

8/3/2016



August 03, 2016

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

Re: CHPRC SAF F16-043
Work Order: 402047
SDG: GEL402047

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 21, 2016. 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,

B Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Purchase Order: 304070 - 8C
Chain of Custody: F16-043-090 and F16-043-091
Enclosures



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Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF F16-043
SDG: GEL402047**

August 03, 2016

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 21, 2016, 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
402047001	B36653
402047002	B36654

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: GC/MS Volatile, 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.

8/3/2016

B. Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL402047
Work Order #: 402047

GC/MS Volatile

Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer

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

Quality Control (QC) Information

Surrogate Recoveries

Surrogate recoveries, in sample 402047001 (B36653) was outside the acceptance limits. Sample re-analysis confirmed matrix interference. The initial results are reported.

Technical Information

Sample Re-extraction/Re-analysis

Sample 402047001 (B36653) was re-analyzed due to unacceptable surrogate or internal standard recoveries in the initial analysis. The re-analysis confirmed. The initial results are reported.

Miscellaneous Information

Additional Comments

The samples in this SDG varied in color and size. Ten milliliters of de-ionized water was added to the contents of the sample container at the time of analysis.

Metals

Determination of Metals by ICP

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

Calibration Information

CRDL/PQL Requirements

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 402047002 (B36654).

Quality Control (QC) Information

Method Blank (MB) Statement

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of sodium. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203590069 (MB).

Matrix Spike (MS/MSD) Recovery Statement

The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

Sample	Analyte	Value
1203590072 (B36654MS)	Potassium	130* (75%-125%)

Duplicate Relative Percent Difference (RPD) Statement

Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203590071 (B36654DUP)	Phosphorous	25.6* (0%-20%)

Technical Information

Sample Dilutions

Sample was diluted for titanium in order to bring raw values within the linear range of the instrument, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for antimony. 402047002 (B36654).

Analyte	402047
	002
Antimony	10X

Determination of Metals by ICP-MS

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

Quality Control (QC) Information

Method Blank (MB) Statement

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of chromium and zinc. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203590344 (MB).

Duplicate Relative Percent Difference (RPD) Statement

Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203590346 (B36654DUP)	Lead	22.8* (0%-20%)
	Molybdenum	516* (+/-204 ug/kg)
	Nickel	49.3* (0%-20%)

Serial Dilution % Difference Statement

Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified.

Sample	Analyte	Value
1203590348 (B36654SDILT)	Cobalt	11.8 *(0%-10%)
	Copper	16.2 *(0%-10%)
	Nickel	14.2 *(0%-10%)

Technical Information

Sample Dilutions

Sample 402047002 (B36654) was diluted to ensure that the analyte concentration was within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	402047
	002
Several	40X 2X 10X

General Chemistry

Carbon, Total Organic

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.

pH

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

Technical Information

Holding Times

Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

Sample	Analyte	Value
1203591340 (B36654DUP)	pH	Received 21-JUL-16, out of holding 19-JUL-16
402047002 (B36654)	pH	Received 21-JUL-16, out of holding 19-JUL-16

Radiochemistry

Dry Weight

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

Certification Statement

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

Chain of Custody and Supporting Documentation

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F16-043-090	PAGE 1 OF 1
COLLECTOR J.R. Aguilar/CHPRC	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	PRICE CODE 8C	DATA TURNAROUND 15 Days / 15 Days
SAMPLING LOCATION C9425, I-002	PROJECT DESIGNATION 100-NR-2 Drilling - Soil	FIELD LOGBOOK NO. 11NF-2-445-5/7	SAF NO. F16-043	AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO. GWS-453	ACTUAL SAMPLE DEPTH 60.03' - 61.53'	COA 304070	METHOD OF SHIPMENT FEDERAL EXPRESS	ORIGINAL	
SHIPPED TO GEL Laboratories, LLC	BILL OF LADING/AIR BILL NO. 77680253 6871				

402047

MATRIX* A=Air DL=Drum L=Liquid 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 Cool <-7C and >-20C	HOLDING TIME 14 Days	TYPE OF CONTAINER aGs	NO. OF CONTAINER(S) 5	VOLUME 40mL	SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS
SPECIAL HANDLING AND/OR STORAGE N/A							
SAMPLE NO. B36653	MATRIX* SOIL	SAMPLE DATE JUL 19 2016	SAMPLE TIME 1350				

