



September 24, 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: 380436  
SDG: GEL380436

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 02, 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: F15-028-045  
Enclosures



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# Case Narrative

September 29, 2015

General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF F15-028  
SDG: GEL380436

September 24, 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 02, 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>
380436001	B31TX4

**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*  
September 29, 2015

Sarah Edwards for  
Heather Shaffer  
Project Manager

September 29, 2015

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST <b>30436</b>		PAGE 1 OF 2	
COLLECTOR D.W. Brotherton/CHPRC	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	PRICE CODE 7H	DATA TURNAROUND 30 Days / 30 Days
SAMPLING LOCATION C8797, Interval W-4	PROJECT DESIGNATION 100-KE Characterization Boreholes - Water	SAF NO. F15-028	COA 303581	AIR QUALITY	METHOD OF SHIPMENT FEDERAL EXPRESS
ICE CHEST NO. <b>GW5-537</b>	FIELD LOGBOOK NO. <b>HNF-N-645-3/22</b>	ACTUAL SAMPLE DEPTH <b>95.0'</b>	BILL OF LADING/AIR BILL NO. <b>7744 1349 0700</b>		
SHIPPED TO GEL Laboratories, LLC	OFFSITE PROPERTY NO. <b>5931</b>				
MATRIX* A=Air DL=Drum L=Liquid O=Oil 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 be regulated for transportation per 49 CFR/JATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	PRESERVATION HNO3 to pH <2 Cool <=6C	None	HNO3 to pH <2	None
	HOLDING TIME 6 Months	14 Days	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	4L	1L	500mL
	SAMPLE ANALYSIS 6010_METALS. ICP: COMMON (Chromium);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	GAMMA_GS: COMMON;	ANCMISO_EIE. PRECIP_AEA: COMMON;	1129_SEP_LEPS. _GS: COMMON;
	SPECIAL HANDLING AND/OR STORAGE -RADIOACTIVE-THE TO-822314- JUL 9/1/15				
SAMPLE NO. B31TX4	MATRIX* WATER	SAMPLE DATE 9/1/15	SAMPLE TIME 0904		

  

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	DATE/TIME	DATE/TIME	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM D.W. Brotherton/CHPRC	RECEIVED BY/STORED IN F.M. Hall/CHPRC	SEP 01 2015	9/15/15	TRVL-15-112
RELINQUISHED BY/REMOVED FROM F.M. Hall/CHPRC	RECEIVED BY/STORED IN FEDEX	SEP 01 2015	9/15/15	(1) 2320_ALKALINITY: COMMON {Alkalinity}; 2320_ALKALINITY: COMMON (Add-on) {Bicarbonate, Carbonate alkalinity, Hydroxylion};
RELINQUISHED BY/REMOVED FROM [Signature]	RECEIVED BY/STORED IN M. Kinsley	SEP 01 2015	9-2-15 0850	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	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 = FSR1224      TRVL NUM = TRVL-15-112      A-6003-618 (REV 2)

September 29, 2015

CH2MHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST **380436** PAGE 2 OF 2

F15-028-045 PRICE CODE 7H DATA TURNAROUND 30 Days / 30 Days

COLLECTOR D.W. Brotherton/CHPRC PROJECT COORDINATOR TODAYAK, D

SAMPLING LOCATION C8797, Interval W-4 TELEPHONE NO. 376-6427

ICE CHEST NO. **645-537** PROJECT DESIGNATION 100-KE Characterization Boreholes - Water

SHIPPED TO GEL Laboratories, LLC OFFSITE PROPERTY NO. **5931** FIELD LOGBOOK NO. **110F-N-6453/22** ACTUAL SAMPLE DEPTH **95.0'**

SAF NO. F15-028 COA 303581 METHOD OF SHIPMENT FEDERAL EXPRESS

BILL OF LADING/AIR BILL NO. **7744 1349 0700**

MATRIX*	PRESERVATION	HNO3 to pH
A=Air	HOLDING TIME	<2
DL=Drum	TYPE OF CONTAINER	6 Months
Liquids	NO. OF CONTAINER(S)	G/P
DS=Drum	VOLUME	1
Solids	SAMPLE ANALYSIS	1L
L=Liquid	SPECIAL HANDLING AND/OR STORAGE	UISO_PLATE_A
O=Oil	"RADIOACTIVE-THE-TO: B92334"	EACOMMON;
S=Soil	SAMPLE NO.	
SE=Sediment	MATRIX*	
T=Tissue	WATER	
V=Vegetation		
W=Water		
WI=Wipe		
X=Other		

