



April 03, 2018

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

Re: CHPRC SAF W18-002  
Work Order: 445545  
SDG: GEL445545

Dear Mr. Fitzgerald:

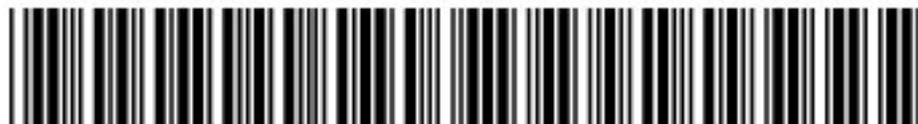
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 09, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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,

Anna Dupree for  
Heather Shaffer  
Project Manager

Purchase Order: 300071 -7H  
Chain of Custody: W18-002-080  
Enclosures



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# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF W18-002  
SDG: GEL445545**

**April 03, 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 March 09, 2018, 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>
445545001	B3H3R1

**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 and Metals.

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.

APRIL 5, 2018

REV. 0

  
Anna Dupree for  
Heather Shaffer  
Project Manager

**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL445545**  
**Work Order #: 445545**

## **Metals**

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

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.

### **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**

### **Alkalinity**

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**

<b>CH2M Hill Plateau Remediation Company</b>	<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b> <span style="font-size: 2em; color: blue;">445545</span>	C.O.C.# <b>W18-002-080</b> Page 1 of 1
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<b>Collector:</b> Juan Aguilar /CHPRC	<b>Contact/Requester:</b> Karen Waters-Husted	<b>Telephone No.:</b> 509-376-4650
<b>SAF No.:</b> W18-002	<b>Sampling Origin:</b> Hanford Site	<b>Purchase Order/Charge Code:</b> 300071
<b>Project Title:</b> RCRA, February 2018	<b>Logbook No.:</b> HNF-N-506-99/11	<b>Ice Chest No.:</b> GWS-400
<b>Shipped To (Lab):</b> GEL Laboratories, LLC	<b>Method of Shipment:</b> Commercial Carrier	<b>Bill of Lading/Air Bill No.:</b> 771756282710
<b>Protocol:</b> RCRA	<b>Priority:</b> 30 Days	<b>Offsite Property No.:</b> 9138

**POSSIBLE SAMPLE HAZARDS/REMARK**  
 \*\* \*\* 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**  
 Low Volume Wells. Do not use for QC.

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3H3R1	N	W	3-8-18	0850	1x125-mL G/P	2320_ALKALINITY: GW 01	14 Days	Cool <=6C
B3H3R1	N	W	3-8-18	0850	1x125-mL G/P	6010_METALS_ICP: GW 04; 6020_METALS_ICPMS: GW 01	6 Months	HNO3 to pH <2

APRIL 5, 2018

Relinquished By: <u>Juan Aguilar</u> /CHPRC Signature: _____ Date/Time: <u>MAR 08 2018 1204</u>	Received By: <u>Troy Bacon</u> /CHPRC Signature: _____ Date/Time: <u>MAR 08 2018 1204</u>	Matrix * S = Soil      DS = Drum Solids SE = Sediment      DL = Drum Liquid SO = Solid      T = Tissue SL = Sludge      WI = Wipe W = Water      L = Liquid O = Oil      V = Vegetation A = Air      X = Other
Relinquished By: <u>Troy Bacon</u> /CHPRC Signature: _____ Date/Time: <u>MAR 08 2018 1400</u>	Received By: <b>FEDEX</b> Signature: _____ Date/Time: _____	
Relinquished By: <b>Fed Ex</b> Signature: _____ Date/Time: _____	Received By: <u>Shakeris Tarplin</u> /GEL Laboratories Signature: _____ Date/Time: <u>3/9/18 0855</u>	
Relinquished By: _____ Signature: _____ Date/Time: _____	Received By: _____ Signature: _____ Date/Time: _____	
<b>FINAL SAMPLE DISPOSITION</b> Disposal Method (e.g., Return to customer, per lab procedure, used in process): _____		Disposed By: _____ Date/Time: _____

REV. 0



# **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 03 April 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 Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-18-13
Utah NELAP	SC000122018-26
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# Metals Analysis

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL445545**  
**Work Order #: 445545**

**Product: Determination of Metals by ICP****Analytical Method:** SW846 3005A/6010D**Analytical Procedure:** GL-MA-E-013 REV# 30**Analytical Batch:** 1745920**Product: Determination of Metals by ICP-MS****Analytical Method:** SW846 3005A/6020B**Analytical Procedure:** GL-MA-E-014 REV# 32**Analytical Batch:** 1746005**Preparation Method:** SW846 3005A**Preparation Procedure:** GL-MA-E-006 REV# 14**Preparation Batches:** 1745919 and 1746004

