

September 03, 2015

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

Re: CHPRC SAF S15-007
Work Order: 378034
SDG: GEL378034

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 28, 2015. This revised data report has been prepared and reviewed in accordance with GEL's standard operating procedures. Per client P&D, this revision is to report the GW01 Alkalinity list.

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

Sincerely,



Heather Shaffer
Project Manager

Purchase Order: 300071 7H
Chain of Custody: S15-007-099 and S15-007-100
Enclosures



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Problem and Discrepancy Report

Problem and Discrepancy Report

GEL

SDG GEL378034

09/02/15

The data package has the following issues:

The report only contains total alkalinity instead of the GW01 with 4 compounds.

Resolution: *Provide correction.*

Lab Response:

The lab will correct and submit a revision.

Provide a resolution to each issue noted on the report

Page 1 of 1

Case Narrative

Per client P&D, this revision is to report the GW01 Alkalinity list.

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF S15-007
SDG: GEL378034**

September 03, 2015

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 July 28, 2015, 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 and DER

Sample Identification

The laboratory received the following samples:

Laboratory Identification	Sample Description
378034001	B31L45
378034002	B31L44
378034003	B31L47

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.

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



Heather Shaffer
Project Manager

Chain of Custody and Supporting Documentation

CH2M Hill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C.# **S15-007-099**

Page 1 of 1

378034

Telephone No. 509-376-4650

Contact/Requester Karen Waters-Husted

Purchase Order/Charge Code 300071

Sampling Origin Hanford Site

Logbook No. HNF-N-506 277116

Ice Chest No. GWS-2939

Method of Shipment Commercial Carrier

Bill of Lading/Air Bill No. 774145194017

Offsite Property No. 5824

Priority: 30 Days **PRIORITY**

Total Activity Exemption: Yes No

POSSIBLE SAMPLE HAZARDS/REMARKS

SPECIAL INSTRUCTIONS Hold Time

N/A

*** 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

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B31L44	N	W	7-27-15	1057	1x500-mL G/P	6010_METALS_ICP: GW 04; 6020_METALS_ICPMS: GW 01	6 Months	HNO3 to pH <2
B31L47	Y	W	7-27-15	1	1x250-mL G/P	2320_ALKALINITY: GW 01	14 Days	Cool <=6C
B31L47	Y	W	7-27-15	1057	1x500-mL G/P	6010_METALS_ICP: GW 04; 6020_METALS_ICPMS: GW 01	6 Months	HNO3 to pH <2

Relinquished By K.C. Patterson/CHPRC	Signature	Date/Time JUL 27 2015 1240	Received By B.E. Biggs CHPRC	Signature	Date/Time JUL 27 2015 1240	Matrix *
Relinquished By B.E. Biggs CHPRC	Signature	Date/Time JUL 27 2015 1400	Received By FEDEX	Signature	Date/Time	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air
Relinquished By cf 5	Signature	Date/Time	Received By M. Kinshaw	Signature	Date/Time 7-28-15 0850	DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
Relinquished By	Signature	Date/Time	Received By	Signature	Date/Time	

FINAL SAMPLE DISPOSITION

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

Disposed By

Date/Time

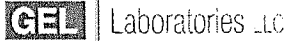
PRINTED ON 5/27/2015

FSR ID = FSR39

A-6004-842 (REV 2)

CH2M Hill Plateau Remediation Company		C.O.C. # S15-007-100 Page 1 of 1	
CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 378034		Telephone No. 509-376-4650 Purchase Order/Charge Code 30007367-27-15 Ice Chest No. GWS-2939 Bill of Lading/Air Bill No. 774145194017 Offsite Property No. 582	
Collector K.C. Patterson/CHPRC SAF No. S15-007 Project Title CERCLA, JULY 2015 Shipped To (Lab) GEL Laboratories, LLC Protocol SURV	Contact/Requester Karen Waters-Husted Sampling Origin Hanford Site Logbook No. HNF-N-506 77116 Method of Shipment Commercial Carrier Priority: 30 Days PRIORITY	SPECIAL INSTRUCTIONS Hold Time N/A	Total Activity Exemption: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
POSSIBLE SAMPLE HAZARDS/REMARKS ** ** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1	Sample No. Filter * Date Time No/Type Container Sample Analysis Holding Time Preservative B31L45 N W 7-27-15 1057 1x250-mL G/P 9056_ANIONS_IC: COMMON; 9056_ANIONS_IC: GW 02 28 Days/48 Hours Cool <=6C		

Relinquished By K.C. Patterson/CHPRC Relinquished By BE. Briggs Relinquished By CHPRC Relinquished By	Print Sign BE. Briggs BE. Briggs BE. Briggs CHPRC	Date/Time JUL 27 2015 1240 JUL 27 2015 1400 JUL 27 2015 1400 Date/Time	Received By BE. Briggs Received By FEDEX Received By Keston Received By	Sign BE. Briggs BE. Briggs BE. Briggs Keston	Date/Time JUL 27 2015 1240 Date/Time JUL 27 2015 1400 Date/Time 7-28-15 0830 Date/Time	Matrix * S = Soil DS = Drum Solids SE = Sediment DL = Drum Liquids SO = Solid T = Tissue SL = Sludge WI = Wipe W = Water L = Liquid O = Oil V = Vegetation A = Air X = Other
FINAL SAMPLE DISPOSITION		Disposal Method (e.g., Return to customer, per lab procedure, used in process)		Disposed By		Date/Time