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM D.W. Brotherton/CHPRC	RECEIVED BY/STORED IN F.M. HAWCHPRC	TRVL-15-112
DATE/TIME SEP 01 2015 10:15	DATE/TIME 9/15/15	
RELINQUISHED BY/REMOVED FROM F.M. HAWCHPRC	RECEIVED BY/STORED IN FEDEX	
DATE/TIME SEP 01 2015	DATE/TIME 9/15/15	
RELINQUISHED BY/REMOVED FROM F.M. HAWCHPRC	RECEIVED BY/STORED IN M. K... ..	
DATE/TIME SEP 01 2015	DATE/TIME 9/15/15	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	
DATE/TIME	DATE/TIME	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	
DATE/TIME	DATE/TIME	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	
DATE/TIME	DATE/TIME	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	
DATE/TIME	DATE/TIME	
LABORATORY SECTION	RECEIVED BY	TITLE
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY

September 29, 2015

**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>OPRC</u>		SDG/AR/COC/Work Order: <u>380436</u>
Received By: <u>mk</u>		Date Received: <u>9-2-15</u>
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>cpm 0</u>
Classified Radioactive II or III by RSO?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Package, COC, and/or Samples marked as beryllium or asbestos containing?	Yes <input checked="" type="checkbox"/> No <input 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?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method <u>Ice bags</u> 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"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>ECU32015930</u> Secondary Temperature Device Serial # (if Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7 VOA vials contain acid preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air <input checked="" type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <u>7744 1349 .0700</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 24 September 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	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	SC000122015-18
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# Metals Analysis

# Case Narrative

September 29, 2015

Metals

Technical Case Narrative

CH2MHill Plateau Remediation Company (CPRC)

SDG #: GEL380436

Work Order #: 380436

Sample ID	Client ID
380436001	B31TX4
1203386370	Method Blank (MB)ICP
1203386371	Laboratory Control Sample (LCS)
1203386374	380436001(B31TX4L) Serial Dilution (SD)
1203386372	380436001(B31TX4S) Matrix Spike (MS)
1203386373	380436001(B31TX4SD) Matrix Spike Duplicate (MSD)

**Sample Analysis**

Sample 380436 001 in this SDG was analyzed for metals on an "as received" basis.

**Method/Analysis Information**

<b>Analytical Batch:</b>	1505001
<b>Prep Batch :</b>	1505000
<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 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: 380436001 (B31TX4).

**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 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:

September 29, 2015

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.

September 29, 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: GEL380436 GEL Work Order: 380436

**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:** 29 SEP 2015

**Title:** Data Validator

# Sample Data Summary

METALS  
-1-  
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL380436

METHOD TYPE: SW846

SAMPLE ID: 380436001

CLIENT ID: B31TX4

CONTRACT: CPRC0F15028

MATRIX: WATER

DATE RECEIVED 02-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	1	ug/L	U		P	1	1	OPTIMA3	090415A-1

\*Analytical Methods:

P SW846 3005A/6010C

# Quality Control Summary

**September 29, 2015**  
**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: September 29, 2015

Page 1 of 2

**CH2M Hill Plateau Remediation Company**

**MSIN R3-50 CHPRC**

**PO Box 1600**

**Richland, Washington**

**Contact: Mr. Scot Fitzgerald**

**Workorder: 380436**

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1505001										
QC1203386371	LCS										
Chromium	500			491	ug/L		98.3	(80%-120%)	HSC	09/04/15	14:57
QC1203386370	MB										
Chromium			U	ND	ug/L					09/04/15	14:54
QC1203386372	380436001	MS									
Chromium	500	U	ND	478	ug/L		95.5	(75%-125%)		09/04/15	15:03
QC1203386373	380436001	MSD									
Chromium	500	U	ND	486	ug/L	1.71	97.1	(0%-20%)		09/04/15	15:07
QC1203386374	380436001	SDILT									
Chromium		U	ND DU	ND	ug/L	N/A		(0%-10%)		09/04/15	15:10

**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

September 29, 2015  
**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 380436

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

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 #: GEL380436  
Work Order #: 380436

**Method/Analysis Information**

**Product:** Alkalinity  
**Analytical Batch:** 1506381      **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>
380436001	B31TX4
1203389817	Method Blank (MB)
1203389818	Laboratory Control Sample (LCS)
1203389819	380436001(B31TX4) Sample Duplicate (DUP)
1203389822	380343002(B32CB2) Sample Duplicate (DUP)

Sample 380436 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 MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Samples 380343002 (B32CB2) and 380436001 (B31TX4) 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 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.