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>
445545001	B3H3R1
1203987009	Method Blank (MB) <b>ICP</b>
1203987010	Laboratory Control Sample (LCS)
1203987013	445538007(NonSDGL) Serial Dilution (SD)
1203987011	445538007(NonSDGS) Matrix Spike (MS)
1203987012	445538007(NonSDGSD) Matrix Spike Duplicate (MSD)
1203987156	Method Blank (MB) <b>ICP-MS</b>
1203987157	Laboratory Control Sample (LCS)
1203987160	445538007(NonSDGL) Serial Dilution (SD)
1203987158	445538007(NonSDGS) Matrix Spike (MS)
1203987159	445538007(NonSDGSD) 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: GEL445545 GEL Work Order: 445545

**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.

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: 04 APR 2018****Title: Data Validator**

# Sample Data Summary

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

SDG No: GEL445545

CONTRACT: CPRCOW18002

METHOD TYPE: SW846

SAMPLE ID: 445545001

BASIS: As Received

DATE COLLECTED 08-MAR-18

CLIENT ID: B3H3R1

LEVEL: Low

DATE RECEIVED 09-MAR-18

MATRIX: WATER

%SOLIDS: 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	98.1	ug/L		19.3	50	50	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	03/19/18 22:51	180319-3	1746005
7440-38-2	Arsenic	3.21	ug/L	B	2	5	5	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-39-3	Barium	51.1	ug/L		0.67	2	2	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-41-7	Beryllium	0.20	ug/L	U	0.2	0.5	0.5	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	TXT1	04/03/18 16:04	040318-1	1745920
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-70-2	Calcium	50400	ug/L		50	200	200	1	P	TXT1	04/03/18 16:04	040318-1	1745920
7440-47-3	Chromium	13.2	ug/L		3	10	10	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-48-4	Cobalt	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-50-8	Copper	0.759	ug/L	B	0.3	1	1	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7439-89-6	Iron	86.8	ug/L	B	30	100	100	1	P	TXT1	04/03/18 16:04	040318-1	1745920
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7439-95-4	Magnesium	16400	ug/L		110	300	300	1	P	TXT1	04/03/18 16:04	040318-1	1745920
7439-96-5	Manganese	3.2	ug/L	B	1	5	5	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7439-98-7	Molybdenum	6.65	ug/L		0.2	0.5	0.5	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-02-0	Nickel	1.85	ug/L	B	0.6	2	2	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-09-7	Potassium	5140	ug/L		50	150	150	1	P	TXT1	04/03/18 16:04	040318-1	1745920
7782-49-2	Selenium	2.73	ug/L	B	2	5	5	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-23-5	Sodium	35900	ug/L		100	300	300	1	P	TXT1	04/03/18 16:04	040318-1	1745920
7440-24-6	Strontium	210	ug/L		2	10	10	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-29-1	Thorium	0.70	ug/L	U	0.7	2	2	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-31-5	Tin	1	ug/L	U	1	5	5	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-61-1	Uranium	0.929	ug/L		0.067	0.2	0.2	1	MS	BAJ	03/19/18 19:05	180319-2	1746005
7440-62-2	Vanadium	26.3	ug/L		1	5	5	1	P	TXT1	04/03/18 16:04	040318-1	1745920
7440-66-6	Zinc	89.3	ug/L		3.3	10	10	1	MS	BAJ	03/19/18 19:05	180319-2	1746005

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1745920	1745919	SW846 3005A	50	mL	50	mL	03/09/18	JXM8
1746005	1746004	SW846 3005A	50	mL	50	mL	03/09/18	JXM8

**\*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: April 4, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 445545

Parmname	NOM	Sample Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>										
Batch	1746005									
QC1203987157	LCS									
Aluminum	2000		2130	ug/L		106	(80%-120%)	BAJ	03/19/18	18:29
Antimony	50.0		48.9	ug/L		97.8	(80%-120%)		03/19/18	22:15
Arsenic	50.0		51.5	ug/L		103	(80%-120%)		03/19/18	18:29
Barium	50.0		49.4	ug/L		98.7	(80%-120%)			
Beryllium	50.0		57.1	ug/L		114	(80%-120%)			
Cadmium	50.0		49.5	ug/L		99.1	(80%-120%)			
Chromium	50.0		49.8	ug/L		99.5	(80%-120%)			
Cobalt	50.0		50.2	ug/L		100	(80%-120%)			
Copper	50.0		51.0	ug/L		102	(80%-120%)			
Lead	50.0		49.9	ug/L		99.7	(80%-120%)			
Manganese	50.0		48.2	ug/L		96.4	(80%-120%)			
Molybdenum	50.0		49.8	ug/L		99.5	(80%-120%)			
Nickel	50.0		52.3	ug/L		105	(80%-120%)			