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM J.R. Aguilar/CHPRC	DATE/TIME JUL 19 2016 1455	RECEIVED BY/STORED IN SSU-1	DATE/TIME JUL 19 2016 1455
RELINQUISHED BY/REMOVED FROM SSU-1	DATE/TIME JUL 20 2016 0900	RECEIVED BY/STORED IN CHPRC	DATE/TIME JUL 20 2016 0900
RELINQUISHED BY/REMOVED FROM Janella Zunker	DATE/TIME JUL 20 2016 1400	RECEIVED BY/STORED IN FEDEx	DATE/TIME JUL 20 2016 0850
RELINQUISHED BY/REMOVED FROM M. Kinslow	DATE/TIME JUL 20 2016 1400	RECEIVED BY/STORED IN M. Kinslow	DATE/TIME JUL 20 2016 0850
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SPECIAL INSTRUCTIONS
SPLIT SPOON PARTS B & A WILL BE COMBINED TO ENSURE ADEQUATE SAMPLE MATERIAL FOR ANALYSIS; ** ALL VOA samples will be collected using EPA Method 5035A and will include 5 bottles for low level analysis.** The laboratory is to use one of the low level VOA bottles for moisture content determination.** VOA bottles will be labeled with an appended suffix of K, L, M, N, or P. These suffixes are for the purpose of providing bottle weights to the laboratories. These suffixes should not be included as part of the sample ID reported in the final data packages.
(1) 5035/8260_VOA: LOW LEVEL: COMMON {Chloroform, Ethylbenzene};

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME
PRINTED ON 7/12/2016	FSR ID = FSR33901	TRVL NUM = TRVL-16-186	A-6003-618 (REV 2)

SAMPLE RECORD SHEET FOR VOC SAMPLE COLLECTION

Location:

C9425

Sampler Initials and Date: JRA 7-19-16

Sample Number ¹	Sample Suffix	Initial Weight ² (grams)	Total Weight ³ (grams)	Soil Weight ⁴ (grams)
B36653	K	29.82	35.43	5.61
B36653	L	30.12	36.84	6.72
B36653	M	29.85	36.24	6.39
B36653	N	29.73	36.08	6.35
B36653	P	29.91	35.32	5.41

¹ Enter sample number associated with the sampling event.

² Initial weight is to include all labels, stickers, bags, spin bars (for samples with suffix K, L, M, N and P) and anything else that will be associated with the bottle when it is weighed with the sample.

³ Ensure that everything weighed for the empty bottle and no additional items (besides the sample) is weighed.

⁴ Soil weight is the vial with sample minus Initial Weight.

A-6005-526 (REV 0)

SAMPLE RECEIPT & REVIEW FORM

Client: <u>CPR</u>		SDG/AR/COC/Work Order:	
Received By: <u>MK</u>		Date Received: <u>7-21-16</u>	
Suspected Hazard Information		Yes	No
COC/Samples marked as radioactive?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Classified Radioactive II or III by RSO?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
COC/Samples marked containing PCBs?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Package, COC, and/or Samples marked as beryllium or asbestos containing?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Samples identified as Foreign Soil?		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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 type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Ice bags <input checked="" type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> None <input type="checkbox"/> Other (describe) *all temperatures are recorded in Celsius <u>IC DC</u>
2a	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>30461961</u> Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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 type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected: (If unknown, select No)
7	VOA vials contain acid preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
8	VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
9	Are Encore containers present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
10	Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
11	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
12	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
14	Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16	Carrier and tracking number.				Circle Applicable: FedEx Air <input checked="" type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <u>7768 0253 6871 1c</u> <u>7768 0465 7896 2c</u>

Comments (Use Continuation Form if needed):

Data Review Qualifier Definitions

Project Specific Qualifier Definitions for GEL Client Code: CPRC

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

Laboratory Certifications

List of current GEL Certifications as of 03 August 2016

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA160006
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-16-11
Utah NELAP	SC000122016-20
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Volatile Analysis

Case Narrative

**GC/MS Volatile
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL402047
Work Order #: 402047**

Product: Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer

Analytical Method: SW846 5035A/8260C

Analytical Procedure: GL-OA-E-038 REV# 22

Analytical Batch: 1584772

Preparation Method: SW846 5035A

Preparation Procedure: GL-OA-E-039 REV# 10

Preparation Batch: 1584771

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402047001	B36653
1203592396	Method Blank (MB)
1203592398	Laboratory Control Sample (LCS)
1203592399	401766001(B36644) Post Spike (PS)
1203592400	401766001(B36644) Post Spike Duplicate (PSD)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

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

Quality Control (QC) Information

Surrogate Recoveries

Surrogate recoveries, in sample 402047001 (B36653) was outside the acceptance limits. Sample re-analysis confirmed matrix interference. The initial results are reported.

Technical Information

Sample Re-extraction/Re-analysis

Sample 402047001 (B36653) was re-analyzed due to unacceptable surrogate or internal standard recoveries in the initial analysis. The re-analysis confirmed. The initial results are reported.

Miscellaneous Information

Additional Comments

The samples in this SDG varied in color and size. Ten milliliters of de-ionized water was added to the contents of the sample container at the time of analysis.

