



June 12, 2017

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

Re: CHPRC SAF S17-005  
Work Order: 423176  
SDG: GEL423176

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 16, 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,

  
Brielle Luthman for  
Heather Shaffer  
Project Manager

Purchase Order: 300071 - 7H  
Chain of Custody: S17-005-042, S17-005-043, S17-005-229, S17-005-230, S17-005-231, S17-005-232 and  
S17-005-264  
Enclosures



<b>SAMPLE ISSUE RESOLUTION (SIR) REPORT</b>		<b>SIR Number:</b> SIR17-0832 <b>Rev. Number:</b> 0 <b>Date Initiated:</b> 07/18/2017
<b><u>SAMPLE EVENT INFORMATION</u></b>		
<b>SAF NUM(S):</b>	S17-005	
<b>LABORATORY:</b>	GEL	
<b><u>SAMPLING INFORMATION</u></b>		
<b>NUMBER OF SAMPLES:</b>	1	
<b>SAMPLE NUMBERS:</b>	B39DM9	
<b>SAMPLE MATRIX:</b>	WATER	
<b>SDG NUM(S):</b>	GEL423176	
<b><u>ISSUE BACKGROUND</u></b>		
<b>CLASS:</b>	Laboratory Issue	
<b>TYPE:</b>	Chain of Custody Issue	
<b>DESCRIPTION:</b>	COC S17-005-232, missing date in the final received by box.	
<b><u>RESOLUTION</u></b>		
<b>PROPOSED RESOLUTION:</b>	DOCUMENT AND CLOSE	
<b>FINAL RESOLUTION:</b>	DOCUMENT AND CLOSE	
<b>SUBMITTED BY:</b>		
CALIXTO, SE	_____	06/12/2017 _____
<b>ACCEPTED BY:</b>		
KILLAND, KE	_____	07/18/2017 _____

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# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF S17-005  
SDG: GEL423176**

**June 12, 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 May 16, 2017, 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><u>Laboratory Identification</u></b>	<b><u>Sample Description</u></b>
423176001	B39DM8
423176002	B39DM9
423176003	B39DN0
423176004	B39DN1
423176005	B39DM4
423176006	B39DM5
423176007	B39F28
423176008	B39F29

**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.

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.

  
Brielle Luthman for  
Heather Shaffer  
Project Manager

**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL423176**  
**Work Order #: 423176**

## **Metals**

### **Determination of Metals by ICP**

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**

##### **CRDL/PQL Requirements**

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 423176007 (B39F28) and 423176008 (B39F29).

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

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**

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

The method blanks (MB) analyzed with this SDG met the acceptance criteria. However, where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

Sample	Analyte	Value
1203790468 (MB)	Tin	1.32 betw (1 - 2.5)

## **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 1203790280 (B39DM9DUP), 1203790281 (B39DM9PS) and 423176002 (B39DM9) were diluted because target analyte concentrations exceeded the calibration range.

Analyte	<b>423176</b>
	<b>002</b>
Chloride	10X
Nitrate	10X
Sulfate	10X

**Miscellaneous Information****Manual Integrations**

Samples 1203790280 (B39DM9DUP), 1203790281 (B39DM9PS), 423176001 (B39DM8) and 423176002 (B39DM9) were manually integrated to correctly position the baseline as set in the calibration standards.

**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.

**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.

**Technical Information****Recounts**

Sample 1203793685 (LCS) was recounted due to low recovery. The recount is reported.

**C14\_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.

**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**

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

C.O.C. # **S17-005-230**  
Page 1 of 1

**CH2M Hill Plateau Remediation Company**

Collector: **Roger Friesz Jr. /CHPRC**      Contact/Requester: **Karen Waters-Husted**      Telephone No. **509-376-4650**

SAF No. **S17-005**      Sampling Origin: **Hanford Site**      Purchase Order/Charge Code: **300071**

Project Title: **SURV, MAY 2017**      Logbook No. **HNF-N-506 92 / 74**      Ice Chest No. **625-620**

Shipped To (Lab): **GEL Laboratories, LLC**      Method of Shipment: **Commercial Carrier**      Bill of Lading/Air Bill No. **7791 42881214**

Protocol: **SURV**      Priority: **30 Days**      **PRIORITY**      Offsite Property No. **7904**

**POSSIBLE SAMPLE HAZARDS/REMARKS**  
\*\*\* Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1

SPECIAL INSTRUCTIONS: **N/A**      Hold Time:      Total Activity Exemption: Yes  No

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B39DM8	N	W	5-15-17	0815	1x125-mL G/P	9056_ANIONS_IC: COMMON	48 Hours	Cool <=6C

Relinquished By	Print	Sign	Received By	Print	Sign	Date/Time	Date/Time	Matrix *
Roger Friesz Jr. /CHPRC			Frank Hall /CHPRC			MAY 15 2017 1107	MAY 15 2017 1107	S = Soil, SE = Sediment, SO = Solid, SL = Sludge, W = Water, O = Oil, A = Air, DS = Drum Solids, DL = Drum Liquids, T = Tissue, WI = Wipe, L = Liquid, V = Vegetation, X = Other
Frank Hall /CHPRC			FEDEX			MAY 15 2017		
			Received By: <b>STACY BOONG</b>			5/16/17 9:20		
			Received By:					

Disposal Method (e.g., Return to customer, per lab procedure, used in process)

Disposed By: \_\_\_\_\_ Date/Time: \_\_\_\_\_

PRINTED ON 3/29/2017      FSR ID = FSR42933      A-6004-842 (REV 2)

CH2M Hill Plateau Remediation Company

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. #

S17-005-232

Page 1 of 1

423776

Collector	Reggie Friess, Jr. /CHPRC	Contact/Requester	Karen Waters-Husted	Telephone No.	509-376-4650
SAF No.	S17-005	Sampling Origin	Hanford Site	Purchase Order/Charge Code	300071
Project Title	SURV, MAY 2017	Logbook No.	HNF-N-506 921 74	Ice Chest No.	620
Shipped To (Lab)	GEL Laboratories, LLC	Method of Shipment	Commercial Carrier	Bill of Lading/Air Bill No.	7791 4288 1214
Protocol	SURV	Priority:	30 Days	Offsite Property No.	7904
<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> *** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1		<b>SPECIAL INSTRUCTIONS</b> N/A		Total Activity Exemption: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Sample No.	Filter	Date	Time	No/Type Container	Sample Analysis
B39DM9	N	W	5-5-17 0935	1x125-mL G/P	9056_ANIONS_IC: COMMON
				Holding Time	Preservative
				48 Hours	Cool <=6C