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 445545

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1746005										
Selenium	50.0			50.4	ug/L		101	(80%-120%)	BAJ	03/19/18	18:29
Silver	50.0			52.3	ug/L		105	(80%-120%)			
Strontium	50.0			50.2	ug/L		100	(80%-120%)			
Thallium	50.0			46.2	ug/L		92.5	(80%-120%)			
Thorium	50.0			45.5	ug/L		91	(80%-120%)			
Tin	50.0			49.3	ug/L		98.6	(80%-120%)			
Uranium	50.0			47.3	ug/L		94.6	(80%-120%)			
Zinc	50.0			49.9	ug/L		99.7	(80%-120%)			
QC1203987156	MB										
Aluminum			U	19.3	ug/L					03/19/18	18:26
Antimony			U	1.00	ug/L					03/19/18	22:12
Arsenic			U	2.00	ug/L					03/19/18	18:26
Barium			U	0.670	ug/L						
Beryllium			U	0.200	ug/L						
Cadmium			U	0.300	ug/L						
Chromium			U	3.00	ug/L						

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 445545

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1746005										
Cobalt			U	0.300	ug/L				BAJ	03/19/18	18:26
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						
Silver			U	0.300	ug/L						
Strontium			U	2.00	ug/L						
Thallium			U	0.600	ug/L						
Thorium			U	0.700	ug/L						
Tin			U	1.00	ug/L						
Uranium			U	0.067	ug/L						
Zinc			U	3.30	ug/L						
QC1203987158 445538007 MS											
Aluminum	2000	U	19.3	1960	ug/L		97.7	(75%-125%)		03/19/18	18:35

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 445545

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Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>												
Batch	1746005											
Antimony	50.0	U	1.00		47.5	ug/L		94.7	(75%-125%)	BAJ	03/19/18	22:22
Arsenic	50.0	U	2.00		51.4	ug/L		99.5	(75%-125%)		03/19/18	18:35
Barium	50.0	U	0.670		47.7	ug/L		95.2	(75%-125%)			
Beryllium	50.0	U	0.200		55.5	ug/L		111	(75%-125%)			
Cadmium	50.0	U	0.300		49.7	ug/L		99.3	(75%-125%)			
Chromium	50.0	U	3.00		47.0	ug/L		92	(75%-125%)			
Cobalt	50.0	U	0.300		48.5	ug/L		96.9	(75%-125%)			
Copper	50.0	U	0.300		48.7	ug/L		97.4	(75%-125%)			
Lead	50.0	U	0.500		48.5	ug/L		96.8	(75%-125%)			
Manganese	50.0	U	1.00		46.5	ug/L		92.8	(75%-125%)			
Molybdenum	50.0	U	0.200		50.2	ug/L		100	(75%-125%)			
Nickel	50.0	U	0.600		50.2	ug/L		99.7	(75%-125%)			
Selenium	50.0	U	2.00		50.9	ug/L		102	(75%-125%)			
Silver	50.0	U	0.300		50.6	ug/L		101	(75%-125%)			
Strontium	50.0	U	2.00		48.8	ug/L		97.6	(75%-125%)			

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**QC Summary**

Workorder: 445545

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Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>												
Batch	1746005											
Thallium	50.0	U	0.600		44.9	ug/L		89.7	(75%-125%)	BAJ	03/19/18	18:35
Thorium	50.0	U	0.700		44.7	ug/L		89.2	(75%-125%)			
Tin	50.0	U	1.00		50.3	ug/L		100	(75%-125%)			
Uranium	50.0	U	0.067		46.2	ug/L		92.3	(75%-125%)			
Zinc	50.0	U	3.30		50.7	ug/L		98.8	(75%-125%)			
QC1203987159 445538007 MSD												
Aluminum	2000	U	19.3		1950	ug/L	0.342	97.3	(0%-20%)		03/19/18	18:39
Antimony	50.0	U	1.00		46.5	ug/L	2.09	92.7	(0%-20%)		03/19/18	22:25
Arsenic	50.0	U	2.00		49.2	ug/L	4.32	95.2	(0%-20%)		03/19/18	18:39
Barium	50.0	U	0.670		47.1	ug/L	1.18	94.1	(0%-20%)			
Beryllium	50.0	U	0.200		55.6	ug/L	0.151	111	(0%-20%)			
Cadmium	50.0	U	0.300		47.9	ug/L	3.69	95.7	(0%-20%)			
Chromium	50.0	U	3.00		48.4	ug/L	2.92	94.8	(0%-20%)			
Cobalt	50.0	U	0.300		48.5	ug/L	0.0536	96.9	(0%-20%)			
Copper	50.0	U	0.300		48.2	ug/L	1.07	96.4	(0%-20%)			
Lead	50.0	U	0.500		47.5	ug/L	2.08	94.8	(0%-20%)			