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: GEL402047 GEL Work Order: 402047

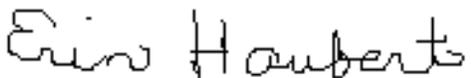
The Qualifiers in this report are defined as follows:

- T Spike and/or spike duplicate 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.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

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: Erin Haubert

Date: 29 JUL 2016

Title: Data Validator

Sample Data Summary

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 1

SDG Number: GEL402047	Date Collected: 07/19/2016 13:50	Matrix: SOIL
Lab Sample ID: 402047001	Date Received: 07/21/2016 08:50	%Moisture: 8.1
Client ID: B36653	Client: CPRC001	Project: CPRC0F16043
Batch ID: 1584772	Method: SW846 5035A/8260C	SOP Ref: GL-OA-E-038
Run Date: 07/26/2016 11:56	Inst: VOA3.I	Dilution: 1
Prep Date: 07/19/2016 13:50	Analyst: CDS1	Purge Vol: 5 mL
Data File: 072616V3\3T210.D	Aliquot: 6.7 g	Final Volume: 5 mL
	Column: DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
67-66-3	Chloroform	U	0.244	ug/kg	0.244	1.62
100-41-4	Ethylbenzene	U	0.244	ug/kg	0.244	1.62

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: July 27, 2016

Page 1 of 2

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 402047

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS											
Batch	1584772										
QC1203592398	LCS										
Chloroform	50.0			56.2	ug/kg		112	(70%-130%)	CDS1	07/26/16	08:53
Ethylbenzene	50.0			55.5	ug/kg		111	(70%-130%)			
**1,2-Dichloroethane-d4	50.0			49.7	ug/L		99	(81%-124%)			
**Bromofluorobenzene	50.0			52.1	ug/L		104	(70%-130%)			
**Toluene-d8	50.0			49.3	ug/L		99	(81%-120%)			
QC1203592396	MB										
Chloroform			U	0.300	ug/kg					07/26/16	10:24
Ethylbenzene			U	0.300	ug/kg						
**1,2-Dichloroethane-d4	50.0			52.4	ug/L		105	(81%-124%)			
**Bromofluorobenzene	50.0			50.9	ug/L		102	(70%-130%)			
**Toluene-d8	50.0			51.3	ug/L		103	(81%-120%)			
QC1203592399	401766001	PS									
Chloroform	50.0	U	0.00	46.9	ug/L		94	(70%-130%)		07/26/16	15:31
Ethylbenzene	50.0	U	0.00	43.3	ug/L		87	(70%-130%)			
**1,2-Dichloroethane-d4	50.0		61.0	50.3	ug/L		101	(81%-124%)			
**Bromofluorobenzene	50.0		55.2	51.9	ug/L		104	(70%-130%)			
**Toluene-d8	50.0		56.8	48.4	ug/L		97	(81%-120%)			
QC1203592400	401766001	PSD									
Chloroform	50.0	U	0.00	46.3	ug/L	1	93	(0%-20%)		07/26/16	16:02
Ethylbenzene	50.0	U	0.00	40.2	ug/L	7	80	(0%-20%)			
**1,2-Dichloroethane-d4	50.0		61.0	51.2	ug/L		102	(81%-124%)			

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QC Summary

Workorder: 402047

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS											
Batch	1584772										
**Bromofluorobenzene	50.0	55.2		53.0	ug/L		106	(70%-130%)			
**Toluene-d8	50.0	56.8		48.1	ug/L		96	(81%-120%)	CDS1	07/26/16	16:02

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- 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
- N Spike Sample recovery is outside control limits.
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate 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
 - o Analyte failed to recover within LCS limits (Organics only)

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.

Surrogate Recovery Report

SDG Number: GEL402047

Matrix Type: SOLID

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203592398	LCS for batch 1584771	99	99	104
1203592396	MB for batch 1584771	105	103	102
402047001	B36653	167 *	159 *	154 *
1203592399	B36644PS	101	97	104
1203592400	B36644PSD	102	96	106

Surrogate

DCED4 = 1,2-Dichloroethane-d4

TOL = Toluene-d8

BFB = Bromofluorobenzene

Acceptance Limits

(81%-124%)

(81%-120%)

(70%-130%)

* Recovery outside Acceptance Limits

Column to be used to flag recovery values

D Sample Diluted

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL402047
Work Order #: 402047

Product: Determination of Metals by ICP**Analytical Method:** 6010_METALS_ICP**Analytical Procedure:** GL-MA-E-013 REV# 26**Analytical Batch:** 1583862**Product: Determination of Metals by ICP-MS****Analytical Method:** 6020_METALS_ICPMS**Analytical Procedure:** GL-MA-E-014 REV# 28**Analytical Batch:** 1583993**Preparation Method:** SW846 3050B**Preparation Procedure:** GL-MA-E-009 REV# 26**Preparation Batches:** 1583861 and 1583992

