

July 5, 2016

REV. 2



gel.com

July 05, 2016

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

Re: CHPRC SAF S16-002  
Work Order: 391727  
SDG: GEL391727

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 19, 2016. This revised data report has been prepared and reviewed in accordance with GEL's standard operating procedures. Revision 2: Per change order, this package was revised to correct the Appedix IX Volatiles reporting list.

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

Sincerely,

A handwritten signature in black ink that reads "Heather Shaffer".

Heather Shaffer  
Project Manager

Purchase Order: 300071 - 7H  
Chain of Custody: S16-002-118  
Enclosures



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<b>SAMPLE ISSUE RESOLUTION</b>	<b>SIR NUM</b>	SIR16-471
	<b>REV NUM</b>	0
	<b>DATE INITIATED</b>	7/7/2016

**SAMPLE EVENT INFORMATION**

SAF NUM(S) S16-002

OPERABLE UNIT(S)

PROJECT(S) CERC16

SAMPLE EVENT TITLE(S) CERC16

LABORATORY GEL Laboratories, LLC

**SAMPLING INFORMATION**

NUMBER OF SAMPLES 1

SAMPLE NUMBERS B34549

SAMPLE MATRIX WATER

COLLECTION DATE 2/18/2016 - 2/18/2016

SDG NUM GEL391727

**ISSUE BACKGROUND**

CLASS Sample Management Issues

TYPE Analyte Correction

**DESCRIPTION** SMR discovered the 8260\_VOA\_GCMS\_IX: COMMON service list for GEL inadvertently omitted several compounds. Omitted compounds were: Bromodichloromethane (75-27-4), bromomethane (74-83-9), ethyl cyanide (107-12-0), Methyl methacrylate (80-62-6), trichlorofluoromethane (75-69-4), cis-1,2-dichloroethene (156-59-2) and 1,4-dichlorobenzene (106-46-7).

**DISPOSITION****DESCRIPTION** Please add the omitted compounds.**JUSTIFICATION** Final Disposition: Add the compounds and re-issue the report.

SUBMITTED BY: Doris Ayres DATE: 07/07/2016

ACCEPTED BY: Heather Shaffer DATE: 07/07/2016

# **Problem and Discrepancy Report**

## Problem and Discrepancy Report

GEL

SDG GEL391727

03/17/16

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The data package has the following issues:

- The Volatiles data included in this data package are for a sample that does not belong in this SDG.

**Resolution:** *Provide correction.*

**Lab Response:**

The lab will submit a corrected revision.

Provide a resolution to each issue noted on the report

Page 1 of 1

# Case Narrative

Revision 2: Per change order, this package was revised to correct the Appedix IX Volatiles reporting list.

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF S16-002  
SDG: GEL391727**

**July 05, 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 February 19, 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:

<b>Laboratory Identification</b>	<b>Sample Description</b>
391727001	B34549
391727002	B34551

**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, 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.

**July 5, 2016**

Revision #2 05-JUL-2016

**REV. 2**

*Heather Shaffer*

Heather Shaffer  
Project Manager

**Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL391727  
Work Order #: 391727**

## **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.

#### **Calibration Information**

##### **Continuing Calibration Verification Requirements**

The calibration verification standard requirements were not all met for samples 1203495805 (MB), 1203495806 (LCS), 1203495807 (B34549PS) and 1203495808 (B34549PSD) . Methacrylonitrile recovered at -20.1%D/drift and Isobutyl alcohol recovered at -22.0%D/drift in the daily CCV analyzed on 2/24/16. There were no positive results for any of the analytes that were outside the calibration criteria. The results are reported.

#### **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>
1203495807 (B34549PS)	2-Butanone	56* (70%-130%)
	2-Hexanone	62* (70%-130%)
	Acetone	44* (70%-130%)
1203495808 (B34549PSD)	2-Butanone	54* (70%-130%)
	2-Hexanone	61* (70%-130%)
	Acetone	43* (70%-130%)

#### **Technical Information**

##### **Sample Re-extraction/Re-analysis**

Sample 391727001 (B34549) was re-analyzed and reported due to an unacceptable recovery in the calibration verification check.

## **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.

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

#### **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 analytes. The post spike recoveries were within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recoveries may be attributed to possible sample matrix interference and/or non-homogeneity.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203494024 (B34549MS)	Boron	159* (75%-125%)
	Magnesium	145* (75%-125%)
1203494025 (B34549MSD)	Boron	160* (75%-125%)
	Magnesium	152* (75%-125%)
1203494027 (Non SDG 391729001MS)	Boron	54.7* (75%-125%)
1203494028 (Non SDG 391729001MSD)	Boron	54* (75%-125%)

### **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.

### **Calibration Information**

#### **CRDL/PQL Requirements**

The CRDL standard recoveries for SW846 6020A/6020B met the advisory control limits with the exception of uranium. Client sample concentrations were greater than two times the PQL; therefore the data were not adversely affected.

## **Radiochemistry**

### **GAMMA\_GS: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.

### **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 1203498638 (LCS) was recounted due to low recovery. The recount is reported.

#### **9310\_ALPHABETA\_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**

##### **Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

##### **Recounts**

Sample 1203498643 (LCS) was recounted due to high recovery. The recount is reported.

#### **Miscellaneous Information**

##### **Additional Comments**

The matrix spike and matrix spike duplicate, 1203498641 (B34545MS) and 1203498642 (B34545MSD), aliquots were reduced to conserve sample volume.

#### **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 1203493796 (B34514MS) was recounted due to low recovery. The recount is reported. Sample 1203493795 (B34514DUP) was recounted to verify sample results. Recount is reported.

#### **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**

391727

CH2M Hill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C.# S16-002-118  
Page 1 of 1

391727

Collector: Scott King CHPRC  
 Contact/Requester: Karen Waters-Husted  
 Telephone No. 509-376-4650  
 SAF No. S16-002  
 Sampling Origin: Hanford Site  
 Purchase Order/Charge Code: 300071  
 Project Title: SURV, FEBRUARY 2016  
 Logbook No. HNF-N-50682-47  
 Ice Chest No. GWS-401  
 Shipped To (Lab): GEL Laboratories, LLC  
 Method of Shipment: Commercial Carrier  
 Bill of Lading/Air Bill No. 775681955330  
 Protocol: CERCLA  
 Priority: 30 Days  
 SPECIAL INSTRUCTIONS: PRIORITY  
 Hold Time: 30 Days  
 Offsite Property No. 6365  
 Total Activity Exemption: Yes  No

POSSIBLE SAMPLE HAZARDS/REMARKS  
 \*\*\* Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1

Sample No.	Filter	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B34549	N	FEB 18 2016	1108	1x500-mL G/P	6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04	6 Months	HNO3 to pH <2
B34549	N			4x40-mL aGs*	8260_VOA_GCMS_IX: COMMON	14 Days	HCl or H2SO4 to pH <2/Cool <=6C
B34549	N			2X1-L P	9310_ALPHABETA_GPC: COMMON	6 Months	HNO3 to pH <2
B34549	N			1x4-L G/P	GAMMA_GS: COMMON	6 Months	HNO3 to pH <2
B34549	N			3X1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2
B34549	N			1x500-mL P	TRITIUM_DIST_LSC: COMMON	6 Months	None
B34551	Y	FEB 18 2016	1108	1x500-mL G/P	6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04	6 Months	HNO3 to pH <2

FEB 18 2016  
922-18-14

Relinquished By: Scott King CHPRC Signature: [Signature]	Date/Time: FEB 18 2016 1215	Received By: Kevin Patterson CHPRC Signature: [Signature]	Date/Time: FEB 18 2016 1215
Relinquished By: Kevin Patterson CHPRC Signature: [Signature]	Date/Time: FEB 18 2016 1430	Received By: FEDEX	Date/Time: [Blank]
Relinquished By: [Signature]	Date/Time: FEB EX	Received By: Patricia Dent P. Dent alia 16 09100	Date/Time: [Blank]
Relinquished By: [Signature]	Date/Time: [Blank]	Received By: [Blank]	Date/Time: [Blank]

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

Disposed By: [Blank]

Matrix \*

S	=	Soil	=	DS	=	Drum Solids
SE	=	Sediment	=	DL	=	Drum Liquids
SO	=	Solid	=	T	=	Tissue
SL	=	Sludge	=	WI	=	Wipe
W	=	Water	=	L	=	Liquid
O	=	Oil	=	V	=	Vegetation
A	=	Air	=	X	=	Other



SAMPLE RECEIPT & REVIEW FORM

Client: <u>CPRC</u>		SDG/AR/COC/Work Order: <u>391727</u>
Received By: <u>P. Agent</u>		Date Received: <u>2/19/16</u>
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?	<input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0.1e</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 <u>1e</u>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): <u>201404436</u>
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: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?			<input checked="" type="checkbox"/>	Sample ID's and containers affected: (If unknown, select No)
7 VOA vials contain acid preservation?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>			(If yes, immediately deliver to Volatiles laboratory)
9 Are Encore containers present?			<input checked="" type="checkbox"/>	ID's and tests affected:
10 Samples received within holding time?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's 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"/>		<input checked="" type="checkbox"/>	<u>2/19/16</u>
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
16 Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7756 7661 1035</u> <u>7756 8195 5330</u> <u>7756 7661 2042</u> <u>7756 7661 2053</u> } <u>1e</u>

Comments (Use Continuation Form if needed):

# Data Review Qualifier Definitions

## GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 (843) 556-8171

Report Date: 17-MAR-16

## 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 05 July 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 #: GEL391727  
 Work Order #: 391727**

**Product: Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer**  
**Analytical Method: SW846 8260C**  
**Analytical Procedure: GL-OA-E-038 REV# 22**  
**Analytical Batch: 1547345**

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>
391727001	B34549
1203495805	Method Blank (MB)
1203495806	Laboratory Control Sample (LCS)
1203495807	391727001(B34549) Post Spike (PS)
1203495808	391727001(B34549) Post Spike Duplicate (PSD)
1203498583	Method Blank (MB)
1203498584	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.