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**QC Summary**

Workorder: 445545

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1746005										
Manganese	50.0	U	1.00		49.3	ug/L	5.86	98.4	(0%-20%)	BAJ	03/19/18 18:39
Molybdenum	50.0	U	0.200		47.9	ug/L	4.76	95.5	(0%-20%)		
Nickel	50.0	U	0.600		51.3	ug/L	2.05	102	(0%-20%)		
Selenium	50.0	U	2.00		48.2	ug/L	5.5	96.4	(0%-20%)		
Silver	50.0	U	0.300		48.6	ug/L	4.06	97.2	(0%-20%)		
Strontium	50.0	U	2.00		47.0	ug/L	3.86	93.9	(0%-20%)		
Thallium	50.0	U	0.600		44.1	ug/L	1.78	88.1	(0%-20%)		
Thorium	50.0	U	0.700		44.0	ug/L	1.71	87.7	(0%-20%)		
Tin	50.0	U	1.00		46.5	ug/L	7.84	92.7	(0%-20%)		
Uranium	50.0	U	0.067		45.2	ug/L	2.03	90.5	(0%-20%)		
Zinc	50.0	U	3.30		46.7	ug/L	8.04	90.9	(0%-20%)		
QC1203987160 445538007 SDILT											
Aluminum		U	2.82	DU	96.5	ug/L	N/A	(0%-20%)			03/19/18 18:45
Antimony		U	0.167	DU	5.00	ug/L	N/A	(0%-20%)			03/19/18 22:32
Arsenic		U	1.61	DU	10.0	ug/L	N/A	(0%-20%)			03/19/18 18:45
Barium		U	0.044	DU	3.35	ug/L	N/A	(0%-20%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1746005										
Beryllium	U	0.003	DU	1.00	ug/L	N/A		(0%-20%)	BAJ	03/19/18	18:45
Cadmium	U	0.013	DU	1.50	ug/L	N/A		(0%-20%)			
Chromium	U	0.950	DU	15.0	ug/L	N/A		(0%-20%)			
Cobalt	U	0.021	DU	1.50	ug/L	N/A		(0%-20%)			
Copper	U	0.048	DU	1.50	ug/L	N/A		(0%-20%)			
Lead	U	0.109	DU	2.50	ug/L	N/A		(0%-20%)			
Manganese	U	0.118	DU	5.00	ug/L	N/A		(0%-20%)			
Molybdenum	U	0.143	DU	1.00	ug/L	N/A		(0%-20%)			
Nickel	U	0.407	DU	3.00	ug/L	N/A		(0%-20%)			
Selenium	U	-0.027	DU	10.0	ug/L	N/A		(0%-20%)			
Silver	U	0.002	DU	1.50	ug/L	N/A		(0%-20%)			
Strontium	U	0.039	DU	10.0	ug/L	N/A		(0%-20%)			
Thallium	U	0.028	DU	3.00	ug/L	N/A		(0%-20%)			
Thorium	U	0.123	DU	3.50	ug/L	N/A		(0%-20%)			
Tin	U	0.168	DU	5.00	ug/L	N/A		(0%-20%)			

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**QC Summary**

Workorder: 445545

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Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1746005										
Uranium	U	0.011	DU	0.335	ug/L	N/A		(0%-20%)	BAJ	03/19/18	18:45
Zinc	U	1.27	DU	16.5	ug/L	N/A		(0%-20%)			
<b>Metals Analysis-ICP</b>											
Batch	1745920										
QC1203987010	LCS										
Boron	500			522	ug/L		104	(80%-120%)	TXT1	04/03/18	15:43
Calcium	5000			5490	ug/L		110	(80%-120%)			
Iron	5000			5490	ug/L		110	(80%-120%)			
Magnesium	5000			5480	ug/L		110	(80%-120%)			
Potassium	5000			5270	ug/L		105	(80%-120%)			
Sodium	5000			5220	ug/L		104	(80%-120%)			
Vanadium	500			524	ug/L		105	(80%-120%)			
QC1203987009	MB										
Boron			U	15.0	ug/L					04/03/18	15:40
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: 445545

