

February 21, 2018

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

Re: CHPRC SAF F17-070  
Work Order: 443836  
SDG: GEL443836

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 15, 2018. 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,



Heather Shaffer  
Project Manager

Purchase Order: 303979  
Chain of Custody: F17-070-269, F17-070-270 and F17-070-458  
Enclosures



## Table of Contents

Sample Issue Resolution.....	1
Case Narrative.....	3
Chain of Custody and Supporting Documentation.....	9
Data Review Qualifier Definitions.....	14
Laboratory Certifications.....	16
Volatile Analysis.....	18
Case Narrative.....	19
Sample Data Summary.....	22
Quality Control Summary.....	24
Metals Analysis.....	29
Case Narrative.....	30
Sample Data Summary.....	33
Quality Control Summary.....	35
General Chem Analysis.....	38
Case Narrative.....	39
Sample Data Summary.....	42
Quality Control Summary.....	44
Radiological Analysis.....	47
Case Narrative.....	48
Sample Data Summary.....	53

Quality Control Summary.....58

# Sample Issue Resolution

**SAMPLE ISSUE RESOLUTION (SIR) REPORT****SIR Number:** SIR18-0493**Rev. Number:** 0**Date Initiated:** 02/20/2018**SAMPLE EVENT INFORMATION****SAF NUM(S):** F17-070**LABORATORY:** GEL**SAMPLING INFORMATION****NUMBER OF SAMPLES:** 1**SAMPLE NUMBERS:** B3H7X7**SAMPLE MATRIX:** WATER**SDG NUM(S):** GEL443836**ISSUE BACKGROUND****CLASS:** Field Sampling Issue**TYPE:** Insufficient Sample Volume Collected**DESCRIPTION:** One vial for 8260\_VOA analysis on sample ID B3H7X7 was received with headspace.**RESOLUTION****PROPOSED RESOLUTION:** The lab will avoid using this vial.**FINAL RESOLUTION:** Accept proposed resolution**SUBMITTED BY:**

SHAFFER, H

02/16/2018

**ACCEPTED BY:**

NAGEL, SE

02/20/2018

# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF F17-070  
SDG: GEL443836**

**February 21, 2018**

**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 February 15, 2018, for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

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

**Sample Identification**

The laboratory received the following samples:

<b>Laboratory Identification</b>	<b>Sample Description</b>
443836001	B3H7X6
443836002	B3H7X7
443836003	B3H915

**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: GC/MS Volatile, General Chemistry, Metals and Radiochemistry.

We certify that this package is in compliance with the SOW, both technically and for completeness, including a full description of, explanation of, and corrective actions for, any and all deviations, from either the analyses requested or the case narrative requested. Release of the data contained in this hard copy data package has been authorized by the Laboratory Analytical Manager (or designee) and the laboratory's client services representative as verified by their signatures on this report.



Heather Shaffer  
Project Manager

**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL443836**  
**Work Order #: 443836**

## **GC/MS Volatile**

### **Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer**

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

## **Metals**

### **Determination of Metals by ICP-MS**

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

## **General Chemistry**

### **Ion Chromatography**

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

### **Technical Information**

#### **Sample Dilutions**

The following samples 1203972280 (Non SDG 443834001DUP), 1203972281 (Non SDG 443834001PS) and 443836003 (B3H915) were diluted because target analyte concentrations exceeded the calibration range.

Analyte	<b>443836</b>
	<b>003</b>
Chloride	10X
Nitrate	10X
Sulfate	10X

**Radiochemistry****I129LL\_SEP\_LEPS\_GS: COMMON (low level)**

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

**9310\_ALPHABETA\_GPC: COMMON**

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

**Technical Information****Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

**Miscellaneous Information****Additional Comments**

The matrix spike and matrix spike duplicate, 1203972598 (B3H7X6MS) and 1203972599 (B3H7X6MSD), aliquots were reduced to conserve sample volume.

**TC99\_EIE\_LSC: COMMON**

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

**TRITIUM\_DIST\_LSC: COMMON**

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

**Miscellaneous Information****Additional Comments**

The matrix spike, 1203972683 (B3H7X6MS), aliquot was reduced to conserve sample volume.