September 29, 2015

**GEL LABORATORIES LLC**

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL380436 GEL Work Order: 380436

**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:** 28 SEP 2015

**Title:** Data Validator

# Sample Data Summary

## Certificate of Analysis

Report Date: September 28, 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: B31TX4	Project: CPRC0F15028
Sample ID: 380436001	Client ID: CPRC001
Matrix: WATER	
Collect Date: 01-SEP-15 09:04	
Receive Date: 02-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		90300	725	1000	ug/L		AMB	09/10/15	1654	1506381	1
Bicarbonate alkalinity (CaCO3)		90300	725	1000	ug/L						
Carbonate alkalinity (CaCO3)	U	725	725	1000	ug/L						
Hydroxide alkalinity as CaCO3	U	725	725	1000	ug/L						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	2320_ALKALINITY	

**Notes:**

# Quality Control Summary

**September 29, 2015**  
**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: September 28, 2015

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**CH2M Hill Plateau Remediation Company**  
**MSIN R3-50 CHPRC**  
**PO Box 1600**  
**Richland, Washington**

**Contact: Mr. Scot Fitzgerald**

**Workorder: 380436**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Titration and Ion Analysis</b>											
Batch	1506381										
QC1203389819	380436001	DUP									
Alkalinity, Total as CaCO3		90300		90800	ug/L	0.554		(0%-20%)	AMB	09/10/15	16:57
Bicarbonate alkalinity (CaCO3)		90300		90800	ug/L	0.554		(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					
QC1203389822	380343002	DUP									
Alkalinity, Total as CaCO3		106000		107000	ug/L	0.471		(0%-20%)		09/10/15	16:09
Bicarbonate alkalinity (CaCO3)		106000		107000	ug/L	0.471		(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					
QC1203389818	LCS										
Alkalinity, Total as CaCO3	50000			52700	ug/L		105	(90%-110%)		09/10/15	15:39
QC1203389817	MB										
Alkalinity, Total as CaCO3			U	725	ug/L					09/10/15	15:30
Bicarbonate alkalinity (CaCO3)			U	725	ug/L						
Carbonate alkalinity (CaCO3)			U	725	ug/L						
Hydroxide alkalinity as CaCO3			U	725	ug/L						

**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.

September 29, 2015  
**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 380436

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

September 29, 2015

Radiochemistry

Technical Case Narrative

CH2MHill Plateau Remediation Company (CPRC)

SDG #: GEL380436

Work Order #: 380436

**Method/Analysis Information**

**Product:** AMCMISO\_EIE\_PRECIP\_AEA: COMMON

Analytical Method: AMCMISO\_EIE\_PREC\_AEA

Analytical Batch Number: 1504949

<b>Sample ID</b>	<b>Client ID</b>
380436001	B31TX4
1203386246	Method Blank (MB)
1203386248	Laboratory Control Sample (LCS)
1203386247	380436001(B31TX4) Sample Duplicate (DUP)

Sample 380436 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.

**Designated QC**

The following sample was used for QC: 380436001 (B31TX4).

**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.

**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:** 1504951

<b>Sample ID</b>	<b>Client ID</b>
380436001	B31TX4
1203386249	Method Blank (MB)
1203386251	Laboratory Control Sample (LCS)
1203386250	380436001(B31TX4) Sample Duplicate (DUP)

Sample 380436 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.

**Designated QC**

The following sample was used for QC: 380436001 (B31TX4).

**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.

**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: 1504952

<b>Sample ID</b>	<b>Client ID</b>
380436001	B31TX4
1203386252	Method Blank (MB)
1203386254	Laboratory Control Sample (LCS)
1203386253	380436001(B31TX4) Sample Duplicate (DUP)

Sample 380436 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.

**Designated QC**

The following sample was used for QC: 380436001 (B31TX4).

**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**

September 29, 2015

Sample 1203386253 (B31TX4DUP) was recounted due to a suspected 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:** I129\_SEP\_LEPS\_GS: COMMON  
**Analytical Method:** DOE EML HASL-300,I-01 Modified  
**Analytical Batch Number:** 1504214

Sample ID	Client ID
380436001	B31TX4
1203384335	Method Blank (MB)
1203384338	Laboratory Control Sample (LCS)
1203384336	380251001(B31TW8) Sample Duplicate (DUP)
1203384337	380251001(B31TW8) Matrix Spike (MS)

Sample 380436 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.

**Designated QC**

The following sample was used for QC: 380251001 (B31TW8).

**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>GAMMA_GS:COMMON (Cs137,Co60,Eu152,Eu154,Eu155)</b>
Analytical Method:	901.1_GAMMA_GS
Analytical Batch Number:	1505824

<b>Sample ID</b>	<b>Client ID</b>
380436001	B31TX4
1203388290	Method Blank (MB)
1203388293	Laboratory Control Sample (LCS)
1203388291	380339001(B31TW6) Sample Duplicate (DUP)

Sample 380436 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.