SAMPLE RECEIPT & REVIEW FORM

Client: <u>OPREC</u>		SDG/AR/COC/Work Order: <u>378034</u>
Received By: <u>MTK</u>		Date Received: <u>7-18-15</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.
COC/Samples marked as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>Open</u>
Classified Radioactive II or III by RSO?	<input checked="" type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	<input checked="" type="checkbox"/>	
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input checked="" type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?	<input checked="" type="checkbox"/>	

Sample Receipt Criteria	Yes	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Preservation Method: <u>Ice bags</u> Blue ice Dry ice None Other (describe) All temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Temperature Device Serial #: <u>ES032015830</u> Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples (EPA 6850) have headspace as required?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's and containers affected:
7 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's and containers affected:
8 Are Encore containers present?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If yes, immediately deliver to Volatiles laboratory)
9 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ID's and tests affected:
10 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's and containers affected:
11 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's affected:
12 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's affected:
13 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
14 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
15 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7741 4519 4017</u>

Comments (Use Continuation Form if needed):

Data Review Qualifier Definitions

Project Specific Qualifier Definitions for GEL Client Code: CPRC

Code	Status	Qualifier Definition	CofA	Department	Fraction	Additional Comments
U	Programmed	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.	Y			Includes MDA, TPU, count uncert.
J	Programmed	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	Y	Organics		Organics only
P	Programmed	Aroclor target analyte with greater than 25% difference between column analyses.	Y	Organics		PCB only
C	Manual	Analyte has been confirmed by GC/MS analysis	Y	Organics	Pesticide	IF GC/MS confirmation was attempted but unsuccessful do not qualify with C
B	Programmed	The analyte was detected in both the associated QC blank and in the sample.	Y	Organics		
E	Manual	Concentration exceeds the calibration range of the instrument	Y	Organics		Qualifier Uploaded
A	Manual	The TIC is a suspected aldol-condensation product	Y	Organics	Semi-Volatile	Uploaded with TIC
X	Programmed	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			Replaces H Hold Date In RAD replaces UI. Same usage as standard X as well.
N	Programmed	Spike Sample recovery is outside control limits.	Y			
*	Programmed	Duplicate analysis not within control limits	Y	Inorganics		
>	Programmed	Result greater than quantifiable range or greater than upper limit of the analysis range	Y	General Chemistry		
Z	Manual	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			
B	Programmed	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).	Y	Inorganics	Metals	Replaces J Estimated Value
D	Programmed	Results are reported from a diluted aliquot of sample.	Y			Dilution
E	Programmed	Reported value is estimated due to interferences. See comment in narrative.	Y	Inorganics	Metals	GEL E
M	Manual	Duplicate precision not met.	Y	Inorganics	Metals	Replaces *
o	Programmed	Analyte failed to recover within LCS limits (Organics only)	Y	Organics		
S	Manual	Reported value determined by the Method of Standard Additions (MSA)	Y	Inorganics		Not coded B/C Rarely performed
T	Programmed	Spike and/or spike duplicate sample recovery is outside control limits.	Y	Organics		GC/MS only
W	Manual	Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.	Y	Inorganics		No GFAA in house.
B	Programmed	The associated QC sample blank has a result $\geq 2X$ the MDA and, after corrections, result is \geq MDA for this sample	Y	Radiological		
Y	Manual	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			
+	Manual	Correlation coefficient for Method of Standard Additions (MSA) is < 0.995	Y	Inorganics		
B	Programmed	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).	Y	General Chemistry		Replaces J Estimated Value
C	Programmed	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.	Y	Inorganics	Metals	Replaces B Blank Detection
C	Programmed	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.	Y	General Chemistry		Replaces B Blank Detection
<	Programmed	Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide	Y	General Chemistry		for Reactive CN/S

Project Specific Qualifier Definitions for GEL Client Code: CPCR

Code	Status	Qualifier Definition	CofA	Department	Fraction	Additional Comments
UX	Manual	Gamma Spectroscopy--Uncertain identification	Y	Radiological		

Laboratory Certifications

List of current GEL Certifications as of 03 September 2015

State	Certification
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California	2940 Interim
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013-10
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	LA150001
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68-00485
Plant Material Permit	PDEP-12-00260
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-15-10
Utah NELAP	SC000122015-18
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Metals Analysis

Case Narrative

Metals**Technical Case Narrative****CH2MHill Plateau Remediation Company (CPRC)****SDG #: GEL378034****Work Order #: 378034**

Sample ID	Client ID
378034002	B31L44
378034003	B31L47
1203363116	Method Blank (MB)ICP
1203363117	Laboratory Control Sample (LCS)
1203363120	378034002(B31L44L) Serial Dilution (SD)
1203363118	378034002(B31L44S) Matrix Spike (MS)
1203363119	378034002(B31L44SD) Matrix Spike Duplicate (MSD)
1203363090	Method Blank (MB)ICP-MS
1203363091	Laboratory Control Sample (LCS)
1203363094	378034002(B31L44L) Serial Dilution (SD)
1203363092	378034002(B31L44S) Matrix Spike (MS)
1203363093	378034002(B31L44SD) Matrix Spike Duplicate (MSD)

Sample Analysis

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

Method/Analysis Information

Analytical Batch:	1496042 and 1496031
Prep Batch :	1496041 and 1496030
Standard Operating Procedures:	GL-MA-E-013 REV# 24, GL-MA-E-006 REV# 12 and GL-MA-E-014 REV# 26
Analytical Method:	6010_METALS_ICP and 6020_METALS_ICPMS
Prep Method :	SW846 3005A

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

System Configuration

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard.