**Certification Statement**

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

# **Chain of Custody and Supporting Documentation**

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		PAGE 1 OF 1	
COLLECTOR Jeff Tuckson CHPRC	COMPANY CONTACT LYNCH, SA	TELEPHONE NO. 373-5586	PROJECT COORDINATOR LYNCH, SA	REQUIRED TAT 7 Days	
SAMPLING LOCATION C9607, I-005	PROJECT DESIGNATION 200-UP-1 Remedial Action Wells Sampling and Analysis - Water		METHOD OF SHIPMENT FEDERAL EXPRESS		
ICE CHEST NO. GWS-601	FIELD LOGBOOK NO. HNF-N-645 6-85	ACTUAL SAMPLE DEPTH 364.70	PURCHASE ORDER/CHARGE CODE 300192	ORIGINAL	
SHIPPED TO GEL Laboratories, LLC	OFFSITE PROPERTY NO. 9060		BILL OF LADING/AIR BILL NO. 771485129655		
MATRIX* A=Air DL=Drum L=Liquid DS=Drum S=Soil O=Oil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	PRESERVATION *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.		HNO3 to pH <2	HNO3 to pH <2	HNO3 to pH None
SPECIAL HANDLING AND/OR STORAGE N/A	HOLDING TIME 6 Months	G/P	6 Months	6 Months	6 Months
	TYPE OF CONTAINER NO. OF CONTAINER(S)	1	4	1	1
	VOLUME 500mL	1L	1L	500mL	500mL
	SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS	9310_ALPHA TA_GPC COMMON (Gross alpha, Gross beta);	1129LL_SEP_LE PS_GS COMMON;	TC99_FIE_LSC COMMON;	TRITIUM_DIST LSC COMMON;
SAMPLE NO. B3H7X6	FILTERED Yes	MATRIX* WATER	SAMPLE DATE FEB 14 2018	SAMPLE TIME 0846	

CHAIN OF POSSESSION RELINQUISHED BY/REMOVED FROM Jeff Tuckson CHPRC	DATE/TIME FEB 14 2018 1300	SIGN/PRINT NAMES Troy Bacon CHPRC	DATE/TIME FEB 14 2018
		Troy L. Bacon	FEB 14 2018
		FEDEX	
		C-Tarplin	2/15/18
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME
PRINTED ON 12/13/2017	FRS ID = FSR55026	TRVL NUM = TRVL-18-058	A-6003-618 (REV 3)

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F17-070-270	PAGE 1 OF 1
COLLECTOR Jeff Tuckers CHPRC	COMPANY CONTACT LYNCH, SA	TELEPHONE NO. 373-5586	PROJECT COORDINATOR LYNCH, SA	REQUIRED TAT 7 Days	
SAMPLING LOCATION C9607, I-005	PROJECT DESIGNATION 200-UP-1 Remedial Action Wells Sampling and Analysis - Water	FIELD LOGBOOK NO. HNF-N-645 6-85	SAF NO. F17-070	METHOD OF SHIPMENT FEDERAL EXPRESS	
ICE CHEST NO. GWS-601	ACTUAL SAMPLE DEPTH 364.70	PURCHASE ORDER/CHARGE CODE 300192	BILL OF LADING/AIR BILL NO. 9060	ORIGINAL	
SHIPPED TO GEL Laboratories, LLC	PRESERVATION HCl or H2SO4 to pH <2/Cool <=6C	HOLDING TIME 14 Days	OFFSITE PROPERTY NO. 9060	7714 8512 9655	
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/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	TYPE OF CONTAINER aGs*	NO. OF CONTAINER(S) 5		
SPECIAL HANDLING AND/OR STORAGE N/A	VOLUME 40mL	SAMPLE ANALYSIS 8260_VOA_GCM S: COMMON (Carbon tetrachloride, Trichloroethene );			
SAMPLE NO. FILTERED MATRIX* B3H7X7 No WATER	SAMPLE DATE FEB 14 2018	SAMPLE TIME 0846			

Page 14 of 64

CHAIN OF POSSESSION RELINQUISHED BY/REMOVED FROM Jeff Tuckers CHPRC Troy Bacon CHPRC	DATE/TIME FEB 14 2018 1300 FEB 14 2018 1400	SIGN/ PRINT NAMES RECEIVED BY/STORED IN Troy Bacon CHPRC Troy L. Bacon CHPRC FEDEX	DATE/TIME FEB 14 2018 1300 FEB 14 2018 1400	SPECIAL INSTRUCTIONS TRVL-18-058; Water samples to be purged until field readings of DO stabilize at or above 7,000 µg/L and REDOX potential is at least 200 Mv
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME	
PRINTED ON 12/13/2017	FSR ID = FSR55026	TRVL NUM = TRVL-18-058	A-6003-618 (REV 3)	

**CH2M Hill Plateau Remediation Company**  
**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** *11010* **PAGE 1 OF 1**  
**COLLECTOR** Jeff Tuckerson **COMPANY CONTACT** LYNCH, SA **TELEPHONE NO.** 373-5586 **PROJECT COORDINATOR** LYNCH, SA **REQUIRED TAT** 7 Days  
**SAMPLING LOCATION** C9607, I-005 **PROJECT DESIGNATION** 200-Up-1 Remedial Action Wells Sampling and Analysis - Water **SAF NO.** F17-070 **METHOD OF SHIPMENT** ORIGINAL  
**ICE CHEST NO.** GWS-601 **FIELD LOGBOOK NO.** HNF-N-645 *6-85* **ACTUAL SAMPLE DEPTH** 364.70 **PURCHASE ORDER/CHARGE CODE** 300192 **FEDERAL EXPRESS**  
**SHIPPED TO** GEL Laboratories, LLC **OFFSITE PROPERTY NO.** 9060 **BILL OF LADING/AIR BILL NO.** 171485129655

