



March 27, 2017

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

Re: CHPRC SAF X17-033  
Work Order: 417458  
SDG: GEL417458

Dear Mr. Fitzgerald:

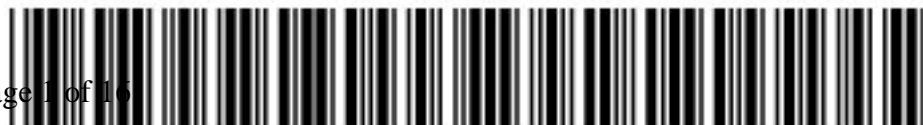
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 28, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

*B Luthman*  
Brielle Luthman for  
Heather Shaffer  
Project Manager

Purchase Order: 304323 - 7H  
Chain of Custody: X17-033-038  
Enclosures



## Table of Contents

Sample Issue Resolution.....	1
Case Narrative.....	3
Chain of Custody and Supporting Documentation.....	9
Data Review Qualifier Definitions.....	12
Laboratory Certifications.....	14
Volatile Analysis.....	16
Case Narrative.....	17
Sample Data Summary.....	21
Quality Control Summary.....	23
FID Alcohols Analysis.....	35
Case Narrative.....	36
Sample Data Summary.....	39
Quality Control Summary.....	41
Metals Analysis.....	45
Case Narrative.....	46
Sample Data Summary.....	50
Quality Control Summary.....	53
General Chem Analysis.....	61
Case Narrative.....	62
Sample Data Summary.....	66

Quality Control Summary.....69

Radiological Analysis.....72

Case Narrative.....73

Sample Data Summary.....77

Quality Control Summary.....81

# Sample Issue Resolution

**SAMPLE ISSUE RESOLUTION**

**SIR NUM** SIR17-426  
**REV NUM** 0  
**DATE INITIATED** 2/8/2017

**SAMPLE EVENT INFORMATION**

**SAF NUM(S)** X17-033  
**OPERABLE UNIT(S)** 100-KR-4  
**PROJECT(S)** CERC17  
**SAMPLE EVENT TITLE(S)** CERC17  
**LABORATORY** GEL Laboratories, LLC

**SAMPLING INFORMATION**

**NUMBER OF SAMPLES** 14  
**SAMPLE NUMBERS** B38JV3, B38JW9, B38JY5, B38JY6, B38K17, B38K33, B38K49, B38K56, B38K72, B38K88, B38KB4, B38KJ1, B38KJ8, B38KK5  
**SAMPLE MATRIX** WATER  
**COLLECTION DATE** -  
**SDG NUM**

**ISSUE BACKGROUND**

**CLASS** Sample Management Issues  
**TYPE** Addition of Analyses  
**DESCRIPTION** The project needs to have 2-propanol added to the 8260\_VOA list as a reported analyte.

**DISPOSITION**

**DESCRIPTION** Add the 2-propanol (as a single compound or as part of GW02). To the samples listed above.  
**JUSTIFICATION** Final Disposition: Accept proposed resolution.

SUBMITTED BY: Scot Fitzgerald DATE: 02/08/2017  
ACCEPTED BY: Heather Shaffer DATE: 02/08/2017

# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF X17-033  
SDG: GEL417458**

**March 27, 2017**

**Laboratory Identification:**

GEL Laboratories LLC  
2040 Savage Road  
Charleston, South Carolina 29407  
(843) 556-8171

**Summary**

**Sample receipt**

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on February 28, 2017, for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. Please refer to the enclosed SIR for further details..

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

**Sample Identification**

The laboratory received the following samples:

<b>Laboratory Identification</b>	<b>Sample Description</b>
417458001	B38JV6
417458002	B38JV3

**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: Alcohols, 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.

3/28/2017

REV.0

*B. Luthman*  
Brielle Luthman for  
Heather Shaffer  
Project Manager

**Technical Case Narrative**  
**CH2M Hill Plateau Remediation Company (CPRC)**  
**SDG #: GEL417458**  
**Work Order #: 417458**

## **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**

##### **Matrix Spike/Matrix Spike Duplicate Recovery Statement**

The spike and/or spike duplicate (See Below) recoveries were not all within the acceptance limits. The recoveries were similar. It is believed possible matrix interference has been demonstrated.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203741150 (Non SDG 417280003PS)	Acetone	68* (70%-130%)
1203741151 (Non SDG 417280003PSD)	Acetone	65* (70%-130%)
	Carbon tetrachloride	64* (70%-130%)

#### **Technical Information**

##### **Sample Dilutions/Methanol Dilutions**

Samples 1203741150 (Non SDG 417280003PS) and 1203741151 (Non SDG 417280003PSD) in this SDG were analyzed at a dilution. The samples were not analyzed at a lower dilution. There were positive results for target analytes within the middle to upper range of the calibration curve.

## **Alcohols**

### **Analysis of Alcohol by Flame Ionization Detector**

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.

## **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**

#### **Continuing Calibration Blanks (CCB) Requirements**

All continuing calibration blanks (CCB) bracketing the sample in this SDG did not meet the acceptance criteria for potassium. The samples bracketed by this CCB, however, contained the element which failed at a concentration at least ten times greater than the concentration in the CCB. This indicates that any contribution to the concentration of these elements in the samples from potential laboratory contamination would be minimal. 417458001 (B38JV6) and 417458002 (B38JV3).

### **Quality Control (QC) Information**

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

The samples in this SDG contained analytes at concentrations more than ten times the negative value reported in the method blank, therefore the data was not adversely affected.

Sample	Analyte	Value
1203737634 (MB)	Potassium	See applicable report

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

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

## **General Chemistry**

### **Cyanide, Total**

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**

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

The spike recovery falls outside of the GEL acceptance limits but within the client specified limits. 1203737622 (B38JV3MS).

### **Alkalinity**

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

## **Radiochemistry**

### **SRISO\_SEP\_PRECIP\_GPC: COMMON**

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

#### **Technical Information**

##### **Recounts**

Sample 1203741139 (MB) was recounted due to a suspected blank false positive. The recount is reported.

### **TRITIUM\_DIST\_LSC: COMMON**

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

#### **Technical Information**

##### **Recounts**

Sample 1203738590 (Non SDG 417373001MS) was recounted due to low recovery. The recount is reported.