**Calibration Information**

**Continuing Calibration Verification Requirements**

The calibration verification standard requirements were not all met for samples 1203495805 (MB), 1203495806 (LCS), 1203495807 (B34549PS) and 1203495808 (B34549PSD) . Methacrylonitrile recovered at -20.1%D/drift and Isobutyl alcohol recovered at -22.0%D/drift in the daily CCV analyzed on 2/24/16. There were no positive results for any of the analytes that were outside the calibration criteria. The results are reported.

**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>
1203495807 (B34549PS)	2-Butanone	56* (70%-130%)
	2-Hexanone	62* (70%-130%)
	Acetone	44* (70%-130%)
1203495808 (B34549PSD)	2-Butanone	54* (70%-130%)
	2-Hexanone	61* (70%-130%)
	Acetone	43* (70%-130%)

**Technical Information**

**Sample Re-extraction/Re-analysis**

Sample 391727001 (B34549) was re-analyzed and reported due to an unacceptable recovery in the calibration verification check.

**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: GEL391727 GEL Work Order: 391727

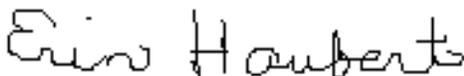
**The Qualifiers in this report are defined as follows:**

- 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:** 15 MAR 2016

**Title:** Data Validator

# Sample Data Summary

Volatile  
Certificate of Analysis  
Sample Summary

Page 1 of 2

<b>SDG Number:</b> GEL391727	<b>Date Collected:</b> 02/18/2016 11:08	<b>Matrix:</b> WATER
<b>Lab Sample ID:</b> 391727001	<b>Date Received:</b> 02/19/2016 09:00	
<b>Client ID:</b> B34549	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0S16002
<b>Batch ID:</b> 1547345	<b>Method:</b> SW846 8260C	<b>SOP Ref:</b> GL-OA-E-038
<b>Run Date:</b> 02/25/2016 18:48	<b>Inst:</b> VOA3.I	<b>Dilution:</b> 1
<b>Prep Date:</b> 02/25/2016 18:48	<b>Analyst:</b> CDS1	<b>Purge Vol:</b> 5 mL
<b>Data File:</b> 022516V3\3X420.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	RDL
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	2.00	4.00
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	2.00	5.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	2.00	5.00
79-34-5	1,1,2,2-Tetrachloroethane	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
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	2.00	5.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	2.00	5.00
106-93-4	1,2-Dibromoethane	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
78-87-5	1,2-Dichloropropane	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
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	2.00	5.00
75-25-2	Bromoform	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	U	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
124-48-1	Dibromochloromethane	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
100-42-5	Styrene	U	0.300	ug/L	0.300	2.00	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	U	0.300	ug/L	0.300	2.00	5.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	2.00	5.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	2.00	5.00
156-60-5	trans-1,2-Dichloroethylene	U	0.300	ug/L	0.300	2.00	5.00
10061-02-6	trans-1,3-Dichloropropylene	U	0.300	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	TU	3.00	ug/L	3.00	10.0	10.0
126-99-8	2-Chloro-1,3-butadiene	U	0.300	ug/L	0.300	2.00	10.0
108-10-1	4-Methyl-2-pentanone	U	3.00	ug/L	3.00	10.0	10.0
107-05-1	Allyl chloride	U	3.00	ug/L	3.00	10.0	10.0
74-83-9	Bromomethane	U	0.300	ug/L	0.300	2.00	10.0
75-00-3	Chloroethane	U	0.300	ug/L	0.300	2.00	10.0
74-87-3	Chloromethane	U	0.300	ug/L	0.300	2.00	10.0
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	2.00	10.0

Volatile  
Certificate of Analysis  
Sample Summary

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<b>SDG Number:</b> GEL391727	<b>Date Collected:</b> 02/18/2016 11:08	<b>Matrix:</b> WATER
<b>Lab Sample ID:</b> 391727001	<b>Date Received:</b> 02/19/2016 09:00	
<b>Client ID:</b> B34549	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0S16002
<b>Batch ID:</b> 1547345	<b>Method:</b> SW846 8260C	<b>SOP Ref:</b> GL-OA-E-038
<b>Run Date:</b> 02/25/2016 18:48	<b>Inst:</b> VOA3.I	<b>Dilution:</b> 1
<b>Prep Date:</b> 02/25/2016 18:48	<b>Analyst:</b> CDS1	<b>Purge Vol:</b> 5 mL
<b>Data File:</b> 022516V3\3X420.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	RDL
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	2.00	10.0
97-63-2	Ethyl methacrylate	U	3.00	ug/L	3.00	10.0	10.0
74-88-4	Iodomethane	U	3.00	ug/L	3.00	10.0	10.0
126-98-7	Methacrylonitrile	U	3.00	ug/L	3.00	10.0	10.0
80-62-6	Methyl methacrylate	U	3.00	ug/L	3.00	10.0	10.0
107-12-0	Propionitrile	U	3.00	ug/L	3.00	10.0	10.0
75-69-4	Trichlorofluoromethane	U	0.300	ug/L	0.300	2.00	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
591-78-6	2-Hexanone	TU	3.00	ug/L	3.00	10.0	20.0
67-64-1	Acetone	TU	3.00	ug/L	3.00	10.0	20.0
108-05-4	Vinyl acetate	U	1.60	ug/L	1.60	5.00	50.0
110-57-6	trans-1,4-Dichloro-2-butene	U	1.50	ug/L	1.50	10.0	50.0
75-05-8	Acetonitrile	U	16.7	ug/L	16.7	50.0	100
107-02-8	Acrolein	U	3.00	ug/L	3.00	10.0	100
107-13-1	Acrylonitrile	U	3.00	ug/L	3.00	10.0	100
78-83-1	Isobutyl alcohol	U	33.0	ug/L	33.0	100	500

# Quality Control Summary

**GEL LABORATORIES LLC**

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**QC Summary**

Report Date: June 29, 2016

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 391727

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
QC1203495806	LCS										
1,1,1,2-Tetrachloroethane	50.0			51.8	ug/L		104	(70%-130%)	CDS1	02/24/16	07:56
1,1,1-Trichloroethane	50.0			54.2	ug/L		108	(70%-130%)			
1,1,2,2-Tetrachloroethane	50.0			52.9	ug/L		106	(70%-130%)			
1,1,2-Trichloroethane	50.0			50.4	ug/L		101	(70%-130%)			
1,1-Dichloroethane	50.0			52.8	ug/L		106	(70%-130%)			
1,1-Dichloroethylene	50.0			53.8	ug/L		108	(70%-130%)			
1,2,3-Trichloropropane	50.0			49.7	ug/L		99	(70%-130%)			
1,2-Dibromo-3-chloropropane	50.0			57.1	ug/L		114	(70%-130%)			
1,2-Dibromoethane	50.0			50.7	ug/L		101	(70%-130%)			
1,2-Dichloroethane	50.0			47.1	ug/L		94	(70%-130%)			
1,2-Dichloropropane	50.0			50.0	ug/L		100	(70%-130%)			
1,4-Dichlorobenzene	50.0			54.6	ug/L		109	(70%-130%)			
2-Butanone	250			218	ug/L		87	(70%-130%)			
2-Hexanone	250			226	ug/L		90	(70%-130%)			
4-Methyl-2-pentanone	250			201	ug/L		80	(70%-130%)			
Acetone	250			202	ug/L		81	(70%-130%)			
Acetonitrile	1250			1010	ug/L		81	(70%-130%)			
Benzene	50.0			53.1	ug/L		106	(70%-130%)			
Bromodichloromethane	50.0			52.5	ug/L		105	(70%-130%)			
Bromoform	50.0			55.3	ug/L		111	(70%-130%)			

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
Bromomethane	50.0			51.6	ug/L		103	(70%-130%)	CDS1	02/24/16	07:56
Carbon disulfide	250			259	ug/L		104	(70%-130%)			
Carbon tetrachloride	50.0			52.0	ug/L		104	(70%-130%)			
Chlorobenzene	50.0			53.8	ug/L		108	(70%-130%)			
Chloroethane	50.0			52.8	ug/L		106	(70%-130%)			
Chloroform	50.0			51.0	ug/L		102	(70%-130%)			
Chloromethane	50.0			46.3	ug/L		93	(70%-130%)			
Dibromochloromethane	50.0			52.3	ug/L		105	(70%-130%)			
Dibromomethane	50.0			50.9	ug/L		102	(70%-130%)			
Dichlorodifluoromethane	50.0			55.1	ug/L		110	(70%-130%)			
Ethylbenzene	50.0			51.1	ug/L		102	(70%-130%)			
Iodomethane	250			258	ug/L		103	(70%-130%)			
Methylene chloride	50.0			52.8	ug/L		106	(70%-130%)			
Styrene	50.0			49.1	ug/L		98	(70%-130%)			
Tetrachloroethylene	50.0			53.2	ug/L		106	(70%-130%)			
Toluene	50.0			49.9	ug/L		100	(70%-130%)			
Trichloroethylene	50.0			54.1	ug/L		108	(70%-130%)			
Trichlorofluoromethane	50.0			55.2	ug/L		110	(70%-130%)			
Vinyl acetate	250			204	ug/L		81	(70%-130%)			
Vinyl chloride	50.0			47.3	ug/L		95	(70%-130%)			
Xylenes (total)	150			153	ug/L		102	(70%-130%)			

