

7/27/2016



July 27, 2016

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

Re: CHPRC SAF X16-037
Work Order: 400415
SDG: GEL400415

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on June 30, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

B Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Purchase Order: 300071 - 7H
Chain of Custody: X16-037-069
Enclosures

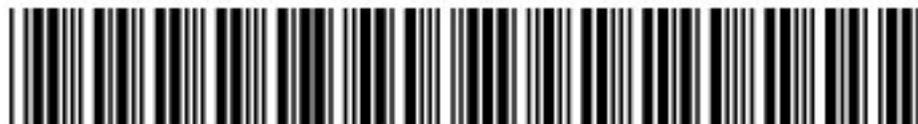


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Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF X16-037
SDG: GEL400415**

July 27, 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 June 30, 2016, for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

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

Sample Identification

The laboratory received the following samples:

Laboratory Identification	Sample Description
400415001	B35MB0
400415002	B35MB3

Case Narrative

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: GC/MS Volatile, General Chemistry, Metals and Radiochemistry.

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

7/27/2016

B. Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Technical Case Narrative
CH2M Hill Plateau Remediation Company (CPRC)
SDG #: GEL400415
Work Order #: 400415

GC/MS Volatile

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

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

Quality Control (QC) Information

Matrix Spike/Matrix Spike Duplicate Recovery Statement

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

Sample	Analyte	Value
1203578736 (Non SDG 400414001PS)	Acetone	61* (70.0%-130.0%)
1203578737 (Non SDG 400414001PSD)	Acetone	57* (70.0%-130.0%)

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

Method Blank (MB) Statement

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of sodium and zinc. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203577408 (MB).

General Chemistry

Alkalinity

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

Radiochemistry

SRISO_SEP_PRECIP_GPC: COMMON

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

TRITIUM_DIST_LSC: COMMON

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

Technical Information

Recounts

Sample 400415001 (B35MB0) was recounted to verify sample results. The recount results are similar to the original results. Original results are reported.

C14_LSC: COMMON

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

Certification Statement

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

Chain of Custody and Supporting Documentation

CH2M Hill Plateau Remediation Company
CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST
 C.O.C. # **X16-037-069**
 Page 1 of 1

Collector: Ed Kauer CHPRC
SAF No.: X16-037
Project Title: 100-KW Rebound Study, May 31, 2016
Shipped To (Lab): GEL Laboratories, LLC
Protocol: CERCLA

Contact/Requester: Karen Waters-Husted
Sampling Origin: Hanford Site
Logbook No.: HNF-N-506 8/137
Method of Shipment: Commercial Carrier
Priority: 30 Days **PRIORITY**

Telephone No.: 509-376-4650
Purchase Order/Charge Code: 304027
Ice Chest No.: GWS-546
Bill of Lading/Air Bill No.: 7700388 07AO
Offsite Property No.: 6784

SPECIAL INSTRUCTIONS: Hold Time
Special Handling: N/A
 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
B35MB0	N	W	JUN 29 2016	1225	1x250-mL G/P	2320_ALKALINITY: GW 01	14 Days	Cool <=6C
B35MB0	N	W			1x500-mL G/P	6010_METALS_ICP: COMMON	6 Months	HNO3 to pH <2
B35MB0	N	W			4x40-mL aGs*	8260_VOA_GCMS: COMMON	14 Days	HCl or H2SO4 to pH <2/Cool <=6C
B35MB0	N	W			1x500-mL G/P	C14_LSC: COMMON	6 Months	None
B35MB0	N	W			3x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2
B35MB0	N	W			1x500-mL P	TRITIUM_DIST_LSC: COMMON	6 Months	None
B35MB3	Y	W			1x500-mL G/P	6010_METALS_ICP: COMMON	6 Months	HNO3 to pH <2

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix *
Ed Kauer CHPRC	<i>[Signature]</i>		JUN 29 2016 1245	Christina Aguiar CHPRC	<i>[Signature]</i>		JUN 29 2016 1245	S = Soil, SE = Sediment, SO = Solid, SL = Sludge, W = Water, O = Oil, A = Air, DS = Drum Solids, DL = Drum Liquids, T = Tissue, WI = Wipe, L = Liquid, V = Vegetation, X = Other
Christina Aguiar CHPRC	<i>[Signature]</i>		JUN 29 2016 1400	FCDEX				
Christina Aguiar CHPRC	<i>[Signature]</i>		JUN 29 2016 1500	M. Kason	<i>[Signature]</i>		6-30-16 0915	
Relinquished By			Date/Time	Received By			Date/Time	
Relinquished By			Date/Time	Received By			Date/Time	