### **C14\_LSC: COMMON**

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

#### **Certification Statement**

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

# **Chain of Custody and Supporting Documentation**

CH2M Hill Plateau Remediation Company  
 C.O.C. # **X17-033-038**  
 Page 1 of 1

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**  
 417458  
 Telephone No. 509-376-4650  
 Purchase Order/Charge Code 304323  
 Contact/Requester Karen Waters-Husted  
 Sampling Origin Hanford Site  
 Logbook No. HNF-N-506 93 / 4  
 Method of Shipment Commercial Carrier  
 Priority: 30 Days **PRIORITY**  
 Bill of Lading/Air Bill No. 7785 19923784  
 Offsite Property No. 175609

**POSSIBLE SAMPLE HAZARDS/REMARKS**  
 SPECIAL INSTRUCTIONS Hold Time Total Activity/Exemption: Yes  No   
 N/A

Sample No.	Filter	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B38JV6	Y	2/20/17	1317	1x250-mL G/P	2320_ALKALINITY: GW 01	14 Days	Cool <=6C
B38JV6	Y			1x500-mL G/P	6010_METALS_ICP: COMMON; 6020_METALS_ICPMS: Chromium (1)	6 Months	HNO3 to pH <2
B38JV3	N			1x500-mL G/P	6010_METALS_ICP: COMMON; 6020_METALS_ICPMS: Chromium (1)	6 Months	HNO3 to pH <2
B38JV3	N			5x40-mL aGs*	8260_VOA_GCMS: COMMON	14 Days	HCl or H2SO4 to pH <2/Cool <=6C
B38JV3	N			1x250-mL G/P	9012_CYANIDE: COMMON	14 Days	NaOH to pH >=12/Cool <=6C
B38JV3	N			1x500-mL G/P	C14_LSC: COMMON	6 Months	None
B38JV3	N			1x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2
B38JV3	N			1x250-mL P	TRITIUM_DIST_LSC: COMMON	6 Months	None

Relinquished By: Roger Friesz Jr. /CHPRC  
 Received By: SSU-1  
 Date/Time: FEB 26 2017 1445  
 Sign: [Signature]

Relinquished By: Janelle Zunker /CHPRC  
 Received By: Janelle Zunker /CHPRC  
 Date/Time: FEB 27 2017 0810  
 Sign: [Signature]

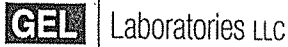
Relinquished By: Janelle Zunker /CHPRC  
 Received By: FEDEx  
 Date/Time: FEB 27 2017 1400  
 Sign: [Signature]

Relinquished By: Ashely Goodman  
 Received By: Ashely Goodman  
 Date/Time: 2/28/17 0915  
 Sign: [Signature]

Disposal Method (e.g., Return to customer, per lab procedure, used in process)  
 Disposed By: [Signature]

FINAL SAMPLE DISPOSITION  
 Date/Time: [Signature]

PRINTED ON 1/16/2017  
 FSR ID = FSR7479  
 A-6004-842 (REV 2)



**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>CPRC</u>		SDG/AR/COC/Work Order: <u>417458</u>
Received By: <u>AA</u>		Date Received: <u>2/28/17</u>
Suspected Hazard Information	Yes <input type="checkbox"/> No <input 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>9 CPA</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	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: Ice bags 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"/>			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4 Sample containers intact and sealed?	<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"/>	Sample ID's, containers affected and observed pH: <u>B387F6</u> If Preservation added, Lot#: <u>161208BP</u>
6 Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
7 VOA vials contain acid preservation?	<input checked="" type="checkbox"/>			(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
9 Are Encore containers present?			<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
14 Are sample containers identifiable as GEL provided?			<input checked="" type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

16 Carrier and tracking number.	Circle Applicable: <u>FedEx Air</u> FedEx Ground UPS Field Services Courier Other
	<u>7785 1992 3770</u> <u>7785 1992 3975</u> <u>7785 2653 6408</u> <u>7785 1992 3986</u>

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials CS Date 2/28/17 Page 1 of 1

# 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 27 March 2017**

<b>State</b>	<b>Certification</b>
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	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	T104704235-17-12
Utah NELAP	SC000122016-21
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 #: GEL417458  
Work Order #: 417458**

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

**Analytical Method: SW846 8260C**

**Analytical Procedure: GL-OA-E-038 REV# 24**

**Analytical Batch: 1644821**

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
417458002	B38JV3
1203741148	Method Blank (MB)
1203741149	Laboratory Control Sample (LCS)
1203741150	417280003(NonSDG) Post Spike (PS)
1203741151	417280003(NonSDG) Post Spike Duplicate (PSD)
1203741929	Method Blank (MB)
1203741930	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Quality Control (QC) Information**

**Matrix Spike/Matrix Spike Duplicate Recovery Statement**

The spike and/or spike duplicate (See Below) recoveries were not all within the acceptance limits. The recoveries were similar. It is believed possible matrix interference has been demonstrated.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203741150 (Non SDG 417280003PS)	Acetone	68* (70%-130%)
1203741151 (Non SDG 417280003PSD)	Acetone	65* (70%-130%)
	Carbon tetrachloride	64* (70%-130%)

**Technical Information**

**Sample Dilutions/Methanol Dilutions**

Samples 1203741150 (Non SDG 417280003PS) and 1203741151 (Non SDG 417280003PSD) in this SDG were analyzed at a dilution. The samples were not analyzed at a lower dilution. There were positive results for target analytes within the middle to upper range of the calibration curve.

**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: GEL417458 GEL Work Order: 417458

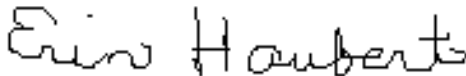
**The Qualifiers in this report are defined as follows:**

- 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
- 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: 23 MAR 2017

Title: Data Validator

# Sample Data Summary

Volatile  
Certificate of Analysis  
Sample Summary

Page 1 of 1

SDG Number: GEL417458	Date Collected: 02/26/2017 13:17	Matrix: WATER
Lab Sample ID: 417458002	Date Received: 02/28/2017 09:15	
Client ID: B38JV3	Client: CPRC001	Project: CPRC0X17033
Batch ID: 1644821	Method: SW846 8260C	SOP Ref: GL-OA-E-038
Run Date: 03/06/2017 19:44	Inst: VOA6.I	Dilution: 1
Prep Date: 03/06/2017 19:44	Analyst: JP1	Purge Vol: 5 mL
Data File: 030617V6\6X125.D	Column: DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	RDL
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	2.00	5.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	2.00	5.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	2.00	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	2.00	5.00
75-15-0	Carbon disulfide	U	1.60	ug/L	1.60	10.0	5.00
56-23-5	Carbon tetrachloride	TU	0.300	ug/L	0.300	2.00	5.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	2.00	5.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	2.00	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	2.00	5.00
75-09-2	Methylene chloride	U	1.60	ug/L	1.60	5.00	5.00
127-18-4	Tetrachloroethylene	U	0.300	ug/L	0.300	2.00	5.00
108-88-3	Toluene	U	0.300	ug/L	0.300	2.00	5.00
79-01-6	Trichloroethylene	J	1.29	ug/L	0.300	2.00	5.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	2.00	10.0
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	2.00	10.0
78-93-3	2-Butanone	U	3.00	ug/L	3.00	10.0	10.0
108-10-1	4-Methyl-2-pentanone	U	3.00	ug/L	3.00	10.0	10.0
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	2.00	10.0
1330-20-7	Xylenes (total)	U	0.300	ug/L	0.300	6.00	10.0
67-64-1	Acetone	JT	3.73	ug/L	3.00	10.0	20.0

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: March 26, 2017

Page 1 of 10

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 417458

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1644821										
QC1203741149	LCS										
1,1,1-Trichloroethane	50.0			57.1	ug/L		114	(70%-130%)	JP1	03/06/17	10:40
1,1,2-Trichloroethane	50.0			53.4	ug/L		107	(70%-130%)			
1,1-Dichloroethane	50.0			57.4	ug/L		115	(70%-130%)			
1,1-Dichloroethylene	50.0			55.2	ug/L		110	(70%-130%)			
1,2-Dichloroethane	50.0			55.2	ug/L		110	(70%-130%)			
2-Butanone	250			308	ug/L		123	(70%-130%)			
4-Methyl-2-pentanone	250			276	ug/L		111	(70%-130%)			
Acetone	250			268	ug/L		107	(70%-130%)			
Benzene	50.0			56.3	ug/L		113	(70%-130%)			
Carbon disulfide	250			293	ug/L		117	(70%-130%)			
Carbon tetrachloride	50.0			59.6	ug/L		119	(70%-130%)			
Chlorobenzene	50.0			53.2	ug/L		106	(70%-130%)			
Chloroform	50.0			56.1	ug/L		112	(70%-130%)			