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
cis-1,2-Dichloroethylene	50.0			52.2	ug/L		104	(70%-130%)			
cis-1,3-Dichloropropylene	50.0			53.1	ug/L		106	(70%-130%)	CDS1	02/24/16	07:56
trans-1,2-Dichloroethylene	50.0			50.8	ug/L		102	(70%-130%)			
trans-1,3-Dichloropropylene	50.0			49.5	ug/L		99	(70%-130%)			
**1,2-Dichloroethane-d4	50.0			47.0	ug/L		94	(70%-130%)			
**Bromofluorobenzene	50.0			49.5	ug/L		99	(70%-130%)			
**Toluene-d8	50.0			44.7	ug/L		89	(70%-130%)			
QC1203498584 LCS											
1,1,1,2-Tetrachloroethane	50.0			51.3	ug/L		103	(70%-130%)		02/25/16	10:07
1,1,1-Trichloroethane	50.0			54.6	ug/L		109	(70%-130%)			
1,1,2,2-Tetrachloroethane	50.0			52.4	ug/L		105	(70%-130%)			
1,1,2-Trichloroethane	50.0			51.8	ug/L		104	(70%-130%)			
1,1-Dichloroethane	50.0			53.3	ug/L		107	(70%-130%)			
1,1-Dichloroethylene	50.0			53.8	ug/L		108	(70%-130%)			
1,2,3-Trichloropropane	50.0			50.7	ug/L		101	(70%-130%)			
1,2-Dibromo-3-chloropropane	50.0			58.4	ug/L		117	(70%-130%)			
1,2-Dibromoethane	50.0			52.1	ug/L		104	(70%-130%)			
1,2-Dichloroethane	50.0			47.0	ug/L		94	(70%-130%)			
1,2-Dichloropropane	50.0			51.2	ug/L		102	(70%-130%)			
1,4-Dichlorobenzene	50.0			53.2	ug/L		106	(70%-130%)			
2-Butanone	250			223	ug/L		89	(70%-130%)			
2-Hexanone	250			242	ug/L		97	(70%-130%)			
4-Methyl-2-pentanone	250			205	ug/L		82	(70%-130%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
Acetone	250			217	ug/L		87	(70%-130%)	CDS1	02/25/16	10:07
Acetonitrile	1250			1040	ug/L		83	(70%-130%)			
Benzene	50.0			53.2	ug/L		106	(70%-130%)			
Bromodichloromethane	50.0			51.9	ug/L		104	(70%-130%)			
Bromoform	50.0			56.4	ug/L		113	(70%-130%)			
Bromomethane	50.0			53.0	ug/L		106	(70%-130%)			
Carbon disulfide	250			263	ug/L		105	(70%-130%)			
Carbon tetrachloride	50.0			52.1	ug/L		104	(70%-130%)			
Chlorobenzene	50.0			54.5	ug/L		109	(70%-130%)			
Chloroethane	50.0			54.9	ug/L		110	(70%-130%)			
Chloroform	50.0			51.2	ug/L		102	(70%-130%)			
Chloromethane	50.0			44.9	ug/L		90	(70%-130%)			
Dibromochloromethane	50.0			53.4	ug/L		107	(70%-130%)			
Dibromomethane	50.0			51.3	ug/L		103	(70%-130%)			
Dichlorodifluoromethane	50.0			53.0	ug/L		106	(70%-130%)			
Ethylbenzene	50.0			50.0	ug/L		100	(70%-130%)			
Iodomethane	250			262	ug/L		105	(70%-130%)			
Methylene chloride	50.0			55.2	ug/L		110	(70%-130%)			
Styrene	50.0			50.2	ug/L		100	(70%-130%)			
Tetrachloroethylene	50.0			54.9	ug/L		110	(70%-130%)			
Toluene	50.0			54.1	ug/L		108	(70%-130%)			

**GEL LABORATORIES LLC**

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
Trichloroethylene	50.0			53.4	ug/L		107	(70%-130%)			
Trichlorofluoromethane	50.0			53.0	ug/L		106	(70%-130%)	CDS1	02/25/16	10:07
Vinyl acetate	250			202	ug/L		81	(70%-130%)			
Vinyl chloride	50.0			47.5	ug/L		95	(70%-130%)			
Xylenes (total)	150			152	ug/L		101	(70%-130%)			
cis-1,2-Dichloroethylene	50.0			52.0	ug/L		104	(70%-130%)			
cis-1,3-Dichloropropylene	50.0			52.7	ug/L		105	(70%-130%)			
trans-1,2-Dichloroethylene	50.0			51.3	ug/L		103	(70%-130%)			
trans-1,3-Dichloropropylene	50.0			53.6	ug/L		107	(70%-130%)			
**1,2-Dichloroethane-d4	50.0			44.6	ug/L		89	(70%-130%)			
**Bromofluorobenzene	50.0			49.6	ug/L		99	(70%-130%)			
**Toluene-d8	50.0			48.9	ug/L		98	(70%-130%)			
QC1203495805 MB											
1,1,1,2-Tetrachloroethane			U	0.300	ug/L					02/24/16	08:58
1,1,1-Trichloroethane			U	0.300	ug/L						
1,1,2,2-Tetrachloroethane			U	0.300	ug/L						
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						
1,2,3-Trichloropropane			U	0.300	ug/L						
1,2-Dibromo-3-chloropropane			U	0.500	ug/L						
1,2-Dibromoethane			U	0.300	ug/L						
1,2-Dichloroethane			U	0.300	ug/L						

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
1,2-Dichloropropane			U	0.300	ug/L				CDS1	02/24/16	08:58
1,4-Dichlorobenzene			U	0.300	ug/L						
2-Butanone			U	3.00	ug/L						
2-Chloro-1,3-butadiene			U	0.300	ug/L						
2-Hexanone			U	3.00	ug/L						
4-Methyl-2-pentanone			U	3.00	ug/L						
Acetone			U	3.00	ug/L						
Acetonitrile			U	16.7	ug/L						
Acrolein			U	3.00	ug/L						
Acrylonitrile			U	3.00	ug/L						
Allyl chloride			U	3.00	ug/L						
Benzene			U	0.300	ug/L						
Bromodichloromethane			U	0.300	ug/L						
Bromoform			U	0.300	ug/L						
Bromomethane			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						
Chloroethane			U	0.300	ug/L						
Chloroform			U	0.300	ug/L						
Chloromethane			U	0.300	ug/L						

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
Dibromochloromethane			U	0.300	ug/L						
Dibromomethane			U	0.300	ug/L				CDS1	02/24/16	08:58
Dichlorodifluoromethane			U	0.300	ug/L						
Ethyl methacrylate			U	3.00	ug/L						
Ethylbenzene			U	0.300	ug/L						
Iodomethane			U	3.00	ug/L						
Isobutyl alcohol			U	33.0	ug/L						
Methacrylonitrile			U	3.00	ug/L						
Methyl methacrylate			U	3.00	ug/L						
Methylene chloride			U	1.60	ug/L						
Propionitrile			U	3.00	ug/L						
Styrene			U	0.300	ug/L						
Tetrachloroethylene			U	0.300	ug/L						
Toluene			U	0.300	ug/L						
Trichloroethylene			U	0.300	ug/L						
Trichlorofluoromethane			U	0.300	ug/L						
Vinyl acetate			U	1.60	ug/L						
Vinyl chloride			U	0.300	ug/L						
Xylenes (total)			U	0.300	ug/L						
cis-1,2-Dichloroethylene			U	0.300	ug/L						
cis-1,3-Dichloropropylene			U	0.300	ug/L						
trans-1,2-Dichloroethylene			U	0.300	ug/L						

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
trans-1,3-Dichloropropylene			U	0.300	ug/L						
trans-1,4-Dichloro-2-butene			U	1.50	ug/L				CDS1	02/24/16	08:58
**1,2-Dichloroethane-d4	50.0			48.7	ug/L		97	(70%-130%)			
**Bromofluorobenzene	50.0			47.3	ug/L		95	(70%-130%)			
**Toluene-d8	50.0			47.2	ug/L		94	(70%-130%)			
QC1203498583 MB											
1,1,1,2-Tetrachloroethane			U	0.300	ug/L					02/25/16	11:08
1,1,1-Trichloroethane			U	0.300	ug/L						
1,1,2,2-Tetrachloroethane			U	0.300	ug/L						
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						
1,2,3-Trichloropropane			U	0.300	ug/L						
1,2-Dibromo-3-chloropropane			U	0.500	ug/L						
1,2-Dibromoethane			U	0.300	ug/L						
1,2-Dichloroethane			U	0.300	ug/L						
1,2-Dichloropropane			U	0.300	ug/L						
1,4-Dichlorobenzene			U	0.300	ug/L						
2-Butanone			U	3.00	ug/L						
2-Chloro-1,3-butadiene			U	0.300	ug/L						
2-Hexanone			U	3.00	ug/L						
4-Methyl-2-pentanone			U	3.00	ug/L						
Acetone			U	3.00	ug/L						

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
Acetonitrile			U	16.7	ug/L				CDS1	02/25/16	11:08
Acrolein			U	3.00	ug/L						
Acrylonitrile			U	3.00	ug/L						
Allyl chloride			U	3.00	ug/L						
Benzene			U	0.300	ug/L						
Bromodichloromethane			U	0.300	ug/L						
Bromoform			U	0.300	ug/L						
Bromomethane			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						
Chloroethane			U	0.300	ug/L						
Chloroform			U	0.300	ug/L						
Chloromethane			U	0.300	ug/L						
Dibromochloromethane			U	0.300	ug/L						
Dibromomethane			U	0.300	ug/L						
Dichlorodifluoromethane			U	0.300	ug/L						
Ethyl methacrylate			U	3.00	ug/L						
Ethylbenzene			U	0.300	ug/L						
Iodomethane			U	3.00	ug/L						
Isobutyl alcohol			U	33.0	ug/L						