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: <u>CPRC</u>		SDG/AR/COC/Work Order: <u>400418</u>
Received By: <u>MLC</u>		Date Received: <u>6-30-16</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 checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>after 0</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"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius <u>2 C</u>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>152462912</u> Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7 VOA vials contain acid preservation?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
16 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7766 3981 0790</u>

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials DS Date 6/30/16 Page 1 of 1

Data Review Qualifier Definitions

Project Specific Qualifier Definitions for GEL Client Code: CPRC

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

Laboratory Certifications

List of current GEL Certifications as of 27 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 #: GEL400415
Work Order #: 400415**

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

Analytical Method: SW846 8260C

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

Analytical Batch: 1579107

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
400415001	B35MB0
1203578728	Method Blank (MB)
1203578729	Laboratory Control Sample (LCS)
1203578736	400414001(NonSDG) Post Spike (PS)
1203578737	400414001(NonSDG) Post Spike Duplicate (PSD)

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

Data Summary:

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

Quality Control (QC) Information

Matrix Spike/Matrix Spike Duplicate Recovery Statement

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

Sample	Analyte	Value
1203578736 (Non SDG 400414001PS)	Acetone	61* (70.0%-130.0%)
1203578737 (Non SDG 400414001PSD)	Acetone	57* (70.0%-130.0%)

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: GEL400415 GEL Work Order: 400415

The Qualifiers in this report are defined as follows:

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

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.

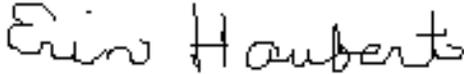
RA Indicates that sample is re-analyzed without re-extraction.

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: 21 JUL 2016

Title: Data Validator

Sample Data Summary

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 1

SDG Number: GEL400415	Date Collected: 06/29/2016 12:25	Matrix: WATER
Lab Sample ID: 400415001	Date Received: 06/30/2016 09:15	
Client ID: B35MB0	Client: CPRC001	Project: CPRC0X16037
Batch ID: 1579107	Method: SW846 8260C	SOP Ref: GL-OA-E-038
Run Date: 07/05/2016 15:22	Inst: VOA3.I	Dilution: 1
Prep Date: 07/05/2016 15:22	Analyst: CDS1	Purge Vol: 5 mL
Data File: 070516V3\3Q215.D	Column: DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	RDL
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	2.00	5.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	2.00	5.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	2.00	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	2.00	5.00
75-15-0	Carbon disulfide	U	1.60	ug/L	1.60	10.0	5.00
56-23-5	Carbon tetrachloride	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	J	0.430	ug/L	0.300	2.00	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	2.00	5.00
75-09-2	Methylene chloride	U	1.60	ug/L	1.60	5.00	5.00
127-18-4	Tetrachloroethylene	U	0.300	ug/L	0.300	2.00	5.00
108-88-3	Toluene	U	0.300	ug/L	0.300	2.00	5.00
79-01-6	Trichloroethylene		5.07	ug/L	0.300	2.00	5.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	2.00	10.0
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	2.00	10.0
78-93-3	2-Butanone	U	3.00	ug/L	3.00	10.0	10.0
108-10-1	4-Methyl-2-pentanone	U	3.00	ug/L	3.00	10.0	10.0
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	2.00	10.0
1330-20-7	Xylenes (total)	U	0.300	ug/L	0.300	6.00	10.0
67-64-1	Acetone	TU	3.00	ug/L	3.00	10.0	20.0

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: July 12, 2016

Page 1 of 6

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 400415

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS											
Batch	1579107										
QC1203578729	LCS										
1,1,1-Trichloroethane	50.0			59.6	ug/L		119	(70%-130%)	CDS1	07/05/16	08:46
1,1,2-Trichloroethane	50.0			52.0	ug/L		104	(70%-130%)			
1,1-Dichloroethane	50.0			56.7	ug/L		113	(70%-130%)			
1,1-Dichloroethylene	50.0			59.9	ug/L		120	(70%-130%)			
1,2-Dichloroethane	50.0			51.1	ug/L		102	(70%-130%)			
2-Butanone	250			291	ug/L		116	(70%-130%)			
4-Methyl-2-pentanone	250			240	ug/L		96	(70%-130%)			
Acetone	250			282	ug/L		113	(70%-130%)			
Benzene	50.0			56.2	ug/L		112	(70%-130%)			
Carbon disulfide	250			284	ug/L		114	(70%-130%)			
Carbon tetrachloride	50.0			56.8	ug/L		114	(70%-130%)			
Chlorobenzene	50.0			54.3	ug/L		109	(70%-130%)			
Chloroform	50.0			55.2	ug/L		110	(70%-130%)			
Ethylbenzene	50.0			52.8	ug/L		106	(70%-130%)			
Methylene chloride	50.0			56.9	ug/L		114	(70%-130%)			
Tetrachloroethylene	50.0			54.9	ug/L		110	(70%-130%)			
Toluene	50.0			53.7	ug/L		107	(70%-130%)			
Trichloroethylene	50.0			57.8	ug/L		116	(70%-130%)			
Vinyl chloride	50.0			50.7	ug/L		101	(70%-130%)			
Xylenes (total)	150			158	ug/L		105	(70%-130%)			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 400415