The Metals analysis - ICPMS was performed on a PerkinElmer NexION 300X ICPMS. The instrument is equipped with a ESI PFA-ST nebulizer, quadrupole mass spectrometer, dual mode electron multiplier detector, and Kinetic Energy Discrimination (KED) technology. Internal standards of scandium, germanium, indium,

tantalum, and/or lutetium were utilized to cover the mass spectrum.

The Metals analysis - ICPMS was performed on a PerkinElmer NexION 350X ICPMS. The instrument is equipped with a ESI PFA-ST nebulizer, quadrupole mass spectrometer, dual mode electron multiplier detector, and Kinetic Energy Discrimination (KED) technology. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum.

Calibration Information

Instrument Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

CRDL/PQL Requirements

The PQL standard recoveries for SW846 6010C met the control limits with the exception of sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 378034002 (B31L44) and 378034003 (B31L47)-ICP.

ICSA/ICSAB Statement

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

Continuing Calibration Blanks (CCB) Requirements

All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria.

Continuing Calibration Verification (CCV) Requirements

All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement

The method blanks (MB) analyzed with this SDG met the acceptance criteria with the exception of sodium. The analyte concentration was greater than the MDL. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203363116 (MB)-ICP.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 378034002 (B31L44)-ICP and ICP-MS.

Matrix Spike (MS/MSD) Recovery Statement

The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The matrix spike met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes.

MS/MSD Relative Percent Difference (RPD) Statement

The relative percent difference (RPD) obtained from the designated matrix spike duplicate (MSD) is evaluated based on acceptance criteria of 20%. The RPD values between qualifying analyte results in the MS and MSD were within the acceptance limits.

Serial Dilution % Difference Statement

All applicable analytes in the serial dilution (SDILT) demonstrated acceptable correlation to its associated sample and met the established acceptance percent difference criteria.

Technical Information**Holding Time Specifications**

GEL assigns holding times based on the associated methodology. Holding time is measured by comparison of the date and time of sample collection to the date and time of sample preparation and analysis. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Preparation Information

The samples in this SDG were not diluted and prepared according to the cited SOP.

Miscellaneous Information**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation

A data exception report was not required for this SDG.

Additional Comments

Additional comments were not required for this SDG.

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: GEL378034 GEL Work Order: 378034

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: 24 AUG 2015

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL378034

METHOD TYPE: SW846

SAMPLE ID: 378034002

CLIENT ID: B31L44

CONTRACT: CPRC0S15007

MATRIX: WATER

DATE RECEIVED 28-JUL-15

LEVEL: Low

<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7429-90-5	Aluminum	15	ug/L	B		MS	15	1	ICPMS11	150820-3
7440-36-0	Antimony	1	ug/L	U		MS	1	1	ICPMS11	150821-4
7440-38-2	Arsenic	1.7	ug/L	U		MS	1.7	1	ICPMS11	150820-3
7440-39-3	Barium	101	ug/L			MS	0.6	1	ICPMS11	150820-3
7440-41-7	Beryllium	0.2	ug/L	U		MS	0.2	1	ICPMS11	150821-7
7440-42-8	Boron	75.1	ug/L			P	15	1	OPTIMA3	080415-1
7440-43-9	Cadmium	0.11	ug/L	U		MS	0.11	1	ICPMS11	150820-3
7440-70-2	Calcium	97200	ug/L			P	50	1	OPTIMA3	080415-1
7440-47-3	Chromium	258	ug/L			MS	2	1	ICPMS11	150820-3
7440-48-4	Cobalt	0.1	ug/L	U		MS	0.1	1	ICPMS11	150820-3
7440-50-8	Copper	7.58	ug/L			MS	0.35	1	ICPMS11	150820-3
7439-89-6	Iron	30	ug/L	U		P	30	1	OPTIMA3	080415-1
7439-92-1	Lead	0.5	ug/L	U		MS	0.5	1	ICPMS11	150820-3
7439-95-4	Magnesium	23900	ug/L			P	110	1	OPTIMA3	080415-1
7439-96-5	Manganese	1	ug/L	U		MS	1	1	ICPMS11	150820-3
7439-98-7	Molybdenum	1.4	ug/L			MS	0.165	1	ICPMS12	150824-2
7440-02-0	Nickel	1.3	ug/L	B		MS	0.5	1	ICPMS11	150820-3
7440-09-7	Potassium	4930	ug/L			P	50	1	OPTIMA3	080415-1
7782-49-2	Selenium	2.88	ug/L	B		MS	1.5	1	ICPMS11	150821-4
7440-22-4	Silver	0.2	ug/L	U		MS	0.2	1	ICPMS11	150821-4
7440-23-5	Sodium	18800	ug/L			P	100	1	OPTIMA3	080415-1
7440-24-6	Strontium	627	ug/L			MS	2	1	ICPMS11	150820-3
7440-28-0	Thallium	0.45	ug/L	U		MS	0.45	1	ICPMS11	150820-3
7440-29-1	Thorium	0.383	ug/L	U		MS	0.383	1	ICPMS11	150821-11
7440-31-5	Tin	1	ug/L	U		MS	1	1	ICPMS11	150821-4
7440-61-1	Uranium	2.97	ug/L			MS	0.067	1	ICPMS11	150821-11