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
Methacrylonitrile			U	3.00	ug/L						
Methyl methacrylate			U	3.00	ug/L				CDS1	02/25/16	11:08
Methylene chloride			U	1.60	ug/L						
Propionitrile			U	3.00	ug/L						
Styrene			U	0.300	ug/L						
Tetrachloroethylene			U	0.300	ug/L						
Toluene			U	0.300	ug/L						
Trichloroethylene			U	0.300	ug/L						
Trichlorofluoromethane			U	0.300	ug/L						
Vinyl acetate			U	1.60	ug/L						
Vinyl chloride			U	0.300	ug/L						
Xylenes (total)			U	0.300	ug/L						
cis-1,2-Dichloroethylene			U	0.300	ug/L						
cis-1,3-Dichloropropylene			U	0.300	ug/L						
trans-1,2-Dichloroethylene			U	0.300	ug/L						
trans-1,3-Dichloropropylene			U	0.300	ug/L						
trans-1,4-Dichloro-2-butene			U	1.50	ug/L						
**1,2-Dichloroethane-d4	50.0			49.4	ug/L		99	(70%-130%)			
**Bromofluorobenzene	50.0			47.7	ug/L		95	(70%-130%)			
**Toluene-d8	50.0			46.4	ug/L		93	(70%-130%)			
QC1203495807 391727001 PS											
1,1,1,2-Tetrachloroethane	50.0	U	0.00	50.3	ug/L		101	(70%-130%)		02/24/16	18:07
1,1,1-Trichloroethane	50.0	U	0.00	56.6	ug/L		113	(70%-130%)			

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QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
1,1,2,2-Tetrachloroethane	50.0	U	0.00	52.1	ug/L		104	(70%-130%)	CDS1	02/24/16	18:07
1,1,2-Trichloroethane	50.0	U	0.00	51.0	ug/L		102	(70%-130%)			
1,1-Dichloroethane	50.0	U	0.00	53.6	ug/L		107	(70%-130%)			
1,1-Dichloroethylene	50.0	U	0.00	52.4	ug/L		105	(70%-130%)			
1,2,3-Trichloropropane	50.0	U	0.00	49.3	ug/L		99	(70%-130%)			
1,2-Dibromo-3-chloropropane	50.0	U	0.00	54.9	ug/L		110	(70%-130%)			
1,2-Dibromoethane	50.0	U	0.00	51.0	ug/L		102	(70%-130%)			
1,2-Dichloroethane	50.0	U	0.00	47.3	ug/L		95	(70%-130%)			
1,2-Dichloropropane	50.0	U	0.00	48.6	ug/L		97	(70%-130%)			
1,4-Dichlorobenzene	50.0	U	0.00	52.5	ug/L		105	(70%-130%)			
2-Butanone	250	TU	0.00	T	140	ug/L	56*	(70%-130%)			
2-Hexanone	250	TU	0.00	T	156	ug/L	62*	(70%-130%)			
4-Methyl-2-pentanone	250	U	0.00		197	ug/L	79	(70%-130%)			
Acetone	250	TU	0.00	T	110	ug/L	44*	(70%-130%)			
Acetonitrile	1250	U	0.00		997	ug/L	80	(70%-130%)			
Benzene	50.0	U	0.00		52.9	ug/L	106	(70%-130%)			
Bromodichloromethane	50.0	U	0.00		51.2	ug/L	102	(70%-130%)			
Bromoform	50.0	U	0.00		54.6	ug/L	109	(70%-130%)			
Bromomethane	50.0	U	0.00		53.5	ug/L	107	(70%-130%)			
Carbon disulfide	250	U	0.00		255	ug/L	102	(70%-130%)			
Carbon tetrachloride	50.0	U	0.00		53.0	ug/L	106	(70%-130%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
Chlorobenzene	50.0	U	0.00	52.5	ug/L		105	(70%-130%)			
Chloroethane	50.0	U	0.00	52.8	ug/L		106	(70%-130%)	CDS1	02/24/16	18:07
Chloroform	50.0	U	0.00	52.6	ug/L		105	(70%-130%)			
Chloromethane	50.0	U	0.00	45.0	ug/L		90	(70%-130%)			
Dibromochloromethane	50.0	U	0.00	52.8	ug/L		106	(70%-130%)			
Dibromomethane	50.0	U	0.00	50.5	ug/L		101	(70%-130%)			
Dichlorodifluoromethane	50.0	U	0.00	52.6	ug/L		105	(70%-130%)			
Ethylbenzene	50.0	U	0.00	50.6	ug/L		101	(70%-130%)			
Iodomethane	250	U	0.00	250	ug/L		100	(70%-130%)			
Methylene chloride	50.0	U	0.00	50.6	ug/L		101	(70%-130%)			
Styrene	50.0	U	0.00	48.2	ug/L		96	(70%-130%)			
Tetrachloroethylene	50.0	U	0.00	54.0	ug/L		108	(70%-130%)			
Toluene	50.0	U	0.00	52.4	ug/L		105	(70%-130%)			
Trichloroethylene	50.0	U	0.00	53.2	ug/L		106	(70%-130%)			
Trichlorofluoromethane	50.0	U	0.00	52.5	ug/L		105	(70%-130%)			
Vinyl acetate	250	U	0.00	211	ug/L		84	(70%-130%)			
Vinyl chloride	50.0	U	0.00	49.1	ug/L		98	(70%-130%)			
Xylenes (total)	150	U	0.00	150	ug/L		100	(70%-130%)			
cis-1,2-Dichloroethylene	50.0	U	0.00	51.7	ug/L		103	(70%-130%)			
cis-1,3-Dichloropropylene	50.0	U	0.00	53.1	ug/L		106	(70%-130%)			
trans-1,2-Dichloroethylene	50.0	U	0.00	50.7	ug/L		101	(70%-130%)			
trans-1,3-Dichloropropylene	50.0	U	0.00	52.7	ug/L		105	(70%-130%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
**1,2-Dichloroethane-d4	50.0	48.6		46.9	ug/L		94	(70%-130%)			
**Bromofluorobenzene	50.0	47.5		48.7	ug/L		97	(70%-130%)	CDS1	02/24/16	18:07
**Toluene-d8	50.0	47.8		48.4	ug/L		97	(70%-130%)			
QC1203495808 391727001 PSD											
1,1,1,2-Tetrachloroethane	50.0	U	0.00	51.7	ug/L	3	103	(0%-20%)		02/24/16	18:38
1,1,1-Trichloroethane	50.0	U	0.00	58.6	ug/L	4	117	(0%-20%)			
1,1,2,2-Tetrachloroethane	50.0	U	0.00	51.5	ug/L	1	103	(0%-20%)			
1,1,2-Trichloroethane	50.0	U	0.00	50.8	ug/L	1	102	(0%-20%)			
1,1-Dichloroethane	50.0	U	0.00	54.4	ug/L	1	109	(0%-20%)			
1,1-Dichloroethylene	50.0	U	0.00	53.4	ug/L	2	107	(0%-20%)			
1,2,3-Trichloropropane	50.0	U	0.00	49.4	ug/L	0	99	(0%-20%)			
1,2-Dibromo-3-chloropropane	50.0	U	0.00	53.3	ug/L	3	107	(0%-20%)			
1,2-Dibromoethane	50.0	U	0.00	51.2	ug/L	0	102	(0%-20%)			
1,2-Dichloroethane	50.0	U	0.00	47.7	ug/L	1	95	(0%-20%)			
1,2-Dichloropropane	50.0	U	0.00	51.2	ug/L	5	102	(0%-20%)			
1,4-Dichlorobenzene	50.0	U	0.00	53.0	ug/L	1	106	(0%-20%)			
2-Butanone	250	TU	0.00	T	134	ug/L	4	54 *	(0%-20%)		
2-Hexanone	250	TU	0.00	T	152	ug/L	3	61 *	(0%-20%)		
4-Methyl-2-pentanone	250	U	0.00		187	ug/L	6	75	(0%-20%)		
Acetone	250	TU	0.00	T	106	ug/L	4	43 *	(0%-20%)		
Acetonitrile	1250	U	0.00		970	ug/L	3	78	(0%-20%)		
Benzene	50.0	U	0.00		54.2	ug/L	2	108	(0%-20%)		
Bromodichloromethane	50.0	U	0.00		52.7	ug/L	3	105	(0%-20%)		

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
Bromoform	50.0	U	0.00	54.2	ug/L	1	108	(0%-20%)	CDS1	02/24/16	18:38
Bromomethane	50.0	U	0.00	45.9	ug/L	15	92	(0%-20%)			
Carbon disulfide	250	U	0.00	257	ug/L	1	103	(0%-20%)			
Carbon tetrachloride	50.0	U	0.00	54.2	ug/L	2	108	(0%-20%)			
Chlorobenzene	50.0	U	0.00	53.6	ug/L	2	107	(0%-20%)			
Chloroethane	50.0	U	0.00	46.2	ug/L	13	92	(0%-20%)			
Chloroform	50.0	U	0.00	52.8	ug/L	0	106	(0%-20%)			
Chloromethane	50.0	U	0.00	38.6	ug/L	15	77	(0%-20%)			
Dibromochloromethane	50.0	U	0.00	53.1	ug/L	0	106	(0%-20%)			
Dibromomethane	50.0	U	0.00	49.9	ug/L	1	100	(0%-20%)			
Dichlorodifluoromethane	50.0	U	0.00	45.6	ug/L	14	91	(0%-20%)			
Ethylbenzene	50.0	U	0.00	51.3	ug/L	1	103	(0%-20%)			
Iodomethane	250	U	0.00	251	ug/L	0	100	(0%-20%)			
Methylene chloride	50.0	U	0.00	51.4	ug/L	2	103	(0%-20%)			
Styrene	50.0	U	0.00	50.0	ug/L	4	100	(0%-20%)			
Tetrachloroethylene	50.0	U	0.00	55.7	ug/L	3	111	(0%-20%)			
Toluene	50.0	U	0.00	54.1	ug/L	3	108	(0%-20%)			
Trichloroethylene	50.0	U	0.00	54.0	ug/L	2	108	(0%-20%)			
Trichlorofluoromethane	50.0	U	0.00	46.8	ug/L	12	94	(0%-20%)			
Vinyl acetate	250	U	0.00	189	ug/L	11	76	(0%-20%)			
Vinyl chloride	50.0	U	0.00	42.0	ug/L	16	84	(0%-20%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1547345										
Xylenes (total)	150	U	0.00	153	ug/L	2	102	(0%-20%)			
cis-1,2-Dichloroethylene	50.0	U	0.00	53.2	ug/L	3	106	(0%-20%)	CDS1	02/24/16	18:38
cis-1,3-Dichloropropylene	50.0	U	0.00	54.5	ug/L	3	109	(0%-20%)			
trans-1,2-Dichloroethylene	50.0	U	0.00	50.3	ug/L	1	101	(0%-20%)			
trans-1,3-Dichloropropylene	50.0	U	0.00	52.6	ug/L	0	105	(0%-20%)			
**1,2-Dichloroethane-d4	50.0		48.6	46.4	ug/L		93	(70%-130%)			
**Bromofluorobenzene	50.0		47.5	49.9	ug/L		100	(70%-130%)			
**Toluene-d8	50.0		47.8	48.9	ug/L		98	(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)

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## QC Summary

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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.