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402047002	B36654
1203590069	Method Blank (MB)ICP
1203590070	Laboratory Control Sample (LCS)
1203590073	402047002(B36654L) Serial Dilution (SD)
1203590071	402047002(B36654D) Sample Duplicate (DUP)
1203590072	402047002(B36654S) Matrix Spike (MS)
1203592345	402047002(B36654PS) Post Spike (PS)
1203590344	Method Blank (MB)ICP-MS
1203590345	Laboratory Control Sample (LCS)
1203590348	402047002(B36654L) Serial Dilution (SD)
1203590346	402047002(B36654D) Sample Duplicate (DUP)
1203590347	402047002(B36654S) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

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

Calibration Information**CRDL/PQL Requirements**

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 402047002 (B36654)-ICP.

Quality Control (QC) Information

Method Blank (MB) Statement

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of sodium. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203590069 (MB)-ICP. The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of chromium and zinc. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203590344 (MB)-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 MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

Sample	Analyte	Value
1203590072 (B36654MS)	Potassium	130* (75%-125%)

Duplicate Relative Percent Difference (RPD) Statement

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203590071 (B36654DUP)	Phosphorous	25.6* (0%-20%)
1203590346 (B36654DUP)	Lead	22.8* (0%-20%)
	Molybdenum	516* (+/-204 ug/kg)
	Nickel	49.3* (0%-20%)

Serial Dilution % Difference Statement

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 25x the IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified.

Sample	Analyte	Value
1203590348 (B36654SDILT)	Cobalt	11.8 *(0%-10%)
	Copper	16.2 *(0%-10%)
	Nickel	14.2 *(0%-10%)

Technical Information**Preparation/Analytical Method Verification**

Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Sample was diluted for titanium in order to bring raw values within the linear range of the instrument, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for antimony. 402047002 (B36654)-ICP. Sample 402047002 (B36654)-ICP-MS was diluted to ensure that the analyte concentration was within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times. ICP-MS.

Analyte	402047
	002
Several	40X 2X 10X 1X

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: GEL402047 GEL Work Order: 402047

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.
- M Duplicate precision not met.
- 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: 03 AUG 2016

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL402047

CONTRACT: CPRC0F16043

METHOD TYPE: SW846

SAMPLE ID:402047002

BASIS: Dry Weight

DATE COLLECTED 19-JUL-16

CLIENT ID: B36654

LEVEL: Low

DATE RECEIVED 21-JUL-16

MATRIX: SOIL

%SOLIDS: 94

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	7560000	ug/kg	D	3080	10300	50	2	MS	SKJ	07/27/16 18:38	160727-4	1583993
7440-36-0	Antimony	3350	ug/kg	UD	3350	10200	10200	10	P	HSC	07/28/16 14:50	072816A-1	1583862
7440-38-2	Arsenic	1450	ug/kg	D	205	1030	10	2	MS	PRB	07/29/16 15:52	160729-3	1583993
7440-39-3	Barium	71800	ug/kg	D	514	2050	20	10	MS	SKJ	07/28/16 15:50	160728-5	1583993
7440-43-9	Cadmium	177	ug/kg	BD	20.5	205	5	2	MS	SKJ	07/27/16 18:38	160727-4	1583993
7440-70-2	Calcium	5120000	ug/kg		8120	25400	25400	1	P	HSC	07/28/16 14:29	072816A-1	1583862
7440-47-3	Chromium	11600	ug/kg	D	205	616	10	2	MS	SKJ	07/27/16 18:38	160727-4	1583993
7440-48-4	Cobalt	8150	ug/kg	DM	61.6	205	20	2	MS	SKJ	07/27/16 18:38	160727-4	1583993
7440-50-8	Copper	16000	ug/kg	DM	67.8	205	8	2	MS	SKJ	07/27/16 18:38	160727-4	1583993
7439-89-6	Iron	14200000	ug/kg		8120	25400	25400	1	P	HSC	07/28/16 14:29	072816A-1	1583862
7439-92-1	Lead	2590	ug/kg	D*	103	411	15	2	MS	SKJ	07/27/16 18:38	160727-4	1583993
7439-95-4	Magnesium	5210000	ug/kg		8630	30500	30500	1	P	HSC	07/28/16 14:29	072816A-1	1583862
7439-96-5	Manganese	392000	ug/kg	D	4110	20500	5	40	MS	SKJ	07/28/16 15:32	160728-5	1583993
7439-98-7	Molybdenum	1250	ug/kg	D*	61.6	205	20	2	MS	SKJ	07/28/16 17:40	160728-6	1583993
7440-02-0	Nickel	28600	ug/kg	D*M	103	411	40	2	MS	SKJ	07/27/16 18:38	160727-4	1583993
7723-14-0	Phosphorous	674000	ug/kg	*	5080	15200	15200	1	P	HSC	07/28/16 14:29	072816A-1	1583862
7440-09-7	Potassium	1020000	ug/kg	N	6500	25400	25400	1	P	HSC	07/28/16 14:29	072816A-1	1583862
7782-49-2	Selenium	1220	ug/kg	D	339	1030	50	2	MS	PRB	07/29/16 15:52	160729-3	1583993
7440-22-4	Silver	184	ug/kg	B	102	508	508	1	P	HSC	07/28/16 14:29	072816A-1	1583862
7440-23-5	Sodium	2170000	ug/kg		7110	25400	25400	1	P	HSC	07/28/16 14:29	072816A-1	1583862
7440-24-6	Strontium	31600	ug/kg	D	2050	10300	10	10	MS	SKJ	07/28/16 15:50	160728-5	1583993
7440-62-2	Vanadium	33000	ug/kg	D	308	1030	1030	2	MS	BAJ	07/29/16 12:51	160729-2	1583993
7440-66-6	Zinc	31300	ug/kg	D	411	2050	25	2	MS	SKJ	07/27/16 18:38	160727-4	1583993