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL378034

METHOD TYPE: SW846

SAMPLE ID: 378034002

CLIENT ID: B31L44

CONTRACT: CPRCOS15007

MATRIX: WATER

DATE RECEIVED 28-JUL-15

LEVEL: Low

<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7440-62-2	Vanadium	5.06	ug/L			P	1	1	OPTIMA3	080415-1
7440-66-6	Zinc	3.5	ug/L	U		MS	3.5	1	ICPMS11	150820-3

***Analytical Methods:**

- P** SW846 3005A/6010C
- MS** SW846 3005A/6020A

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL378034

METHOD TYPE: SW846

SAMPLE ID: 378034003

CLIENT ID: B31L47

CONTRACT: CPRC0S15007

MATRIX: WATER

DATE RECEIVED 28-JUL-15

LEVEL: Low

<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7429-90-5	Aluminum	15	ug/L	U		MS	15	1	ICPMS11	150820-3
7440-36-0	Antimony	1	ug/L	U		MS	1	1	ICPMS11	150821-4
7440-38-2	Arsenic	1.77	ug/L	B		MS	1.7	1	ICPMS11	150820-3
7440-39-3	Barium	104	ug/L			MS	0.6	1	ICPMS11	150820-3
7440-41-7	Beryllium	0.2	ug/L	U		MS	0.2	1	ICPMS11	150821-7
7440-42-8	Boron	75.3	ug/L			P	15	1	OPTIMA3	080415-1
7440-43-9	Cadmium	0.11	ug/L	U		MS	0.11	1	ICPMS11	150820-3
7440-70-2	Calcium	98200	ug/L			P	50	1	OPTIMA3	080415-1
7440-47-3	Chromium	260	ug/L			MS	2	1	ICPMS11	150820-3
7440-48-4	Cobalt	0.1	ug/L	U		MS	0.1	1	ICPMS11	150820-3
7440-50-8	Copper	6.31	ug/L			MS	0.35	1	ICPMS11	150820-3
7439-89-6	Iron	30	ug/L	U		P	30	1	OPTIMA3	080415-1
7439-92-1	Lead	0.5	ug/L	U		MS	0.5	1	ICPMS11	150820-3
7439-95-4	Magnesium	24500	ug/L			P	110	1	OPTIMA3	080415-1
7439-96-5	Manganese	1	ug/L	U		MS	1	1	ICPMS11	150820-3
7439-98-7	Molybdenum	1.35	ug/L			MS	0.165	1	ICPMS12	150824-2
7440-02-0	Nickel	1.45	ug/L	B		MS	0.5	1	ICPMS11	150820-3
7440-09-7	Potassium	5010	ug/L			P	50	1	OPTIMA3	080415-1
7782-49-2	Selenium	2.24	ug/L	B		MS	1.5	1	ICPMS11	150821-4
7440-22-4	Silver	0.2	ug/L	U		MS	0.2	1	ICPMS11	150821-4
7440-23-5	Sodium	18900	ug/L			P	100	1	OPTIMA3	080415-1
7440-24-6	Strontium	633	ug/L			MS	2	1	ICPMS11	150820-3
7440-28-0	Thallium	0.45	ug/L	U		MS	0.45	1	ICPMS11	150820-3
7440-29-1	Thorium	0.383	ug/L	U		MS	0.383	1	ICPMS11	150821-11
7440-31-5	Tin	1	ug/L	U		MS	1	1	ICPMS11	150821-4
7440-61-1	Uranium	2.95	ug/L			MS	0.067	1	ICPMS11	150821-11

METALS
 -1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL378034

METHOD TYPE: SW846

SAMPLE ID: 378034003

CLIENT ID: B31L47

CONTRACT: CPRCOS15007

MATRIX: WATER

DATE RECEIVED 28-JUL-15

LEVEL: Low

<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7440-62-2	Vanadium	5.09	ug/L			P	1	1	OPTIMA3	080415-1
7440-66-6	Zinc	3.5	ug/L	U		MS	3.5	1	ICPMS11	150820-3