## Surrogate Recovery Report

SDG Number: GEL391727

Matrix Type: LIQUID

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203495806	LCS for batch 1547345	94	89	99
1203495805	MB for batch 1547345	97	94	95
1203495807	B34549PS	94	97	97
1203495808	B34549PSD	93	98	100
1203498584	LCS for batch 1547345	89	98	99
1203498583	MB for batch 1547345	99	93	95
391727001	B34549	97	96	95

**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

# Metals Analysis

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL391727**  
**Work Order #: 391727**

**Product: Determination of Metals by ICP****Analytical Method:** 6010\_METALS\_ICP**Analytical Procedure:** GL-MA-E-013 REV# 25**Analytical Batch:** 1546625**Product: Determination of Metals by ICP-MS****Analytical Method:** 6020\_METALS\_ICPMS**Analytical Procedure:** GL-MA-E-014 REV# 27**Analytical Batch:** 1546633**Preparation Method:** SW846 3005A**Preparation Procedure:** GL-MA-E-006 REV# 13**Preparation Batches:** 1546624 and 1546632

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>
391727001	B34549
391727002	B34551
1203494022	Method Blank (MB) <b>ICP</b>
1203494023	Laboratory Control Sample (LCS)
1203494026	391727001(B34549L) Serial Dilution (SD)
1203494029	391729001(NonSDGL) Serial Dilution (SD)
1203494024	391727001(B34549S) Matrix Spike (MS)
1203494027	391729001(NonSDGS) Matrix Spike (MS)
1203494025	391727001(B34549SD) Matrix Spike Duplicate (MSD)
1203494028	391729001(NonSDGSD) Matrix Spike Duplicate (MSD)
1203497014	391727001(B34549PS) Post Spike (PS)
1203497015	391729001(NonSDGPS) Post Spike (PS)
1203494045	Method Blank (MB) <b>ICP-MS</b>
1203494046	Laboratory Control Sample (LCS)
1203494049	391727001(B34549L) Serial Dilution (SD)
1203494047	391727001(B34549S) Matrix Spike (MS)
1203494048	391727001(B34549SD) 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****CRDL/PQL Requirements**

The CRDL standard recoveries for SW846 6020A/6020B met the advisory control limits with the exception of uranium. Client sample concentrations were greater than two times the PQL; therefore the data were not adversely affected. ICP-MS.

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

#### **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 analytes. The post spike recoveries were within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recoveries may be attributed to possible sample matrix interference and/or non-homogeneity.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203494024 (B34549MS)	Boron	159* (75%-125%)
	Magnesium	145* (75%-125%)
1203494025 (B34549MSD)	Boron	160* (75%-125%)
	Magnesium	152* (75%-125%)
1203494027 (Non SDG 391729001MS)	Boron	54.7* (75%-125%)
1203494028 (Non SDG 391729001MSD)	Boron	54* (75%-125%)

#### **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: GEL391727 GEL Work Order: 391727

**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:** 14 MAR 2016

**Title:** Data Validator

# Sample Data Summary

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

SDG No: GEL391727

CONTRACT: CPCR0S16002

METHOD TYPE: SW846

SAMPLE ID: 391727001

BASIS: As Received

DATE COLLECTED 18-FEB-16

CLIENT ID: B34549

LEVEL: Low

DATE RECEIVED 19-FEB-16

MATRIX: WATER

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	15	ug/L	U	15	50	50	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	PRB	02/29/16 18:14	160229-3	1546633
7440-38-2	Arsenic	5.22	ug/L		1.7	5	5	1	MS	PRB	02/29/16 18:14	160229-3	1546633
7440-39-3	Barium	51.4	ug/L		0.6	2	2	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-41-7	Beryllium	0.20	ug/L	U	0.2	0.5	0.5	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-42-8	Boron	21.9	ug/L	BN	15	50	50	1	P	HSC	02/25/16 11:47	022516A-2	1546625
7440-43-9	Cadmium	0.110	ug/L	U	0.11	1	1	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-70-2	Calcium	73800	ug/L		50	200	200	1	P	HSC	02/25/16 11:47	022516A-2	1546625
7440-47-3	Chromium	4.59	ug/L	B	2	10	10	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-48-4	Cobalt	0.151	ug/L	B	0.1	1	1	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-50-8	Copper	1.02	ug/L		0.35	1	1	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7439-89-6	Iron	197	ug/L		30	100	100	1	P	HSC	02/25/16 11:47	022516A-2	1546625
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7439-95-4	Magnesium	19200	ug/L	N	110	300	300	1	P	HSC	02/25/16 11:47	022516A-2	1546625
7439-96-5	Manganese	4.13	ug/L	B	1	5	5	1	MS	PRB	02/29/16 18:14	160229-3	1546633
7439-98-7	Molybdenum	2.93	ug/L		0.165	0.5	0.5	1	MS	PRB	02/29/16 21:04	160229-4	1546633
7440-02-0	Nickel	1.37	ug/L	B	0.5	2	2	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-09-7	Potassium	5900	ug/L		50	150	150	1	P	HSC	02/25/16 11:47	022516A-2	1546625
7782-49-2	Selenium	3.51	ug/L	B	1.5	5	5	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-22-4	Silver	0.20	ug/L	U	0.2	1	1	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-23-5	Sodium	14800	ug/L		100	300	300	1	P	HSC	02/25/16 11:47	022516A-2	1546625
7440-24-6	Strontium	512	ug/L		2	10	10	1	MS	PRB	02/29/16 18:14	160229-3	1546633
7440-28-0	Thallium	0.489	ug/L	B	0.45	2	2	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-29-1	Thorium	0.383	ug/L	U	0.383	2	2	1	MS	PRB	02/29/16 21:04	160229-4	1546633
7440-31-5	Tin	1	ug/L	U	1	5	5	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-61-1	Uranium	5.85	ug/L		0.067	0.2	0.2	1	MS	SKJ	02/29/16 14:18	160229-5	1546633
7440-62-2	Vanadium	14.4	ug/L		1	5	5	1	P	HSC	02/25/16 11:47	022516A-2	1546625
7440-66-6	Zinc	3.5	ug/L	U	3.5	10	10	1	MS	SKJ	02/29/16 14:18	160229-5	1546633

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1546625	1546624	SW846 3005A	50	mL	50	mL	02/22/16	JXM5
1546633	1546632	SW846 3005A	50	mL	50	mL	02/22/16	JXM5

**\*Analytical Methods:**

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METALS

-1-

INORGANICS ANALYSIS DATA PACKAGE

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

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

SDG No: GEL391727

CONTRACT: CPCR0S16002

METHOD TYPE: SW846

SAMPLE ID: 391727002

BASIS: As Received

DATE COLLECTED 18-FEB-16

CLIENT ID: B34551

LEVEL: Low

DATE RECEIVED 19-FEB-16

MATRIX: WATER

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	15	ug/L	U	15	50	50	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	PRB	02/29/16 18:29	160229-3	1546633
7440-38-2	Arsenic	5.43	ug/L		1.7	5	5	1	MS	PRB	02/29/16 18:29	160229-3	1546633
7440-39-3	Barium	53.1	ug/L		0.6	2	2	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-41-7	Beryllium	0.20	ug/L	U	0.2	0.5	0.5	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-42-8	Boron	21.4	ug/L	BN	15	50	50	1	P	HSC	02/25/16 12:09	022516A-2	1546625
7440-43-9	Cadmium	0.110	ug/L	U	0.11	1	1	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-70-2	Calcium	73200	ug/L		50	200	200	1	P	HSC	02/25/16 12:09	022516A-2	1546625
7440-47-3	Chromium	4.12	ug/L	B	2	10	10	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-48-4	Cobalt	0.211	ug/L	B	0.1	1	1	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-50-8	Copper	0.701	ug/L	B	0.35	1	1	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	02/25/16 12:09	022516A-2	1546625
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7439-95-4	Magnesium	18800	ug/L	N	110	300	300	1	P	HSC	02/25/16 12:09	022516A-2	1546625
7439-96-5	Manganese	1.25	ug/L	B	1	5	5	1	MS	PRB	02/29/16 18:29	160229-3	1546633
7439-98-7	Molybdenum	2.82	ug/L		0.165	0.5	0.5	1	MS	PRB	02/29/16 21:20	160229-4	1546633
7440-02-0	Nickel	1.43	ug/L	B	0.5	2	2	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-09-7	Potassium	5910	ug/L		50	150	150	1	P	HSC	02/25/16 12:09	022516A-2	1546625
7782-49-2	Selenium	3.43	ug/L	B	1.5	5	5	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-22-4	Silver	0.20	ug/L	U	0.2	1	1	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-23-5	Sodium	14500	ug/L		100	300	300	1	P	HSC	02/25/16 12:09	022516A-2	1546625
7440-24-6	Strontium	510	ug/L		2	10	10	1	MS	PRB	02/29/16 18:29	160229-3	1546633
7440-28-0	Thallium	0.502	ug/L	B	0.45	2	2	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-29-1	Thorium	0.383	ug/L	U	0.383	2	2	1	MS	PRB	02/29/16 21:20	160229-4	1546633
7440-31-5	Tin	1	ug/L	U	1	5	5	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-61-1	Uranium	5.74	ug/L		0.067	0.2	0.2	1	MS	SKJ	02/29/16 13:54	160229-5	1546633
7440-62-2	Vanadium	14.3	ug/L		1	5	5	1	P	HSC	02/25/16 12:09	022516A-2	1546625
7440-66-6	Zinc	3.5	ug/L	U	3.5	10	10	1	MS	SKJ	02/29/16 13:54	160229-5	1546633