Relinquished By	Reggie Friess, Jr. /CHPRC	Print	Sign	Received By	Frank Hill /CHPRC	Print	Sign	Date/Time	MAY 15 2017 11:07
Relinquished By	Frank Hill /CHPRC	Print	Sign	Received By	FEDEX	Print	Sign	Date/Time	MAY 15 2017 11:07
Relinquished By		Print	Sign	Received By	STACY BOONE	Print	Sign	Date/Time	9:20
Relinquished By		Print	Sign	Received By		Print	Sign	Date/Time	

FINAL SAMPLE DISPOSITION Disposal Method (e.g., Return to customer, per lab procedure, used in process)

Disposed By

Date/Time

**CH2M Hill Plateau Remediation Company**

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

C.O.C. # **S17-005-042**  
Page 1 of 1

423176

Collector: **Roger Friess, Jr. /CHPRC**  
Contact/Requester: **Karen Waters-Husted**  
Telephone No.: **509-376-4650**

SAF No.: **S17-005**  
Sampling Origin: **Hanford Site**  
Purchase Order/Charge Code: **300071**

Project Title: **SURV, MAY 2017**  
Logbook No.: **HNF-N-506 92174**  
Ice Chest No.: **625-620**

Shipped To (Lab): **GEL Laboratories, LLC**  
Method of Shipment: **Commercial Carrier**  
Bill of Lading/Air Bill No.: **779142881214**

Protocol: **SURV**  
Priority: **30 Days**  
Offsite Property No.: **7909**

**POSSIBLE SAMPLE HAZARDS/REMARKS**  
\*\*\* Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1

**SPECIAL INSTRUCTIONS**  
Hold Time: \_\_\_\_\_  
SPECIAL INSTRUCTIONS: **N/A**  
Total Activity Exemption: Yes  No

Sample No.	Filter	* Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B39DNO	N	5-15-17	0815	1x500-mL G/P	C14_LSC: COMMON	6 Months	None

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix *
Relinquished By	Roger Friess, Jr. /CHPRC		MAY 15 2017 1107	Received By	Frank Hall /CHPRC		MAY 15 2017 1107	S = Soil, SE = Sediment, SO = Solid, SL = Sludge, W = Water, O = Oil, A = Air, DS = Drum Solids, DL = Drum Liquids, T = Tissue, WI = Wipe, L = Liquid, V = Vegetation, X = Other
Relinquished By	Roger Friess, Jr. /CHPRC		MAY 15 2017	Received By	FEDEX			
Relinquished By			FED EX	Received By	Stacy Boone		5-16-17 9:20	
Relinquished By				Received By				

Disposal Method (e.g., Return to customer, per lab procedure, used in process): \_\_\_\_\_  
Disposed By: \_\_\_\_\_  
Date/Time: \_\_\_\_\_

PRINTED ON 3/29/2017

FSR ID = FSR42933

A-6004-842 (REV 2)

CH2M Hill Plateau Remediation Company		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>		C.O.C. # <b>S17-005-043</b>
Roger Friesz Jr. /CHPRC		423176		Page 1 of 1
Collector	Karen Waters-Husted	Contact/Requester	Karen Waters-Husted	Telephone No. 509-376-4650
SAF No.	S17-005	Sampling Origin	Hanford Site	Purchase Order/Charge Code 300071
Project Title	SURV, MAY 2017	Logbook No.	HNF-N-506 92174	Ice Chest No. <u>623-620</u>
Shipped To (Lab)	GEL Laboratories, LLC	Method of Shipment	Commercial Carrier	Bill of Lading/Air Bill No. <u>779142881214</u>
Protocol	SURV	Priority:	30 Days	Offsite Property No. <u>79064</u>
<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b>		<b>SPECIAL INSTRUCTIONS</b>		Total Activity Exemption: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
*** ** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1		N/A		
Sample No.	Filter	Date	Time	No/Type Container
B39DN1	N	5-15-17	0925	1x500-mL G/P
				C14_LSC: COMMON
				Sample Analysis
				Holding Time
				6 Months
				Preservative
				None

Relinquished By Roger Friesz Jr. /CHPRC	Print 	Sign 	Date/Time MAY 15 2017 11:07	Received By Frank Hall /CHPRC	Print 	Sign 	Date/Time MAY 15 2017 11:07	Matrix *
Relinquished By Roger Friesz Jr. /CHPRC	Print 	Sign 	Date/Time MAY 15 2017 14:00	Received By FEDEX	Print 	Sign 	Date/Time MAY 15 2017	S = Soil = Drum Solids SE = Sediment = DL = Drum Liquids SO = Solid = T = Tissue SL = Sludge = WI = Wipe W = Water = L = Liquid O = Oil = V = Vegetation A = Air = X = Other
Relinquished By		FED EX	Date/Time	Received By STACY BOONS	Print 	Sign 	Date/Time 5/16/17 9:20	
Relinquished By			Date/Time	Received By			Date/Time	
<b>FINAL SAMPLE DISPOSITION</b>		Disposal Method (e.g., Return to customer, per lab procedure, used in process)		Disposed By		Date/Time		
PRINTED ON 3/29/2017		FRS ID = FSR43487		A-6004-842 (REV 2)				

85165

CH2M Hill Plateau Remediation Company

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C.# S17-005-229

Page 1 of 1

423176

Collector: Roger Frantz Jr. JCHPRC  
 Contact/Requester: Karen Waters-Husted  
 Telephone No. 509-376-4650  
 SAF No. S17-005  
 Sampling Origin: Hanford Site  
 Purchase Order/Charge Code: 300071  
 Project Title: SURV, MAY 2017  
 Logbook No. HNF-N-506 92174  
 Ice Chest No. 6205-620  
 Method of Shipment: Commercial Carrier  
 Bill of Lading/Air Bill No. 779142881214  
 Shipped To (Lab): GEL Laboratories, LLC  
 Priority: 30 Days  
 Offsite Property No. 7904

**POSSIBLE SAMPLE HAZARDS/REMARKS**  
 \*\*\* Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1

**SPECIAL INSTRUCTIONS**  
 N/A

Hold Time: \_\_\_\_\_  
 Total Activity Exemption: Yes  No

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B39DM4	N	W	5-15-17	0815	1x500-mL G/P	6020_METALS_ICPMS: Uranium (1)	6 Months	HNO3 to pH <2
B39DM4	N	W	5-15-17	0815	4x1-L G/P	1129LL_SEP_LEPS_GS_LL: COMMON	6 Months	None
B39DM4	N	W	5-15-17	0815	1x500-mL G/P	TC99_EIE_LSC: COMMON	6 Months	HNO3 to pH <2

