



March 28, 2018

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

Re: CHPRC SAF F16-046
Work Order: 445936
SDG: GEL445936

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 15, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4505.

Sincerely,

Anna Dupree for
Heather Shaffer
Project Manager

Purchase Order: 304235 - 7C
Chain of Custody: F16-046-1615 and F16-046-1616
Enclosures

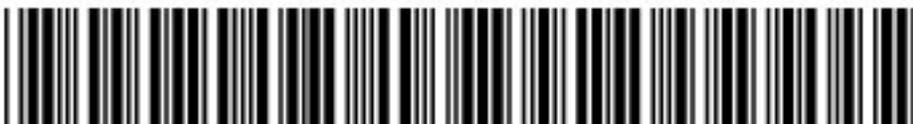


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Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF F16-046
SDG: GEL445936**

March 28, 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 15, 2018, for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

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

Sample Identification

The laboratory received the following samples:

Laboratory Identification	Sample Description
445936001	B3HMT3
445936002	B3HMT4

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.

3/28/2018

REV.0


Anna Dupree for
Heather Shaffer
Project Manager

Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL445936
Work Order #: 445936

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

Cyanide, Chlorinated

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.

Cyanide, Amenable to Chlorination

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.

Cyanide, Total

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.

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

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

TRITIUM_DIST_LSC: COMMON

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

Miscellaneous Information

Additional Comments

The matrix spike, 1203991698 (B3HMT9MS), aliquot was reduced to conserve sample volume.

Certification Statement

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

Chain of Custody and Supporting Documentation

CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 445936				F16-046-1615	PAGE 1 OF 1
COLLECTOR Kevin Patterson CHPRC		COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR SUMNER, LC		REQUIRED TAT 15 Days	
SAMPLING LOCATION 289-T, Influent Tank, Valve V12-Y30		PROJECT DESIGNATION 200W Pump & Treat - Treatment Plant Compliance Sampling - Water		SAF NO. F16-046		ORIGINAL	
ICE CHEST NO. GWS-743		FIELD LOGBOOK NO. HNF-N-491 16/94	ACTUAL SAMPLE DEPTH N/A	PURCHASE ORDER/CHARGE CODE 304235		METHOD OF SHIPMENT FEDERAL EXPRESS	
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO. 9163		BILL OF LADING/AIR BILL NO. 7800 5304 2494			
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	PRESERVATION	HNO3 to pH <2	NaOH to pH >=12/Cool <=6C	None	None	HNO3 to pH <2
		HOLDING TIME	6 Months	14 Days	6 Months	6 Months	6 Months
		TYPE OF CONTAINER	G/P	aG	P	G/P	G/P
		NO. OF CONTAINER(S)	1	1	1	1	1
		VOLUME	500mL	500mL	250mL	4L	500mL
	SPECIAL HANDLING AND/OR STORAGE N/A	SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	906.0 TRITIUM _LSC: COMMON (Tritium);	1129LL_SEP_LE PS_GS: COMMON (Iodine-129);	TC99_EIE_LSC: COMMON (Technetium-99);
SAMPLE NO.	FILTERED	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B3HMT3	N/A	WATER	MAR 13 2018	1015	✓	✓	✓

3/28/2018

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	TRVL-18-085 (1) 6010_METALS_ICP: COMMON {Calcium, Iron, Magnesium, Potassium, Sodium}; 6010_METALS_ICP: COMMON (Add-on) {Boron}; 6020_METALS_ICPMS: COMMON {Aluminum, Chromium, Cobalt, Copper, Molybdenum, Selenium}; 6020_METALS_ICPMS: COMMON (Add-on) {Manganese, Nickel, Uranium, Zinc}; (2) 9012_CYANIDE (TOTAL): COMMON; 9012_CN (AMENABLE): COMMON; 9014_CN (FREE): COMMON;	
Kevin Patterson CHPRC	MAR 13 2018 1055	CHRIS FULTON CHPRC	MAR 13 2018 1055		
CHRIS FULTON CHPRC	MAR 13 2018	SSU #1	MAR 13 2018		
SSU-1	MAR 14 2018 250	Troy Bacon CHPRC	MAR 14 2018 050		
Troy Bacon CHPRC	MAR 14 2018 140	FEDEX			
		Chakeris Tarplie GEL Laboratories	3/15/18 9/5		
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY		DATE/TIME	