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1546625	1546624	SW846 3005A	50	mL	50	mL	02/22/16	JXM5
1546633	1546632	SW846 3005A	50	mL	50	mL	02/22/16	JXM5

**\*Analytical Methods:**

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METALS

-1-

INORGANICS ANALYSIS DATA PACKAGE

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

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: March 14, 2016

Page 1 of 9

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 391727

Parmname	NOM	Sample Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>										
Batch	1546633									
QC1203494046	LCS									
Aluminum	2000		1980	ug/L		98.9	(80%-120%)	SKJ	02/29/16	13:50
Antimony	50.0		48.8	ug/L		97.7	(80%-120%)	PRB	02/29/16	18:10
Arsenic	50.0		49.6	ug/L		99.1	(80%-120%)			
Barium	50.0		48.4	ug/L		96.8	(80%-120%)	SKJ	02/29/16	13:50
Beryllium	50.0		53.0	ug/L		106	(80%-120%)			
Cadmium	50.0		48.9	ug/L		97.8	(80%-120%)			
Chromium	50.0		52.7	ug/L		105	(80%-120%)			
Cobalt	50.0		50.8	ug/L		102	(80%-120%)			
Copper	50.0		52.6	ug/L		105	(80%-120%)			
Lead	50.0		52.0	ug/L		104	(80%-120%)			
Manganese	50.0		48.2	ug/L		96.4	(80%-120%)	PRB	02/29/16	18:10
Molybdenum	50.0		49.6	ug/L		99.2	(80%-120%)		02/29/16	21:01
Nickel	50.0		51.0	ug/L		102	(80%-120%)	SKJ	02/29/16	13:50
Selenium	50.0		50.8	ug/L		102	(80%-120%)			
Silver	50.0		49.7	ug/L		99.4	(80%-120%)			
Strontium	50.0		51.1	ug/L		102	(80%-120%)	PRB	02/29/16	18:10
Thallium	50.0		50.6	ug/L		101	(80%-120%)	SKJ	02/29/16	13:50
Thorium	50.0		42.5	ug/L		85	(80%-120%)	PRB	02/29/16	21:01
Tin	50.0		50.9	ug/L		102	(80%-120%)	SKJ	02/29/16	13:50
Uranium	50.0		52.1	ug/L		104	(80%-120%)			

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1546633										
Zinc	50.0			49.8	ug/L		99.5	(80%-120%)	SKJ	02/29/16	13:50
QC1203494045	MB										
Aluminum			U	15.0	ug/L					02/29/16	13:46
Antimony			U	1.00	ug/L				PRB	02/29/16	18:07
Arsenic			U	1.70	ug/L						
Barium			U	0.600	ug/L				SKJ	02/29/16	13:46
Beryllium			U	0.200	ug/L						
Cadmium			U	0.110	ug/L						
Chromium			U	2.00	ug/L						
Cobalt			U	0.100	ug/L						
Copper			U	0.350	ug/L						
Lead			U	0.500	ug/L						
Manganese			U	1.00	ug/L				PRB	02/29/16	18:07
Molybdenum			U	0.165	ug/L					02/29/16	20:58
Nickel			U	0.500	ug/L				SKJ	02/29/16	13:46
Selenium			U	1.50	ug/L						
Silver			U	0.200	ug/L						
Strontium			U	2.00	ug/L				PRB	02/29/16	18:07
Thallium			U	0.450	ug/L				SKJ	02/29/16	13:46
Thorium			U	0.383	ug/L				PRB	02/29/16	20:58
Tin			U	1.00	ug/L				SKJ	02/29/16	13:46
Uranium			U	0.067	ug/L						

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1546633										
Zinc			U	3.50	ug/L				SKJ	02/29/16	13:46
QC1203494047 391727001 MS											
Aluminum	2000	U	15.0	1970	ug/L		98.2	(75%-125%)		02/29/16	14:22
Antimony	50.0	U	1.00	49.2	ug/L		97.7	(75%-125%)	PRB	02/29/16	18:17
Arsenic	50.0		5.22	57.1	ug/L		104	(75%-125%)			
Barium	50.0		51.4	94.8	ug/L		86.9	(75%-125%)	SKJ	02/29/16	14:22
Beryllium	50.0	U	0.200	56.4	ug/L		113	(75%-125%)			
Cadmium	50.0	U	0.110	48.8	ug/L		97.7	(75%-125%)			
Chromium	50.0	B	4.59	53.5	ug/L		97.9	(75%-125%)			
Cobalt	50.0	B	0.151	47.4	ug/L		94.5	(75%-125%)			
Copper	50.0		1.02	48.5	ug/L		95	(75%-125%)			
Lead	50.0	U	0.500	52.2	ug/L		104	(75%-125%)			
Manganese	50.0	B	4.13	51.0	ug/L		93.8	(75%-125%)	PRB	02/29/16	18:17
Molybdenum	50.0		2.93	52.6	ug/L		99.4	(75%-125%)		02/29/16	21:07
Nickel	50.0	B	1.37	48.1	ug/L		93.4	(75%-125%)	SKJ	02/29/16	14:22
Selenium	50.0	B	3.51	53.9	ug/L		101	(75%-125%)			
Silver	50.0	U	0.200	48.6	ug/L		97.3	(75%-125%)			
Strontium	50.0		512	560	ug/L		N/A	(75%-125%)	PRB	02/29/16	18:17
Thallium	50.0	B	0.489	50.6	ug/L		100	(75%-125%)	SKJ	02/29/16	14:22
Thorium	50.0	U	0.383	43.8	ug/L		87.2	(75%-125%)	PRB	02/29/16	21:07
Tin	50.0	U	1.00	53.0	ug/L		105	(75%-125%)	SKJ	02/29/16	14:22
Uranium	50.0		5.85	59.7	ug/L		108	(75%-125%)			

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1546633										
Zinc	50.0	U	3.50	50.7	ug/L		96	(75%-125%)	SKJ	02/29/16	14:22
QC1203494048 391727001 MSD											
Aluminum	2000	U	15.0	1960	ug/L	0.786	97.4	(0%-20%)		02/29/16	14:26
Antimony	50.0	U	1.00	49.8	ug/L	1.18	98.9	(0%-20%)	PRB	02/29/16	18:20
Arsenic	50.0		5.22	57.2	ug/L	0.133	104	(0%-20%)			
Barium	50.0		51.4	95.2	ug/L	0.465	87.8	(0%-20%)	SKJ	02/29/16	14:26
Beryllium	50.0	U	0.200	57.5	ug/L	2.05	115	(0%-20%)			
Cadmium	50.0	U	0.110	49.7	ug/L	1.83	99.5	(0%-20%)			
Chromium	50.0	B	4.59	53.9	ug/L	0.637	98.6	(0%-20%)			
Cobalt	50.0	B	0.151	47.0	ug/L	0.856	93.7	(0%-20%)			
Copper	50.0		1.02	49.0	ug/L	0.97	95.9	(0%-20%)			
Lead	50.0	U	0.500	52.6	ug/L	0.695	105	(0%-20%)			
Manganese	50.0	B	4.13	51.1	ug/L	0.0921	93.8	(0%-20%)	PRB	02/29/16	18:20
Molybdenum	50.0		2.93	53.0	ug/L	0.659	100	(0%-20%)		02/29/16	21:10
Nickel	50.0	B	1.37	47.9	ug/L	0.386	93	(0%-20%)	SKJ	02/29/16	14:26
Selenium	50.0	B	3.51	53.1	ug/L	1.45	99.2	(0%-20%)			
Silver	50.0	U	0.200	49.0	ug/L	0.774	98	(0%-20%)			
Strontium	50.0		512	569	ug/L	1.73	N/A	(0%-20%)	PRB	02/29/16	18:20
Thallium	50.0	B	0.489	51.7	ug/L	2.08	102	(0%-20%)	SKJ	02/29/16	14:26
Thorium	50.0	U	0.383	43.9	ug/L	0.244	87.4	(0%-20%)	PRB	02/29/16	21:10
Tin	50.0	U	1.00	52.7	ug/L	0.416	105	(0%-20%)	SKJ	02/29/16	14:26
Uranium	50.0		5.85	61.0	ug/L	2.23	110	(0%-20%)			

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1546633										
Zinc	50.0	U	3.50		51.5	ug/L	1.62	97.6	(0%-20%)	SKJ	02/29/16 14:26
QC1203494049 391727001 SDILT											
Aluminum		U	7.88	DU	75.0	ug/L	N/A		(0%-10%)		02/29/16 14:34
Antimony		U	0.338	DU	5.00	ug/L	N/A		(0%-10%)	PRB	02/29/16 18:26
Arsenic			5.22	DU	8.50	ug/L	N/A		(0%-10%)		
Barium			51.4	D	10.6	ug/L	3.38		(0%-10%)	SKJ	02/29/16 14:34
Beryllium		U	0.021	DU	1.00	ug/L	N/A		(0%-10%)		
Cadmium		U	-0.022	DU	0.550	ug/L	N/A		(0%-10%)		
Chromium		B	4.59	DU	10.0	ug/L	N/A		(0%-10%)		
Cobalt		B	0.151	DU	0.500	ug/L	N/A		(0%-10%)		
Copper			1.02	DU	1.75	ug/L	N/A		(0%-10%)		
Lead		U	0.089	DU	2.50	ug/L	N/A		(0%-10%)		
Manganese		B	4.13	DU	5.00	ug/L	N/A		(0%-10%)	PRB	02/29/16 18:26
Molybdenum			2.93	D	0.642	ug/L	9.67		(0%-10%)		02/29/16 21:16
Nickel		B	1.37	DU	2.50	ug/L	N/A		(0%-10%)	SKJ	02/29/16 14:34
Selenium		B	3.51	DU	7.50	ug/L	N/A		(0%-10%)		
Silver		U	0.014	DU	1.00	ug/L	N/A		(0%-10%)		
Strontium			512	D	101	ug/L	.898		(0%-10%)	PRB	02/29/16 18:26
Thallium		B	0.489	D	0.812	ug/L	730		(0%-10%)	SKJ	02/29/16 14:34
Thorium		U	0.154	DU	1.92	ug/L	N/A		(0%-10%)	PRB	02/29/16 21:16
Tin		U	0.277	DU	5.00	ug/L	N/A		(0%-10%)	SKJ	02/29/16 14:34
Uranium			5.85	D	1.25	ug/L	6.5		(0%-10%)		