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 417458

Page 2 of 10

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1644821										
Ethylbenzene	50.0			55.3	ug/L		111	(70%-130%)	JP1	03/06/17	10:40
Methylene chloride	50.0			54.3	ug/L		109	(70%-130%)			
Tetrachloroethylene	50.0			55.8	ug/L		112	(70%-130%)			
Toluene	50.0			54.4	ug/L		109	(70%-130%)			
Trichloroethylene	50.0			58.1	ug/L		116	(70%-130%)			
Vinyl chloride	50.0			60.0	ug/L		120	(70%-130%)			
Xylenes (total)	150			163	ug/L		109	(70%-130%)			
**1,2-Dichloroethane-d4	50.0			49.3	ug/L		99	(70%-130%)			
**Bromofluorobenzene	50.0			49.8	ug/L		100	(70%-130%)			
**Toluene-d8	50.0			47.4	ug/L		95	(70%-130%)			
QC1203741930 LCS											
1,1,1-Trichloroethane	50.0			56.8	ug/L		114	(70%-130%)		03/07/17	10:11
1,1,2-Trichloroethane	50.0			53.3	ug/L		107	(70%-130%)			
1,1-Dichloroethane	50.0			56.3	ug/L		113	(70%-130%)			
1,1-Dichloroethylene	50.0			54.9	ug/L		110	(70%-130%)			
1,2-Dichloroethane	50.0			54.9	ug/L		110	(70%-130%)			

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 417458

Page 3 of 10

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1644821										
2-Butanone	250			305	ug/L		122	(70%-130%)	JP1	03/07/17	10:11
4-Methyl-2-pentanone	250			276	ug/L		110	(70%-130%)			
Acetone	250			270	ug/L		108	(70%-130%)			
Benzene	50.0			55.7	ug/L		111	(70%-130%)			
Carbon disulfide	250			292	ug/L		117	(70%-130%)			
Carbon tetrachloride	50.0			59.2	ug/L		118	(70%-130%)			
Chlorobenzene	50.0			52.4	ug/L		105	(70%-130%)			
Chloroform	50.0			55.7	ug/L		111	(70%-130%)			
Ethylbenzene	50.0			54.9	ug/L		110	(70%-130%)			
Methylene chloride	50.0			53.4	ug/L		107	(70%-130%)			
Tetrachloroethylene	50.0			55.4	ug/L		111	(70%-130%)			
Toluene	50.0			54.0	ug/L		108	(70%-130%)			
Trichloroethylene	50.0			57.2	ug/L		114	(70%-130%)			
Vinyl chloride	50.0			56.7	ug/L		113	(70%-130%)			
Xylenes (total)	150			162	ug/L		108	(70%-130%)			

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 417458

Page 4 of 10

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1644821										
**1,2-Dichloroethane-d4	50.0			46.8	ug/L		94	(70%-130%)	JP1	03/07/17	10:11
**Bromofluorobenzene	50.0			48.9	ug/L		98	(70%-130%)			
**Toluene-d8	50.0			46.7	ug/L		93	(70%-130%)			
QC1203741148	MB										
1,1,1-Trichloroethane			U	0.300	ug/L					03/06/17	12:06
1,1,2-Trichloroethane			U	0.300	ug/L						
1,1-Dichloroethane			U	0.300	ug/L						
1,1-Dichloroethylene			U	0.300	ug/L						
1,2-Dichloroethane			U	0.300	ug/L						
2-Butanone			U	3.00	ug/L						
4-Methyl-2-pentanone			U	3.00	ug/L						
Acetone			U	3.00	ug/L						
Benzene			U	0.300	ug/L						
Carbon disulfide			U	1.60	ug/L						
Carbon tetrachloride			U	0.300	ug/L						
Chlorobenzene			U	0.300	ug/L						

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 417458

Page 5 of 10

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1644821										
Chloroform			U	0.300	ug/L				JP1	03/06/17	12:06
Ethylbenzene			U	0.300	ug/L						
Methylene chloride			U	1.60	ug/L						
Tetrachloroethylene			U	0.300	ug/L						
Toluene			U	0.300	ug/L						
Trichloroethylene			U	0.300	ug/L						
Vinyl chloride			U	0.300	ug/L						
Xylenes (total)			U	0.300	ug/L						
**1,2-Dichloroethane-d4	50.0			48.1	ug/L		96	(70%-130%)			
**Bromofluorobenzene	50.0			49.7	ug/L		99	(70%-130%)			
**Toluene-d8	50.0			46.6	ug/L		93	(70%-130%)			
QC1203741929	MB										
1,1,1-Trichloroethane			U	0.300	ug/L					03/07/17	11:37
1,1,2-Trichloroethane			U	0.300	ug/L						
1,1-Dichloroethane			U	0.300	ug/L						
1,1-Dichloroethylene			U	0.300	ug/L						

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 417458

Page 6 of 10

<b>Parmname</b>	<b>NOM</b>	<b>Sample</b>	<b>Qual</b>	<b>QC</b>	<b>Units</b>	<b>RPD%</b>	<b>REC%</b>	<b>Range</b>	<b>Anlst</b>	<b>Date</b>	<b>Time</b>
<b>Volatile-GC/MS</b>											
Batch	1644821										
1,2-Dichloroethane			U	0.300	ug/L				JP1	03/07/17	11:37
2-Butanone			U	3.00	ug/L						
4-Methyl-2-pentanone			U	3.00	ug/L						
Acetone			U	3.00	ug/L						
Benzene			U	0.300	ug/L						
Carbon disulfide			U	1.60	ug/L						
Carbon tetrachloride			U	0.300	ug/L						
Chlorobenzene			U	0.300	ug/L						
Chloroform			U	0.300	ug/L						
Ethylbenzene			U	0.300	ug/L						
Methylene chloride			U	1.60	ug/L						
Tetrachloroethylene			U	0.300	ug/L						
Toluene			U	0.300	ug/L						
Trichloroethylene			U	0.300	ug/L						
Vinyl chloride			U	0.300	ug/L						