Relinquished By Roger Frantz Jr. JCHPRC	Print MAY 15 2017 1107	Sign 	Received By Frank Hill JCHPRC	Print MAY 15 2017 1107	Sign 	Date/Time MAY 15 2017 1107	Matrix * S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air	DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
Relinquished By Frank Hill JCHPRC	Print MAY 15 2017 1107	Sign 	Received By FEDEX	Print MAY 15 2017	Sign 	Date/Time MAY 15 2017		
Relinquished By	Print FED EX	Sign 	Received By Stacy Boone	Print MAY 15 2017	Sign 	Date/Time MAY 15 2017		
Relinquished By	Print	Sign	Received By	Print	Sign	Date/Time		

Disposal Method (e.g., Return to customer, per lab procedure, used in process)

Disposed By: \_\_\_\_\_ Date/Time: \_\_\_\_\_

PRINTED ON 3/29/2017

FSR ID = FSR42933

A-6004-842 (REV 2)

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

C.O.C. # **S17-005-231** Page 1 of 1

**CH2M Hill Plateau Remediation Company**

423176

Telephone No. 509-376-4650  
Purchase Order/Charge Code 300071

Contact/Requester Karen Waters-Husted  
Sampling Origin Hanford Site

Logbook No. HNF-N-506 92174  
Ice Chest No. Gues-620

Method of Shipment Commercial Carrier  
Bill of Lading/Air Bill No. 7799142881214

Priority: 30 Days **PRIORITY**  
Offsite Property No. 7964

**POSSIBLE SAMPLE HAZARDS/REMARKS**  
\*\*\* Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1

**SPECIAL INSTRUCTIONS**  
N/A

Hold Time  
Total Activity Exemption: Yes  No

Sample No.	Filter	* Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B39DM5	N	5-15-17	0925	1x500-mL GIP	6020_METALS_JCPMS: Uranium (1)	6 Months	HNO3 to pH <2
B39DM5	N	5-15-17	0925	4x1-L GIP	H129LL_SEP_LEPS_GS_LL: COMMON	6 Months	None
B39DM5	N	5-15-17	0925	1x500-mL GIP	TC99_EIE_LSC: COMMON	6 Months	HNO3 to pH <2

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix *
Relinquished By	Roger Friess Jr. /CHPRC	[Signature]	MAY 15 2017 11:07	Received By	Frank Hal /CHPRC	[Signature]	MAY 15 2017 11:07	S = Soil, SE = Sediment, SO = Solid, SL = Sludge, W = Water, O = Oil, A = Air, DS = Drum Solids, DL = Drum Liquids, T = Tissue, WI = Wipe, L = Liquid, V = Vegetation, X = Other
Relinquished By	Frank Hal /CHPRC	[Signature]	MAY 15 2017	Received By	FEDEX	[Signature]		
Relinquished By				Received By	STACY BOONS	[Signature]	5-16-17 9:20	
Relinquished By				Received By				

**FINAL SAMPLE DISPOSITION**  
Disposal Method (e.g., Return to customer, per lab procedure, used in process)

Disposed By \_\_\_\_\_ Date/Time \_\_\_\_\_

PRINTED ON 3/29/2017 FSR ID = FSR43487 A-6004-842 (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 12 June 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	SC000122017-1
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
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-22
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# Metals Analysis

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL423176**  
**Work Order #: 423176**

**Product: Determination of Metals by ICP****Analytical Method:** SW846 3005A/6010D**Analytical Procedure:** GL-MA-E-013 REV# 28**Analytical Batch:** 1665477**Product: Determination of Metals by ICP-MS****Analytical Method:** SW846 3005A/6020B**Analytical Procedure:** GL-MA-E-014 REV# 29**Analytical Batch:** 1665492**Preparation Method:** SW846 3005A**Preparation Procedure:** GL-MA-E-006 REV# 13**Preparation Batches:** 1665476 and 1665491

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>
423176005	B39DM4
423176006	B39DM5
423176007	B39F28
423176008	B39F29
1203790429	Method Blank (MB) <b>ICP</b>
1203790430	Laboratory Control Sample (LCS)
1203790433	423175003(NonSDGL) Serial Dilution (SD)
1203790431	423175003(NonSDGS) Matrix Spike (MS)
1203790432	423175003(NonSDGSD) Matrix Spike Duplicate (MSD)
1203790468	Method Blank (MB) <b>ICP-MS</b>
1203790469	Laboratory Control Sample (LCS)
1203790472	423176005(B39DM4L) Serial Dilution (SD)
1203790470	423176005(B39DM4S) Matrix Spike (MS)
1203790471	423176005(B39DM4SD) 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****CRDL/PQL Requirements**

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 423176007 (B39F28) and 423176008 (B39F29)-ICP.

**Quality Control (QC) Information****Method Blank (MB) Statement**

The method blanks (MB) analyzed with this SDG met the acceptance criteria. However, where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203790468 (MB)	Tin	1.32 betw (1 - 2.5)

**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: GEL423176 GEL Work Order: 423176

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

- \* Duplicate analysis not within control limits
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- D Results are reported from a diluted aliquot of sample.
- N Spike Sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

**Review/Validation**

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

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

**Signature:** **Name: Nik-Cole Elmore****Date: 12 JUN 2017****Title: Data Validator**

# Sample Data Summary

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

**SDG No:** GEL423176

**CONTRACT:** CPRC0S17005

**METHOD TYPE:** SW846

**SAMPLE ID:**423176005

**BASIS:** As Received

**DATE COLLECTED** 15-MAY-17

**CLIENT ID:** B39DM4

**LEVEL:** Low

**DATE RECEIVED** 16-MAY-17

**MATRIX:** WATER

**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-61-1	Uranium	0.067	ug/L	U	0.067	0.2	15	1	MS	BAJ	05/31/17 17:13	170531-3	1665492

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1665492	1665491	SW846 3005A	50	mL	50	mL	05/16/17	CXW4

**\*Analytical Methods:**

MS SW846 3005A/6020B

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

**SDG No:** GEL423176

**CONTRACT:** CPRC0S17005

**METHOD TYPE:** SW846

**SAMPLE ID:**423176006

**BASIS:** As Received

**DATE COLLECTED** 15-MAY-17

**CLIENT ID:** B39DM5

**LEVEL:** Low

**DATE RECEIVED** 16-MAY-17

**MATRIX:** WATER

**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-61-1	Uranium	7.6	ug/L		0.067	0.2	15	1	MS	BAJ	05/31/17 17:29	170531-3	1665492

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1665492	1665491	SW846 3005A	50	mL	50	mL	05/16/17	CXW4