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1546633										
Zinc		U	2.73	DU	17.5	ug/L	N/A	(0%-10%)	SKJ	02/29/16	14:34
<b>Metals Analysis-ICP</b>											
Batch	1546625										
QC1203494023	LCS										
Boron	500				523	ug/L	105	(80%-120%)	HSC	02/25/16	11:44
Calcium	5000				5190	ug/L	104	(80%-120%)			
Iron	5000				5210	ug/L	104	(80%-120%)			
Magnesium	5000				5310	ug/L	106	(80%-120%)			
Potassium	5000				4970	ug/L	99.4	(80%-120%)			
Sodium	5000				4660	ug/L	93.2	(80%-120%)			
Vanadium	500				508	ug/L	102	(80%-120%)			
QC1203494022	MB										
Boron			U		15.0	ug/L				02/25/16	11:40
Calcium			U		50.0	ug/L					
Iron			U		30.0	ug/L					
Magnesium			U		110	ug/L					
Potassium			U		50.0	ug/L					
Sodium			U		100	ug/L					
Vanadium			U		1.00	ug/L					
QC1203494024	391727001 MS										
Boron	500	BN	21.9	N	819	ug/L	159*	(75%-125%)		02/25/16	11:50
Calcium	5000		73800		83100	ug/L	N/A	(75%-125%)			
Iron	5000		197		5070	ug/L	97.4	(75%-125%)			
Magnesium	5000	N	19200	N	26400	ug/L	145*	(75%-125%)			

**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1546625										
Potassium	5000	5900		9950	ug/L		80.9	(75%-125%)			
Sodium	5000	14800		20200	ug/L		108	(75%-125%)	HSC	02/25/16	11:50
Vanadium	500	14.4		513	ug/L		99.7	(75%-125%)			
QC1203494027 391729001 MS											
Boron	500	290	N	564	ug/L		54.7*	(75%-125%)		02/25/16	12:15
Calcium	5000	78700		79300	ug/L		N/A	(75%-125%)			
Iron	5000	U	30.0	5390	ug/L		108	(75%-125%)			
Magnesium	5000	21200		24700	ug/L		N/A	(75%-125%)			
Potassium	5000	4960		11000	ug/L		122	(75%-125%)			
Sodium	5000	15900		20300	ug/L		89.4	(75%-125%)			
Vanadium	500	5.12		529	ug/L		105	(75%-125%)			
QC1203494025 391727001 MSD											
Boron	500	BN	21.9	N	823	ug/L	0.542	160*	(0%-20%)	02/25/16	11:54
Calcium	5000	73800		84200	ug/L	1.32	N/A	(0%-20%)			
Iron	5000	197		5120	ug/L	1.1	98.5	(0%-20%)			
Magnesium	5000	N	19200	N	26800	ug/L	1.41	152*	(0%-20%)		
Potassium	5000	5900		10100	ug/L	1.66	84.3	(0%-20%)			
Sodium	5000	14800		20700	ug/L	2.46	118	(0%-20%)			
Vanadium	500	14.4		516	ug/L	0.713	100	(0%-20%)			
QC1203494028 391729001 MSD											
Boron	500	290	N	560	ug/L	0.582	54*	(0%-20%)		02/25/16	12:18
Calcium	5000	78700		77700	ug/L	2.05	N/A	(0%-20%)			
Iron	5000	U	30.0	5280	ug/L	2.14	105	(0%-20%)			
Magnesium	5000	21200		24100	ug/L	2.77	N/A	(0%-20%)			

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1546625										
Potassium	5000	4960		10900	ug/L	1	119	(0%-20%)			
Sodium	5000	15900		19600	ug/L	3.51	75.4	(0%-20%)	HSC	02/25/16	12:18
Vanadium	500	5.12		527	ug/L	0.443	104	(0%-20%)			
QC1203497014	391727001 PS										
Boron	500	BN	21.9	538	ug/L		103	(80%-120%)		02/26/16	09:42
Magnesium	5000	N	19200	23200	ug/L		80.9	(80%-120%)			
QC1203497015	391729001 PS										
Boron	500		290	788	ug/L		99.7	(80%-120%)		02/26/16	09:46
QC1203494026	391727001 SDILT										
Boron		BN	21.9	DU	75.0	ug/L	N/A	(0%-10%)		02/25/16	11:57
Calcium			73800	D	14700	ug/L	.423	(0%-10%)			
Iron			197	D	38.8	ug/L	1.47	(0%-10%)			
Magnesium		N	19200	D	3860	ug/L	.752	(0%-10%)			
Potassium			5900	D	1180	ug/L	.344	(0%-10%)			
Sodium			14800	D	2990	ug/L	.902	(0%-10%)			
Vanadium			14.4	D	2.91	ug/L	.975	(0%-10%)			
QC1203494029	391729001 SDILT										
Boron			290	D	57.3	ug/L	1.2	(0%-10%)		02/25/16	12:21
Calcium			78700	D	15600	ug/L	1.11	(0%-10%)			
Iron		U	11.3	DU	150	ug/L	N/A	(0%-10%)			
Magnesium			21200	D	4210	ug/L	.793	(0%-10%)			
Potassium			4960	D	979	ug/L	1.4	(0%-10%)			
Sodium			15900	D	2920	ug/L	7.99	(0%-10%)			
Vanadium			5.12	DU	5.00	ug/L	N/A	(0%-10%)			

Notes:

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
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The Qualifiers in this report are defined as follows:

- \* Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- 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 #: GEL391727  
Work Order #: 391727**

**Product:** GAMMA\_GS:COMMON  
**Analytical Method:** 901.1\_GAMMA\_GS  
**Analytical Procedure:** GL-RAD-A-013 REV# 25  
**Analytical Batch:** 1546517

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>
391727001	B34549
1203493679	Method Blank (MB)
1203493680	391727001(B34549) Sample Duplicate (DUP)
1203493681	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Product:** SRISO\_SEP\_PRECIP\_GPC: COMMON  
**Analytical Method:** SRISO\_SEP\_PRECIP\_GPC  
**Analytical Procedure:** GL-RAD-A-004 REV# 17  
**Analytical Batch:** 1548452

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>
391727001	B34549
1203498636	Method Blank (MB)
1203498637	391915005(B34553) Sample Duplicate (DUP)
1203498638	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 1203498638 (LCS) was recounted due to low recovery. The recount is reported.

**Product:** 9310\_ALPHABETA\_GPC: COMMON

**Analytical Method:** BETA\_GPC

**Analytical Procedure:** GL-RAD-A-001 REV# 18

**Analytical Batch:** 1548453

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>
391727001	B34549
1203498639	Method Blank (MB)
1203498640	391915003(B34545) Sample Duplicate (DUP)
1203498641	391915003(B34545) Matrix Spike (MS)
1203498642	391915003(B34545) Matrix Spike Duplicate (MSD)
1203498643	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****Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

**Recounts**

Sample 1203498643 (LCS) was recounted due to high recovery. The recount is reported.

**Miscellaneous Information****Additional Comments**

The matrix spike and matrix spike duplicate, 1203498641 (B34545MS) and 1203498642 (B34545MSD), aliquots were reduced to conserve sample volume.

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

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

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

**Analytical Batch:** 1546555

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>
391727001	B34549
1203493794	Method Blank (MB)
1203493795	390499001(B34514) Sample Duplicate (DUP)
1203493796	390499001(B34514) Matrix Spike (MS)
1203493797	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 1203493796 (B34514MS) was recounted due to low recovery. The recount is reported. Sample 1203493795 (B34514DUP) was recounted to verify sample results. Recount is reported.

#### **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: GEL391727 GEL Work Order: 391727

**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:** 17 MAR 2016

**Title:** Group Leader

# Sample Data Summary

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

<b>SDG Number:</b> GEL391727	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0S16002
<b>Lab Sample ID:</b> 391727001	<b>Date Collected:</b> 02/18/2016 11:08	<b>Matrix:</b> WATER
	<b>Date Received:</b> 02/19/2016 09:00	
<b>Client ID:</b> B34549	<b>Method:</b> SRISO_SEP_PRECIP_GPC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1548452	<b>Analyst:</b> KSD1	<b>SOP Ref:</b> GL-RAD-A-004
<b>Run Date:</b> 03/15/2016 08:08	<b>Aliquot:</b> 300 mL	<b>Instrument:</b> PIC10D
<b>Data File:</b> S1548452r1.xls	<b>Prep Method:</b> EPA 905.0 Modified/DOE RP5	<b>Count Time:</b> 60 min
<b>Prep Batch:</b> 1548452		
<b>Prep Date:</b> 03/14/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90	U	0.430	pCi/L	+/-0.712	0.715	1.25	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	7.40	7.77	mg	95.3	(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).