**Designated QC**

The following sample was used for QC: 380339001 (B31TW6).

**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:** SRTOT\_SEP\_PRECIP\_GPC: COMMON

Analytical Method: SRTOT\_SEP\_PRECIP\_GPC

Analytical Batch Number: 1506138

<b>Sample ID</b>	<b>Client ID</b>
380436001	B31TX4
1203389202	Method Blank (MB)
1203389204	Laboratory Control Sample (LCS)
1203389203	380709001(B31TX7) Sample Duplicate (DUP)

Sample 380436 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.

**Designated QC**

The following sample was used for QC: 380709001 (B31TX7).

**QC Information**

All of the QC samples meet the required acceptance limits with the following exceptions: The sample and the duplicate, 1203389203 (B31TX7DUP) , did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with a value of 1.77.

**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**

Sample 1203389202 (MB) was recounted due to a suspected blank false positive. The recount is reported.  
Sample 1203389203 (B31TX7DUP) was recounted due to high relative percent difference/relative error ratio. 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:** TC99\_EIE\_LSC: COMMON

Analytical Method: TC99\_EIE\_LSC

Analytical Batch Number: 1505369

Sample ID	Client ID
380436001	B31TX4
1203387208	Method Blank (MB)
1203387211	Laboratory Control Sample (LCS)
1203387209	380436001(B31TX4) Sample Duplicate (DUP)

Sample 380436 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.

**Designated QC**

The following sample was used for QC: 380436001 (B31TX4).

**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:** C14\_LSC: COMMON  
Analytical Method: C14\_LSC  
Analytical Batch Number: 1506248

<b>Sample ID</b>	<b>Client ID</b>
380436001	B31TX4
1203389510	Method Blank (MB)
1203389513	Laboratory Control Sample (LCS)
1203389511	380709001(B31TX7) Sample Duplicate (DUP)
1203389512	380709001(B31TX7) Matrix Spike (MS)

Sample 380436 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.

**Designated QC**

The following sample was used for QC: 380709001 (B31TX7).

**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 380436001 (B31TX4) was recounted to verify sample results. The recount result is similar to the original result. Original result 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**

The matrix spike, 1203389512 (B31TX7MS), aliquot was reduced to conserve sample volume.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** TRITIUM\_DIST\_LSC: COMMON

Analytical Method: TRITIUM\_DIST\_LSC

Analytical Batch Number: 1507565

Sample ID	Client ID
380436001	B31TX4
1203393075	Method Blank (MB)
1203393080	Laboratory Control Sample (LCS)
1203393076	380994002(B31TY6) Sample Duplicate (DUP)
1203393078	380994002(B31TY6) Matrix Spike (MS)

Sample 380436 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.

**Designated QC**

The following sample was used for QC: 380994002 (B31TY6).

**QC Information**

All of the QC samples meet the required acceptance limits with the following exceptions: The blank, 1203393075 (MB), did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots. All other samples met the detection 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 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 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**

September 29, 2015

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.

September 29, 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: GEL380436 GEL Work Order: 380436

**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:** Kate Gellatly

**Date:** 25 SEP 2015

**Title:** Analyst I

# Sample Data Summary

September 29, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL380436	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 380436001	<b>Date Collected:</b> 09/01/2015 09:04	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/02/2015 08:50	
<b>Client ID:</b> B31TX4	<b>Method:</b> AMCMISO_EIE_PREC_AEA	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1504949	<b>Analyst:</b> JXD2	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 09/15/2015 16:24	<b>Aliquot:</b> 0.1 L	<b>Instrument:</b> 1111
<b>Data File:</b> S0380436001_AM.1A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, Am-05	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1504949		
<b>Prep Date:</b> 09/14/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.115	pCi/L	+/-0.226	0.226	0.313	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	18.5	21.4	pCi/L	86.2	(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).

September 29, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL380436	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 380436001	<b>Date Collected:</b> 09/01/2015 09:04	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/02/2015 08:50	
<b>Client ID:</b> B31TX4	<b>Method:</b> PUIISO_PLATE_AEA	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1504951	<b>Analyst:</b> JXD2	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 09/16/2015 09:31	<b>Aliquot:</b> 0.1 L	<b>Instrument:</b> 1071
<b>Data File:</b> S0380436001_PU.1A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, Pu-11-	<b>Count Time:</b> 239.9998 min
<b>Prep Batch:</b> 1504951		
<b>Prep Date:</b> 09/14/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	0.0607	pCi/L	+/-0.392	0.392	0.801	1.00
OER-100-70	Plutonium-239/240	U	-0.0433	pCi/L	+/-0.405	0.405	0.940	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	10.9	19.8	pCi/L	54.9	(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).