<b>MATRIX*</b> A=Air DL=Drum L=Liquid DS=Drum S=Soil O=Oil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	<b>POSSIBLE SAMPLE HAZARDS/ REMARKS</b> *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	<b>PRESERVATION</b> Cool <=6C
	<b>HOLDING TIME</b> 48 Hours	
	<b>TYPE OF CONTAINER</b> P	
	<b>NO. OF CONTAINER(S)</b> 1	
	<b>VOLUME</b> 125mL	
	<b>SAMPLE ANALYSIS</b> SEE ITEM (1) IN SPECIAL INSTRUCTIONS	
<b>SAMPLE NO.</b> B3H915	<b>FILTERED</b> Yes	<b>MATRIX*</b> WATER
	<b>SAMPLE DATE</b> FEB 14 2018	<b>SAMPLE TIME</b> 0846

**CHAIN OF POSSESSION**  
**RELINQUISHED BY/REMOVED FROM** Jeff Tuckerson **DATE/TIME** FEB 14 2018 **SIGN/ PRINT NAMES** Troy Bacon  
 CHPRC *12/20* **RECEIVED BY/STORED IN** Troy Bacon **DATE/TIME** FEB 14 2018  
 CHPRC *12/20* **FEDEX**  
 Troy Bacon **DATE/TIME** FEB 14 2018 **FEDEX**  
 CHPRC *12/20* **FEDEX**  
 CHPRC *12/20* **FEDEX**  
**SPECIAL INSTRUCTIONS**  
 TRVL-18-058; Water samples to be purged until field readings of DO stabilize at or above 7,000 µg/L and REDOX potential is at least 200 Mv  
 (1) 300.0 ANIONS\_IC: COMMON {Chloride, Nitrogen in Nitrate, Sulfate};

**FINAL SAMPLE DISPOSITION** PRINTED ON 12/13/2017 **DISPOSAL METHOD** **DISPOSED BY** **DATE/TIME**  
**FRS ID = FSR55026** **TRVL NUM = TRVL-18-058** **A-6003-618 (REV 3)**



SAMPLE RECEIPT & REVIEW FORM

#5

Client: <b>CPRC</b>		SDG/AR/COC/Work Order: <b>443836</b>	
Received By: <b>C. Tarplin</b>		Date Received: <b>15 Feb 2018</b>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other 7714 80048406                      771482218489 7714 83778109                      771483463299 7714 85129455	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
Shipped as a DOT Hazardous?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____	
COC/Samples marked or classified as radioactive?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> (CPM) mR/Hr Classified as: (Rad 1) Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:	

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 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: <u>Wet Ice</u> Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius                      TEMP: <u>2C</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: _____ IR4-17 Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>			If Yes, Are Encores or Soil Kits present? Yes _____ No <input checked="" type="checkbox"/> (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes <input checked="" type="checkbox"/> No _____ N/A _____ (If unknown, select No) VOA vials free of headspace? Yes _____ No <input checked="" type="checkbox"/> N/A _____ Sample ID's and containers affected: <b>B3H7X7 has one vial w/ headspace</b> <b>B3H4R4 has two vials w/ headspace</b>
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
12 Are sample containers identifiable as GEL provided?			<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials MEH Date 02/16/18 Page 1 of 1

# **Data Review Qualifier Definitions**

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

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

# Laboratory Certifications

**List of current GEL Certifications as of 21 February 2018**

<b>State</b>	<b>Certification</b>
Alaska	17-018
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-18-13
Utah NELAP	SC000122017-25
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# **Volatile Analysis**

# Case Narrative

GC/MS Volatile  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL443836  
Work Order #: 443836

**Product:** Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer

**Analytical Method:** SW846 8260C

**Analytical Procedure:** GL-OA-E-038 REV# 26

**Analytical Batch:** 1739833

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
443836002	B3H7X7
1203973334	Method Blank (MB)
1203973335	Laboratory Control Sample (LCS)
1203973336	443833001(NonSDG) Post Spike (PS)
1203973337	443833001(NonSDG) Post Spike Duplicate (PSD)

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

**Data Summary:**

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

**Certification Statement**

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

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL443836 GEL Work Order: 443836

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

J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated

T Spike and/or spike duplicate 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.

DL Indicates that sample is diluted.

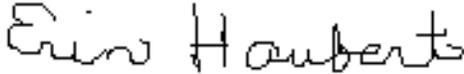
RA Indicates that sample is re-analyzed without re-extraction.