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1583862	1583861	SW846 3050B	0.524	g	50	mL	07/22/16	SXW1
1583993	1583992	SW846 3050B	0.518	g	50	mL	07/22/16	SXW1

***Analytical Methods:**

P SW846 3050B/6010C
MS SW846 3050B/6020A

Quality Control Summary

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QC Summary

Report Date: August 3, 2016

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 402047

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1583993										
QC1203590346 402047002 DUP											
Aluminum	D	7560000	D	7050000	ug/kg	6.87		(0%-20%)	SKJ	07/27/16	18:42
Arsenic	D	1450	D	1240	ug/kg	15.8	^	(+/-1020)	PRB	07/29/16	15:54
Barium	D	71800	D	77400	ug/kg	7.54		(0%-20%)	SKJ	07/28/16	15:52
Cadmium	BD	177	D	227	ug/kg	24.6	^	(+/-204)		07/27/16	18:42
Chromium	D	11600	D	9610	ug/kg	18.6		(0%-20%)			
Cobalt	DM	8150	D	8500	ug/kg	4.26		(0%-20%)			
Copper	DM	16000	D	16800	ug/kg	5.35		(0%-20%)			
Lead	*D	2590	*D	2060	ug/kg	22.8*		(0%-20%)			
Manganese	D	392000	D	378000	ug/kg	3.61		(0%-20%)		07/28/16	15:35
Molybdenum	*D	1250	*D	734	ug/kg	52.3*	^	(+/-204)		07/28/16	17:42
Nickel	*DM	28600	*D	17300	ug/kg	49.3*		(0%-20%)		07/27/16	18:42
Selenium	D	1220	D	1070	ug/kg	13.1	^	(+/-1020)	PRB	07/29/16	15:54
Strontium	D	31600	D	30600	ug/kg	3.06	^	(+/-10200)	SKJ	07/28/16	15:52
Vanadium	D	33000	D	32400	ug/kg	1.88		(0%-20%)	BAJ	07/29/16	12:53
Zinc	D	31300	D	32900	ug/kg	4.92		(0%-20%)	SKJ	07/27/16	18:42
QC1203590345 LCS											
Aluminum		192000	D	191000	ug/kg			99.5 (80%-120%)		07/27/16	18:34
Arsenic		4810	D	4400	ug/kg			91.5 (80%-120%)	PRB	07/29/16	15:50
Barium		4810	D	4910	ug/kg			102 (80%-120%)	SKJ	07/28/16	15:30
Cadmium		4810	D	4730	ug/kg			98.3 (80%-120%)		07/27/16	18:34

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QC Summary

Workorder: 402047

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Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1583993										
Chromium	4810		D	5180	ug/kg		108	(80%-120%)			
Cobalt	4810		D	4830	ug/kg		101	(80%-120%)	SKJ	07/27/16	18:34
Copper	4810		D	4830	ug/kg		101	(80%-120%)			
Lead	4810		D	4980	ug/kg		104	(80%-120%)			
Manganese	4810		D	5070	ug/kg		105	(80%-120%)		07/28/16	15:30
Molybdenum	4810		D	4910	ug/kg		102	(80%-120%)		07/28/16	17:37
Nickel	4810		D	4890	ug/kg		102	(80%-120%)		07/27/16	18:34
Selenium	4810		D	4080	ug/kg		84.9	(80%-120%)	PRB	07/29/16	15:50
Strontium	4810		D	4870	ug/kg		101	(80%-120%)	SKJ	07/28/16	15:30
Vanadium	4810		D	4510	ug/kg		93.8	(80%-120%)	BAJ	07/29/16	12:49
Zinc	4810		D	5190	ug/kg		108	(80%-120%)	SKJ	07/27/16	18:34
QC1203590344	MB										
Aluminum			DU	2900	ug/kg					07/27/16	18:30
Arsenic			DU	193	ug/kg				PRB	07/29/16	15:48
Barium			DU	96.7	ug/kg				SKJ	07/28/16	15:27
Cadmium			DU	19.3	ug/kg					07/27/16	18:30
Chromium			BD	332	ug/kg						
Cobalt			DU	58.0	ug/kg						
Copper			DU	63.8	ug/kg						
Lead			DU	96.7	ug/kg						
Manganese			DU	193	ug/kg					07/28/16	15:27
Molybdenum			DU	58.0	ug/kg					07/28/16	17:35
Nickel			DU	96.7	ug/kg					07/27/16	18:30