***Analytical Methods:**

- P** SW846 3005A/6010C
- MS** SW846 3005A/6020A

Quality Control Summary

QC Summary

Report Date: August 24, 2015

Page 1 of 8

CH2M Hill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 378034

Parmname	NOM	Sample Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS										
Batch	1496031									
QC1203363091	LCS									
Aluminum	2000		1970	ug/L		98.7	(80%-120%)	PRB	08/21/15	02:00
Antimony	50.0		49.8	ug/L		99.6	(80%-120%)		08/21/15	20:12
Arsenic	50.0		47.9	ug/L		95.8	(80%-120%)		08/21/15	02:00
Barium	50.0		51.8	ug/L		104	(80%-120%)			
Beryllium	50.0		59.6	ug/L		119	(80%-120%)		08/22/15	04:01
Cadmium	50.0		48.6	ug/L		97.2	(80%-120%)		08/21/15	02:00
Chromium	50.0		50.0	ug/L		99.9	(80%-120%)			
Cobalt	50.0		50.6	ug/L		101	(80%-120%)			
Copper	50.0		50.3	ug/L		101	(80%-120%)			
Lead	50.0		42.3	ug/L		84.5	(80%-120%)			
Manganese	50.0		47.1	ug/L		94.3	(80%-120%)			
Molybdenum	50.0		53.0	ug/L		106	(80%-120%)	BAJ	08/24/15	12:30
Nickel	50.0		51.5	ug/L		103	(80%-120%)	PRB	08/21/15	02:00
Selenium	50.0		52.7	ug/L		105	(80%-120%)		08/21/15	20:12
Silver	50.0		50.6	ug/L		101	(80%-120%)			
Strontium	50.0		48.2	ug/L		96.4	(80%-120%)		08/21/15	02:00
Thallium	50.0		41.7	ug/L		83.3	(80%-120%)			
Thorium	50.0		50.7	ug/L		101	(80%-120%)		08/24/15	12:46
Tin	50.0		50.6	ug/L		101	(80%-120%)		08/21/15	20:12
Uranium	50.0		51.5	ug/L		103	(80%-120%)		08/24/15	12:46

QC Summary

Workorder: 378034

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1496031										
Zinc	50.0			45.0	ug/L		89.9	(80%-120%)	PRB	08/21/15	02:00
QC1203363090	MB										
Aluminum			U	ND	ug/L					08/21/15	01:57
Antimony			U	ND	ug/L					08/21/15	20:09
Arsenic			U	ND	ug/L					08/21/15	01:57
Barium			U	ND	ug/L						
Beryllium			U	ND	ug/L					08/22/15	03:58
Cadmium			U	ND	ug/L					08/21/15	01:57
Chromium			U	ND	ug/L						
Cobalt			U	ND	ug/L						
Copper			U	ND	ug/L						
Lead			U	ND	ug/L						
Manganese			U	ND	ug/L						
Molybdenum			U	ND	ug/L				BAJ	08/24/15	12:29
Nickel			U	ND	ug/L				PRB	08/21/15	01:57
Selenium			U	ND	ug/L					08/21/15	20:09
Silver			U	ND	ug/L						
Strontium			U	ND	ug/L					08/21/15	01:57
Thallium			U	ND	ug/L						
Thorium			U	ND	ug/L					08/24/15	12:45
Tin			U	ND	ug/L					08/21/15	20:09
Uranium			U	ND	ug/L					08/24/15	12:45

QC Summary

Workorder: 378034

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1496031										
Zinc			U	ND	ug/L				PRB	08/21/15	01:57
QC1203363092 378034002 MS											
Aluminum	2000	B	15.0	1940	ug/L		96.3	(75%-125%)		08/21/15	02:06
Antimony	50.0	U	ND	51.1	ug/L		102	(75%-125%)		08/21/15	20:19
Arsenic	50.0	U	ND	51.3	ug/L		99.2	(75%-125%)		08/21/15	02:06
Barium	50.0		101	154	ug/L		106	(75%-125%)			
Beryllium	50.0	U	ND	55.2	ug/L		110	(75%-125%)		08/22/15	04:06
Cadmium	50.0	U	ND	46.5	ug/L		93	(75%-125%)		08/21/15	02:06
Chromium	50.0		258	309	ug/L		N/A	(75%-125%)			
Cobalt	50.0	U	ND	50.8	ug/L		101	(75%-125%)			
Copper	50.0		7.58	57.2	ug/L		99.2	(75%-125%)			
Lead	50.0	U	ND	41.9	ug/L		83.7	(75%-125%)			
Manganese	50.0	U	ND	48.1	ug/L		95	(75%-125%)			
Molybdenum	50.0		1.40	54.6	ug/L		107	(75%-125%)	BAJ	08/24/15	12:33
Nickel	50.0	B	1.30	52.1	ug/L		102	(75%-125%)	PRB	08/21/15	02:06
Selenium	50.0	B	2.88	54.5	ug/L		103	(75%-125%)		08/21/15	20:19
Silver	50.0	U	ND	49.5	ug/L		99	(75%-125%)			
Strontium	50.0		627	659	ug/L		N/A	(75%-125%)		08/21/15	02:06
Thallium	50.0	U	ND	41.7	ug/L		83.2	(75%-125%)			
Thorium	50.0	U	ND	51.4	ug/L		103	(75%-125%)		08/24/15	12:49
Tin	50.0	U	ND	50.1	ug/L		99.9	(75%-125%)		08/21/15	20:19
Uranium	50.0		2.97	54.5	ug/L		103	(75%-125%)		08/24/15	12:49