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CH2M Hill Plateau Remediation Company <i>88</i>		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		445936		F16-046-1616	PAGE 1 OF 1
COLLECTOR Kevin Patterson CHPRC		COMPANY CONTACT SUMNER, LC		TELEPHONE NO. 376-3922		PROJECT COORDINATOR SUMNER, LC	
SAMPLING LOCATION 289-T, Influent Tank, Valve V12-Y30		PROJECT DESIGNATION 200W Pump & Treat - Treatment Plant Compliance Sampling - Water		SAF NO. F16-046		REQUIRED TAT 15 Days	
ICE CHEST NO. <i>GWS-743</i>		FIELD LOGBOOK NO. <i>HNF-N-491 16/94</i>		ACTUAL SAMPLE DEPTH N/A		PURCHASE ORDER/CHARGE CODE 304235	
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO. <i>9103</i>		BILL OF LADING/AIR BILL NO. <i>7800 5304 2493</i>			
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other		POSSIBLE SAMPLE HAZARDS/ REMARKS *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.		PRESERVATION HNO3 to pH <2 NaOH to pH >=12/Cool <=6C		HOLDING TIME 6 Months 14 Days	
SPECIAL HANDLING AND/OR STORAGE N/A		TYPE OF CONTAINER G/P aG		NO. OF CONTAINER(S) 1 1		VOLUME 500mL 500mL	
SAMPLE ANALYSIS		SEE ITEM (1) IN SPECIAL INSTRUCTIONS		SEE ITEM (2) IN SPECIAL INSTRUCTIONS			
SAMPLE NO.	FILTERED	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B3HMT4	Yes	WATER	MAR 13 2018	1015	✓	✓	

3/28/2018

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	TRVL-18-085; Filtering shall be performed by SGRP Field Sampling Services using a (0.45µm) filter while in the field. (1) 6010_METALS_ICP: COMMON {Calcium, Iron, Magnesium, Potassium, Sodium}; 6010_METALS_ICP: COMMON (Add-on) {Boron}; 6020_METALS_ICPMS: COMMON {Aluminum, Chromium, Cobalt, Copper, Molybdenum, Selenium}; 6020_METALS_ICPMS: COMMON (Add-on) {Manganese, Nickel, Uranium, Zinc}; (2) 9012_CYANIDE (TOTAL): COMMON; 9012_CN (AMENABLE): COMMON; 9014_CN (FREE): COMMON;	
Kevin Patterson	MAR 13 2018 1055	CHRIS FULTON CHPRC	MAR 13 2018 1055		
CHRIS FULTON CHPRC	MAR 13 2018 1205	SSO#1	MAR 13 2018 1205		
SSU-1	MAR 14 2018 0650	Troy Bacon CHPRC	MAR 14 2018 0650		
Troy Bacon CHPRC	MAR 14 2018 1400	FEDEX			
		Chakeris Tarplin/ GEL Laboratories	3/15/18 9/5		

FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME



SAMPLE RECEIPT & REVIEW FORM

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Client: <u>CPRC</u>		SDG/AR/COC/Work Order: <u>445936</u>		
Received By: <u>C. Tarplin</u>		Date Received: <u>03-15-2018</u>		
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other		
		<u>7800 5304 2493</u> <u>7800 6606 4354</u>		
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.		
Shipped as a DOT Hazardous?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____		
COC/Samples marked or classified as radioactive?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> <u>CPM</u> mR/Hr Classified as: <u>Rad 1</u> Rad 2 Rad 3		
Is package, COC, and/or Samples marked HAZ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____		
Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: <u>Wet Ice</u> Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: <u>2°C</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: <u>IR4-17</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>			If Yes, Are Encores or Soil Kits present? Yes _____ No <input checked="" type="checkbox"/> (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes <input checked="" type="checkbox"/> No _____ N/A _____ (If unknown, select No) VOA vials free of headspace? Yes <input checked="" type="checkbox"/> No _____ N/A _____ Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected: _____
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected: _____
12 Are sample containers identifiable as GEL provided?	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
Comments (Use Continuation Form if needed):				

PM (or PMA) review: Initials ASJ Date 3/16/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

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 28 March 2018

State	Certification
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 #: GEL445936
Work Order #: 445936

Product: Determination of Metals by ICP**Analytical Method:** SW846 3005A/6010D**Analytical Procedure:** GL-MA-E-013 REV# 30**Analytical Batch:** 1747466**Product: Determination of Metals by ICP-MS****Analytical Method:** SW846 3005A/6020B**Analytical Procedure:** GL-MA-E-014 REV# 32**Analytical Batch:** 1747462**Preparation Method:** SW846 3005A**Preparation Procedure:** GL-MA-E-006 REV# 14**Preparation Batches:** 1747461 and 1747465