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS											
Batch	1579107										
**1,2-Dichloroethane-d4	50.0			47.1	ug/L		94	(70%-130%)	CDS1	07/05/16	08:46
**Bromofluorobenzene	50.0			51.8	ug/L		104	(70%-130%)			
**Toluene-d8	50.0			48.4	ug/L		97	(70%-130%)			
QC1203578728	MB										
1,1,1-Trichloroethane			U	0.300	ug/L					07/05/16	10:49
1,1,2-Trichloroethane			U	0.300	ug/L						
1,1-Dichloroethane			U	0.300	ug/L						
1,1-Dichloroethylene			U	0.300	ug/L						
1,2-Dichloroethane			U	0.300	ug/L						
2-Butanone			U	3.00	ug/L						
4-Methyl-2-pentanone			U	3.00	ug/L						
Acetone			U	3.00	ug/L						
Benzene			U	0.300	ug/L						
Carbon disulfide			U	1.60	ug/L						
Carbon tetrachloride			U	0.300	ug/L						
Chlorobenzene			U	0.300	ug/L						
Chloroform			U	0.300	ug/L						
Ethylbenzene			U	0.300	ug/L						
Methylene chloride			U	1.60	ug/L						
Tetrachloroethylene			U	0.300	ug/L						
Toluene			U	0.300	ug/L						
Trichloroethylene			U	0.300	ug/L						

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QC Summary

Workorder: 400415

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS											
Batch	1579107										
Vinyl chloride			U	0.300	ug/L				CDS1	07/05/16	10:49
Xylenes (total)			U	0.300	ug/L						
**1,2-Dichloroethane-d4	50.0			48.6	ug/L		97	(70%-130%)			
**Bromofluorobenzene	50.0			48.1	ug/L		96	(70%-130%)			
**Toluene-d8	50.0			49.2	ug/L		98	(70%-130%)			
QC1203578736 400414001 PS											
1,1,1-Trichloroethane	50.0	U	0.00	59.9	ug/L		120	(70%-130%)		07/05/16	17:04
1,1,2-Trichloroethane	50.0	U	0.00	50.3	ug/L		101	(70%-130%)			
1,1-Dichloroethane	50.0	U	0.00	56.3	ug/L		113	(70%-130%)			
1,1-Dichloroethylene	50.0	U	0.00	56.7	ug/L		113	(70%-130%)			
1,2-Dichloroethane	50.0	U	0.00	51.0	ug/L		102	(70%-130%)			
2-Butanone	250	U	0.00	195	ug/L		78	(70%-130%)			
4-Methyl-2-pentanone	250	U	0.00	238	ug/L		95	(70%-130%)			
Acetone	250	TU	0.00 T	151	ug/L		61 *	(70%-130%)			
Benzene	50.0	U	0.00	54.8	ug/L		110	(70%-130%)			
Carbon disulfide	250	U	0.00	270	ug/L		108	(70%-130%)			
Carbon tetrachloride	50.0	U	0.00	55.8	ug/L		112	(70%-130%)			
Chlorobenzene	50.0	U	0.00	52.5	ug/L		105	(70%-130%)			
Chloroform	50.0	J	1.75	56.0	ug/L		108	(70%-130%)			
Ethylbenzene	50.0	U	0.00	50.6	ug/L		101	(70%-130%)			
Methylene chloride	50.0	U	0.00	55.3	ug/L		111	(70%-130%)			
Tetrachloroethylene	50.0	U	0.00	51.8	ug/L		104	(70%-130%)			