September 29, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL380436	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 380436001	<b>Date Collected:</b> 09/01/2015 09:04	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/02/2015 08:50	
<b>Client ID:</b> B31TX4	<b>Method:</b> UIISO_IE_PRECIP_AEA	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1504952	<b>Analyst:</b> JXD2	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 09/16/2015 09:31	<b>Aliquot:</b> 0.1 L	<b>Instrument:</b> 1008
<b>Data File:</b> S0380436001_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> 1504952		
<b>Prep Date:</b> 09/14/2015 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	U	0.0679	pCi/L	+/-0.232	0.232	0.430	1.00
15117-96-1/13982-7	Uranium-235/236	U	0.161	pCi/L	+/-0.277	0.278	0.242	1.00
7440-61-1	Uranium-238	U	0.379	pCi/L	+/-0.370	0.375	0.458	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	18.6	21.2	pCi/L	88	(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).

September 29, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL380436	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 380436001	<b>Date Collected:</b> 09/01/2015 09:04	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/02/2015 08:50	
<b>Client ID:</b> B31TX4	<b>Method:</b> SRTOT_SEP_PRECIP_GPC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1506138	<b>Analyst:</b> KSD1	<b>SOP Ref:</b> GL-RAD-A-004
<b>Run Date:</b> 09/22/2015 13:01	<b>Aliquot:</b> 300 mL	<b>Instrument:</b> LB4100H4
<b>Data File:</b> S1506138r1.xls	<b>Prep Method:</b> EPA 905.0 Modified/DOE RP5	<b>Count Time:</b> 60 min
<b>Prep Batch:</b> 1506138		
<b>Prep Date:</b> 09/18/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium		218	pCi/L	+/-7.00	50.6	1.74	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	8.00	8.10	mg	98.8	(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).

September 29, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL380436	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 380436001	<b>Date Collected:</b> 09/01/2015 09:04	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/02/2015 08:50	
<b>Client ID:</b> B31TX4	<b>Method:</b> DOE EML HASL-300,I-01 Mo	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1504214	<b>Analyst:</b> MJH1	<b>SOP Ref:</b> GL-RAD-A-006
<b>Run Date:</b> 09/11/2015 14:00	<b>Aliquot:</b> 0.3 L	<b>Instrument:</b> XRAY2
<b>Data File:</b> I380436001.CNF;1	<b>Prep Method:</b> DOE EML HASL-300,I-01 M	<b>Count Time:</b> 60 min
<b>Prep Batch:</b> 1504214		
<b>Prep Date:</b> 09/10/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	U	2.40	pCi/L	+/-2.01	2.03	5.28	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).

September 29, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL380436  
 Lab Sample ID: 380436001  
  
 Client ID: B31TX4  
 Batch ID: 1505824  
 Run Date: 09/12/2015 10:03  
 Data File: G380436001.CNF;1  
 Prep Batch: 1505824  
 Prep Date: 09/11/2015 00:00

Client: CPRC001  
 Date Collected: 09/01/2015 09:04  
 Date Received: 09/02/2015 08:50  
  
 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: GAM25  
 Count Time: 120 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	U	1.23	pCi/L	+/-2.93	2.99	5.71	10.0
10198-40-0	Cobalt-60	U	-2.43	pCi/L	+/-3.59	3.75	6.17	
14683-23-9	Europium-152	U	-3.88	pCi/L	+/-8.63	8.81	14.5	
15585-10-1	Europium-154	U	-0.499	pCi/L	+/-9.30	9.30	18.0	
14391-16-3	Europium-155	U	-5.93	pCi/L	+/-8.49	8.92	13.9	

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).

September 29, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL380436	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 380436001	<b>Date Collected:</b> 09/01/2015 09:04	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/02/2015 08:50	
<b>Client ID:</b> B31TX4	<b>Method:</b> TC99_EIE_LSC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1505369	<b>Analyst:</b> MYM1	<b>SOP Ref:</b> GL-RAD-A-059
<b>Run Date:</b> 09/20/2015 15:17	<b>Aliquot:</b> 200 mL	<b>Instrument:</b> LSCGREEN
<b>Data File:</b> E1505369.xls	<b>Prep Method:</b> DOE EML HASL-300, Tc-02-	<b>Count Time:</b> 40 min
<b>Prep Batch:</b> 1505369		
<b>Prep Date:</b> 09/15/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	0.794	pCi/L	+/-8.09	8.09	13.9	15.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	97500	97200	CPM	100	(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).

