 6 of 6

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
C						Target analyte was detected in the sample and the associated blank. The associated blank concentration is $\geq$ EQL or is $>$ 5% of the measured concentration and/or decision level for associated samples.				
D						Results are reported from a diluted aliquot of sample.				
E						Reported value is estimated due to interferences. See comment in narrative.				
M						Duplicate precision not met.				
N						Spike Sample recovery is outside control limits.				
S						Reported value determined by the Method of Standard Additions (MSA)				
U						Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.				
UX						Gamma Spectroscopy--Uncertain identification				
W						Post-digestion spike recovery for GFAA out of control limit. Sample absorbency $<$ 50% of spike absorbency.				
X						Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier				
Y						Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier				
Z						Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier				

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

\*\* Indicates analyte is a surrogate compound.

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