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QC Summary

Workorder: 400415

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS											
Batch	1579107										
Toluene	50.0	U	0.00	52.7	ug/L		105	(70%-130%)	CDS1	07/05/16	17:04
Trichloroethylene	50.0	U	0.00	56.5	ug/L		113	(70%-130%)			
Vinyl chloride	50.0	U	0.00	49.4	ug/L		99	(70%-130%)			
Xylenes (total)	150	U	0.00	150	ug/L		100	(70%-130%)			
**1,2-Dichloroethane-d4	50.0		48.8	48.6	ug/L		97	(70%-130%)			
**Bromofluorobenzene	50.0		45.7	51.2	ug/L		102	(70%-130%)			
**Toluene-d8	50.0		48.4	48.8	ug/L		98	(70%-130%)			
QC1203578737 400414001 PSD											
1,1,1-Trichloroethane	50.0	U	0.00	59.3	ug/L	1	119	(0%-20%)		07/05/16	17:34
1,1,2-Trichloroethane	50.0	U	0.00	51.7	ug/L	3	103	(0%-20%)			
1,1-Dichloroethane	50.0	U	0.00	55.8	ug/L	1	112	(0%-20%)			
1,1-Dichloroethylene	50.0	U	0.00	56.8	ug/L	0	114	(0%-20%)			
1,2-Dichloroethane	50.0	U	0.00	50.7	ug/L	0	101	(0%-20%)			
2-Butanone	250	U	0.00	184	ug/L	6	74	(0%-20%)			
4-Methyl-2-pentanone	250	U	0.00	234	ug/L	2	94	(0%-20%)			
Acetone	250	TU	0.00	142	ug/L	6	57*	(0%-20%)			
Benzene	50.0	U	0.00	55.3	ug/L	1	111	(0%-20%)			
Carbon disulfide	250	U	0.00	267	ug/L	1	107	(0%-20%)			
Carbon tetrachloride	50.0	U	0.00	54.6	ug/L	2	109	(0%-20%)			
Chlorobenzene	50.0	U	0.00	52.7	ug/L	0	105	(0%-20%)			
Chloroform	50.0	J	1.75	54.5	ug/L	3	105	(0%-20%)			
Ethylbenzene	50.0	U	0.00	52.7	ug/L	4	105	(0%-20%)			

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QC Summary

Workorder: 400415

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS											
Batch	1579107										
Methylene chloride	50.0	U	0.00	52.5	ug/L	5	105	(0%-20%)	CDS1	07/05/16	17:34
Tetrachloroethylene	50.0	U	0.00	54.4	ug/L	5	109	(0%-20%)			
Toluene	50.0	U	0.00	53.0	ug/L	1	106	(0%-20%)			
Trichloroethylene	50.0	U	0.00	54.9	ug/L	3	110	(0%-20%)			
Vinyl chloride	50.0	U	0.00	48.5	ug/L	2	97	(0%-20%)			
Xylenes (total)	150	U	0.00	155	ug/L	4	104	(0%-20%)			
**1,2-Dichloroethane-d4	50.0		48.8	48.4	ug/L		97	(70%-130%)			
**Bromofluorobenzene	50.0		45.7	50.2	ug/L		100	(70%-130%)			
**Toluene-d8	50.0		48.4	49.5	ug/L		99	(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

Workorder: 400415

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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: GEL400415

Matrix Type: LIQUID

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203578729	LCS for batch 1579107	94	97	104
1203578728	MB for batch 1579107	97	98	96
400415001	B35MB0	107	104	97
1203578736	B34WV9PS	97	98	102
1203578737	B34WV9PSD	97	99	100

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 #: GEL400415
Work Order #: 400415

Product: Determination of Metals by ICP**Analytical Method:** 6010_METALS_ICP**Analytical Procedure:** GL-MA-E-013 REV# 26**Analytical Batch:** 1578541**Preparation Method:** SW846 3005A**Preparation Procedure:** GL-MA-E-006 REV# 13**Preparation Batch:** 1578538

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
400415001	B35MB0
400415002	B35MB3
1203577408	Method Blank (MB)ICP
1203577409	Laboratory Control Sample (LCS)
1203577412	400415001(B35MB0L) Serial Dilution (SD)
1203577410	400415001(B35MB0S) Matrix Spike (MS)
1203577411	400415001(B35MB0SD) 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.

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

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of sodium and zinc. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203577408 (MB).

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: GEL400415 GEL Work Order: 400415

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- D Results are reported from a diluted aliquot of sample.
- N Spike Sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

Review/Validation

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

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

Signature: 

Name: Nik-Cole Elmore

Date: 26 JUL 2016

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL400415

CONTRACT: CPRC0X16037

METHOD TYPE: SW846

SAMPLE ID: 400415001

BASIS: As Received

DATE COLLECTED 29-JUN-16

CLIENT ID: B35MB0

LEVEL: Low

DATE RECEIVED 30-JUN-16

MATRIX: WATER

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-36-0	Antimony	3.5	ug/L	U	3.5	10	10	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-38-2	Arsenic	5	ug/L	U	5	30	30	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-39-3	Barium	51.1	ug/L		1	5	5	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-43-9	Cadmium	1	ug/L	U	1	5	5	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-70-2	Calcium	51800	ug/L		50	200	200	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-47-3	Chromium	8.6	ug/L		1	5	5	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	07/13/16 13:03	071316-1	1578541
7439-89-6	Iron	33.7	ug/L	B	30	100	100	1	P	HSC	07/13/16 13:03	071316-1	1578541
7439-95-4	Magnesium	15400	ug/L		110	300	300	1	P	HSC	07/13/16 13:03	071316-1	1578541
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-02-0	Nickel	2.05	ug/L	B	1.5	5	5	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-09-7	Potassium	5640	ug/L		50	150	150	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-22-4	Silver	1	ug/L	U	1	5	5	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-23-5	Sodium	13400	ug/L		100	300	300	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-62-2	Vanadium	13.1	ug/L		1	5	5	1	P	HSC	07/13/16 13:03	071316-1	1578541
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	07/13/16 13:03	071316-1	1578541