**\*Analytical Methods:**

MS SW846 3005A/6020B

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

SDG No: GEL423176

CONTRACT: CPCR0517005

METHOD TYPE: SW846

SAMPLE ID: 423176007

BASIS: As Received

DATE COLLECTED 15-MAY-17

CLIENT ID: B39F28

LEVEL: Low

DATE RECEIVED 16-MAY-17

MATRIX: WATER

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	48	ug/L	B	19.3	50	50	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	06/01/17 08:11	170531-6	1665492
7440-38-2	Arsenic	2.12	ug/L	B	2	5	5	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-39-3	Barium	59.8	ug/L		0.67	2	2	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-41-7	Beryllium	0.20	ug/L	U	0.2	0.5	0.5	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	06/07/17 19:22	060717A-1	1665477
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-70-2	Calcium	49300	ug/L		50	200	200	1	P	HSC	06/07/17 19:22	060717A-1	1665477
7440-47-3	Chromium	30.6	ug/L		3	10	10	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-48-4	Cobalt	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-50-8	Copper	0.569	ug/L	B	0.3	1	1	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7439-89-6	Iron	48.5	ug/L	B	30	100	100	1	P	HSC	06/07/17 19:22	060717A-1	1665477
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7439-95-4	Magnesium	10600	ug/L		110	300	300	1	P	HSC	06/07/17 19:22	060717A-1	1665477
7439-96-5	Manganese	3	ug/L	B	1	5	5	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7439-98-7	Molybdenum	4.06	ug/L		0.2	0.5	0.5	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-02-0	Nickel	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-09-7	Potassium	6730	ug/L		50	150	150	1	P	HSC	06/07/17 19:22	060717A-1	1665477
7782-49-2	Selenium	2.32	ug/L	B	2	5	5	1	MS	BAJ	06/01/17 08:11	170531-6	1665492
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-23-5	Sodium	21000	ug/L		100	300	300	1	P	HSC	06/10/17 13:02	061017A-2	1665477
7440-24-6	Strontium	241	ug/L		2	10	10	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-29-1	Thorium	0.70	ug/L	U	0.7	2	2	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-31-5	Tin	1	ug/L	U	1	5	5	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-61-1	Uranium	2.44	ug/L		0.067	0.2	0.2	1	MS	BAJ	05/31/17 17:33	170531-3	1665492
7440-62-2	Vanadium	4.4	ug/L	B	1	5	5	1	P	HSC	06/07/17 19:22	060717A-1	1665477
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	MS	BAJ	05/31/17 17:33	170531-3	1665492

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1665477	1665476	SW846 3005A	50	mL	50	mL	05/16/17	CXW4
1665492	1665491	SW846 3005A	50	mL	50	mL	05/16/17	CXW4

**\*Analytical Methods:**

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METALS

-1-

INORGANICS ANALYSIS DATA PACKAGE

P SW846 3005A/6010D  
MS SW846 3005A/6020B

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

**SDG No:** GEL423176

**CONTRACT:** CPRC0S17005

**METHOD TYPE:** SW846

**SAMPLE ID:**423176008

**BASIS:** As Received

**DATE COLLECTED** 15-MAY-17

**CLIENT ID:** B39F29

**LEVEL:** Low

**DATE RECEIVED** 16-MAY-17

**MATRIX:** WATER

**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	19.3	ug/L	U	19.3	50	50	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	06/01/17 08:13	170531-6	1665492
7440-38-2	Arsenic	2.2	ug/L	B	2	5	5	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-39-3	Barium	59.6	ug/L		0.67	2	2	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-41-7	Beryllium	0.20	ug/L	U	0.2	0.5	0.5	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	06/07/17 19:25	060717A-1	1665477
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-70-2	Calcium	49200	ug/L		50	200	200	1	P	HSC	06/07/17 19:25	060717A-1	1665477
7440-47-3	Chromium	30.7	ug/L		3	10	10	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-48-4	Cobalt	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-50-8	Copper	0.475	ug/L	B	0.3	1	1	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	06/07/17 19:25	060717A-1	1665477
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7439-95-4	Magnesium	10500	ug/L		110	300	300	1	P	HSC	06/07/17 19:25	060717A-1	1665477
7439-96-5	Manganese	1	ug/L	U	1	5	5	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7439-98-7	Molybdenum	4.13	ug/L		0.2	0.5	0.5	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-02-0	Nickel	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-09-7	Potassium	7080	ug/L		50	150	150	1	P	HSC	06/07/17 19:25	060717A-1	1665477
7782-49-2	Selenium	2	ug/L	B	2	5	5	1	MS	BAJ	06/01/17 08:13	170531-6	1665492
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-23-5	Sodium	21800	ug/L		100	300	300	1	P	HSC	06/10/17 13:05	061017A-2	1665477
7440-24-6	Strontium	243	ug/L		2	10	10	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-29-1	Thorium	0.70	ug/L	U	0.7	2	2	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-31-5	Tin	1	ug/L	U	1	5	5	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-61-1	Uranium	2.47	ug/L		0.067	0.2	0.2	1	MS	BAJ	05/31/17 17:36	170531-3	1665492
7440-62-2	Vanadium	4.22	ug/L	B	1	5	5	1	P	HSC	06/07/17 19:25	060717A-1	1665477
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	MS	BAJ	05/31/17 17:36	170531-3	1665492

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1665477	1665476	SW846 3005A	50	mL	50	mL	05/16/17	CXW4
1665492	1665491	SW846 3005A	50	mL	50	mL	05/16/17	CXW4

**\*Analytical Methods:**

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METALS

-1-

INORGANICS ANALYSIS DATA PACKAGE

P SW846 3005A/6010D  
MS SW846 3005A/6020B

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: June 12, 2017

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 423176

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1665492										
QC1203790469	LCS										
Aluminum	2000			2070	ug/L		103	(80%-120%)	BAJ	05/31/17	17:10
Antimony	50.0			49.0	ug/L		98	(80%-120%)		06/01/17	08:00
Arsenic	50.0			52.7	ug/L		105	(80%-120%)		05/31/17	17:10
Barium	50.0			49.8	ug/L		99.6	(80%-120%)			
Beryllium	50.0			57.0	ug/L		114	(80%-120%)			
Cadmium	50.0			49.4	ug/L		98.9	(80%-120%)			
Chromium	50.0			49.4	ug/L		98.7	(80%-120%)			
Cobalt	50.0			49.7	ug/L		99.5	(80%-120%)			
Copper	50.0			50.1	ug/L		100	(80%-120%)			
Lead	50.0			49.4	ug/L		98.9	(80%-120%)			
Manganese	50.0			49.1	ug/L		98.1	(80%-120%)			
Molybdenum	50.0			49.3	ug/L		98.6	(80%-120%)			
Nickel	50.0			49.7	ug/L		99.4	(80%-120%)			