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

QC Summary

Workorder: 417458

Page 7 of 10

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1644821										
Xylenes (total)			U	0.300	ug/L				JP1	03/07/17	11:37
**1,2-Dichloroethane-d4	50.0			48.3	ug/L		97	(70%-130%)			
**Bromofluorobenzene	50.0			49.8	ug/L		100	(70%-130%)			
**Toluene-d8	50.0			47.8	ug/L		96	(70%-130%)			
QC1203741150 417280003 PS											
1,1,1-Trichloroethane	50.0	DU	0.00	D	48.9	ug/L	98	(70%-130%)		03/07/17	18:19
1,1,2-Trichloroethane	50.0	DU	0.00	D	52.0	ug/L	104	(70%-130%)			
1,1-Dichloroethane	50.0	DU	0.00	D	53.5	ug/L	107	(70%-130%)			
1,1-Dichloroethylene	50.0	DU	0.00	D	48.0	ug/L	96	(70%-130%)			
1,2-Dichloroethane	50.0	DU	0.00	D	54.9	ug/L	110	(70%-130%)			
2-Butanone	250	DU	0.00	D	207	ug/L	83	(70%-130%)			
4-Methyl-2-pentanone	250	DU	0.00	D	268	ug/L	107	(70%-130%)			
Acetone	250	DTU	0.00	DT	170	ug/L	68*	(70%-130%)			
Benzene	50.0	DU	0.00	D	51.2	ug/L	102	(70%-130%)			
Carbon disulfide	250	DU	0.00	D	259	ug/L	103	(70%-130%)			
Carbon tetrachloride	50.0	DT	78.3	DE	116	ug/L	76	(70%-130%)			

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**QC Summary**

Workorder: 417458

Page 8 of 10

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1644821										
Chlorobenzene	50.0	DU	0.00	D	44.0	ug/L	88	(70%-130%)	JP1	03/07/17	18:19
Chloroform	50.0	DJ	0.410	D	53.2	ug/L	106	(70%-130%)			
Ethylbenzene	50.0	DU	0.00	D	43.7	ug/L	87	(70%-130%)			
Methylene chloride	50.0	DU	0.00	D	52.3	ug/L	105	(70%-130%)			
Tetrachloroethylene	50.0	DU	0.00	D	44.1	ug/L	88	(70%-130%)			
Toluene	50.0	DU	0.00	D	47.1	ug/L	94	(70%-130%)			
Trichloroethylene	50.0	DU	0.00	D	49.7	ug/L	99	(70%-130%)			
Vinyl chloride	50.0	DU	0.00	D	49.7	ug/L	99	(70%-130%)			
Xylenes (total)	150	DU	0.00	D	128	ug/L	86	(70%-130%)			
**1,2-Dichloroethane-d4	50.0		46.5		48.0	ug/L	96	(70%-130%)			
**Bromofluorobenzene	50.0		47.2		48.3	ug/L	97	(70%-130%)			
**Toluene-d8	50.0		44.4		47.4	ug/L	95	(70%-130%)			
QC1203741151 417280003 PSD											
1,1,1-Trichloroethane	50.0	DU	0.00	D	45.0	ug/L	8	90	(0%-20%)	03/07/17	18:47
1,1,2-Trichloroethane	50.0	DU	0.00	D	49.3	ug/L	5	99	(0%-20%)		
1,1-Dichloroethane	50.0	DU	0.00	D	48.8	ug/L	9	98	(0%-20%)		

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 417458

Page 9 of 10

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1644821										
1,1-Dichloroethylene	50.0	DU	0.00	D	43.9	ug/L	9	88	(0%-20%)	JP1	03/07/17 18:47
1,2-Dichloroethane	50.0	DU	0.00	D	50.9	ug/L	8	102	(0%-20%)		
2-Butanone	250	DU	0.00	D	198	ug/L	5	79	(0%-20%)		
4-Methyl-2-pentanone	250	DU	0.00	D	257	ug/L	4	103	(0%-20%)		
Acetone	250	DTU	0.00	DT	163	ug/L	4	65 *	(0%-20%)		
Benzene	50.0	DU	0.00	D	47.3	ug/L	8	95	(0%-20%)		
Carbon disulfide	250	DU	0.00	D	240	ug/L	7	96	(0%-20%)		
Carbon tetrachloride	50.0	DT	78.3	DET	110	ug/L	5	64 *	(0%-20%)		
Chlorobenzene	50.0	DU	0.00	D	43.9	ug/L	0	88	(0%-20%)		
Chloroform	50.0	DJ	0.410	D	48.9	ug/L	8	97	(0%-20%)		
Ethylbenzene	50.0	DU	0.00	D	44.0	ug/L	1	88	(0%-20%)		
Methylene chloride	50.0	DU	0.00	D	47.8	ug/L	9	96	(0%-20%)		
Tetrachloroethylene	50.0	DU	0.00	D	43.1	ug/L	2	86	(0%-20%)		
Toluene	50.0	DU	0.00	D	44.9	ug/L	5	90	(0%-20%)		
Trichloroethylene	50.0	DU	0.00	D	46.6	ug/L	6	93	(0%-20%)		

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 417458

Page 10 of 10

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1644821										
Vinyl chloride	50.0	DU	0.00	D	46.1	ug/L	8	92	(0%-20%)	JP1	03/07/17 18:47
Xylenes (total)	150	DU	0.00	D	131	ug/L	2	87	(0%-20%)		
**1,2-Dichloroethane-d4	50.0		46.5		46.0	ug/L		92	(70%-130%)		
**Bromofluorobenzene	50.0		47.2		46.0	ug/L		92	(70%-130%)		
**Toluene-d8	50.0		44.4		44.9	ug/L		90	(70%-130%)		

**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: GEL417458****Matrix Type: LIQUID**

<b>Sample ID</b>	<b>Client ID</b>	<b>DCED4 %REC</b>	<b>TOL %REC</b>	<b>BFB %REC</b>
1203741149	LCS for batch 1644821	99	95	100
1203741148	MB for batch 1644821	96	93	99
417458002	B38JV3	94	92	97
1203741930	LCS for batch 1644821	94	93	98
1203741929	MB for batch 1644821	97	96	100
1203741150	B38F92PS	96 D	95 D	97 D
1203741151	B38F92PSD	92 D	90 D	92 D

**Surrogate****Acceptance Limits**

DCED4 = 1,2-Dichloroethane-d4 (70%-130%)  
TOL = Toluene-d8 (70%-130%)  
BFB = Bromofluorobenzene (70%-130%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

# **FID Alcohols Analysis**

# Case Narrative

**Alcohols**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL417458**  
**Work Order #: 417458**

**Product:** Analysis of Alcohol by Flame Ionization Detector

**Analytical Method:** SW846 8015C

**Analytical Procedure:** GL-OA-E-046 REV# 10

**Analytical Batch:** 1643389

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
417458002	B38JV3
1203737718	Method Blank (MB)
1203737719	Laboratory Control Sample (LCS)
1203737720	417285004(B38KB4) 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: GEL417458 GEL Work Order: 417458

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

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

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.

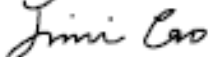
RA Indicates that sample is re-analyzed without re-extraction.