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1578541	1578538	SW846 3005A	50	mL	50	mL	07/01/16	SXW1

***Analytical Methods:**

P SW846 3005A/6010C

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL400415

CONTRACT: CPRC0X16037

METHOD TYPE: SW846

SAMPLE ID: 400415002

BASIS: As Received

DATE COLLECTED 29-JUN-16

CLIENT ID: B35MB3

LEVEL: Low

DATE RECEIVED 30-JUN-16

MATRIX: WATER

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-36-0	Antimony	3.5	ug/L	U	3.5	10	10	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-38-2	Arsenic	5	ug/L	U	5	30	30	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-39-3	Barium	55.3	ug/L		1	5	5	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-43-9	Cadmium	1	ug/L	U	1	5	5	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-70-2	Calcium	56000	ug/L		50	200	200	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-47-3	Chromium	8.57	ug/L		1	5	5	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	07/13/16 13:00	071316-1	1578541
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	07/13/16 13:00	071316-1	1578541
7439-95-4	Magnesium	16500	ug/L		110	300	300	1	P	HSC	07/13/16 13:00	071316-1	1578541
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-02-0	Nickel	1.5	ug/L	U	1.5	5	5	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-09-7	Potassium	6110	ug/L		50	150	150	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-22-4	Silver	1	ug/L	U	1	5	5	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-23-5	Sodium	14200	ug/L		100	300	300	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-62-2	Vanadium	14.2	ug/L		1	5	5	1	P	HSC	07/13/16 13:00	071316-1	1578541
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	07/13/16 13:00	071316-1	1578541

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1578541	1578538	SW846 3005A	50	mL	50	mL	07/01/16	SXW1

***Analytical Methods:**

P SW846 3005A/6010C

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: July 26, 2016

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 400415

Parmname	NOM	Sample Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP										
Batch	1578541									
QC1203577409	LCS									
Antimony	500		527	ug/L		105	(80%-120%)	HSC	07/13/16	12:50
Arsenic	500		502	ug/L		100	(80%-120%)			
Barium	500		517	ug/L		103	(80%-120%)			
Cadmium	500		508	ug/L		102	(80%-120%)			
Calcium	5000		5250	ug/L		105	(80%-120%)			
Chromium	500		512	ug/L		102	(80%-120%)			
Cobalt	500		518	ug/L		104	(80%-120%)			
Copper	500		530	ug/L		106	(80%-120%)			
Iron	5000		5370	ug/L		107	(80%-120%)			
Magnesium	5000		5360	ug/L		107	(80%-120%)			
Manganese	500		514	ug/L		103	(80%-120%)			
Nickel	500		524	ug/L		105	(80%-120%)			
Potassium	5000		5010	ug/L		100	(80%-120%)			
Silver	500		512	ug/L		102	(80%-120%)			
Sodium	5000		5100	ug/L		102	(80%-120%)			
Vanadium	500		525	ug/L		105	(80%-120%)			
Zinc	500		500	ug/L		100	(80%-120%)			
QC1203577408	MB									
Antimony		U	3.50	ug/L					07/13/16	12:47
Arsenic		U	5.00	ug/L						

7/27/2016

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QC Summary

Workorder: 400415

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1578541										
Barium			U	1.00	ug/L						
Cadmium			U	1.00	ug/L				HSC	07/13/16	12:47
Calcium			U	50.0	ug/L						
Chromium			U	1.00	ug/L						
Cobalt			U	1.00	ug/L						
Copper			U	3.00	ug/L						
Iron			U	30.0	ug/L						
Magnesium			U	110	ug/L						
Manganese			U	2.00	ug/L						
Nickel			U	1.50	ug/L						
Potassium			U	50.0	ug/L						
Silver			U	1.00	ug/L						
Sodium			B	120	ug/L						
Vanadium			U	1.00	ug/L						
Zinc			B	9.61	ug/L						
QC1203577410 400415001 MS											
Antimony	500	U	3.50	520	ug/L		104	(75%-125%)		07/13/16	13:06
Arsenic	500	U	5.00	502	ug/L		99.5	(75%-125%)			
Barium	500		51.1	549	ug/L		99.6	(75%-125%)			
Cadmium	500	U	1.00	483	ug/L		96.5	(75%-125%)			
Calcium	5000		51800	57300	ug/L		N/A	(75%-125%)			
Chromium	500		8.60	499	ug/L		98.1	(75%-125%)			
Cobalt	500	U	1.00	478	ug/L		95.6	(75%-125%)			