QC Summary

Workorder: 378034

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1496031										
Zinc	50.0	U	ND	46.3	ug/L		85.6	(75%-125%)	PRB	08/21/15	02:06
QC1203363093	378034002 MSD										
Aluminum	2000	B	15.0	1910	ug/L	1.66	94.7	(0%-20%)		08/21/15	02:09
Antimony	50.0	U	ND	50.4	ug/L	1.42	100	(0%-20%)		08/21/15	20:22
Arsenic	50.0	U	ND	50.1	ug/L	2.35	96.8	(0%-20%)		08/21/15	02:09
Barium	50.0		101	154	ug/L	0.127	106	(0%-20%)			
Beryllium	50.0	U	ND	54.4	ug/L	1.4	109	(0%-20%)		08/22/15	04:09
Cadmium	50.0	U	ND	46.4	ug/L	0.163	92.9	(0%-20%)		08/21/15	02:09
Chromium	50.0		258	304	ug/L	1.51	N/A	(0%-20%)			
Cobalt	50.0	U	ND	50.4	ug/L	0.735	101	(0%-20%)			
Copper	50.0		7.58	56.5	ug/L	1.25	97.8	(0%-20%)			
Lead	50.0	U	ND	42.1	ug/L	0.426	84	(0%-20%)			
Manganese	50.0	U	ND	47.5	ug/L	1.38	93.7	(0%-20%)			
Molybdenum	50.0		1.40	55.1	ug/L	0.82	107	(0%-20%)	BAJ	08/24/15	12:35
Nickel	50.0	B	1.30	51.6	ug/L	1.09	101	(0%-20%)	PRB	08/21/15	02:09
Selenium	50.0	B	2.88	53.6	ug/L	1.65	102	(0%-20%)		08/21/15	20:22
Silver	50.0	U	ND	49.8	ug/L	0.54	99.5	(0%-20%)			
Strontium	50.0		627	662	ug/L	0.382	N/A	(0%-20%)		08/21/15	02:09
Thallium	50.0	U	ND	41.1	ug/L	1.26	82.2	(0%-20%)			
Thorium	50.0	U	ND	51.0	ug/L	0.824	102	(0%-20%)		08/24/15	12:51
Tin	50.0	U	ND	50.5	ug/L	0.73	101	(0%-20%)		08/21/15	20:22
Uranium	50.0		2.97	54.4	ug/L	0.206	103	(0%-20%)		08/24/15	12:51

September 9, 2015
GEL LABORATORIES LLC

Rev 1

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

QC Summary

Workorder: 378034

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1496031										
Zinc	50.0	U	ND		45.0	ug/L	2.8	83	(0%-20%)	PRB	08/21/15 02:09
QC1203363094 378034002 SDILT											
Aluminum		B	15.0	DU	ND	ug/L	N/A		(0%-10%)		08/21/15 02:15
Antimony		U	ND	DU	ND	ug/L	N/A		(0%-10%)		08/21/15 20:28
Arsenic		U	ND	DU	ND	ug/L	N/A		(0%-10%)		08/21/15 02:15
Barium			101	D	20.0	ug/L	.915		(0%-10%)		
Beryllium		U	ND	DU	ND	ug/L	N/A		(0%-10%)		08/22/15 04:15
Cadmium		U	ND	DU	ND	ug/L	N/A		(0%-10%)		08/21/15 02:15
Chromium			258	D	51.0	ug/L	1.21		(0%-10%)		
Cobalt		U	ND	DU	ND	ug/L	N/A		(0%-10%)		
Copper			7.58	D	1.58	ug/L	4.16		(0%-10%)		
Lead		U	ND	DU	ND	ug/L	N/A		(0%-10%)		
Manganese		U	ND	DU	ND	ug/L	N/A		(0%-10%)		
Molybdenum			1.40	D	0.268	ug/L	3.94		(0%-10%)	BAJ	08/24/15 12:38
Nickel		B	1.30	DU	ND	ug/L	N/A		(0%-10%)	PRB	08/21/15 02:15
Selenium		B	2.88	DU	ND	ug/L	N/A		(0%-10%)		08/21/15 20:28
Silver		U	ND	DU	ND	ug/L	N/A		(0%-10%)		
Strontium			627	D	120	ug/L	4.39		(0%-10%)		08/21/15 02:15
Thallium		U	ND	DU	ND	ug/L	N/A		(0%-10%)		
Thorium		U	ND	DU	ND	ug/L	N/A		(0%-10%)		08/24/15 12:54
Tin		U	ND	DU	ND	ug/L	N/A		(0%-10%)		08/21/15 20:28
Uranium			2.97	D	0.633	ug/L	6.57		(0%-10%)		08/24/15 12:54

QC Summary

Workorder: 378034

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1496031										
Zinc		U	ND DU	ND	ug/L	N/A		(0%-10%)	PRB	08/21/15	02:15
Metals Analysis-ICP											
Batch	1496042										
QC1203363117	LCS										
Boron	500			516	ug/L		103	(80%-120%)	HSC	08/04/15	17:40
Calcium	5000			5140	ug/L		103	(80%-120%)			
Iron	5000			5370	ug/L		107	(80%-120%)			
Magnesium	5000			5240	ug/L		105	(80%-120%)			
Potassium	5000			5350	ug/L		107	(80%-120%)			
Sodium	5000			5480	ug/L		110	(80%-120%)			
Vanadium	500			509	ug/L		102	(80%-120%)			
QC1203363116	MB										
Boron			U	ND	ug/L					08/04/15	17:36
Calcium			U	ND	ug/L						
Iron			U	ND	ug/L						
Magnesium			U	ND	ug/L						
Potassium			U	ND	ug/L						
Sodium			B	238	ug/L						
Vanadium			U	ND	ug/L						
QC1203363118	378034002 MS										
Boron	500		75.1	612	ug/L		107	(75%-125%)		08/04/15	17:46
Calcium	5000		97200	103000	ug/L		N/A	(75%-125%)			
Iron	5000	U	ND	5330	ug/L		106	(75%-125%)			
Magnesium	5000		23900	29500	ug/L		N/A	(75%-125%)			