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: Jimin Cao

Date: 27 MAR 2017

Title: Data Validator

# Sample Data Summary

FID Alcohols  
Certificate of Analysis  
Sample Summary

Page 1 of 1

SDG Number:	GEL417458	Date Collected:	02/26/2017 13:17	Matrix:	WATER
Lab Sample ID:	417458002	Date Received:	02/28/2017 09:15	Client:	CPRC001
Client ID:	B38JV3	Method:	SW846 8015C	Project:	CPRC0X17033
Batch ID:	1643389	Inst:	FID6.I	SOP Ref:	GL-OA-E-046
Run Date:	03/08/2017 12:44	Analyst:	LXA1	Dilution:	1
Prep Date:	03/08/2017 12:44	Column:	DB-WAX	Inj. Vol:	1 uL
Data File:	030817AL\F6c0812.D				

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
67-63-0	Isopropyl Alcohol	J	370	ug/L	250	1000

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: March 9, 2017

Page 1 of 2

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 417458

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Alcohols</b>											
Batch	1643389										
QC1203737720	417285004	DUP									
Isopropyl Alcohol	U	250	U	250	ug/L	N/A			LXA1	03/08/17	11:47
**1,4-Dioxane-d8	50000	49800		38100	ug/L		76	(61%-122%)			
QC1203737719	LCS										
Isopropyl Alcohol	50000			50300	ug/L		101	(71%-112%)		03/08/17	11:05
**1,4-Dioxane-d8	50000			49000	ug/L		98	(61%-122%)			
QC1203737718	MB										
Isopropyl Alcohol			U	250	ug/L					03/08/17	10:51
**1,4-Dioxane-d8	50000			51000	ug/L		102	(61%-122%)			

**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

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**QC Summary**

Workorder: 417458

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
----------	-----	--------	------	----	-------	------	------	-------	-------	------	------

- 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: GEL417458

Matrix Type: LIQUID

---

Sample ID	Client ID	1,4-Dio %REC
1203737718	MB for batch 1643389	102
1203737719	LCS for batch 1643389	98
1203737720	B38KB4DUP	76
417458002	B38JV3	98

---

**Surrogate**

1,4-Diox = 1,4-Dioxane-d8

**Acceptance Limits**

(61%-122%)

\* 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 #: GEL417458**  
**Work Order #: 417458**

**Product: Determination of Metals by ICP****Analytical Method:** SW846 3005A/6010D**Analytical Procedure:** GL-MA-E-013 REV# 28**Analytical Batch:** 1643353**Product: Determination of Metals by ICP-MS****Analytical Method:** SW846 3005A/6020B**Analytical Procedure:** GL-MA-E-014 REV# 29**Analytical Batch:** 1643355**Preparation Method:** SW846 3005A**Preparation Procedure:** GL-MA-E-006 REV# 13**Preparation Batches:** 1643352 and 1643354

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
417458001	B38JV6
417458002	B38JV3
1203737634	Method Blank (MB) <b>ICP</b>
1203737635	Laboratory Control Sample (LCS)
1203737638	417450003(NonSDGL) Serial Dilution (SD)
1203737636	417450003(NonSDGS) Matrix Spike (MS)
1203737637	417450003(NonSDGSD) Matrix Spike Duplicate (MSD)
1203737639	Method Blank (MB) <b>ICP-MS</b>
1203737640	Laboratory Control Sample (LCS)
1203737643	417450004(NonSDGL) Serial Dilution (SD)
1203737641	417450004(NonSDGS) Matrix Spike (MS)
1203737642	417450004(NonSDGSD) Matrix Spike Duplicate (MSD)

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

**Data Summary:**

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

**Calibration Information****Continuing Calibration Blanks (CCB) Requirements**

All continuing calibration blanks(CCB) bracketing the sample in this SDG did not meet the acceptance criteria for potassium. The samples bracketed by this CCB, however, contained the element which failed at a concentration at least ten times greater than the concentration in the CCB. This indicates that any contribution to the concentration of these elements in the samples from potential laboratory contamination would be minimal. 417458001 (B38JV6) and 417458002 (B38JV3)-ICP.

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

The samples in this SDG contained analytes at concentrations more than ten times the negative value reported in the method blank, therefore the data was not adversely affected.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203737634 (MB)	Potassium	See applicable report

**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: GEL417458 GEL Work Order: 417458

**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: 28 MAR 2017****Title: Data Validator**

# Sample Data Summary

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

**SDG No:** GEL417458

**CONTRACT:** CPRC0X17033

**METHOD TYPE:** SW846

**SAMPLE ID:** 417458001

**BASIS:** As Received

**DATE COLLECTED** 26-FEB-17

**CLIENT ID:** B38JV6

**LEVEL:** Low

**DATE RECEIVED** 28-FEB-17

**MATRIX:** WATER

**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-36-0	Antimony	3.5	ug/L	U	3.5	10	10	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-38-2	Arsenic	5.7	ug/L	B	5	30	30	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-39-3	Barium	36.6	ug/L		1	5	5	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-43-9	Cadmium	1	ug/L	U	1	5	5	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-70-2	Calcium	59900	ug/L		50	200	200	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-47-3	Chromium	4.81	ug/L	B	3	10	10	1	MS	BAJ	03/26/17 17:08	170326-5	1643355
7440-47-3	Chromium	4.14	ug/L	B	1	5	5	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	03/06/17 18:15	030617-1	1643353
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	03/06/17 18:15	030617-1	1643353
7439-95-4	Magnesium	14200	ug/L		110	300	300	1	P	HSC	03/16/17 11:45	031617-2	1643353
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-02-0	Nickel	1.5	ug/L	U	1.5	5	5	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-09-7	Potassium	7260	ug/L		50	150	150	1	P	HSC	03/16/17 11:45	031617-2	1643353
7440-22-4	Silver	1	ug/L	U	1	5	5	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-23-5	Sodium	19700	ug/L		100	300	300	1	P	HSC	03/16/17 11:45	031617-2	1643353
7440-62-2	Vanadium	8.48	ug/L		1	5	5	1	P	HSC	03/06/17 18:15	030617-1	1643353
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	03/06/17 18:15	030617-1	1643353

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1643353	1643352	SW846 3005A	50	mL	50	mL	03/01/17	SXW1
1643355	1643354	SW846 3005A	50	mL	50	mL	03/01/17	SXW1

**\*Analytical Methods:**

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

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

SDG No: GEL417458

CONTRACT: CPRC0X17033

METHOD TYPE: SW846

SAMPLE ID: 417458002

BASIS: As Received

DATE COLLECTED 26-FEB-17

CLIENT ID: B38JV3

LEVEL: Low

DATE RECEIVED 28-FEB-17

MATRIX: WATER

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-36-0	Antimony	3.56	ug/L	B	3.5	10	10	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-38-2	Arsenic	5	ug/L	U	5	30	30	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-39-3	Barium	52.3	ug/L		1	5	5	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-43-9	Cadmium	1	ug/L	U	1	5	5	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-70-2	Calcium	65300	ug/L		50	200	200	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-47-3	Chromium	6.25	ug/L	B	3	10	10	1	MS	BAJ	03/26/17 17:14	170326-5	1643355
7440-47-3	Chromium	6.31	ug/L		1	5	5	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	03/06/17 18:24	030617-1	1643353
7439-89-6	Iron	67.3	ug/L	B	30	100	100	1	P	HSC	03/06/17 18:24	030617-1	1643353
7439-95-4	Magnesium	14500	ug/L		110	300	300	1	P	HSC	03/16/17 11:54	031617-2	1643353
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-02-0	Nickel	1.67	ug/L	B	1.5	5	5	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-09-7	Potassium	7350	ug/L		50	150	150	1	P	HSC	03/16/17 11:54	031617-2	1643353
7440-22-4	Silver	1	ug/L	U	1	5	5	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-23-5	Sodium	19900	ug/L		100	300	300	1	P	HSC	03/16/17 11:54	031617-2	1643353
7440-62-2	Vanadium	9.23	ug/L		1	5	5	1	P	HSC	03/06/17 18:24	030617-1	1643353
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	03/06/17 18:24	030617-1	1643353