September 29, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL380436	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 380436001	<b>Date Collected:</b> 09/01/2015 09:04	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/02/2015 08:50	
<b>Client ID:</b> B31TX4	<b>Method:</b> C14_LSC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1506248	<b>Analyst:</b> GXR1	<b>SOP Ref:</b> GL-RAD-A-003
<b>Run Date:</b> 09/23/2015 05:16	<b>Aliquot:</b> 300.04 mL	<b>Instrument:</b> LSCTEAL
<b>Data File:</b> C1506248.xls	<b>Prep Method:</b> EPA EERF C-01 Modified	<b>Count Time:</b> 32.9000015258789 min
<b>Prep Batch:</b> 1506248		
<b>Prep Date:</b> 09/22/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14		636	pCi/L	+/-13.1	119	5.09	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).

September 29, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL380436	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15028
<b>Lab Sample ID:</b> 380436001	<b>Date Collected:</b> 09/01/2015 09:04	<b>Matrix:</b> WATER
	<b>Date Received:</b> 09/02/2015 08:50	
<b>Client ID:</b> B31TX4	<b>Method:</b> TRITIUM_DIST_LSC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1507565	<b>Analyst:</b> GXR1	<b>SOP Ref:</b> GL-RAD-A-002
<b>Run Date:</b> 09/21/2015 15:46	<b>Aliquot:</b> 50 mL	<b>Instrument:</b> LSCPINK
<b>Data File:</b> T1507565R.xls	<b>Prep Method:</b> EPA 906.0 Modified	<b>Count Time:</b> 120.0297 min
<b>Prep Batch:</b> 1507565		
<b>Prep Date:</b> 09/17/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		465	pCi/L	+/-90.9	128	109	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).

# Quality Control Data

**QC Summary**

Report Date: September 25, 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:** 380436

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1504949								
QC1203386246	MB								
Americium-241			U	-0.0119	pCi/L			JXD2	09/15/1516:24
				Uncert: +/-0.178					
				TPU: +/-0.179					
**Americium-243 Tracer	21.4			20.0	pCi/L	REC: 93	(15%-125%)		
				Uncert: +/-2.20					
				TPU: +/-3.33					
QC1203386247	380436001	DUP							
Americium-241		U	0.115	U	-0.0575	pCi/L			09/15/1516:24
				Uncert: +/-0.226		RPD: 0	N/A		
				TPU: +/-0.226		RER: 1.29	(0-2)		
**Americium-243 Tracer	21.4	18.5		21.9	pCi/L	REC: 103	(15%-125%)		
				Uncert: +/-2.31					
				TPU: +/-3.47					
QC1203386248	LCS								
Americium-241		19.7		19.1	pCi/L	REC: 97	(80%-120%)		
				Uncert: +/-2.09					
				TPU: +/-3.05					
**Americium-243 Tracer	21.4			22.6	pCi/L	REC: 105	(15%-125%)		
				Uncert: +/-2.19					
				TPU: +/-3.32					
Batch	1504951								
QC1203386249	MB								
Plutonium-238			U	0.0826	pCi/L			JXD2	09/16/1509:31
				Uncert: +/-0.227					
				TPU: +/-0.228					
Plutonium-239/240			U	0.0206	pCi/L				
				Uncert: +/-0.235					
				TPU: +/-0.235					
**Plutonium-242 Tracer	19.8			16.9	pCi/L	REC: 86	(15%-125%)		
				Uncert: +/-2.23					
				TPU: +/-3.33					
QC1203386250	380436001	DUP							
Plutonium-238		U	0.0607	U	0.00319	pCi/L			
				Uncert: +/-0.392		RPD: 0	N/A		
				TPU: +/-0.392		RER: 0.246	(0-2)		
Plutonium-239/240		U	-0.0433	U	-0.0159	pCi/L			
				Uncert: +/-0.405		RPD: 0	N/A		
				TPU: +/-0.405		RER: 0.114	(0-2)		
**Plutonium-242 Tracer	19.8	10.9		15.1	pCi/L	REC: 76	(15%-125%)		
				Uncert: +/-2.90					
				TPU: +/-4.24					
QC1203386251	LCS								
Plutonium-238			U	0.171	pCi/L				
				Uncert: +/-0.303					