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QC Summary

Workorder: 400415

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1578541										
Copper	500	U	3.00	517	ug/L		103	(75%-125%)	HSC	07/13/16	13:06
Iron	5000	B	33.7	5210	ug/L		104	(75%-125%)			
Magnesium	5000		15400	20600	ug/L		105	(75%-125%)			
Manganese	500	U	2.00	489	ug/L		97.7	(75%-125%)			
Nickel	500	B	2.05	464	ug/L		92.4	(75%-125%)			
Potassium	5000		5640	10700	ug/L		101	(75%-125%)			
Silver	500	U	1.00	496	ug/L		99.3	(75%-125%)			
Sodium	5000		13400	18600	ug/L		103	(75%-125%)			
Vanadium	500		13.1	527	ug/L		103	(75%-125%)			
Zinc	500	U	3.30	478	ug/L		95.7	(75%-125%)			
QC1203577411 400415001 MSD											
Antimony	500	U	3.50	532	ug/L	2.17	106	(0%-20%)		07/13/16	13:09
Arsenic	500	U	5.00	510	ug/L	1.59	101	(0%-20%)			
Barium	500		51.1	557	ug/L	1.42	101	(0%-20%)			
Cadmium	500	U	1.00	490	ug/L	1.52	98	(0%-20%)			
Calcium	5000		51800	58700	ug/L	2.27	N/A	(0%-20%)			
Chromium	500		8.60	508	ug/L	1.83	99.9	(0%-20%)			
Cobalt	500	U	1.00	486	ug/L	1.59	97.2	(0%-20%)			
Copper	500	U	3.00	527	ug/L	1.92	105	(0%-20%)			
Iron	5000	B	33.7	5320	ug/L	2.01	106	(0%-20%)			
Magnesium	5000		15400	21000	ug/L	1.75	112	(0%-20%)			
Manganese	500	U	2.00	498	ug/L	1.86	99.6	(0%-20%)			

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QC Summary

Workorder: 400415

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1578541										
Nickel	500	B	2.05	489	ug/L	5.22	97.4	(0%-20%)	HSC	07/13/16	13:09
Potassium	5000		5640	10900	ug/L	1.79	105	(0%-20%)			
Silver	500	U	1.00	503	ug/L	1.31	101	(0%-20%)			
Sodium	5000		13400	18800	ug/L	1.24	108	(0%-20%)			
Vanadium	500		13.1	537	ug/L	1.88	105	(0%-20%)			
Zinc	500	U	3.30	489	ug/L	2.13	97.7	(0%-20%)			
QC1203577412	400415001	SDILT									
Antimony		U	2.38 DU	17.5	ug/L	N/A		(0%-10%)		07/13/16	13:12
Arsenic		U	4.57 DU	25.0	ug/L	N/A		(0%-10%)			
Barium			51.1 D	10.1	ug/L	1.32		(0%-10%)			
Cadmium		U	0.055 DU	5.00	ug/L	N/A		(0%-10%)			
Calcium			51800 D	10600	ug/L	2.18		(0%-10%)			
Chromium			8.60 BD	1.73	ug/L	.422		(0%-10%)			
Cobalt		U	-0.47 DU	5.00	ug/L	N/A		(0%-10%)			
Copper		U	0.843 DU	15.0	ug/L	N/A		(0%-10%)			
Iron		B	33.7 DU	150	ug/L	N/A		(0%-10%)			
Magnesium			15400 D	3150	ug/L	2.39		(0%-10%)			
Manganese		U	0.307 DU	10.0	ug/L	N/A		(0%-10%)			
Nickel		B	2.05 DU	7.50	ug/L	N/A		(0%-10%)			
Potassium			5640 D	1120	ug/L	1.07		(0%-10%)			
Silver		U	-1.06 DU	5.00	ug/L	N/A		(0%-10%)			
Sodium			13400 D	2740	ug/L	2.02		(0%-10%)			

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QC Summary

Workorder: 400415

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1578541										
Vanadium		13.1	BD	2.68	ug/L	2.33		(0%-10%)	HSC	07/13/16	13:12
Zinc	U	-0.975	D	34.7	ug/L	N/A		(0%-10%)			

Notes:

The Qualifiers in this report are defined as follows:

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

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

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

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

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

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

General Chem Analysis

Case Narrative

**General Chemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL400415
Work Order #: 400415**

Product: Alkalinity

Analytical Method: 2320_ALKALINITY

Analytical Procedure: GL-GC-E-033 REV# 12

Analytical Batch: 1578692

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
400415001	B35MB0
1203577776	Method Blank (MB)
1203577777	Laboratory Control Sample (LCS)
1203577779	400390001(NonSDG) Sample Duplicate (DUP)

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

Data Summary:

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

Certification Statement

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

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL400415 GEL Work Order: 400415

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Aubrey Kingsbury

Date: 20 JUL 2016

Title: Analyst I

Sample Data Summary

7/27/2016

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: July 20, 2016

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF X16-037

Client Sample ID: B35MB0 Project: CPRC0X16037
 Sample ID: 400415001 Client ID: CPRC001
 Matrix: WATER
 Collect Date: 29-JUN-16 12:25
 Receive Date: 30-JUN-16
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis												
2320_ALKALINITY: GW 01 "As Received"												
Alkalinity, Total as CaCO3		120000	725	1000	ug/L			RXB5	06/30/16	1835	1578692	1
Bicarbonate alkalinity (CaCO3)		120000	725	1000	ug/L							
Carbonate alkalinity (CaCO3)	U	725	725	1000	ug/L							
Hydroxide alkalinity as CaCO3	U	725	725	1000	ug/L							

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	2320_ALKALINITY	

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: July 20, 2016

CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 400415

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1578692										
QC1203577779	400390001	DUP									
Alkalinity, Total as CaCO3		124000		123000	ug/L	0.409		(0%-20%)	RXB5	06/30/16	18:09
Bicarbonate alkalinity (CaCO3)		124000		123000	ug/L	0.409		(0%-20%)			
Carbonate alkalinity (CaCO3)	U	725	U	725	ug/L	N/A					
Hydroxide alkalinity as CaCO3	U	725	U	725	ug/L	N/A					
QC1203577777	LCS										
Alkalinity, Total as CaCO3	50000			55000	ug/L		110	(80%-120%)		06/30/16	17:52
QC1203577776	MB										
Alkalinity, Total as CaCO3			U	725	ug/L					06/30/16	17:50
Bicarbonate alkalinity (CaCO3)			U	725	ug/L						
Carbonate alkalinity (CaCO3)			U	725	ug/L						
Hydroxide alkalinity as CaCO3			U	725	ug/L						

Notes:

The Qualifiers in this report are defined as follows:

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

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QC Summary

Workorder: 400415

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

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

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

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

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

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL400415
Work Order #: 400415

Product: SRISO_SEP_PRECIP_GPC: COMMON

Analytical Method: SRISO_SEP_PRECIP_GPC

Analytical Procedure: GL-RAD-A-004 REV# 17

Analytical Batch: 1579220

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
400415001	B35MB0
1203579106	Method Blank (MB)
1203579107	400141005(B35ML6) Sample Duplicate (DUP)
1203579108	Laboratory Control Sample (LCS)

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

Data Summary:

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

Product: TRITIUM_DIST_LSC: COMMON

Analytical Method: TRITIUM_DIST_LSC

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

Analytical Batch: 1579141

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
400415001	B35MB0
1203578832	Method Blank (MB)
1203578833	400025001(B35M74) Sample Duplicate (DUP)
1203578834	400025001(B35M74) Matrix Spike (MS)
1203578835	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 400415001 (B35MB0) was recounted to verify sample results. The recount results are similar to the original results. Original results are reported.

Product: C14_LSC: COMMON

Analytical Method: C14_LSC

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

Analytical Batch: 1580362

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
400415001	B35MB0
1203581480	Method Blank (MB)
1203581481	400415001(B35MB0) Sample Duplicate (DUP)
1203581482	400415001(B35MB0) Matrix Spike (MS)
1203581483	Laboratory Control Sample (LCS)

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

Data Summary:

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

Certification Statement

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

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL400415 GEL Work Order: 400415

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: 25 JUL 2016

Title: Group Leader

Sample Data Summary

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL400415	Client: CPRC001	Project: CPRC0X16037
Lab Sample ID: 400415001	Date Collected: 06/29/2016 12:25	Matrix: WATER
	Date Received: 06/30/2016 09:15	
Client ID: B35MB0	Method: SRISO_SEP_PRECIP_GPC	Prep Basis: "As Received"
Batch ID: 1579220	Analyst: BXF1	SOP Ref: GL-RAD-A-004
Run Date: 07/13/2016 13:40	Aliquot: 300 mL	Instrument: PIC13B
Data File: S1579220r1.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 1579220		
Prep Date: 07/12/2016 14:13		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90	U	0.124	pCi/L	+/-0.647	0.647	1.22	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	7.20	7.37	mg	97.8	(40%-110%)

