



a member of **The GEL Group** INC



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

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

December 20, 2017

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

Re: CHPRC SAF F17-019  
Work Order: 439572  
SDG: GEL439572

Dear Mr. Fitzgerald:

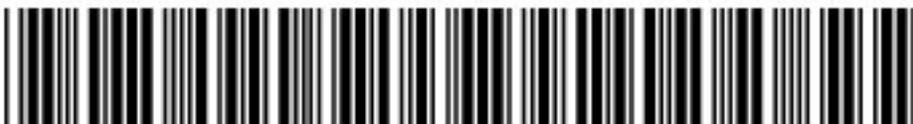
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 14, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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: 304235 - 7C  
Chain of Custody: F17-019-079  
Enclosures



## Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	5
Data Review Qualifier Definitions.....	7
Laboratory Certifications.....	9
Radiological Analysis.....	11
Case Narrative.....	12
Sample Data Summary.....	16
Quality Control Summary.....	18

# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF F17-019  
SDG: GEL439572**

**December 20, 2017**

**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 14, 2017, 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.

**Sample Identification**

The laboratory received the following sample:

<b>Laboratory Identification</b>	<b>Sample Description</b>
439572001	B3CYY0

**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.

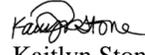
**Data Package**

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: 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.

12/20/2017

REV.0

  
Kaitlyn Stone for  
Heather Shaffer  
Project Manager

**Radiochemistry**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL439572**  
**Work Order #: 439572**

TC99\_EIE\_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.

**Quality Control (QC) Information**

**Duplication Criteria between QC Sample and Duplicate Sample**

The QC Sample and the Duplicate, (see below), did not meet the relative error ratio requirement; however, they do meet the relative percent difference requirement.

Sample	Analyte	Value
1203936394 (B3CYY0DUP)	Technetium-99	RPD 18.3 (0.00%-20.00%) RER 2.26* (0-2)

**Technical Information**

**Recounts**

Samples were recounted due to high relative percent difference/relative error ratio and low recovery. The recounts are reported.

**Miscellaneous Information**

**Additional Comments**

Sample 439572001 (B3CYY0) is a relog. The result is 20661.085 pCi/L with a duplicate result of 24819.937 pCi/L. These results duplicate with an RER value of 2.26 and an RPD of 18.3%.

**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		FL17-019-079	PAGE 1 OF 1
COLLECTOR Frank Heit /CHPRC	COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR SUMNER, LC	PRICE CODE 7C	DATA TURNAROUND 15 Days / 15 Days
SAMPLING LOCATION 299-E33-351, YE30	PROJECT DESIGNATION 200W Pump & Treat - Perched Water Sampling	FIELD LOGBOOK NO. HNF-N-49116	SAF NO. F17-019	AIR QUALITY	METHOD OF SHIPMENT FEDERAL EXPRESS
ICE CHEST NO. 6WS-609	ACTUAL SAMPLE DEPTH N/A	OFFSITE PROPERTY NO. 8421	COA 304235		ORIGINAL
SHIPPED TO GEL Laboratories, LLC	BILL OF LADING/AIR BILL NO. 7702 503 1291				
MATRIX* A=Air DL=Drum L=Liquid DS=Drum S=Soil D=Oil 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 None	HN03 to pH <2	HN03 to pH <2	None
		HOLDING TIME 6 Months	6 Months	6 Months	6 Months
		TYPE OF CONTAINER G/P	G/P	G/P	P
		NO. OF CONTAINER(S) 4	1	1	1
		VOLUME 1L	500mL	1L	1L
		SAMPLE ANALYSIS GAMMA LL; COBALT 60 LL;	TC99, EIE, LSC; COMMON;	TRITIUM, DIST LSC; COMMON;	TRITIUM, DIST LSC; COMMON;
SPECIAL HANDLING AND/OR STORAGE N/A					
SAMPLE NO. B3CY0	MATRIX* WATER	SAMPLE DATE SEP 13 2017	SAMPLE TIME 1043		

432757-45 18717  
Relog 439572

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS TRVL-17-213	
RELINQUISHED BY/REMOVED FROM Frank Heit /CHPRC	DATE/TIME SEP 13 2017 1043	RECEIVED BY/STORED IN Janelle Zunker /CHPRC	DATE/TIME SEP 13 2017 1201		
RELINQUISHED BY/REMOVED FROM Janelle Zunker /CHPRC	DATE/TIME SEP 13 2017 1100	RECEIVED BY/STORED IN Christu Games /FEDEX	DATE/TIME 9/14/17 0850		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
LABORATORY SECTION	RECEIVED BY	TITLE		DATE/TIME	
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY		DATE/TIME	
PRINTED ON 8/21/2017	FSR ID = FSR49339	TRVL NUM = TRVL-17-213		A-6003-618 (REV 2)	