RE Indicates that sample is re-extracted.

**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:** Erin Haubert

**Date:** 19 FEB 2018

**Title:** Data Validator

# Sample Data Summary

February 21, 2018

Revision 0

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

<b>SDG Number:</b> GEL443836	<b>Date Collected:</b> 02/14/2018 08:46	<b>Matrix:</b> WATER
<b>Lab Sample ID:</b> 443836002	<b>Date Received:</b> 02/15/2018 09:05	
<b>Client ID:</b> B3H7X7	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F17070
<b>Batch ID:</b> 1739833	<b>Method:</b> SW846 8260C	<b>SOP Ref:</b> GL-OA-E-038
<b>Run Date:</b> 02/16/2018 13:52	<b>Inst:</b> VOA3.I	<b>Dilution:</b> 1
<b>Prep Date:</b> 02/16/2018 13:52	<b>Analyst:</b> JP1	<b>Purge Vol:</b> 5 mL
<b>Data File:</b> 021618V3\3V509.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	RDL
56-23-5	Carbon tetrachloride		12.8	ug/L	0.300	2.00	5.00
79-01-6	Trichloroethylene	J	2.54	ug/L	0.300	2.00	5.00

# Quality Control Summary

**QC Summary**

Report Date: February 20, 2018

Page 1 of 3

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 443836

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1739833										
QC1203973335	LCS										
Carbon tetrachloride	50.0			49.7	ug/L		99	(70%-130%)	JP1	02/16/18	10:43
Trichloroethylene	50.0			48.3	ug/L		97	(70%-130%)			
**1,2-Dichloroethane-d4	50.0			52.3	ug/L		105	(70%-130%)			
**Bromofluorobenzene	50.0			51.1	ug/L		102	(70%-130%)			
**Toluene-d8	50.0			46.8	ug/L		94	(70%-130%)			
QC1203973334	MB										
Carbon tetrachloride			U	0.300	ug/L					02/16/18	12:17
Trichloroethylene			U	0.300	ug/L						
**1,2-Dichloroethane-d4	50.0			53.1	ug/L		106	(70%-130%)			
**Bromofluorobenzene	50.0			51.5	ug/L		103	(70%-130%)			
**Toluene-d8	50.0			46.9	ug/L		94	(70%-130%)			
QC1203973336	443833001	PS									
Carbon tetrachloride	50.0	U	0.00	58.8	ug/L		118	(70%-130%)		02/16/18	19:07
Trichloroethylene	50.0	U	0.00	53.7	ug/L		107	(70%-130%)			
**1,2-Dichloroethane-d4	50.0		51.1	53.5	ug/L		107	(70%-130%)			

**QC Summary**

Workorder: 443836

Page 2 of 3

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1739833										
**Bromofluorobenzene	50.0	50.5		50.0	ug/L		100	(70%-130%)	JP1	02/16/18	19:07
**Toluene-d8	50.0	48.7		46.3	ug/L		93	(70%-130%)			
QC1203973337 443833001 PSD											
Carbon tetrachloride	50.0	U	0.00	55.6	ug/L	6	111	(0%-20%)		02/16/18	19:39
Trichloroethylene	50.0	U	0.00	51.7	ug/L	4	103	(0%-20%)			
**1,2-Dichloroethane-d4	50.0		51.1	49.3	ug/L		99	(70%-130%)			
**Bromofluorobenzene	50.0		50.5	48.3	ug/L		97	(70%-130%)			
**Toluene-d8	50.0		48.7	44.9	ug/L		90	(70%-130%)			

**Notes:**

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- N Spike Sample recovery is outside control limits.
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate 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
- o Analyte failed to recover within LCS limits (Organics only)

QC Summary

Workorder: 443836

Page 3 of 3

Parmname	NOM	Sample	Qual	QC	Units	RPD%	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.

February 21, 2018

Revision 0

## Surrogate Recovery Report

SDG Number: GEL443836

Matrix Type: LIQUID

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203973335	LCS for batch 1739833	105	94	102
1203973334	MB for batch 1739833	106	94	103
443836002	B3H7X7	105	94	101
1203973336	B3D7T6PS	107	93	100
1203973337	B3D7T6PSD	99	90	97

**Surrogate**

DCED4 = 1,2-Dichloroethane-d4

TOL = Toluene-d8

BFB = Bromofluorobenzene

**Acceptance Limits**

(70%-130%)

(70%-130%)

(70%-130%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

# Metals Analysis

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL443836**  
**Work Order #: 443836**

**Product: Determination of Metals by ICP-MS****Analytical Method:** SW846 3005A/6020B**Analytical Procedure:** GL-MA-E-014 REV# 32**Analytical Batch:** 1739451**Preparation Method:** SW846 3005A**Preparation Procedure:** GL-MA-E-006 REV# 14**Preparation Batch:** 1739450

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
443836001	B3H7X6
1203972338	Method Blank (MB)ICP-MS
1203972339	Laboratory Control Sample (LCS)
1203972342	443836001(B3H7X6L) Serial Dilution (SD)
1203972340	443836001(B3H7X6S) Matrix Spike (MS)
1203972341	443836001(B3H7X6SD) Matrix Spike Duplicate (MSD)

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

**Data Summary:**

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

**Calibration Information****ICSA/ICSAB Statement**

For the ICP-MS analysis, the ICSA solution contains analyte concentrations which are verified trace impurities indigenous to the purchased standard.