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 423176

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1665492										
Selenium	50.0			51.2	ug/L		102	(80%-120%)	BAJ	06/01/17	08:00
Silver	50.0			50.9	ug/L		102	(80%-120%)		05/31/17	17:10
Strontium	50.0			49.5	ug/L		98.9	(80%-120%)			
Thallium	50.0			45.9	ug/L		91.7	(80%-120%)			
Thorium	50.0			46.3	ug/L		92.7	(80%-120%)			
Tin	50.0			48.9	ug/L		97.8	(80%-120%)			
Uranium	50.0			47.8	ug/L		95.6	(80%-120%)			
Zinc	50.0			52.7	ug/L		105	(80%-120%)			
QC1203790468	MB										
Aluminum			U	19.3	ug/L					05/31/17	17:07
Antimony			U	1.00	ug/L					06/01/17	07:58
Arsenic			U	2.00	ug/L					05/31/17	17:07
Barium			U	0.670	ug/L						
Beryllium			U	0.200	ug/L						
Cadmium			U	0.300	ug/L						
Chromium			U	3.00	ug/L						

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**QC Summary**

Workorder: 423176

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1665492										
Cobalt			U	0.300	ug/L				BAJ	05/31/17	17:07
Copper			U	0.300	ug/L						
Lead			U	0.500	ug/L						
Manganese			U	1.00	ug/L						
Molybdenum			U	0.200	ug/L						
Nickel			U	0.600	ug/L						
Selenium			U	2.00	ug/L					06/01/17	07:58
Silver			U	0.300	ug/L					05/31/17	17:07
Strontium			U	2.00	ug/L						
Thallium			U	0.600	ug/L						
Thorium			U	0.700	ug/L						
Tin			B	1.32	ug/L						
Uranium			U	0.067	ug/L						
Zinc			U	3.30	ug/L						
QC1203790470	423176005	MS									
Aluminum	2000	U	19.3	2080	ug/L		104	(75%-125%)		05/31/17	17:16

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 423176

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Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>												
Batch	1665492											
Antimony	50.0	U	1.00		48.8	ug/L		97.1	(75%-125%)	BAJ	06/01/17	08:04
Arsenic	50.0	U	2.00		53.0	ug/L		104	(75%-125%)		05/31/17	17:16
Barium	50.0	U	0.670		51.8	ug/L		103	(75%-125%)			
Beryllium	50.0	U	0.200		57.2	ug/L		114	(75%-125%)			
Cadmium	50.0	U	0.300		50.9	ug/L		102	(75%-125%)			
Chromium	50.0	U	3.00		50.2	ug/L		100	(75%-125%)			
Cobalt	50.0	U	0.300		50.9	ug/L		102	(75%-125%)			
Copper	50.0	U	0.300		51.9	ug/L		104	(75%-125%)			
Lead	50.0	U	0.500		50.4	ug/L		101	(75%-125%)			
Manganese	50.0	U	1.00		51.2	ug/L		102	(75%-125%)			
Molybdenum	50.0	U	0.200		50.5	ug/L		101	(75%-125%)			
Nickel	50.0	U	0.600		51.8	ug/L		104	(75%-125%)			
Selenium	50.0	U	2.00		52.7	ug/L		105	(75%-125%)		06/01/17	08:04
Silver	50.0	U	0.300		51.5	ug/L		103	(75%-125%)		05/31/17	17:16
Strontium	50.0	U	2.00		49.8	ug/L		99.1	(75%-125%)			

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 423176

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Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>												
Batch	1665492											
Thallium	50.0	U	0.600		47.3	ug/L		94	(75%-125%)	BAJ	05/31/17	17:16
Thorium	50.0	U	0.700		47.7	ug/L		94.1	(75%-125%)			
Tin	50.0	U	1.00		50.1	ug/L		99.4	(75%-125%)			
Uranium	50.0	U	0.067		48.7	ug/L		97.4	(75%-125%)			
Zinc	50.0	U	3.30		53.0	ug/L		102	(75%-125%)			
QC1203790471 423176005 MSD												
Aluminum	2000	U	19.3		2160	ug/L	3.63	108	(0%-20%)		05/31/17	17:20
Antimony	50.0	U	1.00		48.9	ug/L	0.113	97.2	(0%-20%)		06/01/17	08:05
Arsenic	50.0	U	2.00		52.9	ug/L	0.181	104	(0%-20%)		05/31/17	17:20
Barium	50.0	U	0.670		52.0	ug/L	0.387	104	(0%-20%)			
Beryllium	50.0	U	0.200		58.4	ug/L	2.14	117	(0%-20%)			
Cadmium	50.0	U	0.300		52.0	ug/L	2.11	104	(0%-20%)			
Chromium	50.0	U	3.00		51.0	ug/L	1.54	102	(0%-20%)			
Cobalt	50.0	U	0.300		51.9	ug/L	2.02	104	(0%-20%)			
Copper	50.0	U	0.300		52.9	ug/L	1.91	106	(0%-20%)			
Lead	50.0	U	0.500		51.0	ug/L	1.18	102	(0%-20%)			

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**QC Summary**

Workorder: 423176

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1665492										
Manganese	50.0	U	1.00	50.2	ug/L	1.83	100	(0%-20%)	BAJ	05/31/17	17:20
Molybdenum	50.0	U	0.200	50.2	ug/L	0.646	100	(0%-20%)			
Nickel	50.0	U	0.600	51.2	ug/L	1.2	102	(0%-20%)			
Selenium	50.0	U	2.00	50.6	ug/L	3.98	101	(0%-20%)		06/01/17	08:05
Silver	50.0	U	0.300	52.1	ug/L	1.11	104	(0%-20%)		05/31/17	17:20
Strontium	50.0	U	2.00	49.7	ug/L	0.171	98.9	(0%-20%)			
Thallium	50.0	U	0.600	48.6	ug/L	2.76	96.7	(0%-20%)			
Thorium	50.0	U	0.700	49.0	ug/L	2.81	96.8	(0%-20%)			
Tin	50.0	U	1.00	50.5	ug/L	0.804	100	(0%-20%)			
Uranium	50.0	U	0.067	49.5	ug/L	1.43	98.8	(0%-20%)			
Zinc	50.0	U	3.30	52.1	ug/L	1.59	101	(0%-20%)			
QC1203790472 423176005 SDILT											
Aluminum		U	3.78 DU	96.5	ug/L	N/A		(0%-20%)		05/31/17	17:26
Antimony		U	0.269 DU	5.00	ug/L	N/A		(0%-20%)		06/01/17	08:07
Arsenic		U	0.869 DU	10.0	ug/L	N/A		(0%-20%)		05/31/17	17:26
Barium		U	0.109 DU	3.35	ug/L	N/A		(0%-20%)			