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1745920										
Sodium			U	100	ug/L				TXT1	04/03/18	15:40
Vanadium			U	1.00	ug/L						
QC1203987011 445538007 MS											
Boron	500	U	15.0	480	ug/L		95.2	(75%-125%)		04/03/18	15:48
Calcium	5000	B	110	4940	ug/L		96.5	(75%-125%)			
Iron	5000	U	30.0	4990	ug/L		99.7	(75%-125%)			
Magnesium	5000	U	110	4950	ug/L		98.5	(75%-125%)			
Potassium	5000	U	50.0	4840	ug/L		96.9	(75%-125%)			
Sodium	5000	U	100	4800	ug/L		95	(75%-125%)			
Vanadium	500	U	1.00	482	ug/L		96.3	(75%-125%)			
QC1203987012 445538007 MSD											
Boron	500	U	15.0	490	ug/L	2.03	97.2	(0%-20%)		04/03/18	15:50
Calcium	5000	B	110	5050	ug/L	2.38	98.9	(0%-20%)			
Iron	5000	U	30.0	5100	ug/L	2.12	102	(0%-20%)			
Magnesium	5000	U	110	5100	ug/L	3.03	102	(0%-20%)			
Potassium	5000	U	50.0	4930	ug/L	1.85	98.7	(0%-20%)			
Sodium	5000	U	100	4880	ug/L	1.85	96.8	(0%-20%)			

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**QC Summary**

Workorder: 445545

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1745920										
Vanadium	500	U	1.00		493	ug/L	2.35	98.6	(0%-20%)	TXT1	04/03/18 15:50
QC1203987013 445538007 SDILT											
Boron		U	3.61	DU	75.0	ug/L	N/A		(0%-20%)		04/03/18 15:52
Calcium		B	110	BD	57.6	ug/L	161		(0%-20%)		
Iron		U	6.31	DU	150	ug/L	N/A		(0%-20%)		
Magnesium		U	21.1	DU	550	ug/L	N/A		(0%-20%)		
Potassium		U	-29.5	BD	-69.8	ug/L	N/A		(0%-20%)		
Sodium		U	44.5	DU	500	ug/L	N/A		(0%-20%)		
Vanadium		U	0.0636	DU	5.00	ug/L	N/A		(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

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**QC Summary**

Workorder: 445545

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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 #: GEL445545  
Work Order #: 445545**

**Product: Alkalinity**

**Analytical Method:** 2320\_ALKALINITY

**Analytical Procedure:** GL-GC-E-033 REV# 13

**Analytical Batch:** 1745547

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>
445545001	B3H3R1
1203986246	Laboratory Control Sample (LCS)
1203986248	445545001(B3H3R1) Sample Duplicate (DUP)

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**

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL445545 GEL Work Order: 445545

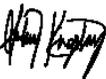
**The Qualifiers in this report are defined as follows:**

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:** Aubrey Kingsbury**Date:** 26 MAR 2018**Title:** Analyst I

# Sample Data Summary

**GEL LABORATORIES LLC**

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

**Certificate of Analysis**

Report Date: March 26, 2018

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF W18-002

Client Sample ID: B3H3R1 Project: CPRCOW18002  
 Sample ID: 445545001 Client ID: CPRC001  
 Matrix: WATER  
 Collect Date: 08-MAR-18 08:50  
 Receive Date: 09-MAR-18  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis												
2320_ALKALINITY: GW 01 "As Received"												
Alkalinity, Total as CaCO3		111000	1450	4000	ug/L			RXB5	03/14/18	1559	1745547	1
Bicarbonate alkalinity (CaCO3)		111000	1450	4000	ug/L							
Carbonate alkalinity (CaCO3)	U	1450	1450	4000	ug/L							
Hydroxide alkalinity as CaCO3	U	1450	1450	4000	ug/L							

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	2320_ALKALINITY		

**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

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: March 26, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 445545

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Titration and Ion Analysis</b>											
Batch	1745547										
QC1203986248	445545001	DUP									
Alkalinity, Total as CaCO3		111000		111000	ug/L	0.36		(0%-20%)	RXB5	03/14/18	16:01
Bicarbonate alkalinity (CaCO3)		111000		111000	ug/L	0.36		(0%-20%)			
Carbonate alkalinity (CaCO3)	U	1450	U	1450	ug/L	N/A					
Hydroxide alkalinity as CaCO3	U	1450	U	1450	ug/L	N/A					
QC1203986246	LCS										
Alkalinity, Total as CaCO3	100000			107000	ug/L		107	(80%-120%)		03/14/18	15:05

**Notes:**

The Qualifiers in this report are defined as follows:

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

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**QC Summary**

Workorder: 445545

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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.