**Certification Statement**

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

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL443836 GEL Work Order: 443836

**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:** Jamie Johnson

**Date:** 21 FEB 2018

**Title:** Group Leader

# Sample Data Summary

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

**SDG No:** GEL443836

**CONTRACT:** CPRC0F17070

**METHOD TYPE:** SW846

**SAMPLE ID:** 443836001

**BASIS:** As Received

**DATE COLLECTED** 14-FEB-18

**CLIENT ID:** B3H7X6

**LEVEL:** Low

**DATE RECEIVED** 15-FEB-18

**MATRIX:** WATER

**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-47-3	Chromium	3	ug/L	U	3	10	10	1	MS	SKJ	02/20/18 10:39	180220-1	1739451
7439-96-5	Manganese	42.2	ug/L		1	5	5	1	MS	SKJ	02/20/18 10:39	180220-1	1739451
7440-61-1	Uranium	2.3	ug/L		0.067	0.2	0.2	1	MS	SKJ	02/20/18 10:39	180220-1	1739451

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1739451	1739450	SW846 3005A	50	mL	50	mL	02/15/18	JXM8

**\*Analytical Methods:**

MS SW846 3005A/6020B

# Quality Control Summary

**QC Summary**

Report Date: February 21, 2018

Page 1 of 2

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 443836

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1739451										
QC1203972339	LCS										
Chromium	50.0			48.9	ug/L		97.9	(80%-120%)	SKJ	02/20/18	10:34
Manganese	50.0			49.6	ug/L		99.3	(80%-120%)			
Uranium	50.0			48.9	ug/L		97.8	(80%-120%)			
QC1203972338	MB										
Chromium			U	3.00	ug/L					02/20/18	10:32
Manganese			U	1.00	ug/L						
Uranium			U	0.067	ug/L						
QC1203972340	443836001 MS										
Chromium	50.0	U	3.00	49.5	ug/L		98.9	(75%-125%)		02/20/18	10:41
Manganese	50.0		42.2	89.0	ug/L		93.7	(75%-125%)			
Uranium	50.0		2.30	53.4	ug/L		102	(75%-125%)			
QC1203972341	443836001 MSD										
Chromium	50.0	U	3.00	49.0	ug/L	0.997	98	(0%-20%)		02/20/18	10:44
Manganese	50.0		42.2	87.8	ug/L	1.41	91.2	(0%-20%)			
Uranium	50.0		2.30	52.1	ug/L	2.57	99.6	(0%-20%)			

**QC Summary**

Workorder: 443836

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1739451										
QC1203972342	443836001	SDILT									
Chromium	U	-0.06	DU	15.0	ug/L	N/A		(0%-20%)	SKJ	02/20/18	10:48
Manganese		42.2	D	8.68	ug/L	2.86		(0%-20%)			
Uranium		2.30	D	0.483	ug/L	5.14		(0%-20%)			

**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

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 #: GEL443836  
Work Order #: 443836**

**Product: Ion Chromatography****Analytical Method:** 300.0\_ANIONS\_IC**Analytical Procedure:** GL-GC-E-086 REV# 25**Analytical Batch:** 1739427

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
443836003	B3H915
1203972278	Method Blank (MB)
1203972279	Laboratory Control Sample (LCS)
1203972280	443834001(NonSDG) Sample Duplicate (DUP)
1203972281	443834001(NonSDG) Post Spike (PS)

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

**Data Summary:**

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

**Technical Information****Sample Dilutions**

The following samples 1203972280 (Non SDG 443834001DUP), 1203972281 (Non SDG 443834001PS) and 443836003 (B3H915) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	<b>443836</b>
	<b>003</b>
Chloride	10X
Nitrate	10X
Sulfate	10X

**Certification Statement**

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

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL443836 GEL Work Order: 443836

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

B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).