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1643353	1643352	SW846 3005A	50	mL	50	mL	03/01/17	SXW1
1643355	1643354	SW846 3005A	50	mL	50	mL	03/01/17	SXW1

**\*Analytical Methods:**

P SW846 3005A/6010D

MS SW846 3005A/6020B

# Quality Control Summary

**GEL LABORATORIES LLC**

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**QC Summary**

Report Date: March 28, 2017

Page 1 of 7

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 417458

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1643355										
QC1203737640	LCS										
Chromium	50.0			51.0	ug/L		102	(80%-120%)	BAJ	03/26/17	16:54
QC1203737639	MB										
Chromium			U	3.00	ug/L					03/26/17	16:52
QC1203737641	417450004	MS									
Chromium	50.0	B	4.19	53.8	ug/L		99.3	(75%-125%)		03/26/17	16:59
QC1203737642	417450004	MSD									
Chromium	50.0	B	4.19	53.5	ug/L	0.675	98.6	(0%-20%)		03/26/17	17:01
QC1203737643	417450004	SDILT									
Chromium		B	4.19	DU	15.0	ug/L	N/A	(0%-20%)		03/26/17	17:05
<b>Metals Analysis-ICP</b>											
Batch	1643353										
QC1203737635	LCS										
Antimony	500			508	ug/L		102	(80%-120%)	HSC	03/06/17	17:31
Arsenic	500			506	ug/L		101	(80%-120%)			
Barium	500			509	ug/L		102	(80%-120%)			
Cadmium	500			512	ug/L		102	(80%-120%)			
Calcium	5000			5090	ug/L		102	(80%-120%)			
Chromium	500			499	ug/L		99.7	(80%-120%)			

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**QC Summary**

Workorder: 417458

Page 2 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1643353										
Cobalt	500			502	ug/L		100	(80%-120%)	HSC	03/06/17	17:31
Copper	500			497	ug/L		99.5	(80%-120%)			
Iron	5000			4880	ug/L		97.7	(80%-120%)			
Magnesium	5000			4960	ug/L		99.1	(80%-120%)		03/16/17	11:05
Manganese	500			501	ug/L		100	(80%-120%)		03/06/17	17:31
Nickel	500			495	ug/L		98.9	(80%-120%)			
Potassium	5000			4950	ug/L		98.9	(80%-120%)		03/16/17	11:05
Silver	500			485	ug/L		97	(80%-120%)		03/06/17	17:31
Sodium	5000			4960	ug/L		99.2	(80%-120%)		03/16/17	11:05
Vanadium	500			500	ug/L		100	(80%-120%)		03/06/17	17:31
Zinc	500			480	ug/L		95.9	(80%-120%)			
QC1203737634	MB										
Antimony			U	3.50	ug/L					03/06/17	17:28
Arsenic			U	5.00	ug/L						
Barium			U	1.00	ug/L						
Cadmium			U	1.00	ug/L						

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**QC Summary**

Workorder: 417458

Page 3 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1643353										
Calcium			U	50.0	ug/L				HSC	03/06/17	17:28
Chromium			U	1.00	ug/L						
Cobalt			U	1.00	ug/L						
Copper			U	3.00	ug/L						
Iron			U	30.0	ug/L						
Magnesium			U	110	ug/L					03/27/17	12:06
Manganese			U	2.00	ug/L					03/06/17	17:28
Nickel			U	1.50	ug/L						
Potassium			B	-52.3	ug/L					03/27/17	12:06
Silver			U	1.00	ug/L					03/06/17	17:28
Sodium			U	100	ug/L					03/27/17	12:06
Vanadium			U	1.00	ug/L					03/06/17	17:28
Zinc			U	3.30	ug/L						
QC1203737636 417450003 MS											
Antimony	500	U	3.50	518	ug/L		104	(75%-125%)		03/06/17	17:37
Arsenic	500	B	5.19	533	ug/L		106	(75%-125%)			

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**QC Summary**

Workorder: 417458

Page 4 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1643353										
Barium	500	54.6		554	ug/L		99.9	(75%-125%)	HSC	03/06/17	17:37
Cadmium	500	U	1.00	506	ug/L		101	(75%-125%)			
Calcium	5000	54400		59900	ug/L		N/A	(75%-125%)			
Chromium	500	B	4.46	498	ug/L		98.7	(75%-125%)			
Cobalt	500	U	1.00	486	ug/L		97.2	(75%-125%)			
Copper	500	U	3.00	495	ug/L		98.9	(75%-125%)			
Iron	5000	U	30.0	4860	ug/L		97	(75%-125%)			
Magnesium	5000	13800		18700	ug/L		98	(75%-125%)		03/16/17	11:10
Manganese	500	U	2.00	487	ug/L		97.1	(75%-125%)		03/06/17	17:37
Nickel	500	U	1.50	483	ug/L		96.6	(75%-125%)			
Potassium	5000	7080		11700	ug/L		91.5	(75%-125%)		03/16/17	11:10
Silver	500	U	1.00	486	ug/L		97.2	(75%-125%)		03/06/17	17:37
Sodium	5000	24200		29000	ug/L		N/A	(75%-125%)		03/16/17	11:10
Vanadium	500	11.6		518	ug/L		101	(75%-125%)		03/06/17	17:37
Zinc	500	U	3.30	480	ug/L		95.5	(75%-125%)			

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**QC Summary**

Workorder: 417458

Page 5 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1643353										
	QC1203737637 417450003 MSD										
Antimony	500	U	3.50	535	ug/L	3.15	107	(0%-20%)	HSC	03/06/17	17:40
Arsenic	500	B	5.19	550	ug/L	3.08	109	(0%-20%)			
Barium	500		54.6	575	ug/L	3.75	104	(0%-20%)			
Cadmium	500	U	1.00	526	ug/L	3.95	105	(0%-20%)			
Calcium	5000		54400	60300	ug/L	0.675	N/A	(0%-20%)			
Chromium	500	B	4.46	519	ug/L	4.03	103	(0%-20%)			
Cobalt	500	U	1.00	502	ug/L	3.27	100	(0%-20%)			
Copper	500	U	3.00	514	ug/L	3.82	103	(0%-20%)			
Iron	5000	U	30.0	4850	ug/L	0.169	96.8	(0%-20%)			
Magnesium	5000		13800	18900	ug/L	1.32	103	(0%-20%)		03/16/17	11:12
Manganese	500	U	2.00	507	ug/L	3.87	101	(0%-20%)		03/06/17	17:40
Nickel	500	U	1.50	499	ug/L	3.27	99.8	(0%-20%)			
Potassium	5000		7080	11800	ug/L	1.08	94	(0%-20%)		03/16/17	11:12
Silver	500	U	1.00	508	ug/L	4.41	102	(0%-20%)		03/06/17	17:40
Sodium	5000		24200	29200	ug/L	0.618	N/A	(0%-20%)		03/16/17	11:12