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
445936001	B3HMT3
445936002	B3HMT4
1203990298	Method Blank (MB) ICP
1203990299	Laboratory Control Sample (LCS)
1203990302	445936001(B3HMT3L) Serial Dilution (SD)
1203990300	445936001(B3HMT3S) Matrix Spike (MS)
1203990301	445936001(B3HMT3SD) Matrix Spike Duplicate (MSD)
1203990288	Method Blank (MB) ICP-MS
1203990289	Laboratory Control Sample (LCS)
1203990292	445936001(B3HMT3L) Serial Dilution (SD)
1203990290	445936001(B3HMT3S) Matrix Spike (MS)
1203990291	445936001(B3HMT3SD) 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: GEL445936 GEL Work Order: 445936

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: 26 MAR 2018****Title: Data Validator**

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL445936

CONTRACT: CPRC0F16046

METHOD TYPE: SW846

SAMPLE ID:445936001

BASIS: As Received

DATE COLLECTED 13-MAR-18

CLIENT ID: B3HMT3

LEVEL: Low

DATE RECEIVED 15-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	19.3	ug/L	U	19.3	50	50	1	MS	SKJ	03/19/18 19:29	180319-3	1747462
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	03/22/18 16:01	032218-1	1747466
7440-70-2	Calcium	65700	ug/L		50	200	200	1	P	HSC	03/22/18 16:01	032218-1	1747466
7440-47-3	Chromium	29.8	ug/L		3	10	10	1	MS	SKJ	03/19/18 19:29	180319-3	1747462
7440-48-4	Cobalt	0.30	ug/L	U	0.3	1	1	1	MS	SKJ	03/19/18 19:29	180319-3	1747462
7440-50-8	Copper	0.481	ug/L	B	0.3	1	1	1	MS	SKJ	03/19/18 19:29	180319-3	1747462
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	03/22/18 16:01	032218-1	1747466
7439-95-4	Magnesium	22200	ug/L		110	300	300	1	P	HSC	03/22/18 16:01	032218-1	1747466
7439-96-5	Manganese	1	ug/L	U	1	5	5	1	MS	SKJ	03/19/18 19:29	180319-3	1747462
7439-98-7	Molybdenum	3.93	ug/L		0.2	0.5	0.5	1	MS	BAJ	03/20/18 15:52	180320-2	1747462
7440-02-0	Nickel	1.05	ug/L	B	0.6	2	2	1	MS	SKJ	03/19/18 19:29	180319-3	1747462
7440-09-7	Potassium	5620	ug/L		50	150	150	1	P	HSC	03/22/18 16:01	032218-1	1747466
7782-49-2	Selenium	3.6	ug/L	B	2	5	5	1	MS	BAJ	03/20/18 15:52	180320-2	1747462
7440-23-5	Sodium	23800	ug/L		100	300	300	1	P	HSC	03/22/18 16:01	032218-1	1747466
7440-61-1	Uranium	0.958	ug/L		0.067	0.2	0.2	1	MS	BAJ	03/20/18 15:52	180320-2	1747462
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	MS	SKJ	03/19/18 19:29	180319-3	1747462

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1747462	1747461	SW846 3005A	50	mL	50	mL	03/15/18	JXM8
1747466	1747465	SW846 3005A	50	mL	50	mL	03/15/18	JXM8