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: **Aubrey Kingsbury**

Date: **21 FEB 2018**

Title: **Analyst I**

# Sample Data Summary

**Certificate of Analysis**

Report Date: February 21, 2018

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF F17-070

Client Sample ID: B3H915 Project: CPRC0F17070  
 Sample ID: 443836003 Client ID: CPRC001  
 Matrix: WATER  
 Collect Date: 14-FEB-18 08:46  
 Receive Date: 15-FEB-18  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
300.0_ANIONS_IC: COMMON "As Received"												
Chloride	D	20100	670	2000	ug/L		10	MAR1	02/15/18	2218	1739427	1
Nitrate-N	D	21800	330	1000	ug/L		10					
Sulfate	D	36500	1330	4000	ug/L		10					

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	300.0_ANIONS_IC		

**Notes:**

Column headers are defined as follows:

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

# Quality Control Summary

**QC Summary**

Report Date: February 21, 2018

Page 1 of 2

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 443836

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1739427										
QC1203972280	443834001	DUP									
Chloride	D	42300	D	42300	ug/L	0.00237		(0%-20%)	MAR1	02/15/18	21:20
Nitrate-N		4150		4170	ug/L	0.505		(0%-20%)		02/15/18	18:55
Sulfate	D	96300	D	96500	ug/L	0.177		(0%-20%)		02/15/18	21:20
QC1203972279	LCS										
Chloride	5000			4820	ug/L		96.4	(80%-120%)		02/15/18	16:02
Nitrate-N	2500			2490	ug/L		99.4	(80%-120%)			
Sulfate	10000			9870	ug/L		98.7	(80%-120%)			
QC1203972278	MB										
Chloride			U	67.0	ug/L					02/15/18	10:14
Nitrate-N			U	33.0	ug/L						
Sulfate			U	133	ug/L						
QC1203972281	443834001	PS									
Chloride	5.00	D	4.23	D	9.28	mg/L		101	(75%-125%)	02/15/18	21:49
Nitrate-N	2.50		4.15		6.86	mg/L		109	(75%-125%)	02/15/18	19:24
Sulfate	10.0	D	9.63	D	19.9	mg/L		102	(75%-125%)	02/15/18	21:49

Notes:

**QC Summary**

Workorder: 443836

Page 2 of 2

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

The Qualifiers in this report are defined as follows:

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

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

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

# Radiological Analysis

# Case Narrative

**Radiochemistry**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL443836**  
**Work Order #: 443836**

**Product:** I129LL\_SEP\_LEPS\_GS: COMMON (low level)

**Analytical Method:** DOE EML HASL-300,I-01 Modified

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

**Analytical Batch:** 1739682

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
443836001	B3H7X6
1203972933	Method Blank (MB)
1203972934	443871012(NonSDG) Sample Duplicate (DUP)
1203972935	443871012(NonSDG) Matrix Spike (MS)
1203972936	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Product:** 9310\_ALPHABETA\_GPC: COMMON

**Analytical Method:** 9310\_ALPHABETA\_GPC

**Analytical Procedure:** GL-RAD-A-001 REV# 19

**Analytical Batch:** 1739562

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
443836001	B3H7X6
1203972596	Method Blank (MB)
1203972597	443836001(B3H7X6) Sample Duplicate (DUP)
1203972598	443836001(B3H7X6) Matrix Spike (MS)
1203972599	443836001(B3H7X6) Matrix Spike Duplicate (MSD)
1203972600	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Technical Information****Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

**Miscellaneous Information****Additional Comments**

The matrix spike and matrix spike duplicate, 1203972598 (B3H7X6MS) and 1203972599 (B3H7X6MSD), aliquots were reduced to conserve sample volume.

**Product:** TC99\_EIE\_LSC: COMMON

**Analytical Method:** TC99\_EIE\_LSC

**Analytical Procedure:** GL-RAD-A-059 REV# 5

**Analytical Batch:** 1739599

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
443836001	B3H7X6
1203972678	Method Blank (MB)
1203972679	443836001(B3H7X6) Sample Duplicate (DUP)
1203972680	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

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

**Analytical Method:** TRITIUM\_DIST\_LSC

**Analytical Procedure:** GL-RAD-A-002 REV# 22

**Analytical Batch:** 1739600

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
443836001	B3H7X6
1203972681	Method Blank (MB)
1203972682	443836001(B3H7X6) Sample Duplicate (DUP)

1203972683  
1203972684

443836001(B3H7X6) Matrix Spike (MS)  
Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Miscellaneous Information**

**Additional Comments**

The matrix spike, 1203972683 (B3H7X6MS), aliquot was reduced to conserve sample volume.