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**QC Summary**

Workorder: 417458

Page 6 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1643353										
Vanadium	500		11.6	539	ug/L	3.92	105	(0%-20%)	HSC	03/06/17	17:40
Zinc	500	U	3.30	499	ug/L	4	99.5	(0%-20%)			
QC1203737638 417450003 SDILT											
Antimony		U	0.314	DU	17.5	ug/L	N/A	(0%-20%)		03/06/17	17:43
Arsenic		B	5.19	DU	25.0	ug/L	N/A	(0%-20%)			
Barium			54.6	D	11.7	ug/L	7.2	(0%-20%)			
Cadmium		U	0.0983	DU	5.00	ug/L	N/A	(0%-20%)			
Calcium			54400	D	11400	ug/L	4.85	(0%-20%)			
Chromium		B	4.46	BD	1.12	ug/L	26.1	(0%-20%)			
Cobalt		U	-0.57	DU	5.00	ug/L	N/A	(0%-20%)			
Copper		U	-0.252	BD	6.43	ug/L	N/A	(0%-20%)			
Iron		U	12.3	DU	150	ug/L	N/A	(0%-20%)			
Magnesium			13800	D	2900	ug/L	5.23	(0%-20%)		03/16/17	11:14
Manganese		U	1.98	DU	10.0	ug/L	N/A	(0%-20%)		03/06/17	17:43
Nickel		U	-0.164	DU	7.50	ug/L	N/A	(0%-20%)			
Potassium			7080	D	1570	ug/L	11	(0%-20%)		03/16/17	11:14

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**QC Summary**

Workorder: 417458

Page 7 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1643353										
Silver	U	-0.617	DU	5.00	ug/L	N/A		(0%-20%)	HSC	03/06/17	17:43
Sodium		24200	D	5030	ug/L	3.99		(0%-20%)		03/16/17	11:14
Vanadium		11.6	BD	2.53	ug/L	8.62		(0%-20%)		03/06/17	17:43
Zinc	U	2.10	BD	3.38	ug/L	N/A		(0%-20%)			

**Notes:**

The Qualifiers in this report are defined as follows:

- \* Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is  $\geq$  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.
- 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 #: GEL417458  
Work Order #: 417458**

**Product: Cyanide, Total****Analytical Method:** 9012\_CYANIDE**Analytical Procedure:** GL-GC-E-095 REV# 19**Analytical Batches:** 1643346 and 1643344

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
417458002	B38JV3
1203737616	Method Blank (MB)
1203737617	Laboratory Control Sample (LCS)
1203737619	417458002(B38JV3) Sample Duplicate (DUP)
1203737622	417458002(B38JV3) Matrix Spike (MS)

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.

**Quality Control (QC) Information****Matrix Spike (MS)/Post Spike (PS) Recovery Statement**

The percent recoveries (%R) obtained from the spike analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The spike recovery falls outside of the GEL acceptance limits but within the client specified limits. 1203737622 (B38JV3MS).

**Product: Alkalinity****Analytical Method:** 2320\_ALKALINITY**Analytical Procedure:** GL-GC-E-033 REV# 13**Analytical Batch:** 1645587

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
417458001	B38JV6
1203743018	Laboratory Control Sample (LCS)
1203743019	417373001(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**

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL417458 GEL Work Order: 417458

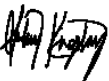
**The Qualifiers in this report are defined as follows:**

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

**Review/Validation**

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

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

**Signature:** **Name:** Aubrey Kingsbury**Date:** 10 MAR 2017**Title:** Analyst I

# Sample Data Summary

**GEL LABORATORIES LLC**

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**Certificate of Analysis**

Report Date: March 10, 2017

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF X17-033

Client Sample ID: B38JV6 Project: CPRC0X17033  
 Sample ID: 417458001 Client ID: CPRC001  
 Matrix: WATER  
 Collect Date: 26-FEB-17 13:17  
 Receive Date: 28-FEB-17  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis												
2320_ALKALINITY: GW 01 "As Received"												
Alkalinity, Total as CaCO3		156000	1450	4000	ug/L			RXB5	03/09/17	1417	1645587	1
Bicarbonate alkalinity (CaCO3)		156000	1450	4000	ug/L							
Carbonate alkalinity (CaCO3)	U	1450	1450	4000	ug/L							
Hydroxide alkalinity as CaCO3	U	1450	1450	4000	ug/L							

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	2320_ALKALINITY		

**Notes:**

Column headers are defined as follows:

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

**GEL LABORATORIES LLC**

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**Certificate of Analysis**

Report Date: March 10, 2017

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF X17-033

Client Sample ID:	B38JV3	Project:	CPRC0X17033
Sample ID:	417458002	Client ID:	CPRC001
Matrix:	WATER		
Collect Date:	26-FEB-17 13:17		
Receive Date:	28-FEB-17		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis												
9012_CYANIDE: COMMON "As Received"												
Cyanide, Total	U	1.67	1.67	5.00	ug/L	1.00	1	AXH3	03/03/17	0852	1643346	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010C Distillation	SW846 9010C Prep	AXH3	03/02/17	1247	1643344

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9012_CYANIDE	

**Notes:**Column headers are defined as follows:

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

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: March 10, 2017

Page 1 of 2

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 417458

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
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**Flow Injection Analysis**

Batch	1643346										
QC1203737619	417458002	DUP									
Cyanide, Total		U	1.67	U	1.67	ug/L	N/A		AXH3	03/03/17	08:53
QC1203737617	LCS										
Cyanide, Total	50.0				51.9	ug/L	104	(80%-120%)		03/03/17	08:36
QC1203737616	MB										
Cyanide, Total			U		1.67	ug/L				03/03/17	08:35
QC1203737622	417458002	MS									
Cyanide, Total	100	U	1.67		115	ug/L	114	(75%-125%)		03/03/17	08:54

**Titration and Ion Analysis**

Batch	1645587										
QC1203743019	417373001	DUP									
Alkalinity, Total as CaCO3			127000		124000	ug/L	2.39	(0%-20%)	RXB5	03/09/17	13:41
Bicarbonate alkalinity (CaCO3)			127000		124000	ug/L	2.39	(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				
QC1203743018	LCS										
Alkalinity, Total as CaCO3	100000				109000	ug/L	109	(80%-120%)		03/09/17	13:17

**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

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 417458

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
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.

# Radiological Analysis

# Case Narrative

**Radiochemistry**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL417458**  
**Work Order #: 417458**

**Product:** SRISO\_SEP\_PRECIP\_GPC: COMMON

**Analytical Method:** SRISO\_SEP\_PRECIP\_GPC

**Analytical Procedure:** GL-RAD-A-004 REV# 18

**Analytical Batch:** 1644819

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
417458002	B38JV3
1203741139	Method Blank (MB)
1203741140	417285005(B38KK5) Sample Duplicate (DUP)
1203741141	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Technical Information**

**Recounts**

Sample 1203741139 (MB) was recounted due to a suspected blank false positive. The recount is reported.

**Product:** TRITIUM\_DIST\_LSC: COMMON

**Analytical Method:** TRITIUM\_DIST\_LSC

**Analytical Procedure:** GL-RAD-A-002 REV# 21

**Analytical Batch:** 1643729

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
417458002	B38JV3
1203738588	Method Blank (MB)
1203738589	417373001(NonSDG) Sample Duplicate (DUP)
1203738590	417373001(NonSDG) Matrix Spike (MS)
1203738591	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Technical Information****Recounts**

Sample 1203738590 (Non SDG 417373001MS) was recounted due to low recovery. The recount is reported.