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**QC Summary**

Workorder: 423176

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1665492										
Beryllium	U	0.016	DU	1.00	ug/L	N/A		(0%-20%)	BAJ	05/31/17	17:26
Cadmium	U	0.010	DU	1.50	ug/L	N/A		(0%-20%)			
Chromium	U	0.158	DU	15.0	ug/L	N/A		(0%-20%)			
Cobalt	U	0.026	DU	1.50	ug/L	N/A		(0%-20%)			
Copper	U	-0.006	BD	0.530	ug/L	N/A		(0%-20%)			
Lead	U	0.051	DU	2.50	ug/L	N/A		(0%-20%)			
Manganese	U	0.132	DU	5.00	ug/L	N/A		(0%-20%)			
Molybdenum	U	0.119	DU	1.00	ug/L	N/A		(0%-20%)			
Nickel	U	0.033	DU	3.00	ug/L	N/A		(0%-20%)			
Selenium	U	-0.328	DU	10.0	ug/L	N/A		(0%-20%)		06/01/17	08:07
Silver	U	0.013	DU	1.50	ug/L	N/A		(0%-20%)		05/31/17	17:26
Strontium	U	0.244	DU	10.0	ug/L	N/A		(0%-20%)			
Thallium	U	0.284	DU	3.00	ug/L	N/A		(0%-20%)			
Thorium	U	0.660	DU	3.50	ug/L	N/A		(0%-20%)			
Tin	U	0.352	DU	5.00	ug/L	N/A		(0%-20%)			

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**QC Summary**

Workorder: 423176

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1665492										
Uranium	U	0.036	DU	0.335	ug/L	N/A		(0%-20%)	BAJ	05/31/17	17:26
Zinc	U	1.79	DU	16.5	ug/L	N/A		(0%-20%)			
<b>Metals Analysis-ICP</b>											
Batch	1665477										
QC1203790430	LCS										
Boron	500			499	ug/L		99.7	(80%-120%)	HSC	06/07/17	19:06
Calcium	5000			4810	ug/L		96.3	(80%-120%)			
Iron	5000			4900	ug/L		98	(80%-120%)			
Magnesium	5000			4820	ug/L		96.4	(80%-120%)			
Potassium	5000			5010	ug/L		100	(80%-120%)			
Sodium	5000			5450	ug/L		109	(80%-120%)		06/10/17	12:46
Vanadium	500			490	ug/L		98.1	(80%-120%)		06/07/17	19:06
QC1203790429	MB										
Boron			U	15.0	ug/L					06/07/17	19:03
Calcium			U	50.0	ug/L						
Iron			U	30.0	ug/L						
Magnesium			U	110	ug/L						
Potassium			U	50.0	ug/L						

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**QC Summary**

Workorder: 423176

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1665477										
Sodium			U	100	ug/L				HSC	06/10/17	12:43
Vanadium			U	1.00	ug/L					06/07/17	19:03
QC1203790431 423175003 MS											
Boron	500	U	15.0	517	ug/L		101	(75%-125%)		06/07/17	19:13
Calcium	5000		22300	26500	ug/L		N/A	(75%-125%)			
Iron	5000	B	70.8	4840	ug/L		95.4	(75%-125%)			
Magnesium	5000		7190	11700	ug/L		90.1	(75%-125%)			
Potassium	5000		3690	8470	ug/L		95.5	(75%-125%)			
Sodium	5000		105000	108000	ug/L		N/A	(75%-125%)		06/10/17	12:53
Vanadium	500		48.9	543	ug/L		98.9	(75%-125%)		06/07/17	19:13
QC1203790432 423175003 MSD											
Boron	500	U	15.0	522	ug/L	0.985	102	(0%-20%)		06/07/17	19:16
Calcium	5000		22300	27500	ug/L	3.42	N/A	(0%-20%)			
Iron	5000	B	70.8	4870	ug/L	0.686	96.1	(0%-20%)			
Magnesium	5000		7190	12000	ug/L	2.34	95.7	(0%-20%)			
Potassium	5000		3690	8650	ug/L	2.14	99.1	(0%-20%)			
Sodium	5000		105000	110000	ug/L	2.48	N/A	(0%-20%)		06/10/17	12:56

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**QC Summary**

Workorder: 423176

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1665477										
Vanadium	500	48.9		548	ug/L	0.929	99.9	(0%-20%)	HSC	06/07/17	19:16
QC1203790433 423175003 SDILT											
Boron	U	12.9	DU	75.0	ug/L	N/A		(0%-20%)		06/07/17	19:19
Calcium		22300	D	4400	ug/L	1.17		(0%-20%)			
Iron	B	70.8	DU	150	ug/L	N/A		(0%-20%)			
Magnesium		7190	D	1450	ug/L	.773		(0%-20%)			
Potassium		3690	D	710	ug/L	3.89		(0%-20%)			
Sodium		105000	D	21500	ug/L	2.47		(0%-20%)		06/10/17	12:59
Vanadium		48.9	D	9.41	ug/L	3.75		(0%-20%)		06/07/17	19:19

**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

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
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 #: GEL423176  
Work Order #: 423176**

**Product: Ion Chromatography****Analytical Method:** 9056\_ANIONS\_IC**Analytical Procedure:** GL-GC-E-086 REV# 25**Analytical Batch:** 1665414

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>
423176001	B39DM8
423176002	B39DM9
1203790278	Method Blank (MB)
1203790279	Laboratory Control Sample (LCS)
1203790280	423176002(B39DM9) Sample Duplicate (DUP)
1203790281	423176002(B39DM9) 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 1203790280 (B39DM9DUP), 1203790281 (B39DM9PS) and 423176002 (B39DM9) 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	423176
	002
Chloride	10X
Nitrate	10X
Sulfate	10X

**Miscellaneous Information****Manual Integrations**

Samples 1203790280 (B39DM9DUP), 1203790281 (B39DM9PS), 423176001 (B39DM8) and 423176002 (B39DM9) were manually integrated to correctly position the baseline as set in the calibration standards.