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QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1583993										
Selenium			DU	319	ug/kg				PRB	07/29/16	15:48
Strontium			DU	387	ug/kg				SKJ	07/28/16	15:27
Vanadium			DU	290	ug/kg				BAJ	07/29/16	12:47
Zinc			BD	623	ug/kg				SKJ	07/27/16	18:30
QC1203590347 402047002 MS											
Aluminum	208000	D	7560000	D	8520000	ug/kg	N/A	(75%-125%)		07/27/16	18:46
Arsenic	5200	D	1450	D	5860	ug/kg	84.9	(75%-125%)	PRB	07/29/16	15:56
Barium	5200	D	71800	D	92300	ug/kg	N/A	(75%-125%)	SKJ	07/28/16	15:55
Cadmium	5200	BD	177	D	5250	ug/kg	97.7	(75%-125%)		07/27/16	18:46
Chromium	5200	D	11600	D	15500	ug/kg	75.8	(75%-125%)			
Cobalt	5200	DM	8150	D	13300	ug/kg	99.6	(75%-125%)			
Copper	5200	DM	16000	D	20700	ug/kg	91.2	(75%-125%)			
Lead	5200	*D	2590	D	7390	ug/kg	92.3	(75%-125%)			
Manganese	5200	D	392000	D	392000	ug/kg	N/A	(75%-125%)		07/28/16	15:37
Molybdenum	5200	*D	1250	D	5910	ug/kg	89.7	(75%-125%)		07/28/16	17:44
Nickel	5200	*DM	28600	D	26000	ug/kg	N/A	(75%-125%)		07/27/16	18:46
Selenium	5200	D	1220	D	5640	ug/kg	85	(75%-125%)	PRB	07/29/16	15:56
Strontium	5200	D	31600	D	39300	ug/kg	N/A	(75%-125%)	SKJ	07/28/16	15:55
Vanadium	5200	D	33000	D	42100	ug/kg	N/A	(75%-125%)	BAJ	07/29/16	12:54
Zinc	5200	D	31300	D	39000	ug/kg	N/A	(75%-125%)	SKJ	07/27/16	18:46
QC1203590348 402047002 SDILT											
Aluminum		D	36800	D	7770	ug/L	5.62	(0%-10%)		07/27/16	18:54
Arsenic		D	7.08	BD	1.45	ug/L	2.39	(0%-10%)	PRB	07/29/16	16:00

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QC Summary

Workorder: 402047

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch	1583993										
Barium	D	69.9	D	14.1	ug/L	.933		(0%-10%)	SKJ	07/28/16	15:57
Cadmium	BD	0.863	BD	0.180	ug/L	4.29		(0%-10%)		07/27/16	18:54
Chromium	D	56.4	D	13.7	ug/L	21		(0%-10%)			
Cobalt	DM	39.7	DM	8.87	ug/L	11.8*		(0%-10%)			
Copper	DM	77.7	DM	18.0	ug/L	16.2*		(0%-10%)			
Lead	*D	12.6	D	2.62	ug/L	3.75		(0%-10%)			
Manganese	D	95.5	D	18.5	ug/L	3.38		(0%-10%)		07/28/16	15:40
Molybdenum	*D	6.11	D	1.23	ug/L	1.06		(0%-10%)		07/28/16	17:49
Nickel	*DM	139	DM	31.8	ug/L	14.2*		(0%-10%)		07/27/16	18:54
Selenium	D	5.96	DU	1690	ug/L	N/A		(0%-10%)	PRB	07/29/16	16:00
Strontium	D	30.7	BD	5.89	ug/L	4.23		(0%-10%)	SKJ	07/28/16	15:57
Vanadium	D	161	D	34.7	ug/L	7.91		(0%-10%)	BAJ	07/29/16	12:58
Zinc	D	152	D	35.4	ug/L	16.2		(0%-10%)	SKJ	07/27/16	18:54