***Analytical Methods:**

P SW846 3005A/6010D

MS SW846 3005A/6020B

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL445936

CONTRACT: CPRC0F16046

METHOD TYPE: SW846

SAMPLE ID:445936002

BASIS: As Received

DATE COLLECTED 13-MAR-18

CLIENT ID: B3HMT4

LEVEL: Low

DATE RECEIVED 15-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	19.3	ug/L	U	19.3	50	50	1	MS	SKJ	03/19/18 19:49	180319-3	1747462
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	03/22/18 16:11	032218-1	1747466
7440-70-2	Calcium	63600	ug/L		50	200	200	1	P	HSC	03/22/18 16:11	032218-1	1747466
7440-47-3	Chromium	26.8	ug/L		3	10	10	1	MS	SKJ	03/19/18 19:49	180319-3	1747462
7440-48-4	Cobalt	0.30	ug/L	U	0.3	1	1	1	MS	SKJ	03/19/18 19:49	180319-3	1747462
7440-50-8	Copper	0.440	ug/L	B	0.3	1	1	1	MS	SKJ	03/19/18 19:49	180319-3	1747462
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	03/22/18 16:11	032218-1	1747466
7439-95-4	Magnesium	21500	ug/L		110	300	300	1	P	HSC	03/22/18 16:11	032218-1	1747466
7439-96-5	Manganese	1	ug/L	U	1	5	5	1	MS	SKJ	03/19/18 19:49	180319-3	1747462
7439-98-7	Molybdenum	3.67	ug/L		0.2	0.5	0.5	1	MS	BAJ	03/20/18 16:02	180320-2	1747462
7440-02-0	Nickel	1.03	ug/L	B	0.6	2	2	1	MS	SKJ	03/19/18 19:49	180319-3	1747462
7440-09-7	Potassium	5550	ug/L		50	150	150	1	P	HSC	03/22/18 16:11	032218-1	1747466
7782-49-2	Selenium	3.15	ug/L	B	2	5	5	1	MS	BAJ	03/20/18 16:02	180320-2	1747462
7440-23-5	Sodium	22800	ug/L		100	300	300	1	P	HSC	03/22/18 16:11	032218-1	1747466
7440-61-1	Uranium	0.930	ug/L		0.067	0.2	0.2	1	MS	BAJ	03/20/18 16:02	180320-2	1747462
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	MS	SKJ	03/19/18 19:49	180319-3	1747462

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1747462	1747461	SW846 3005A	50	mL	50	mL	03/15/18	JXM8
1747466	1747465	SW846 3005A	50	mL	50	mL	03/15/18	JXM8

***Analytical Methods:**

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: 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: 445936

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1747462										
QC1203990289	LCS										
Aluminum	2000			1950	ug/L		97.4	(80%-120%)	SKJ	03/19/18	19:16
Chromium	50.0			48.4	ug/L		96.9	(80%-120%)			
Cobalt	50.0			49.6	ug/L		99.2	(80%-120%)			
Copper	50.0			49.2	ug/L		98.4	(80%-120%)			
Manganese	50.0			49.3	ug/L		98.6	(80%-120%)			
Molybdenum	50.0			52.6	ug/L		105	(80%-120%)	BAJ	03/20/18	15:50
Nickel	50.0			49.2	ug/L		98.4	(80%-120%)	SKJ	03/19/18	19:16
Selenium	50.0			49.8	ug/L		99.6	(80%-120%)	BAJ	03/20/18	15:50
Uranium	50.0			46.3	ug/L		92.6	(80%-120%)			
Zinc	50.0			48.3	ug/L		96.6	(80%-120%)	SKJ	03/19/18	19:16
QC1203990288	MB										
Aluminum			U	19.3	ug/L					03/19/18	19:12
Chromium			U	3.00	ug/L						
Cobalt			U	0.300	ug/L						

GEL LABORATORIES LLC

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

QC Summary

Workorder: 445936

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1747462										
Copper			U	0.300	ug/L				SKJ	03/19/18	19:12
Manganese			U	1.00	ug/L						
Molybdenum			U	0.200	ug/L				BAJ	03/20/18	15:48
Nickel			U	0.600	ug/L				SKJ	03/19/18	19:12
Selenium			U	2.00	ug/L				BAJ	03/20/18	15:48
Uranium			U	0.067	ug/L						
Zinc			U	3.30	ug/L				SKJ	03/19/18	19:12
QC1203990290 445936001 MS											
Aluminum	2000	U	19.3	2110	ug/L		105	(75%-125%)		03/19/18	19:33
Chromium	50.0		29.8	84.2	ug/L		109	(75%-125%)			
Cobalt	50.0	U	0.300	52.9	ug/L		105	(75%-125%)			
Copper	50.0	B	0.481	51.2	ug/L		101	(75%-125%)			
Manganese	50.0	U	1.00	52.3	ug/L		104	(75%-125%)			
Molybdenum	50.0		3.93	56.9	ug/L		106	(75%-125%)	BAJ	03/20/18	15:54
Nickel	50.0	B	1.05	52.8	ug/L		103	(75%-125%)	SKJ	03/19/18	19:33
Selenium	50.0	B	3.60	54.7	ug/L		102	(75%-125%)	BAJ	03/20/18	15:54