QC Summary

Workorder: 378034

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1496042										
Potassium	5000	4930		10300	ug/L		108	(75%-125%)			
Sodium	5000	18800		24200	ug/L		109	(75%-125%)	HSC	08/04/15	17:46
Vanadium	500	5.06		523	ug/L		104	(75%-125%)			
QC1203363119 378034002 MSD											
Boron	500	75.1		610	ug/L	0.363	107	(0%-20%)		08/04/15	17:49
Calcium	5000	97200		100000	ug/L	2.38	N/A	(0%-20%)			
Iron	5000	U	ND	5210	ug/L	2.13	104	(0%-20%)			
Magnesium	5000	23900		28800	ug/L	2.59	N/A	(0%-20%)			
Potassium	5000	4930		10100	ug/L	2.3	103	(0%-20%)			
Sodium	5000	18800		23400	ug/L	3.51	92	(0%-20%)			
Vanadium	500	5.06		520	ug/L	0.65	103	(0%-20%)			
QC1203363120 378034002 SDILT											
Boron		75.1	D	17.3	ug/L	15.4		(0%-10%)		08/04/15	17:52
Calcium		97200	D	18800	ug/L	3.36		(0%-10%)			
Iron		U	ND DU	ND	ug/L	N/A		(0%-10%)			
Magnesium		23900	D	4690	ug/L	1.97		(0%-10%)			
Potassium		4930	D	949	ug/L	3.64		(0%-10%)			
Sodium		18800	D	3520	ug/L	6.41		(0%-10%)			
Vanadium		5.06	D	1.07	ug/L	6.12		(0%-10%)			

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

General Chem Analysis

Case Narrative

**General Chemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL378034
Work Order #: 378034**

Method/Analysis Information

Product: Ion Chromatography

Analytical Batch: 1496071

Method: 9056_ANIONS_IC: COMMON + GW 02

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9056A:

Sample ID	Client ID
378034001	B31L45
1203363180	Method Blank (MB)
1203363181	Laboratory Control Sample (LCS)
1203363182	378034001(B31L45) Sample Duplicate (DUP)
1203363183	378034001(B31L45) Post Spike (PS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-086 REV# 24.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information

The Ion Chromatography analysis was performed on a Dionex ICS-3000 Ion Chromatograph.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

All continuing calibration blanks (CCBs) associated with reported data from this batch were within acceptance limits.

Calibration Verification Information (CCV)

All continuing calibration verification standards (CCVs) associated with reported data from this batch were within

acceptance limits.

Y Intercept Rule

The absolute value of the intercept is less than 3 times the MDL.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 378034001 (B31L45) was selected for QC analysis.

Matrix Spike (MS)/Post Spike (PS) Recovery Statement

The MS/PS recoveries for this sample set were within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The following samples were diluted because target analyte concentrations exceeded the calibration range. 1203363182 (B31L45DUP), 1203363183 (B31L45PS) and 378034001 (B31L45).

Analyte	378034
	001
Chloride	10X
Nitrate	10X
Sulfate	20X

Sample Re-analysis

The samples in this SDG did not require re-analysis.

Miscellaneous Information

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Manual Integrations

Samples 1203363182 (B31L45DUP), 1203363183 (B31L45PS) and 378034001 (B31L45) were manually integrated to correctly position the baseline as set in the calibration standards.

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product: Alkalinity
Analytical Batch: 1497066 **Method:** 2320_ALKALINITY: COMMON (Alkalinity only)

Sample Analysis

The following samples were analyzed using the analytical protocol as established in 2320_ALKALINITY:

Sample ID	Client ID
378034003	B31L47
1203365662	Method Blank (MB)
1203365664	Laboratory Control Sample (LCS)
1203365667	378034003(B31L47) Sample Duplicate (DUP)
1203365669	378034003(B31L47) Matrix Spike (MS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-033 REV# 11.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information

The Titration and Ion analysis was performed on a manually operated buret.

Initial Standardization

The titrant was properly standardized

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 378034003 (B31L47) was selected for QC analysis.

Matrix Spike (MS)/Post Spike (PS) Recovery Statement

The MS/PS recovery for this sample set was within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

The samples in this SDG did not require re-analysis.

Miscellaneous Information**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Additional Comments

50mL of sample was used due to limited sample quantity and selection for QC. 1203365667 (B31L47DUP), 1203365669 (B31L47MS) and 378034003 (B31L47).

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

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: GEL378034 GEL Work Order: 378034

The Qualifiers in this report are defined as follows:

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

D Results are reported from a diluted aliquot of sample.