Metals Analysis-ICP

Batch 1583862

QC1203590071	402047002	DUP									
Antimony	DU	3350	DU	3380	ug/kg	N/A			HSC	07/28/16	14:53
Calcium		5120000		5370000	ug/kg	4.79		(0%-20%)		07/28/16	14:32
Iron		14200000		16500000	ug/kg	14.7		(0%-20%)			
Magnesium		5210000		4620000	ug/kg	12.1		(0%-20%)			
Phosphorous	*	674000	*	871000	ug/kg	25.6*		(0%-20%)			
Potassium	N	1020000		1180000	ug/kg	14.5		(0%-20%)			
Silver	B	184	B	250	ug/kg	30.7	^	(+/-512)			

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QC Summary

Workorder: 402047

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1583862										
Sodium		2170000		2470000	ug/kg	13		(0%-20%)	HSC	07/28/16	14:32
QC1203590070	LCS										
Antimony	47200			46900	ug/kg		99.5	(80%-120%)		07/28/16	14:25
Calcium	472000			473000	ug/kg		100	(80%-120%)			
Iron	472000			459000	ug/kg		97.3	(80%-120%)			
Magnesium	472000			472000	ug/kg		100	(80%-120%)			
Phosphorous	47200			47300	ug/kg		100	(80%-120%)			
Potassium	472000			470000	ug/kg		99.7	(80%-120%)			
Silver	47200			45600	ug/kg		96.8	(80%-120%)			
Sodium	472000			462000	ug/kg		97.9	(80%-120%)			
QC1203590069	MB										
Antimony			U	300	ug/kg					07/28/16	14:22
Calcium			U	7270	ug/kg						
Iron			U	7270	ug/kg						
Magnesium			U	7730	ug/kg						
Phosphorous			U	4550	ug/kg						
Potassium			U	5820	ug/kg						
Silver			U	90.9	ug/kg						
Sodium			B	12000	ug/kg						
QC1203590072	402047002	MS									
Antimony	51400	DU	3350	D	45000	ug/kg	87.7	(75%-125%)		07/28/16	14:56
Calcium	514000		5120000		6160000	ug/kg	N/A	(75%-125%)		07/28/16	14:36
Iron	514000		14200000		17400000	ug/kg	N/A	(75%-125%)			

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QC Summary

Workorder: 402047

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1583862										
Magnesium	514000	5210000		6260000	ug/kg		N/A	(75%-125%)			
Phosphorous	51400	*	674000	912000	ug/kg		N/A	(75%-125%)	HSC	07/28/16	14:36
Potassium	514000	N	1020000	N	1690000	ug/kg	130*	(75%-125%)			
Silver	51400	B	184	49000	ug/kg		95.1	(75%-125%)			
Sodium	514000		2170000	2960000	ug/kg		N/A	(75%-125%)			
QC1203592345	402047002	PS									
Potassium	5000	N	10000	14900	ug/L		96.6	(80%-120%)		07/28/16	14:48
QC1203590073	402047002	SDILT									
Antimony		DU	-1.6	DU	16800	ug/L	N/A	(0%-10%)		07/28/16	15:03
Calcium			50400	D	10300	ug/L	2.04	(0%-10%)		07/28/16	14:38
Iron			140000	D	28600	ug/L	2.2	(0%-10%)			
Magnesium			51400	D	10600	ug/L	3.55	(0%-10%)			
Phosphorous		*	6640	D	1340	ug/L	1.23	(0%-10%)			
Potassium		N	10000	D	2040	ug/L	1.43	(0%-10%)			
Silver		B	1.81	DU	508	ug/L	N/A	(0%-10%)			
Sodium			21400	D	4350	ug/L	1.77	(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 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.

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QC Summary

Workorder: 402047

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
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										
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 #: GEL402047
Work Order #: 402047**

Product: Carbon, Total Organic

Analytical Method: SW846 9060A Modified

Analytical Procedure: GL-GC-E-093 REV# 14

Analytical Batch: 1582512

Preparation Method: SW846 9060A Modified Prep

Preparation Procedure: GL-GC-E-093 REV# 14

Preparation Batch: 1582508

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402047002	B36654
1203586801	Method Blank (MB)
1203586802	Laboratory Control Sample (LCS)
1203586803	401766002(B36649) Sample Duplicate (DUP)
1203586805	401766002(B36649) Post Spike (PS)

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: pH**Analytical Method:** SW846 9045D**Analytical Procedure:** GL-GC-E-008 REV# 21**Analytical Batch:** 1584380

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402047002	B36654
1203591339	Laboratory Control Sample (LCS)
1203591340	402047002(B36654) Sample Duplicate (DUP)

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

Data Summary:

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

Technical Information**Holding Times**

Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

Sample	Analyte	Value
1203591340 (B36654DUP)	pH	Received 21-JUL-16, out of holding 19-JUL-16
402047002 (B36654)	pH	Received 21-JUL-16, out of holding 19-JUL-16

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: GEL402047 GEL Work Order: 402047

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.