GEL LABORATORIES LLC

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

QC Summary

Workorder: 445936

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1747462										
Uranium	50.0	0.958		50.2	ug/L		98.5	(75%-125%)	BAJ	03/20/18	15:54
Zinc	50.0	U	3.30	49.9	ug/L		96.4	(75%-125%)	SKJ	03/19/18	19:33
QC1203990291	445936001	MSD									
Aluminum	2000	U	19.3	1990	ug/L	5.42	99.6	(0%-20%)		03/19/18	19:37
Chromium	50.0		29.8	79.6	ug/L	5.6	99.7	(0%-20%)			
Cobalt	50.0	U	0.300	49.9	ug/L	5.87	99.4	(0%-20%)			
Copper	50.0	B	0.481	48.9	ug/L	4.51	96.9	(0%-20%)			
Manganese	50.0	U	1.00	49.6	ug/L	5.42	98.5	(0%-20%)			
Molybdenum	50.0		3.93	56.6	ug/L	0.626	105	(0%-20%)	BAJ	03/20/18	15:56
Nickel	50.0	B	1.05	49.8	ug/L	5.8	97.5	(0%-20%)	SKJ	03/19/18	19:37
Selenium	50.0	B	3.60	54.9	ug/L	0.356	103	(0%-20%)	BAJ	03/20/18	15:56
Uranium	50.0		0.958	49.2	ug/L	2.12	96.4	(0%-20%)			
Zinc	50.0	U	3.30	47.8	ug/L	4.36	92.1	(0%-20%)	SKJ	03/19/18	19:37
QC1203990292	445936001	SDILT									
Aluminum		U	3.01	DU	96.5	ug/L	N/A	(0%-20%)		03/19/18	19:45
Chromium			29.8	BD	4.75	ug/L	20.2	(0%-20%)			
Cobalt		U	0.143	DU	1.50	ug/L	N/A	(0%-20%)			

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QC Summary

Workorder: 445936

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Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1747462										
Copper	B	0.481	DU	1.50	ug/L	N/A		(0%-20%)	SKJ	03/19/18	19:45
Manganese	U	0.310	DU	5.00	ug/L	N/A		(0%-20%)			
Molybdenum		3.93	D	0.783	ug/L	.28		(0%-20%)	BAJ	03/20/18	16:00
Nickel	B	1.05	DU	3.00	ug/L	N/A		(0%-20%)	SKJ	03/19/18	19:45
Selenium	B	3.60	DU	10.0	ug/L	N/A		(0%-20%)	BAJ	03/20/18	16:00
Uranium		0.958	BD	0.196	ug/L	2.3		(0%-20%)			
Zinc	U	1.70	DU	16.5	ug/L	N/A		(0%-20%)	SKJ	03/19/18	19:45
Metals Analysis-ICP											
Batch	1747466										
QC1203990299	LCS										
Boron	500			490	ug/L		97.9	(80%-120%)	HSC	03/22/18	15:59
Calcium	5000			4980	ug/L		99.6	(80%-120%)			
Iron	5000			4900	ug/L		98	(80%-120%)			
Magnesium	5000			4910	ug/L		98.2	(80%-120%)			
Potassium	5000			4970	ug/L		99.3	(80%-120%)			
Sodium	5000			4880	ug/L		97.7	(80%-120%)			
QC1203990298	MB										
Boron			U	15.0	ug/L					03/22/18	15:56

GEL LABORATORIES LLC

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

QC Summary

Workorder: 445936

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1747466										
Calcium			U	50.0	ug/L				HSC	03/22/18	15:56
Iron			U	30.0	ug/L						
Magnesium			U	110	ug/L						
Potassium			U	50.0	ug/L						
Sodium			U	100	ug/L						
QC1203990300 445936001 MS											
Boron	500	U	15.0	513	ug/L		103	(75%-125%)		03/22/18	16:04
Calcium	5000		65700	69400	ug/L		N/A	(75%-125%)			
Iron	5000	U	30.0	4930	ug/L		98.5	(75%-125%)			
Magnesium	5000		22200	27000	ug/L		N/A	(75%-125%)			
Potassium	5000		5620	10400	ug/L		95.7	(75%-125%)			
Sodium	5000		23800	28300	ug/L		N/A	(75%-125%)			
QC1203990301 445936001 MSD											
Boron	500	U	15.0	500	ug/L	2.66	100	(0%-20%)		03/22/18	16:06
Calcium	5000		65700	67700	ug/L	2.48	N/A	(0%-20%)			
Iron	5000	U	30.0	4800	ug/L	2.75	95.8	(0%-20%)			
Magnesium	5000		22200	26100	ug/L	3.42	N/A	(0%-20%)			