# **Data Review Qualifier Definitions**

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

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

# Laboratory Certifications

**List of current GEL Certifications as of 20 December 2017**

<b>State</b>	<b>Certification</b>
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
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	T104704235-17-12
Utah NELAP	SC000122017-25
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# Radiological Analysis

# Case Narrative

**Radiochemistry**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL439572**  
**Work Order #: 439572**

**Product:** TC99\_EIE\_LSC: COMMON  
**Analytical Method:** TC99\_EIE\_LSC  
**Analytical Procedure:** GL-RAD-A-059 REV# 5  
**Analytical Batch:** 1725360

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>
439572001	B3CYY0
1203936393	Method Blank (MB)
1203936394	439572001(B3CYY0) Sample Duplicate (DUP)
1203936395	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.

**Quality Control (QC) Information**

**Duplication Criteria between QC Sample and Duplicate Sample**

The QC Sample and the Duplicate, (see below), did not meet the relative error ratio requirement; however, they do meet the relative percent difference requirement.

Sample	Analyte	Value
1203936394 (B3CYY0DUP)	Technetium-99	RPD 18.3 (0.00%-20.00%) RER 2.26* (0-2)

**Technical Information**

**Recounts**

Samples were recounted due to high relative percent difference/relative error ratio and low recovery. The recounts are reported.

**Miscellaneous Information**

**Additional Comments**

Sample 439572001 (B3CYY0) is a relog. The result is 20661.085 pCi/L with a duplicate result of 24819.937 pCi/L. These results duplicate with an RER value of 2.26 and an RPD of 18.3%.

**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: GEL439572 GEL Work Order: 439572

**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:** 19 DEC 2017

**Title:** Analyst II

# Sample Data Summary

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

SDG Number: GEL439572	Client: CPRC001	Project: CPRC0F17019
Lab Sample ID: 439572001	Date Collected: 09/13/2017 10:43	Matrix: WATER
Client Sample: -Relog from 432757010	Date Received: 09/14/2017 08:50	
Client ID: B3CYY0		Prep Basis: "As Received"
Batch ID: 1725360	Method: TC99_EIE_LSC	SOP Ref: GL-RAD-A-059
Run Date: 12/18/2017 07:15	Analyst: CXS7	Instrument: LSCGOLD
Data File: E1725360R.xls	Aliquot: 100 mL	Count Time: 15 min
Prep Batch: 1725360	Prep Method: DOE EML HASL-300, Tc-02-	
Prep Date: 12/13/2017 14:44		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99		20700	pCi/L	+/-227	2300	47.8	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	32200	37300	CPM	86.2	(30%-105%)

**Comments:**

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).  
The MDC is a sample specific MDC.

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: December 19, 2017  
Page 1 of 1

**Client :** CH2MHill Plateau Remediation Company  
MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352  
**Contact:** Mr. Scot Fitzgerald  
**Workorder:** 439572

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Liquid Scintillation</b>									
Batch	1725360								
QC1203936393 MB									
Technetium-99			U	2.50	pCi/L			CXS7	12/18/1707:32
				Uncert: +/-25.7					
				TPU: +/-25.7					
**Technetium-99m Tracer	37300			34100	CPM	REC: 91 (30%-105%)			
QC1203936394 439572001 DUP									
Technetium-99		20700		24800	pCi/L				12/18/1707:48
				Uncert: +/-227		RPD: 18 (0%-20%)			
				TPU: +/-2300		RER: 2.26* (0-2)			
**Technetium-99m Tracer	37300	32200		32600	CPM	REC: 88 (30%-105%)			
QC1203936395 LCS									
Technetium-99	888			826	pCi/L	REC: 93 (80%-120%)			12/18/1708:05
				Uncert: +/-55.7					
				TPU: +/-107					
**Technetium-99m Tracer	37300			30300	CPM	REC: 81 (30%-105%)			

**Notes:**

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

The Qualifiers in this report are defined as follows:

- B The associated QC sample blank has a result >= 2X the MDA and, after corrections, result is >= MDA for this sample
- 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.
- UX Gamma Spectroscopy--Uncertain identification
- 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.