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: Kristen Mizzell

Date: 02 AUG 2016

Title: Analyst I

Sample Data Summary

8/3/2016

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: August 2, 2016

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF F16-043

Client Sample ID: B36654 Project: CPRC0F16043
 Sample ID: 402047002 Client ID: CPRC001
 Matrix: SOIL
 Collect Date: 19-JUL-16 13:50
 Receive Date: 21-JUL-16
 Collector: Client
 Moisture: 6.02%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
9060_TOC: COMMON "As Received"												
Total Organic Carbon #1		530000	200000	500000	ug/Kg	1.00	1	TSM	07/25/16	1403	1582512	1
Total Organic Carbon #2	B	470000	200000	500000	ug/Kg	1.00	1					
Total Organic Carbon #3	B	460000	200000	500000	ug/Kg	1.00	1					
Total Organic Carbon #4	B	460000	200000	500000	ug/Kg	1.00	1					
Total Organic Carbon Average	B	460000	200000	500000	ug/Kg	1.00	1					

Titration and Ion Analysis												
9045_pH (Non-Aqueous):COMMON "As Received"												
pH at Temp 22.8C	X	11.4	0.010	0.100	SU		1	RXB5	07/23/16	1729	1584380	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9060A Modified Prep	SW846 9060A Modified Total Organic Carbon	TSM	07/22/16	1130	1582508

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9060A Modified	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

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

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: August 2, 2016

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CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 402047

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1582512										
QC1203586803	401766002	DUP									
Total Organic Carbon Average	B	210000	U	200000	ug/Kg	33.3	^	(+/-500000)	TSM	07/25/16	12:20
QC1203586802	LCS										
Total Organic Carbon Average	3470000			2890000	ug/Kg	83.3		(80%-120%)		07/25/16	11:35
QC1203586801	MB										
Total Organic Carbon Average			U	200000	ug/Kg					07/25/16	11:18
QC1203586805	401766002	PS									
Total Organic Carbon Average	5000	B	210	5190	mg/kg	99.6		(75%-125%)		07/25/16	12:46
Titration and Ion Analysis											
Batch	1584380										
QC1203591340	402047002	DUP									
pH	X	11.4	X	11.4	SU	0.176		(0%-30%)	RXB5	07/23/16	17:31
QC1203591339	LCS										
pH	7.00			6.99	SU	99.9		(70%-130%)		07/23/16	17:27

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

GEL LABORATORIES LLC

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

QC Summary

Workorder: 402047

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
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N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

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

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

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

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

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL402047
Work Order #: 402047

Product: Dry Weight

Analytical Method: ASTM D 2216 (Modified)

Analytical Procedure: GL-OA-E-020 REV# 10

Analytical Batch: 1584043

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
402047001	B36653
402047002	B36654
1203591095	402168001(NonSDG) 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

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

**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL402047 GEL Work Order: 402047

The Qualifiers in this report are defined as follows:

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: 25 JUL 2016

Title: Group Leader

Sample Data Summary

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL402047
Lab Sample ID: 402047001

Client: CPRC001
Date Collected: 07/19/2016 13:50
Date Received: 07/21/2016 08:50

Project: CPRC0F16043
Matrix: SOIL
%Moisture: 8.1

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL402047	Client: CPRC001	Project: CPRC0F16043
Lab Sample ID: 402047002	Date Collected: 07/19/2016 13:50	Matrix: SOIL
	Date Received: 07/21/2016 08:50	%Moisture: 6
Client ID: B36654		Prep Basis: "As Received"
Batch ID: 1584043	Method: ASTM D 2216 (Modified)	SOP Ref: GL-OA-E-020
Run Date: 07/22/2016 15:22	Analyst: CXC1	Instrument: SP-39020004
Data File:		Count Time:
Prep Batch: 1584043		
Prep Date: 07/22/2016 15:22		

CAS No.	Parmname	Qual	Result	Units	MDC		
%MOISTURE	Moisture		6.02	percent	+/-		
Surrogate/Tracer recovery		Result	Nominal	Units	Recovery%	Acceptable Limits	

Comments:

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

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: July 25, 2016

Page 1 of 1

Client : CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington 99352

Contact: Mr. Scot Fitzgerald

Workorder: 402047

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Gravimetric Solids										
Batch	1584043									
QC1203591095	402168001	DUP								
Moisture		10.2		11.0	percent	RPD: 7	(0%-20%)	CXC1	07/22/16	15:22

Notes:

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

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- B The associated QC sample blank has a result $\geq 2X$ the MDA and, after corrections, result is \geq MDA for this sample
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is \geq EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- UX Gamma Spectroscopy--Uncertain identification
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

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

** Indicates analyte is a surrogate compound.

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

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

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