**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.

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL423176 GEL Work Order: 423176

**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:** Kristen Mizzell

**Date:** 05 JUN 2017

**Title:** Analyst I

# Sample Data Summary

**GEL LABORATORIES LLC**

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**Certificate of Analysis**

Report Date: June 5, 2017

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF S17-005

Client Sample ID: B39DM8 Project: CPRC0S17005  
 Sample ID: 423176001 Client ID: CPRC001  
 Matrix: WATER  
 Collect Date: 15-MAY-17 08:15  
 Receive Date: 16-MAY-17  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
9056_ANIONS_IC: COMMON "As Received"												
Chloride	B	113	67.0	200	ug/L		1	MXL2	05/16/17	1217	1665414	1
Fluoride	U	33.0	33.0	500	ug/L		1					
Nitrate-N	U	33.0	33.0	250	ug/L		1					
Nitrite-N	U	33.0	33.0	250	ug/L		1					
Sulfate	U	133	133	500	ug/L		1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9056_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

**GEL LABORATORIES LLC**

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**Certificate of Analysis**

Report Date: June 5, 2017

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF S17-005

Client Sample ID: B39DM9 Project: CPRC0S17005  
 Sample ID: 423176002 Client ID: CPRC001  
 Matrix: WATER  
 Collect Date: 15-MAY-17 09:28  
 Receive Date: 16-MAY-17  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
9056_ANIONS_IC: COMMON "As Received"												
Fluoride	B	304	33.0	500	ug/L		1	MXL2	05/16/17	1246	1665414	1
Nitrite-N	U	33.0	33.0	250	ug/L		1					
Chloride	D	17800	670	2000	ug/L		10	MXL2	05/16/17	1612	1665414	2
Nitrate-N	D	22200	330	1000	ug/L		10					
Sulfate	D	35500	1330	4000	ug/L		10					

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	9056_ANIONS_IC		
2	9056_ANIONS_IC		

**Notes:**

Column headers are defined as follows:

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

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: June 5, 2017

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CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 423176

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1665414										
QC1203790280	423176002	DUP									
Chloride	D	17800	D	17800	ug/L	0.343		(0%-20%)	MXL2	05/16/17	16:41
Fluoride	B	304	B	304	ug/L	0 ^		(+/-500)		05/16/17	13:16
Nitrate-N	D	22200	D	22200	ug/L	0.0361		(0%-20%)		05/16/17	16:41
Nitrite-N	U	33.0	U	33.0	ug/L	N/A				05/16/17	13:16
Sulfate	D	35500	D	35500	ug/L	0.0535		(0%-20%)		05/16/17	16:41
QC1203790279	LCS										
Chloride	5000			4690	ug/L		93.7	(80%-120%)		05/16/17	10:49
Fluoride	2500			2410	ug/L		96.4	(80%-120%)			
Nitrate-N	2500			2320	ug/L		92.9	(80%-120%)			
Nitrite-N	2500			2380	ug/L		95.3	(80%-120%)			
Sulfate	10000			9600	ug/L		96	(80%-120%)			
QC1203790278	MB										
Chloride			U	67.0	ug/L					05/16/17	10:19
Fluoride			U	33.0	ug/L						
Nitrate-N			U	33.0	ug/L						

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**QC Summary**

Workorder: 423176

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1665414										
Nitrite-N			U	33.0	ug/L				MXL2	05/16/17	10:19
Sulfate			U	133	ug/L						
QC1203790281	423176002 PS										
Chloride	5.00	D	1.78	D	6.64	mg/L	97.1	(75%-125%)		05/16/17	17:11
Fluoride	2.50	B	0.304		2.69	mg/L	95.3	(75%-125%)		05/16/17	13:45
Nitrate-N	2.50	D	2.22	D	4.80	mg/L	103	(75%-125%)		05/16/17	17:11
Nitrite-N	2.50	U	0.00		2.35	mg/L	94.1	(75%-125%)		05/16/17	13:45
Sulfate	10.0	D	3.55	D	13.4	mg/L	98.3	(75%-125%)		05/16/17	17:11

**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  $\geq$  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

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**QC Summary**

Workorder: 423176

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<b>Parmname</b>	<b>NOM</b>	<b>Sample</b>	<b>Qual</b>	<b>QC</b>	<b>Units</b>	<b>RPD%</b>	<b>REC%</b>	<b>Range</b>	<b>Anlst</b>	<b>Date</b>	<b>Time</b>
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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 #: GEL423176**  
**Work Order #: 423176**

**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:** 1665781

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>
423176005	B39DM4
423176006	B39DM5
1203791097	Method Blank (MB)
1203791098	422153015(B39JT1) Sample Duplicate (DUP)
1203791099	422153015(B39JT1) Matrix Spike (MS)
1203791100	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:** TC99\_EIE\_LSC: COMMON

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

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

**Analytical Batch:** 1666842

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>
423176005	B39DM4
423176006	B39DM5
1203793683	Method Blank (MB)
1203793684	423007001(NonSDG) Sample Duplicate (DUP)
1203793685	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**

**Recounts**

Sample 1203793685 (LCS) was recounted due to low recovery. The recount is reported.

**Product:** C14\_LSC: COMMON

**Analytical Method:** C14\_LSC

**Analytical Procedure:** GL-RAD-A-003 REV# 15

**Analytical Batch:** 1668315

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>
423176003	B39DN0
423176004	B39DN1
1203797245	Method Blank (MB)
1203797246	423176003(B39DN0) Sample Duplicate (DUP)
1203797247	423176003(B39DN0) Matrix Spike (MS)
1203797248	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.

**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: GEL423176 GEL Work Order: 423176

**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:** Theresa Austin**Date:** 09 JUN 2017**Title:** Group Leader

# Sample Data Summary

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

SDG Number: GEL423176	Client: CPRC001	Project: CPRC0S17005
Lab Sample ID: 423176003	Date Collected: 05/15/2017 08:15	Matrix: WATER
	Date Received: 05/16/2017 09:20	
Client ID: B39DN0	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1668315	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 06/08/2017 16:42	Aliquot: 60.02 mL	Instrument: LSCRED
Data File: C1668315.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 45 min
Prep Batch: 1668315		
Prep Date: 06/08/2017 10:05		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	-7.27	pCi/L	+/-15.6	15.6	27.3	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

**Comments:**

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

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

SDG Number: GEL423176	Client: CPRC001	Project: CPRC0S17005
Lab Sample ID: 423176004	Date Collected: 05/15/2017 09:25	Matrix: WATER
	Date Received: 05/16/2017 09:20	
Client ID: B39DN1	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1668315	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 06/08/2017 17:28	Aliquot: 60.04 mL	Instrument: LSCRED
Data File: C1668315.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 45 min
Prep Batch: 1668315		
Prep Date: 06/08/2017 10:05		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	-1.47	pCi/L	+/-15.8	15.8	27.3	50.0

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). The MDC is a sample specific MDC.