Rad  
 Certificate of Analysis  
 Sample Summary

SDG Number: GEL391727  
 Lab Sample ID: 391727001

Client: CPRC001  
 Date Collected: 02/18/2016 11:08  
 Date Received: 02/19/2016 09:00

Project: CPRC0S16002  
 Matrix: WATER

Client ID: B34549  
 Batch ID: 1548453  
 Run Date: 03/03/2016 14:32  
 Data File: AB1548453r1.xls  
 Prep Batch: 1548453  
 Prep Date: 03/02/2016 14:29

Method: BETA\_GPC  
 Analyst: JXB7  
 Aliquot: 150 mL  
 Prep Method: EPA 900.0/SW846 9310

Prep Basis: "As Received"  
 SOP Ref: GL-RAD-A-001  
 Instrument: PIC10B  
 Count Time: 180 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha ALPHA		4.03	pCi/L	+/-2.19	2.29	3.00	3.00
12587-47-2	Beta BETA		17.8	pCi/L	+/-2.02	3.56	1.93	4.00

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).

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

SDG Number: GEL391727  
 Lab Sample ID: 391727001  
 Client ID: B34549  
 Batch ID: 1546517  
 Run Date: 02/24/2016 08:03  
 Data File: G391727001.CNF;1  
 Prep Batch: 1546517  
 Prep Date: 02/23/2016 00:00

Client: CPRC001  
 Date Collected: 02/18/2016 11:08  
 Date Received: 02/19/2016 09:00  
 Method: 901.1\_GAMMA\_GS  
 Analyst: MJH1  
 Aliquot: 2 L  
 Prep Method: EPA 901.1

Project: CPRC0S16002  
 Matrix: WATER  
 Prep Basis: "As Received"  
 SOP Ref: GL-RAD-A-013  
 Instrument: GAM04  
 Count Time: 120 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	U	1.20	pCi/L	+/-2.72	2.77	5.60	10.0
10198-40-0	Cobalt-60	U	1.23	pCi/L	+/-2.87	2.92	6.31	
14683-23-9	Europium-152	U	-7.87	pCi/L	+/-8.46	9.20	14.0	
15585-10-1	Europium-154	U	-6.02	pCi/L	+/-8.96	9.38	15.8	
14391-16-3	Europium-155	U	-5.39	pCi/L	+/-11.8	12.0	20.1	

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).

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

<b>SDG Number:</b> GEL391727	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0S16002
<b>Lab Sample ID:</b> 391727001	<b>Date Collected:</b> 02/18/2016 11:08	<b>Matrix:</b> WATER
	<b>Date Received:</b> 02/19/2016 09:00	
<b>Client ID:</b> B34549	<b>Method:</b> TRITIUM_DIST_LSC	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1546555	<b>Analyst:</b> TXJ1	<b>SOP Ref:</b> GL-RAD-A-002
<b>Run Date:</b> 02/25/2016 23:59	<b>Aliquot:</b> 50 mL	<b>Instrument:</b> LSCORANGE
<b>Data File:</b> T1546555.xls	<b>Prep Method:</b> EPA 906.0 Modified	<b>Count Time:</b> 120.0296 min
<b>Prep Batch:</b> 1546555		
<b>Prep Date:</b> 02/24/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		6060	pCi/L	+/-196	1190	86.1	100

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).

# Quality Control Summary

**GEL LABORATORIES LLC**

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**QC Summary**

Report Date: March 17, 2016

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**Client :** CH2MHill Plateau Remediation Company  
**MSIN R3-50 CHPRC**  
**PO Box 1600**  
**Richland, Washington 99352**  
**Contact:** Mr. Scot Fitzgerald  
**Workorder:** 391727

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1546517								
QC1203493679	MB								
Cesium-137			U	-1.41	pCi/L			MJH1	02/24/1610:47
				Uncert: +/-2.49					
				TPU: +/-2.57					
Cobalt-60			U	-1.53	pCi/L				
				Uncert: +/-2.49					
				TPU: +/-2.58					
Europium-152			U	3.89	pCi/L				
				Uncert: +/-7.02					
				TPU: +/-7.25					
Europium-154			U	-0.296	pCi/L				
				Uncert: +/-6.88					
				TPU: +/-6.88					
Europium-155			U	-3.86	pCi/L				
				Uncert: +/-10.4					
				TPU: +/-10.6					
QC1203493680	391727001	DUP							
Cesium-137		U	1.20	U	-0.478	pCi/L			02/24/1610:47
				Uncert: +/-2.72		RPD: 0	N/A		
				TPU: +/-2.77		RER: 0.742	(0-2)		
Cobalt-60		U	1.23	U	0.725	pCi/L			
				Uncert: +/-2.87		RPD: 0	N/A		
				TPU: +/-2.92		RER: 0.201	(0-2)		
Europium-152		U	-7.87	U	4.05	pCi/L			
				Uncert: +/-8.46		RPD: 0	N/A		
				TPU: +/-9.20		RER: 1.82	(0-2)		
Europium-154		U	-6.02	U	3.53	pCi/L			
				Uncert: +/-8.96		RPD: 0	N/A		
				TPU: +/-9.38		RER: 1.34	(0-2)		
Europium-155		U	-5.39	U	-2.32	pCi/L			
				Uncert: +/-11.8		RPD: 0	N/A		
				TPU: +/-12.0		RER: 0.352	(0-2)		
QC1203493681	LCS								
Americium-241	34400			36500	pCi/L	REC: 106	(80%-120%)		02/24/1611:02
				Uncert: +/-1510					
				TPU: +/-5550					
Cesium-137	13500			13500	pCi/L	REC: 100	(80%-120%)		
				Uncert: +/-348					
				TPU: +/-1270					
Cobalt-60	14100			14600	pCi/L	REC: 104	(80%-120%)		
				Uncert: +/-401					
				TPU: +/-1200					
Europium-152			U	10.3	pCi/L				
				Uncert: +/-233					
				TPU: +/-233					

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**QC Summary**

Workorder: 391727

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1546517								
Europium-154			U	-11.1	pCi/L				
				Uncert: +/-121					
				TPU: +/-121					
Europium-155			U	73.7	pCi/L				
				Uncert: +/-284					
				TPU: +/-287					
<b>Rad Gas Flow</b>									
Batch	1548452								
QC1203498636	MB								
Strontium-90			U	0.0725	pCi/L			KSD1	03/15/1608:09
				Uncert: +/-0.691					
				TPU: +/-0.691					
**Strontium Carrier		7.77		6.30	mg	REC: 81	(40%-110%)		
QC1203498637	391915005	DUP							
Strontium-90		U	-0.398	U	0.192	pCi/L			03/15/1608:09
			Uncert: +/-0.471		+/-0.759		RPD: 0	N/A	
			TPU: +/-0.471		+/-0.760		RER: 1.3	(0-2)	
**Strontium Carrier		7.77	7.20		6.60	mg	REC: 85	(40%-110%)	
QC1203498638	LCS								
Strontium-90			71.6		78.5	pCi/L	REC: 110	(80%-120%)	03/15/1611:32
			Uncert: +/-4.40						
			TPU: +/-14.2						
**Strontium Carrier		7.77			6.30	mg	REC: 81	(40%-110%)	
Batch	1548453								
QC1203498639	MB								
Alpha			U	0.196	pCi/L			JXB7	03/03/1614:32
				Uncert: +/-1.16					
				TPU: +/-1.16					
Beta			U	-0.394	pCi/L				
				Uncert: +/-1.48					
				TPU: +/-1.48					
QC1203498640	391915003	DUP							
Alpha		U	0.00642	U	1.25	pCi/L			03/03/1614:32
			Uncert: +/-1.55		+/-1.73		RPD: 0	N/A	
			TPU: +/-1.55		+/-1.75		RER: 1.04	(0-2)	
Beta			39.9		45.0	pCi/L			
			Uncert: +/-2.83		+/-3.02		RPD: 12	(0% - 20%)	
			TPU: +/-7.05		+/-8.20		RER: 0.927	(0-2)	
QC1203498641	391915003	MS							
Alpha		240	U	0.00642	247	pCi/L	REC: 103	(75%-125%)	03/03/1614:32
			Uncert: +/-1.55		+/-26.0				
			TPU: +/-1.55		+/-48.9				
Beta		883		39.9	1110	pCi/L	REC: 121	(75%-125%)	
			Uncert: +/-2.83		+/-38.5				
			TPU: +/-7.05		+/-187				
QC1203498642	391915003	MSD							
Alpha		240	U	0.00642	252	pCi/L	REC: 105	(75%-125%)	03/03/1614:32
			Uncert: +/-1.55		+/-27.3		RPD: 2	(0%-20%)	
			TPU: +/-1.55		+/-49.9		RER: 0.144	(0-2)	
							REC:		

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gas Flow</b>									
Batch	1548453								
Beta	883	39.9		1070	pCi/L	117	(75%-125%)		
	Uncert:	+/-2.83		+/-37.8		RPD:	3	(0%-20%)	
	TPU:	+/-7.05		+/-179		RER:	0.267	(0-2)	
QC1203498643	LCS								
Alpha	79.9			70.5	pCi/L	REC:	88	(80%-120%)	03/04/1611:23
	Uncert:			+/-7.02					
	TPU:			+/-14.1					
Beta	294			332	pCi/L	REC:	113	(80%-120%)	
	Uncert:			+/-12.0					
	TPU:			+/-57.8					
<b>Rad Liquid Scintillation</b>									
Batch	1546555								
QC1203493794	MB								
Tritium			U	-0.312	pCi/L			TXJ1	02/26/1605:20
	Uncert:			+/-47.7					
	TPU:			+/-47.7					
QC1203493795	390499001	DUP							
Tritium		10800		11300	pCi/L				02/29/1608:18
	Uncert:	+/-714		+/-740		RPD:	4	(0% - 20%)	
	TPU:	+/-2210		+/-2300		RER:	0.254	(0-2)	
QC1203493796	390499001	MS							
Tritium	2380	10800		12700	pCi/L	REC:	80	(75%-125%)	02/29/1608:35
	Uncert:	+/-714		+/-764					
	TPU:	+/-2210		+/-2580					
QC1203493797	LCS								
Tritium	2370			2210	pCi/L	REC:	93	(80%-120%)	02/26/1609:43
	Uncert:			+/-333					
	TPU:			+/-541					

**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
- 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 >= 2X the MDA and, after corrections, result is >= 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 >= 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.

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
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)									

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.