**Certification Statement**

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

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL443836 GEL Work Order: 443836

**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:** 21 FEB 2018

**Title:** Analyst II

# Sample Data Summary

February 21, 2018

Revision 0

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

<b>SDG Number:</b> GEL443836	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F17070
<b>Lab Sample ID:</b> 443836001	<b>Date Collected:</b> 02/14/2018 08:46	<b>Matrix:</b> WATER
	<b>Date Received:</b> 02/15/2018 09:05	
<b>Client ID:</b> B3H7X6	<b>Method:</b> 9310_ALPHABETA_GPC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1739562	<b>Analyst:</b> BXG2	<b>SOP Ref:</b> GL-RAD-A-001
<b>Run Date:</b> 02/16/2018 11:09	<b>Aliquot:</b> 150 mL	<b>Instrument:</b> PIC6C
<b>Data File:</b> AB1739562.xls	<b>Prep Method:</b> EPA 900.0/SW846 9310	<b>Count Time:</b> 90 min
<b>Prep Batch:</b> 1739562		
<b>Prep Date:</b> 02/15/2018 14:24		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha ALPHA	U	2.81	pCi/L	+/-2.17	2.23	2.87	3.00
12587-47-2	Beta BETA		248	pCi/L	+/-8.52	42.0	2.49	4.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
---------------------------	--------	---------	-------	-----------	-------------------

**Comments:**

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

February 21, 2018

Revision 0

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

SDG Number: GEL443836	Client: CPRC001	Project: CPRC0F17070
Lab Sample ID: 443836001	Date Collected: 02/14/2018 08:46	Matrix: WATER
	Date Received: 02/15/2018 09:05	
Client ID: B3H7X6	Method: DOE EML HASL-300,I-01 Mo	Prep Basis: "As Received"
Batch ID: 1739682	Analyst: BSW1	SOP Ref: GL-RAD-A-006
Run Date: 02/19/2018 16:03	Aliquot: 1.2 L	Instrument: XRAY1
Data File: I443836001.CNF;1	Prep Method: DOE EML HASL-300,I-01 M	Count Time: 180 min
Prep Batch: 1739682		
Prep Date: 02/16/2018 10:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129		0.492	pCi/L	+/-0.288	0.293	0.480	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
---------------------------	--------	---------	-------	-----------	-------------------

**Comments:**

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

February 21, 2018

Revision 0

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL443836	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F17070
<b>Lab Sample ID:</b> 443836001	<b>Date Collected:</b> 02/14/2018 08:46	<b>Matrix:</b> WATER
	<b>Date Received:</b> 02/15/2018 09:05	
<b>Client ID:</b> B3H7X6	<b>Method:</b> TC99_EIE_LSC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1739599	<b>Analyst:</b> CXS7	<b>SOP Ref:</b> GL-RAD-A-059
<b>Run Date:</b> 02/20/2018 06:30	<b>Aliquot:</b> 100 mL	<b>Instrument:</b> LSCRED
<b>Data File:</b> E1739599.xls	<b>Prep Method:</b> DOE EML HASL-300, Tc-02-	<b>Count Time:</b> 15 min
<b>Prep Batch:</b> 1739599		
<b>Prep Date:</b> 02/16/2018 11:18		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99		334	pCi/L	+/-36.1	51.6	43.5	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	51800	52200	CPM	99.2	(30%-105%)

**Comments:**

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

February 21, 2018

Revision 0

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

SDG Number: GEL443836	Client: CPRC001	Project: CPRC0F17070
Lab Sample ID: 443836001	Date Collected: 02/14/2018 08:46	Matrix: WATER
	Date Received: 02/15/2018 09:05	
Client ID: B3H7X6	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1739600	Analyst: BXM4	SOP Ref: GL-RAD-A-002
Run Date: 02/16/2018 17:44	Aliquot: 50 mL	Instrument: LSCGOLD
Data File: T1739600.xls	Prep Method: EPA 906.0 Modified	Count Time: 70 min
Prep Batch: 1739600		
Prep Date: 02/16/2018 07:53		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		8730	pCi/L	+/-408	1740	283	400

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
---------------------------	--------	---------	-------	-----------	-------------------

**Comments:**

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

# Quality Control Summary

**QC Summary**

Report Date: February 21, 2018  
 Page 1 of 3

Client : **CH2MHill Plateau Remediation Company**  
**MSIN R3-50 CHPRC**  
**PO Box 1600**  
**Richland, Washington 99352**  
 Contact: **Mr. Scot Fitzgerald**  
 Workorder: **443836**