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

SDG Number: GEL423176	Client: CPRC001	Project: CPRC0S17005
Lab Sample ID: 423176005	Date Collected: 05/15/2017 08:15	Matrix: WATER
	Date Received: 05/16/2017 09:20	
Client ID: B39DM4	Method: DOE EML HASL-300,I-01 Mo	Prep Basis: "As Received"
Batch ID: 1665781	Analyst: MJH1	SOP Ref: GL-RAD-A-006
Run Date: 05/26/2017 18:27	Aliquot: 1.6 L	Instrument: XRAY2
Data File: I423176005.CNF;1	Prep Method: DOE EML HASL-300,I-01 M	Count Time: 500 min
Prep Batch: 1665781		
Prep Date: 05/25/2017 12:33		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	U	0.176	pCi/L	+/-0.158	0.177	0.299	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.

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

SDG Number: GEL423176	Client: CPRC001	Project: CPRC0S17005
Lab Sample ID: 423176005	Date Collected: 05/15/2017 08:15	Matrix: WATER
	Date Received: 05/16/2017 09:20	
Client ID: B39DM4	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1666842	Analyst: CXS7	SOP Ref: GL-RAD-A-059
Run Date: 05/28/2017 12:55	Aliquot: 100 mL	Instrument: LSCBROWN
Data File: E1666842R.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 20 min
Prep Batch: 1666842		
Prep Date: 05/22/2017 15:47		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	-9.11	pCi/L	+/-25.5	25.5	44.9	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	28400	33300	CPM	85.2	(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.

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

SDG Number: GEL423176	Client: CPRC001	Project: CPRC0S17005
Lab Sample ID: 423176006	Date Collected: 05/15/2017 09:25	Matrix: WATER
	Date Received: 05/16/2017 09:20	
Client ID: B39DM5	Method: DOE EML HASL-300,I-01 Mo	Prep Basis: "As Received"
Batch ID: 1665781	Analyst: MJH1	SOP Ref: GL-RAD-A-006
Run Date: 05/26/2017 18:28	Aliquot: 1.6 L	Instrument: XRAY3
Data File: I423176006.CNF;1	Prep Method: DOE EML HASL-300,I-01 M	Count Time: 500 min
Prep Batch: 1665781		
Prep Date: 05/25/2017 12:33		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129		1.43	pCi/L	+/-0.263	0.298	0.197	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

**Comments:**

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

The MDC is a sample specific MDC.

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

SDG Number: GEL423176	Client: CPRC001	Project: CPRC0S17005
Lab Sample ID: 423176006	Date Collected: 05/15/2017 09:25	Matrix: WATER
	Date Received: 05/16/2017 09:20	
Client ID: B39DM5	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1666842	Analyst: CXS7	SOP Ref: GL-RAD-A-059
Run Date: 05/28/2017 13:17	Aliquot: 100 mL	Instrument: LSCBROWN
Data File: E1666842R.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 20 min
Prep Batch: 1666842		
Prep Date: 05/22/2017 15:47		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99		529	pCi/L	+/-38.9	70.4	40.8	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	30300	33300	CPM	90.9	(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**

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**QC Summary**

Report Date: June 9, 2017  
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**Client :** CH2MHill Plateau Remediation Company  
MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352  
**Contact:** Mr. Scot Fitzgerald  
**Workorder:** 423176

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1665781								
QC1203791097	MB								
Iodine-129			U	-0.283	pCi/L			MJH1	05/30/1707:32
				Uncert: +/-0.318					
				TPU: +/-0.344					
QC1203791098	422153015	DUP							
Iodine-129		U	-0.0723	U	-0.219	pCi/L			05/30/1707:33
			Uncert: +/-0.223		+/-0.255		RPD: 0	N/A	
			TPU: +/-0.226		+/-0.274		RER: 0.808	(0-2)	
QC1203791099	422153015	MS							
Iodine-129		U	-0.0723		30.1	pCi/L	REC: 94	(75%-125%)	05/30/1707:33
			Uncert: +/-0.223		+/-2.09				
			TPU: +/-0.226		+/-3.62				
QC1203791100	LCS								
Iodine-129			26.0		25.0	pCi/L	REC: 96	(80%-120%)	05/30/1707:35
			Uncert: +/-2.11		+/-3.24				
			TPU: +/-3.24						
<b>Rad Liquid Scintillation</b>									
Batch	1666842								
QC1203793683	MB								
Technetium-99			U	1.36	pCi/L			CXS7	05/28/1714:43
				Uncert: +/-25.5					
				TPU: +/-25.5					
**Technetium-99m Tracer		33300		28800	CPM	REC: 86	(30%-105%)		
QC1203793684	423007001	DUP							
Technetium-99		U	39.3	U	38.2	pCi/L			05/28/1715:04
			Uncert: +/-25.5		+/-25.0		RPD: 0	N/A	
			TPU: +/-25.9		+/-25.3		RER: 0.0626	(0-2)	
**Technetium-99m Tracer		33300	30200	30400	CPM	REC: 91	(30%-105%)		
QC1203793685	LCS								
Technetium-99			861		777	pCi/L	REC: 90	(80%-120%)	05/30/1709:06
			Uncert: +/-52.6		+/-101				
			TPU: +/-101						
**Technetium-99m Tracer		33300		29800	CPM	REC: 90	(30%-105%)		
Batch	1668315								
QC1203797245	MB								
Carbon-14			U	-1.49	pCi/L			BXM4	06/09/1703:22
				Uncert: +/-15.8					
				TPU: +/-15.8					
QC1203797246	423176003	DUP							
Carbon-14		U	-7.27	U	5.27	pCi/L			06/09/1704:09
			Uncert: +/-15.6		+/-16.0		RPD: 0	N/A	
			TPU: +/-15.6		+/-16.0		RER: 1.1	(0-2)	
QC1203797247	423176003	MS							
Carbon-14		U	-7.27		1200	pCi/L	REC: 96	(75%-125%)	06/09/1704:55

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**QC Summary**

Workorder: 423176

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
<b>Rad Liquid Scintillation</b>										
Batch	1668315									
		Uncert:	+/-15.6	+/-37.1						
		TPU:	+/-15.6	+/-226						
QC1203797248	LCS									
Carbon-14	1250			1170	pCi/L	REC: 94 (80%-120%)			06/09/1705:41	
		Uncert:		+/-36.8						
		TPU:		+/-221						

**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  $\geq 2X$  the MDA and, after corrections, result is  $\geq$  MDA for this sample
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is  $\geq$  EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- UX Gamma Spectroscopy--Uncertain identification
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

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

\*\* Indicates analyte is a surrogate compound.

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