## QC Summary

Workorder: 380436

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1504951								
Plutonium-239/240	19.7	TPU:		+/-0.303					
		Uncert:		19.3	pCi/L	REC: 98	(80%-120%)		
		TPU:		+/-2.37					
**Plutonium-242 Tracer	19.8	TPU:		+/-3.51					
		Uncert:		15.3	pCi/L	REC: 77	(15%-125%)		
		TPU:		+/-2.41					
		TPU:		+/-3.58					
Batch	1504952								
QC1203386252	MB								
Uranium-233/234			U	0.176	pCi/L			JXD2	09/16/1509:31
		Uncert:		+/-0.398					
		TPU:		+/-0.400					
Uranium-235/236			U	0.0916	pCi/L				
		Uncert:		+/-0.344					
		TPU:		+/-0.344					
Uranium-238			U	0.0273	pCi/L				
		Uncert:		+/-0.285					
		TPU:		+/-0.286					
**Uranium-232 Tracer	21.2			13.0	pCi/L	REC: 61	(15%-125%)		
		Uncert:		+/-2.88					
		TPU:		+/-4.70					
QC1203386253	380436001	DUP							
Uranium-233/234		U	0.0679	U	0.177	pCi/L			09/24/1511:51
		Uncert:	+/-0.232		+/-0.313		RPD: 0	N/A	
		TPU:	+/-0.232		+/-0.314		RER: 0.546	(0-2)	
Uranium-235/236		U	0.161	U	0.242	pCi/L			
		Uncert:	+/-0.277		+/-0.384		RPD: 0	N/A	
		TPU:	+/-0.278		+/-0.386		RER: 0.33	(0-2)	
Uranium-238		U	0.379	U	0.0589	pCi/L			
		Uncert:	+/-0.370		+/-0.221		RPD: 0	N/A	
		TPU:	+/-0.375		+/-0.221		RER: 1.44	(0-2)	
**Uranium-232 Tracer	21.2		18.6		16.4	pCi/L	REC: 78	(15%-125%)	
		Uncert:	+/-2.34		+/-2.54				
		TPU:	+/-4.06		+/-4.28				
QC1203386254	LCS								
Uranium-233/234				26.3	pCi/L				09/16/1509:31
		Uncert:		+/-3.21					
		TPU:		+/-5.65					
Uranium-235/236				0.718	pCi/L				
		Uncert:		+/-0.652					
		TPU:		+/-0.664					
Uranium-238	27.2			28.9	pCi/L	REC: 106	(80%-120%)		
		Uncert:		+/-3.36					
		TPU:		+/-6.11					
**Uranium-232 Tracer	21.2			13.4	pCi/L	REC: 63	(15%-125%)		
		Uncert:		+/-2.91					
		TPU:		+/-4.74					
<b>Rad Gamma Spec</b>									
Batch	1504214								

## QC Summary

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1504214								
QC1203384335	MB								
Iodine-129			U	-0.0468	pCi/L			MJH1	09/11/1515:32
				Uncert: +/-0.390					
				TPU: +/-0.390					
QC1203384336	380251001	DUP							
Iodine-129		U	0.114	U	0.240				09/11/1515:32
				Uncert: +/-1.66		RPD: 0	N/A		
				TPU: +/-1.66		RER: 0.112	(0-2)		
QC1203384337	380251001	MS							
Iodine-129		139	U	0.114		REC: 95	(75%-125%)		09/11/1515:33
				Uncert: +/-1.66					
				TPU: +/-1.66					
QC1203384338	LCS								
Iodine-129		27.7			26.2	REC: 94	(80%-120%)		09/11/1515:33
				Uncert: +/-2.16					
				TPU: +/-3.39					
Batch	1505824								
QC1203388290	MB								
Cesium-137			U	-0.526	pCi/L			MJH1	09/14/1509:34
				Uncert: +/-2.44					
				TPU: +/-2.45					
Cobalt-60			U	1.88	pCi/L				
				Uncert: +/-2.78					
				TPU: +/-2.91					
Europium-152			U	-4.93	pCi/L				
				Uncert: +/-6.97					
				TPU: +/-7.33					
Europium-154			U	-1.83	pCi/L				
				Uncert: +/-6.46					
				TPU: +/-6.52					
Europium-155			U	-1.56	pCi/L				
				Uncert: +/-7.53					
				TPU: +/-7.57					
QC1203388291	380339001	DUP							
Cesium-137		U	1.45	U	1.85				09/14/1509:38
				Uncert: +/-2.96		RPD: 0	N/A		
				TPU: +/-3.03		RER: 0.166	(0-2)		
Cobalt-60		U	-1.67	U	1.68				
				Uncert: +/-3.26		RPD: 0	N/A		
				TPU: +/-3.35		RER: 1.39	(0-2)		
Europium-152		U	4.93	U	-3.67				
				Uncert: +/-8.26		RPD: 0	N/A		
				TPU: +/-8.57		RER: 1.3	(0-2)		
Europium-154		U	-2.98	U	6.33				
				Uncert: +/-8.81		RPD: 0	N/A		
				TPU: +/-8.91		RER: 1.6	(0-2)		
Europium-155		U	11.0	U	2.43				
				Uncert: +/-11.1		RPD: 0	N/A		
				TPU: +/-12.2		RER: 0.977	(0-2)		
QC1203388293	LCS								

## QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1505824								
Americium-241	34400			37600	pCi/L	REC: 109	(80%-120%)		
	Uncert:			+/-1270					
	TPU:			+/-4860					
Cesium-137	13700			14000	pCi/L	REC: 102	(80%-120%)		
	Uncert:			+/-327					
	TPU:			+/-1220					
Cobalt-60	15000			15200	pCi/L	REC: 102	(80%-120%)		
	Uncert:			+/-381					
	TPU:			+/-1240					
Europium-152			U	-44.2	pCi/L				
	Uncert:			+/-199					
	TPU:			+/-200					
Europium-154			U	63.0	pCi/L				
	Uncert:			+/-129					
	TPU:			+/-132					
Europium-155			U	53.0	pCi/L				
	Uncert:			+/-262					
	TPU:			+/-264					
<b>Rad Gas Flow</b>									
Batch	1506138								
QC1203389202	MB								
Total Strontium			U	1.65	pCi/L			KSD1	09/22/1515:22
	Uncert:			+/-1.19					
	TPU:			+/-1.25					
**Strontium Carrier	8.10			8.10	mg	REC: 100	(25%-125%)		
QC1203389203	380709001	DUP							
Total Strontium				27.5	pCi/L				09/23/1508:12
	Uncert:			+/-2.52		RPD: 32*	(0% - 20%)		
	TPU:			+/-6.96		RER: 1.77	(0-2)		
**Strontium Carrier	16.2	8.10		12.8	mg	REC: 79	(25%-125%)		
QC1203389204	LCS								
Total Strontium	72.4			73.9	pCi/L	REC: 102	(80%-120%)		09/22/1513:02
	Uncert:			+/-4.15					
	TPU:			+/-17.5					
**Strontium Carrier	8.10			8.30	mg	REC: 102	(25%-125%)		
<b>Rad Liquid Scintillation</b>									
Batch	1505369								
QC1203387208	MB								
Technetium-99			U	-0.272	pCi/L			MYM1	09/20/1516:43
	Uncert:			+/-5.54					
	TPU:			+/-5.54					
**Technetium-99m Tracer	97200			91200	CPM	REC: 94	(15%-125%)		
QC1203387209	380436001	DUP							
Technetium-99		U	0.794	U	-0.752	pCi/L			09/20/1517:25
	Uncert:		+/-8.09		+/-8.38		RPD: 0	N/A	
	TPU:		+/-8.09		+/-8.38		RER: 0.26	(0-2)	
**Technetium-99m Tracer	97200	97500		94200	CPM	REC: 97	(15%-125%)		
QC1203387211	LCS								
Technetium-99	287			263	pCi/L	REC: 92	(80%-120%)		09/20/1518:49

**QC Summary**

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Liquid Scintillation</b>									
Batch	1505369								
				Uncert:					
				TPU:					
**Technetium-99m Tracer	97200			95400	CPM	REC: 98	(15%-125%)		
Batch	1506248								
QC1203389510	MB								
Carbon-14			U	-0.612	pCi/L			GXR1	09/23/1507:58
				Uncert:					
				TPU:					
QC1203389511	380709001	DUP							
Carbon-14		143		130	pCi/L				09/23/1509:59
				Uncert:		RPD: 9	(0% - 20%)		
				TPU:		RER: 0.647	(0-2)		
QC1203389512	380709001	MS							
Carbon-14	1510	143		1690	pCi/L	REC: 102	(75%-125%)		09/23/1512:00
				Uncert:					
				TPU:					
QC1203389513	LCS								
Carbon-14	252			256	pCi/L	REC: 101	(80%-120%)		09/23/1513:11
				Uncert:					
				TPU:					
Batch	1507565								
QC1203393075	MB								
Tritium			U	23.8	pCi/L			GXR1	09/22/1509:21
				Uncert:					
				TPU:					
QC1203393076	380994002	DUP							
Tritium		133		164	pCi/L				09/22/1511:24
				Uncert:		RPD: 21	(0% - 100%)		
				TPU:		RER: 0.563	(0-2)		
QC1203393078	380994002	MS							
Tritium	1810	133		1510	pCi/L	REC: 76	(75%-125%)		09/21/1509:03
				Uncert:					
				TPU:					
QC1203393080	LCS								
Tritium	1800			1630	pCi/L	REC: 90	(80%-120%)		09/21/1509:20
				Uncert:					
				TPU:					

**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

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

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

\*\* Indicates analyte is a surrogate compound.

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

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

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