GEL LABORATORIES LLC

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QC Summary

Workorder: 445936

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1747466										
Potassium	5000	5620		10400	ug/L	0.491	94.7	(0%-20%)	HSC	03/22/18	16:06
Sodium	5000	23800		27700	ug/L	2.14	N/A	(0%-20%)			
QC1203990302 445936001 SDILT											
Boron	U	-2.72	DU	75.0	ug/L	N/A		(0%-20%)		03/22/18	16:08
Calcium		65700	D	13400	ug/L	1.69		(0%-20%)			
Iron	U	5.82	DU	150	ug/L	N/A		(0%-20%)			
Magnesium		22200	D	4620	ug/L	3.92		(0%-20%)			
Potassium		5620	D	1200	ug/L	7.06		(0%-20%)			
Sodium		23800	D	4810	ug/L	.827		(0%-20%)			

Notes:

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

GEL LABORATORIES LLC

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QC Summary

Workorder: 445936

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

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 #: GEL445936
Work Order #: 445936**

Product: Cyanide, Amenable to Chlorination
Analytical Method: 9012_CYANIDE
Analytical Procedure: GL-GC-E-107 REV# 10
Analytical Batches: 1747805, 1747804 and 1747803

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
445936001	B3HMT3
445936002	B3HMT4

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: Cyanide, Total

Analytical Method: 9012_CYANIDE

Analytical Procedure: GL-GC-E-095 REV# 22

Analytical Batches: 1749716 and 1749715

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
445936001	B3HMT3
445936002	B3HMT4
1203995306	Method Blank (MB)
1203995307	Laboratory Control Sample (LCS)
1203995308	445936001(B3HMT3) Sample Duplicate (DUP)
1203995309	445936001(B3HMT3) Matrix Spike (MS)

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: Cyanide, Chlorinated

Analytical Method: 9012_CYANIDE

Analytical Procedure: GL-GC-E-095 REV# 22

Analytical Batches: 1747804 and 1747803

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
445936001	B3HMT3
445936002	B3HMT4
1203990992	Method Blank (MB)
1203990993	Laboratory Control Sample (LCS)
1203990994	445936001(B3HMT3) 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: GEL445936 GEL Work Order: 445936

The Qualifiers in this report are defined as follows:

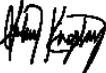
B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).

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 F16-046

Client Sample ID: B3HMT3 Project: CPRC0F16046
 Sample ID: 445936001 Client ID: CPRC001
 Matrix: WATER
 Collect Date: 13-MAR-18 10:15
 Receive Date: 15-MAR-18
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis												
9012_CYANIDE (TOTAL): COMMON "As Received"												
Cyanide, Total	U	1.67	1.67	5.00	ug/L	1.00	1	AXH3	03/26/18	0556	1749716	1
9014_CN (FREE): COMMON "As Received"												
Free Cyanide	U	1.00	1.00	2.00	ug/L		1	AXH3	03/26/18	0603	1750121	2
9012_CN (AMENABLE): COMMON "See Parent Products"												
Cyanide amenable to chlorination	U	1.67	1.67	5.00	ug/L		1	AXH3	03/26/18	0726	1747805	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010C Distillation	SW846 9010C Prep	KLP1	03/23/18	1425	1749715
SW846 9012B	SW846 9012B Cyanide, Chlorinated Prep	KLP1	03/23/18	1507	1747803

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9012_CYANIDE	
2	9014_CYANIDE	
3	9012_CYANIDE	

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

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 F16-046

Client Sample ID: B3HMT4 Project: CPRC0F16046
 Sample ID: 445936002 Client ID: CPRC001
 Matrix: WATER
 Collect Date: 13-MAR-18 10:15
 Receive Date: 15-MAR-18
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis												
9012_CYANIDE (TOTAL): COMMON "As Received"												
Cyanide, Total	U	1.67	1.67	5.00	ug/L	1.00	1	AXH3	03/26/18	0559	1749716	1
9014_CN (FREE): COMMON "As Received"												
Free Cyanide	U	1.00	1.00	2.00	ug/L		1	AXH3	03/26/18	0603	1750121	2
9012_CN (AMENABLE): COMMON "See Parent Products"												
Cyanide amenable to chlorination	U	1.67	1.67	5.00	ug/L		1	AXH3	03/26/18	0726	1747805	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010C Distillation	SW846 9010C Prep	KLP1	03/23/18	1425	1749715
SW846 9012B	SW846 9012B Cyanide, Chlorinated Prep	KLP1	03/23/18	1507	1747803