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

Review/Validation

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

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

Signature: 

Name: Thomas Lewis

Date: 09 SEP 2015

Title: Data Validator

Sample Data Summary

Certificate of Analysis

Report Date: September 9, 2015

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF S15-007

Client Sample ID: B31L45	Project: CPRC0S15007
Sample ID: 378034001	Client ID: CPRC001
Matrix: WATER	
Collect Date: 27-JUL-15 10:57	
Receive Date: 28-JUL-15	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
9056_ANIONS_IC: COMMON + GW 02 "As Received"											
Bromide	B	197	67.0	250	ug/L	1	MXL2	07/28/15	1542	1496071	1
Fluoride	B	98.6	33.0	500	ug/L	1					
Nitrite-N	U	38.0	38.0	250	ug/L	1					
Phosphorus in phosphate	U	67.0	67.0	500	ug/L	1					
Chloride	D	19000	670	2000	ug/L	10	MXL2	07/28/15	1718	1496071	2
Nitrate-N	D	7850	330	1000	ug/L	10					
Sulfate	D	204000	2660	8000	ug/L	20	MXL2	07/30/15	0010	1496071	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9056A	

Notes:

Certificate of Analysis

Report Date: September 9, 2015

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF S15-007

Client Sample ID: B31L47	Project: CPRC0S15007
Sample ID: 378034003	Client ID: CPRC001
Matrix: WATER	
Collect Date: 27-JUL-15 10:57	
Receive Date: 28-JUL-15	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis											
2320_ALKALINITY: GW 01 "As Received"											
Alkalinity, Total as CaCO3		106000	1450	2000	ug/L		PX01	07/31/15	1644	1497066	1
Bicarbonate alkalinity (CaCO3)		106000	1450	2000	ug/L						
Carbonate alkalinity (CaCO3)	U	1450	1450	2000	ug/L						
Hydroxide alkalinity as CaCO3	U	1450	1450	2000	ug/L						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	2320_ALKALINITY	

Notes:

Quality Control Summary

September 9, 2015
GEL LABORATORIES LLC

Rev 1

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

QC Summary

Report Date: September 9, 2015

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CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 378034

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1496071										
QC1203363182 378034001 DUP											
Bromide	B	197	B	199	ug/L	0.656 ^		(+/-250)	MXL2	07/28/15	16:14
Chloride	D	19000	D	18900	ug/L	0.706		(0%-20%)		07/28/15	17:50
Fluoride	B	98.6	B	99.5	ug/L	0.909 ^		(+/-500)		07/28/15	16:14
Nitrate-N	D	7850	D	7640	ug/L	2.82		(0%-20%)		07/28/15	17:50
Nitrite-N	U	38.0	U	38.0	ug/L	N/A				07/28/15	16:14
Phosphorus in phosphate	U	67.0	U	67.0	ug/L	N/A					
Sulfate	D	204000	D	204000	ug/L	0.145		(0%-20%)		07/30/15	00:42
QC1203363181 LCS											
Bromide		1250		1280	ug/L		103	(90%-110%)		07/28/15	15:11
Chloride		5000		4660	ug/L		93.2	(90%-110%)			
Fluoride		2500		2450	ug/L		97.9	(90%-110%)			
Nitrate-N		2500		2430	ug/L		97.1	(90%-110%)			
Nitrite-N		2500		2410	ug/L		96.5	(90%-110%)			
Phosphorus in phosphate		1250		1270	ug/L		101	(90%-110%)			
Sulfate		10000		9700	ug/L		97	(90%-110%)			
QC1203363180 MB											
Bromide			U	67.0	ug/L					07/28/15	14:40
Chloride			U	67.0	ug/L						
Fluoride			U	33.0	ug/L						
Nitrate-N			U	33.0	ug/L						
Nitrite-N			U	38.0	ug/L						

QC Summary

Workorder: 378034

Page 2 of 3

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1496071										
Phosphorus in phosphate			U	67.0	ug/L				MXL2	07/28/15	14:40
Sulfate			U	133	ug/L						
QC1203363183	378034001	PS									
Bromide	1.25	B	0.197	1.48	mg/L		103	(90%-110%)		07/28/15	16:46
Chloride	5.00	D	1.90	D	6.84	mg/L	98.7	(90%-110%)		07/28/15	18:22
Fluoride	2.50	B	0.0986	2.50	mg/L		95.9	(90%-110%)		07/28/15	16:46
Nitrate-N	2.50	D	0.785	D	3.21	mg/L	96.9	(90%-110%)		07/28/15	18:22
Nitrite-N	2.50	U	0.00	2.44	mg/L		97.4	(90%-110%)		07/28/15	16:46
Phosphorus in phosphate	1.25	U	0.00	1.16	mg/L		93	(90%-110%)			
Sulfate	10.0	D	10.2	D	20.9	mg/L	107	(90%-110%)		07/30/15	01:13
Titration and Ion Analysis											
Batch	1497066										
QC1203365667	378034003	DUP									
Alkalinity, Total as CaCO3			106000	106000	ug/L	0		(0%-20%)	PXO1	07/31/15	16:46
Bicarbonate alkalinity (CaCO3)			106000	106000	ug/L	0		(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				
QC1203365664	LCS										
Alkalinity, Total as CaCO3	50000			53300	ug/L		107	(90%-110%)		07/31/15	16:17
QC1203365662	MB										
Alkalinity, Total as CaCO3			U	725	ug/L					07/31/15	16:17
Bicarbonate alkalinity (CaCO3)			U	725	ug/L						
Carbonate alkalinity (CaCO3)			U	725	ug/L						
Hydroxide alkalinity as CaCO3			U	725	ug/L						
QC1203365669	378034003	MS									

QC Summary

Workorder: 378034

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1497066										
Alkalinity, Total as CaCO3	100000	106000		209000	ug/L		104	(80%-120%)		07/31/15	16:54

Notes:

The Qualifiers in this report are defined as follows:

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

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.