Comments:

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

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL400415	Client: CPRC001	Project: CPRC0X16037
Lab Sample ID: 400415001	Date Collected: 06/29/2016 12:25	Matrix: WATER
	Date Received: 06/30/2016 09:15	
Client ID: B35MB0	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1579141	Analyst: TXJ1	SOP Ref: GL-RAD-A-002
Run Date: 07/14/2016 06:17	Aliquot: 50 mL	Instrument: LSCBROWN
Data File: T1579141.xls	Prep Method: EPA 906.0 Modified	Count Time: 45 min
Prep Batch: 1579141		
Prep Date: 07/13/2016 10:38		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		1120	pCi/L	+/-244	326	340	400

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

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

**Rad
Certificate of Analysis
Sample Summary**

SDG Number: GEL400415	Client: CPRC001	Project: CPRC0X16037
Lab Sample ID: 400415001	Date Collected: 06/29/2016 12:25	Matrix: WATER
	Date Received: 06/30/2016 09:15	
Client ID: B35MB0	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1580362	Analyst: TXJ1	SOP Ref: GL-RAD-A-003
Run Date: 07/19/2016 20:16	Aliquot: 60 mL	Instrument: LSCSILVER
Data File: C1580362.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 30 min
Prep Batch: 1580362		
Prep Date: 07/19/2016 08:44		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14		365	pCi/L	+/-32.0	74.9	40.1	50.0

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

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

Quality Control Summary

7/27/2016

GEL LABORATORIES LLC

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QC Summary

Report Date: July 25, 2016

Page 1 of 3

Client : CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352

Contact: Mr. Scot Fitzgerald

Workorder: 400415

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gas Flow									
Batch	1579220								
QC1203579106	MB								
Strontium-90			U	0.441	pCi/L			BXF1	07/13/1613:40
				Uncert: +/-0.786					
				TPU: +/-0.789					
**Strontium Carrier		7.37		5.90	mg	REC: 80	(40%-110%)		
QC1203579107	400141005	DUP							
Strontium-90		U	-0.937	U	-0.00283				07/13/1613:40
				Uncert: +/-0.740		RPD: 0	N/A		
				TPU: +/-0.740		RER: 1.91	(0-2)		
**Strontium Carrier		7.37	6.90	7.10	mg	REC: 96	(40%-110%)		
QC1203579108	LCS								
Strontium-90		72.9		77.0	pCi/L	REC: 106	(80%-120%)		07/13/1613:32
				Uncert: +/-4.42					
				TPU: +/-12.8					
**Strontium Carrier		7.37		7.30	mg	REC: 99	(40%-110%)		
Rad Liquid Scintillation									
Batch	1579141								
QC1203578832	MB								
Tritium			U	-4.81	pCi/L			TXJ1	07/14/1607:52
				Uncert: +/-190					
				TPU: +/-190					
QC1203578833	400025001	DUP							
Tritium		1460		1490	pCi/L				07/14/1608:39
				Uncert: +/-246		RPD: 2	(0% - 100%)		
				TPU: +/-374		RER: 0.109	(0-2)		
QC1203578834	400025001	MS							
Tritium		2330	1460	3380	pCi/L	REC: 82	(75%-125%)		07/14/1609:26
				Uncert: +/-246					
				TPU: +/-374					
QC1203578835	LCS								
Tritium		2320		1860	pCi/L	REC: 80	(80%-120%)		07/14/1610:13
				Uncert: +/-260					
				TPU: +/-444					
Batch	1580362								
QC1203581480	MB								
Carbon-14			U	-18.5	pCi/L			TXJ1	07/19/1621:19
				Uncert: +/-22.4					
				TPU: +/-22.4					
QC1203581481	400415001	DUP							
Carbon-14		365		366	pCi/L				07/19/1621:51
				Uncert: +/-32.0		RPD: 0	(0% - 20%)		
				TPU: +/-74.9		RER: 0.0288	(0-2)		
QC1203581482	400415001	MS							
Carbon-14		1260	365	1590	pCi/L	REC: 97	(75%-125%)		07/19/1622:23

QC Summary

Workorder: 400415

Page 2 of 3

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Liquid Scintillation										
Batch	1580362									
		Uncert:	+/-32.0	+/-51.2						
		TPU:	+/-74.9	+/-300						
QC1203581483	LCS									
Carbon-14	1260			1230	pCi/L	REC: 98 (80%-120%)			07/19/1622:54	
		Uncert:		+/-46.9						
		TPU:		+/-234						

Notes:

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

The Qualifiers in this report are defined as follows:

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

7/27/2016

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QC Summary

Workorder: 400415

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

** Indicates analyte is a surrogate compound.

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

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

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