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9012_CYANIDE	
2	9014_CYANIDE	
3	9012_CYANIDE	

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: 445936

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Flow Injection Analysis											
Batch	1747804										
QC1203990994	445936001	DUP									
Cyanide, Chlorinated		U	1.67	B	2.63	ug/L	74.7 ^	(+/-5.00)	AXH3	03/26/18	07:07
QC1203990993	LCS										
Cyanide, Chlorinated	50.0		U	1.67	ug/L		0	(-200%-200%)		03/26/18	06:57
QC1203990992	MB										
Cyanide, Chlorinated			U	1.67	ug/L					03/26/18	06:56
Batch	1749716										
QC1203995308	445936001	DUP									
Cyanide, Total		U	1.67	U	1.67	ug/L	N/A		AXH3	03/26/18	05:57
QC1203995307	LCS										
Cyanide, Total	50.0				46.3	ug/L	92.6	(80%-120%)		03/26/18	05:51
QC1203995306	MB										
Cyanide, Total			U	1.67	ug/L					03/26/18	05:50
QC1203995309	445936001	MS									
Cyanide, Total	100	U	1.67		107	ug/L	106	(75%-125%)		03/26/18	05:58

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.

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QC Summary

Workorder: 445936

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
U	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.										
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										

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

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

* Indicates that a Quality Control parameter was not within specifications.

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

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

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL445936
Work Order #: 445936**

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: 1748215

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
445936001	B3HMT3
1203991891	Method Blank (MB)
1203991892	445909009(NonSDG) Sample Duplicate (DUP)
1203991893	445909009(NonSDG) Matrix Spike (MS)
1203991894	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.

Qualifier Information

Qualifier	Reason	Analyte	Sample	Client Sample
X	Results are considered a false positive due to no valid peak.	Iodine-129	445936001	B3HMT3

Product: TC99_EIE_LSC: COMMON

Analytical Method: TC99_EIE_LSC

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

Analytical Batch: 1748111

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
445936001	B3HMT3
1203991672	Method Blank (MB)
1203991673	445936001(B3HMT3) Sample Duplicate (DUP)
1203991674	Laboratory Control Sample (LCS)

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

Data Summary:

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

Product: TRITIUM_DIST_LSC: COMMON

Analytical Method: TRITIUM_DIST_LSC

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

Analytical Batch: 1748118

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
445936001	B3HMT3
1203991696	Method Blank (MB)
1203991697	445848001(B3HMT9) Sample Duplicate (DUP)
1203991698	445848001(B3HMT9) Matrix Spike (MS)
1203991699	Laboratory Control Sample (LCS)

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

Data Summary:

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

Miscellaneous Information

Additional Comments

The matrix spike, 1203991698 (B3HMT9MS), aliquot was reduced to conserve sample volume.

Certification Statement

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

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL445936 GEL Work Order: 445936

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.

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

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: 28 MAR 2018****Title: Group Leader**

Sample Data Summary

**Rad
Certificate of Analysis
Sample Summary**

SDG Number: GEL445936	Client: CPRC001	Project: CPRC0F16046
Lab Sample ID: 445936001	Date Collected: 03/13/2018 10:15	Matrix: WATER
	Date Received: 03/15/2018 09:15	
Client ID: B3HMT3	Method: DOE EML HASL-300,I-01 Mo	Prep Basis: "As Received"
Batch ID: 1748215	Analyst: BSW1	SOP Ref: GL-RAD-A-006
Run Date: 03/20/2018 08:26	Aliquot: 1.2 L	Instrument: XRAY5
Data File: I445936001.CNF;2	Prep Method: DOE EML HASL-300,I-01 M	Count Time: 150 min
Prep Batch: 1748215		
Prep Date: 03/19/2018 10:29		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	X	0.706	pCi/L	+/-0.650	0.654	0.513	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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Comments:

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
 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: GEL445936	Client: CPRC001	Project: CPRC0F16046
Lab Sample ID: 445936001	Date Collected: 03/13/2018 10:15	Matrix: WATER
	Date Received: 03/15/2018 09:15	
Client ID: B3HMT3	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1748111	Analyst: TXJ1	SOP Ref: GL-RAD-A-059
Run Date: 03/28/2018 06:22	Aliquot: 100 mL	Instrument: LSCSILVER
Data File: E1748111.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 15 min
Prep Batch: 1748111		
Prep Date: 03/23/2018 12:04		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99		123	pCi/L	+/-28.2	31.3	39.9	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	34900	37000	CPM	94.5	(30%-105%)

Comments:

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
 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: GEL445936	Client: CPRC001	Project: CPRC0F16046
Lab Sample ID: 445936001	Date Collected: 03/13/2018 10:15	Matrix: WATER
	Date Received: 03/15/2018 09:15	
Client ID: B3HMT3	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1748118	Analyst: MXH8	SOP Ref: GL-RAD-A-002
Run Date: 03/21/2018 00:27	Aliquot: 50 mL	Instrument: LSCGREEN
Data File: T1748118.xls	Prep Method: EPA 906.0 Modified	Count Time: 50 min
Prep Batch: 1748118		
Prep Date: 03/20/2018 07:29		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		2680	pCi/L	+/-262	580	285	400

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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Comments:

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).
 The MDC is a sample specific MDC.

Quality Control Summary

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QC Summary

Report Date: March 28, 2018
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Client : CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352
Contact: Mr. Scot Fitzgerald
Workorder: 445936

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1748215								
QC1203991891	MB								
Iodine-129			U	-0.0712	pCi/L			BSW1	03/20/1811:08
				Uncert: +/-0.317					
				TPU: +/-0.319					
QC1203991892	445909009	DUP							
Iodine-129		X	0.823	U	0.325	pCi/L			03/20/1811:09
				Uncert: +/-0.792	+/-0.448	RPD: 4	(0% - 100%)		
				TPU: +/-0.796	+/-0.472	RER: 1.05	(0-2)		
QC1203991893	445909009	MS							
Iodine-129		X	0.823		37.9	pCi/L	REC: 107	(75%-125%)	03/20/1811:09
				Uncert: +/-0.792	+/-3.63				
				TPU: +/-0.796	+/-5.25				
QC1203991894	LCS								
Iodine-129					39.2	pCi/L	REC: 113	(80%-120%)	03/20/1813:09
				Uncert: +/-3.81					
				TPU: +/-5.46					
Rad Liquid Scintillation									
Batch	1748111								
QC1203991672	MB								
Technetium-99			U	17.6	pCi/L			TXJ1	03/28/1807:30
				Uncert: +/-22.3					
				TPU: +/-22.4					
**Technetium-99m Tracer		37000			35600	CPM	REC: 96	(30%-105%)	
QC1203991673	445936001	DUP							
Technetium-99			123		129	pCi/L			03/28/1807:47
				Uncert: +/-28.2	+/-26.5	RPD: 5	(0% - 100%)		
				TPU: +/-31.3	+/-30.1	RER: 0.267	(0-2)		
**Technetium-99m Tracer		37000			34900	CPM	REC: 99	(30%-105%)	
QC1203991674	LCS								
Technetium-99					888	pCi/L	REC: 103	(80%-120%)	03/28/1808:03
				Uncert: +/-48.9					
				TPU: +/-112					
**Technetium-99m Tracer		37000			35600	CPM	REC: 96	(30%-105%)	
Batch	1748118								
QC1203991696	MB								
Tritium			U	-47.2	pCi/L			MXH8	03/21/1804:53
				Uncert: +/-162					
				TPU: +/-162					
QC1203991697	445848001	DUP							
Tritium			2300		2580	pCi/L			03/21/1805:45
				Uncert: +/-251	+/-256	RPD: 12	(0%-20%)		
				TPU: +/-510	+/-561	RER: 0.727	(0-2)		
QC1203991698	445848001	MS							
Tritium		5140	2300		6460	pCi/L	REC: 81	(75%-125%)	03/21/1806:37

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QC Summary

Workorder: 445936

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Liquid Scintillation										
Batch	1748118									
		Uncert:	+/-251	+/-542						
		TPU:	+/-510	+/-1360						
QC1203991699	LCS									
Tritium	2570			2540	pCi/L	REC: 99 (80%-120%)			03/21/1807:29	
		Uncert:		+/-261						
		TPU:		+/-556						

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 analyte was detected in the associated method blank \geq MDC or $>5\%$ sample activity.
- 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.