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1739682								
QC1203972933	MB								
Iodine-129			U	0.265	pCi/L			BSW1	02/20/1808:56
				Uncert: +/-0.517					
				TPU: +/-0.518					
QC1203972934	443871012	DUP							
Iodine-129		U	0.484	U	0.165				02/20/1809:21
				Uncert: +/-0.350		RPD: 0	N/A		
				TPU: +/-0.416		RER: 1.05	(0-2)		
QC1203972935	443871012	MS							
Iodine-129		U	0.484		34.1	REC: 98	(75%-125%)		02/20/1809:21
				Uncert: +/-0.350					
				TPU: +/-0.416					
QC1203972936	LCS								
Iodine-129				34.7	32.1	REC: 92	(80%-120%)		02/20/1809:47
				Uncert: +/-3.29					
				TPU: +/-4.59					
<b>Rad Gas Flow</b>									
Batch	1739562								
QC1203972596	MB								
Alpha			U	-0.354	pCi/L			BXG2	02/16/1811:09
				Uncert: +/-0.935					
				TPU: +/-0.936					
Beta			U	0.576	pCi/L				
				Uncert: +/-1.50					
				TPU: +/-1.51					
QC1203972597	443836001	DUP							
Alpha		U	2.81		5.95				02/16/1811:09
				Uncert: +/-2.17		RPD: 72	(0% - 100%)		
				TPU: +/-2.23		RER: 1.59	(0-2)		
Beta			248		223				
				Uncert: +/-8.52		RPD: 11	(0%-20%)		
				TPU: +/-42.0		RER: 0.9	(0-2)		
QC1203972598	443836001	MS							
Alpha		U	2.81		493	REC: 102	(75%-125%)		02/16/1811:09
				Uncert: +/-2.17					
				TPU: +/-2.23					
Beta			1880		2200	REC: 104	(75%-125%)		
				Uncert: +/-8.52					
				TPU: +/-42.0					
QC1203972599	443836001	MSD							
Alpha		U	2.81		463	REC: 96	(75%-125%)		02/16/1811:09
				Uncert: +/-2.17		RPD: 6	(0%-20%)		
				TPU: +/-2.23		RER: 0.455	(0-2)		
Beta			1880		2300	REC: 109	(75%-125%)		
				Uncert: +/-8.52		RPD: 4	(0%-20%)		

**QC Summary**

Workorder: 443836

Page 2 of 3

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gas Flow</b>									
Batch	1739562								
		TPU:	+/-42.0	+/-381					
						RER:	0.365 (0-2)		
QC1203972600	LCS								
Alpha	80.6			77.7	pCi/L	REC:	96 (80%-120%)		02/16/1811:09
		Uncert:		+/-7.59					
		TPU:		+/-14.8					
Beta	314			335	pCi/L	REC:	107 (80%-120%)		
		Uncert:		+/-11.6					
		TPU:		+/-55.8					
<b>Rad Liquid Scintillation</b>									
Batch	1739599								
QC1203972678	MB								
Technetium-99			U	-38.1	pCi/L			CXS7	02/20/1806:46
		Uncert:		+/-25.0					
		TPU:		+/-25.0					
**Technetium-99m Tracer	52200			48400	CPM	REC:	93 (30%-105%)		
QC1203972679	443836001	DUP							
Technetium-99			334	392	pCi/L				02/20/1807:03
		Uncert:	+/-36.1	+/-39.2		RPD:	16 (0%-20%)		
		TPU:	+/-51.6	+/-58.4		RER:	1.45 (0-2)		
**Technetium-99m Tracer	52200		51800	49000	CPM	REC:	94 (30%-105%)		
QC1203972680	LCS								
Technetium-99	888			723	pCi/L	REC:	81 (80%-120%)		02/20/1807:19
		Uncert:		+/-48.5					
		TPU:		+/-93.4					
**Technetium-99m Tracer	52200			47000	CPM	REC:	90 (30%-105%)		
Batch	1739600								
QC1203972681	MB								
Tritium			U	-84.8	pCi/L			BXM4	02/16/1818:57
		Uncert:		+/-157					
		TPU:		+/-157					
QC1203972682	443836001	DUP							
Tritium			8730	8830	pCi/L				02/16/1820:09
		Uncert:	+/-408	+/-408		RPD:	1 (0%-20%)		
		TPU:	+/-1740	+/-1750		RER:	0.0797 (0-2)		
QC1203972683	443836001	MS							
Tritium	5160		8730	13000	pCi/L	REC:	84 (75%-125%)		02/16/1821:22
		Uncert:	+/-408	+/-720					
		TPU:	+/-1740	+/-2620					
QC1203972684	LCS								
Tritium	2580			2100	pCi/L	REC:	82 (80%-120%)		02/16/1822:34
		Uncert:		+/-243					
		TPU:		+/-474					

**Notes:**

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

The Qualifiers in this report are defined as follows:

**QC Summary**

Workorder: 443836

Page 3 of 3

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
*						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				
A						The TIC is a suspected aldol-condensation product				
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 analyte was detected in both the associated QC blank and in the sample.				
B						The analyte was detected in the associated method blank >= MDC or >5% sample activity.				
C						Analyte has been confirmed by GC/MS analysis				
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						Concentration exceeds the calibration range of the instrument				
E						Reported value is estimated due to interferences. See comment in narrative.				
J						The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated				
M						Duplicate precision not met.				
N						Spike Sample recovery is outside control limits.				
P						Aroclor target analyte with greater than 25% difference between column analyses.				
S						Reported value determined by the Method of Standard Additions (MSA)				
T						Spike and/or spike duplicate 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.				
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				
o						Analyte failed to recover within LCS limits (Organics only)				

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.