**Product:** C14\_LSC: COMMON

**Analytical Method:** C14\_LSC

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

**Analytical Batch:** 1643733

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
417458002	B38JV3
1203738603	Method Blank (MB)
1203738604	417377013(NonSDG) Sample Duplicate (DUP)
1203738605	417377013(NonSDG) Matrix Spike (MS)
1203738606	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Certification Statement**

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

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL417458 GEL Work Order: 417458

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

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

**Review/Validation**

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

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

**Signature:** **Name:** Theresa Austin**Date:** 22 MAR 2017**Title:** Group Leader

# Sample Data Summary

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

SDG Number: GEL417458	Client: CPRC001	Project: CPRC0X17033
Lab Sample ID: 417458002	Date Collected: 02/26/2017 13:17	Matrix: WATER
	Date Received: 02/28/2017 09:15	
Client ID: B38JV3	Method: SRISO_SEP_PRECIP_GPC	Prep Basis: "As Received"
Batch ID: 1644819	Analyst: KSD1	SOP Ref: GL-RAD-A-004
Run Date: 03/21/2017 14:59	Aliquot: 300 mL	Instrument: PIC9D
Data File: S1644819r2.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 1644819		
Prep Date: 03/15/2017 12:03		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90	U	-0.0879	pCi/L	+/-0.991	0.991	1.88	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	6.60	7.75	mg	85.2	(40%-110%)

**Comments:**

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

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

<b>SDG Number:</b> GEL417458	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0X17033
<b>Lab Sample ID:</b> 417458002	<b>Date Collected:</b> 02/26/2017 13:17	<b>Matrix:</b> WATER
	<b>Date Received:</b> 02/28/2017 09:15	
<b>Client ID:</b> B38JV3	<b>Method:</b> TRITIUM_DIST_LSC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1643729	<b>Analyst:</b> MYM1	<b>SOP Ref:</b> GL-RAD-A-002
<b>Run Date:</b> 03/03/2017 19:31	<b>Aliquot:</b> 50 mL	<b>Instrument:</b> LSCYELLOW
<b>Data File:</b> T1643729R.xls	<b>Prep Method:</b> EPA 906.0 Modified	<b>Count Time:</b> 40 min
<b>Prep Batch:</b> 1643729		
<b>Prep Date:</b> 03/03/2017 07:47		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		5920	pCi/L	+/-446	1230	359	400

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

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

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

<b>SDG Number:</b> GEL417458	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0X17033
<b>Lab Sample ID:</b> 417458002	<b>Date Collected:</b> 02/26/2017 13:17	<b>Matrix:</b> WATER
	<b>Date Received:</b> 02/28/2017 09:15	
<b>Client ID:</b> B38JV3	<b>Method:</b> C14_LSC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1643733	<b>Analyst:</b> TXJ1	<b>SOP Ref:</b> GL-RAD-A-003
<b>Run Date:</b> 03/09/2017 20:40	<b>Aliquot:</b> 60 mL	<b>Instrument:</b> LSCBLUE
<b>Data File:</b> C1643733.xls	<b>Prep Method:</b> EPA EERF C-01 Modified	<b>Count Time:</b> 4.44999980926514 min
<b>Prep Batch:</b> 1643733		
<b>Prep Date:</b> 03/09/2017 09:13		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14		24800	pCi/L	+/-489	4630	79.1	50.0

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

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

# Quality Control Summary

**GEL LABORATORIES LLC**

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**QC Summary**

Report Date: March 22, 2017  
Page 1 of 3

**Client :** CH2MHill Plateau Remediation Company  
MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352  
**Contact:** Mr. Scot Fitzgerald  
**Workorder:** 417458

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gas Flow</b>									
Batch	1644819								
QC1203741139	MB								
Strontium-90			U	-0.504	pCi/L			KSD1	03/21/1717:22
				Uncert: +/-0.648					
				TPU: +/-0.648					
**Strontium Carrier	7.75			7.80	mg	REC: 101	(40%-110%)		
QC1203741140	417285005	DUP							
Strontium-90		U	-0.30	U	0.430				03/21/1715:01
				Uncert: +/-0.538		RPD: 0	N/A		
				TPU: +/-0.538		RER: 1.48	(0-2)		
**Strontium Carrier	7.75	7.60		7.10	mg	REC: 92	(40%-110%)		
QC1203741141	LCS								
Strontium-90				72.4	pCi/L	REC: 99	(80%-120%)		03/21/1715:01
				Uncert: +/-4.30					
				TPU: +/-12.3					
**Strontium Carrier	7.75			7.10	mg	REC: 92	(40%-110%)		
<b>Rad Liquid Scintillation</b>									
Batch	1643729								
QC1203738588	MB								
Tritium			U	-196	pCi/L			MYM1	03/04/1701:09
				Uncert: +/-181					
				TPU: +/-181					
QC1203738589	417373001	DUP							
Tritium			7490	7280	pCi/L				03/04/1701:51
				Uncert: +/-468		RPD: 3	(0% - 20%)		
				TPU: +/-1520		RER: 0.199	(0-2)		
QC1203738590	417373001	MS							
Tritium		2280	7490	9410	pCi/L	REC: 85	(75%-125%)		03/05/1709:24
				Uncert: +/-468					
				TPU: +/-1520					
QC1203738591	LCS								
Tritium				1920	pCi/L	REC: 84	(80%-120%)		03/04/1703:13
				Uncert: +/-296					
				TPU: +/-475					
Batch	1643733								
QC1203738603	MB								
Carbon-14			U	6.83	pCi/L			TXJ1	03/09/1721:49
				Uncert: +/-21.9					
				TPU: +/-21.9					
QC1203738604	417377013	DUP							
Carbon-14		U	-2.16	U	14.0				03/09/1722:21
				Uncert: +/-21.6		RPD: 0	N/A		
				TPU: +/-21.6		RER: 1.02	(0-2)		
QC1203738605	417377013	MS							
Carbon-14		1250	U	-2.16	1170	pCi/L	REC: 93	(75%-125%)	03/09/1722:52

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QC Summary

Workorder: 417458

Page 2 of 3

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
<b>Rad Liquid Scintillation</b>										
Batch										
				Uncert:						
				TPU:						
QC1203738606	LCS									
Carbon-14	1250				1250	pCi/L REC: 100 (80%-120%)			03/09/1723:24	
				Uncert:						
				TPU:						

**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
- A The TIC is a suspected aldol-condensation product
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- B The analyte was detected in both the associated QC blank and in the sample.
- B The associated QC sample blank has a result  $\geq 2X$  the MDA and, after corrections, result is  $\geq$  MDA for this sample
- C Analyte has been confirmed by GC/MS analysis
- 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 Concentration exceeds the calibration range of the instrument
- E Reported value is estimated due to interferences. See comment in narrative.
- 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
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- P Aroclor target analyte with greater than 25% difference between column analyses.
- S Reported value determined by the Method of Standard Additions (MSA)
- 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.
- 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
- o Analyte failed to recover within LCS limits (Organics only)

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**QC Summary**

Workorder: 417458

Page 3 of 3

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	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.

\*\* 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.