

May 10, 2018

Rev 0



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May 10, 2018

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

Re: CHPRC SAF W18-004
Work Order: 447944
SDG: GEL447944

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 13, 2018. 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,


Anna Dupree for
Heather Shaffer
Project Manager

Purchase Order: 300071-7H
Chain of Custody: W18-004-104, W18-004-119 and W18-004-120
Enclosures



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Case Narrative

**General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF W18-004
SDG: GEL447944**

May 10, 2018

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 April 13, 2018, 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.

Sample Identification

The laboratory received the following samples:

<u>Laboratory Identification</u>	<u>Sample Description</u>
447944001	B3HR12
447944002	B3HR10
447944003	B3HRJ6
447944004	B3HRK1

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 Semivolatile Herbicide, GC Semivolatile Pesticide, 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.



Anna Dupree for
Heather Shaffer
Project Manager

Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL447944
Work Order #: 447944

GC Semivolatile Pesticide

Organochlorine Pesticides and Chlorinated Hydrocarbons

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 (CCV) Requirements

Calibration verification standards (ICV or CCV) requirements have not been met for samples in this batch in this SDG. One or more target analytes failed acceptance criteria with a positive bias in the standards bracketing the samples in this SDG. These target analytes were not detected above the PQL in the associated environmental samples; therefore, the non-compliance had no adverse effect on the data.

Technical Information

Florisol

Florisol clean-up was not performed on client and quality control samples in this batch.

Miscellaneous Information

Additional Comments

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The following additional comments were required:

Detected target analytes were reported from the analytical column with the lower concentration. Results below the method detection limit (non-detects) were reported from column one.

Due to software issue, the surrogate recovery range was not indicated or possibly indicated incorrectly in Quantitation Report. Please see Surrogate Recovery Report for correct surrogate recovery acceptance limits.

The Toxaphene and/or Chlordane standards were analyzed for this SDG as a retention time marker and pattern reference. A five-point calibration curve and calibration verification standard forms were not submitted in the data package since Toxaphene and/or Chlordane were not detected in the client samples.

GC Semivolatile Herbicide

Analysis of Chlorophenoxy Acid Herbicides by ECD

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 (CCV) Requirements

The calibration verification standards (CCV) did not meet acceptance criteria. MCPP failed acceptance criteria with a negative bias on one analytical column in the standards bracketing samples 447944003 (B3HRJ6) and 447944004 (B3HRK1) and associated QC. The negative bias for the analytical data is a result of instrument response decreasing after the initial calibration. The instrument response never decreased to a point where the target analytes would not be detected. All analytes were within the established retention time windows for this method.

Quality Control (QC) Information

Surrogate Recoveries

Samples (See Below) did not meet surrogate recovery acceptance criteria. Since there were no target analytes detected in the associated samples above the reporting limits, the biased high surrogate recoveries had no adverse impact on the reported data.

Sample	Analyte	Value
1204008888 (B3HRJ6MS)	2, 4-Dichlorophenylacetic acid	266* (42%-136%)
1204008889 (B3HRJ6MSD)	2, 4-Dichlorophenylacetic acid	245* (42%-136%)

Laboratory Control Sample (LCS) Recovery

The LCS (See Below) did not meet spike recovery acceptance criteria for Dinoseb. The client established the limits of 70%-130%. However, Dinoseb was within GEL SPC limits. The PM was notified and instructed the lab to report.

Sample	Analyte	Value
1204008885 (LCS)	Dinoseb	54* (70%-130%)

Miscellaneous Information

Manual Integrations

Samples 1204008888 (B3HRJ6MS) and 1204008889 (B3HRJ6MSD) required manual integration to correctly position the baseline as set in the calibration standard injections.

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 acceptance criteria. However, where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

Sample	Analyte	Value
1204008783 (MB)	Antimony	4.24 between (3.5 - 5)

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

RAISO_SEP_GPC

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.

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

Sample Re-prep/Re-analysis

Samples 447944003 (B3HRJ6) and 447944004 (B3HRK1) were re-prepped due to high relative percent difference/relative error ratio. The re-analysis is being reported.

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.

Miscellaneous Information

Additional Comments

The matrix spike and matrix spike duplicate, 1204018053 (B3HRJ6MS) and 1204018054 (B3HRJ6MSD), aliquots were reduced to conserve sample volume.

903.1_RA-226_LUC: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.

Miscellaneous Information**Additional Comments**

The matrix spike, 1204007972 (B3HRJ6MS), aliquot was reduced to conserve sample volume.

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

CH2MHill Plateau Remediation Company Larry Rosane ACHRC		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 447 944		C.O.C.# W18-004-119 Page 1 of 1			
Collector: Larry Rosane ACHRC	Contact/Requester: Karen Waters-Husted	Telephone No.: 509-376-4650		Preservative: Cool <=6C			
SAF No.: W18-004	Sampling Origin: Hanford Site	Purchase Order/Charge Code: 300071		Preservative: Cool <=6C			
Project Title: RCRA_WAC, APRIL 2018	Logbook No.: HNF-N-506 97/83	Ice Chest No.: GWS-683		Preservative: Cool <=6C			
Shipped To (Lab): GEL Laboratories, LLC	Method of Shipment: Commercial Carrier	Bill of Lading/Air Bill No.: 771984766642		Preservative: HNO3 to pH <2			
Protocol: RCRA	Priority: 30 Days	Offsite Property No.: 9306		Preservative: HNO3 to pH <2			
POSSIBLE SAMPLE HAZARDS/REMARK ** ** 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		SPECIAL INSTRUCTIONS N/A					
Sample No.	Filter	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3HRJ6	N	4-12-18	0905	1x250-mL G/P	2320_ALKALINITY: GW 01	14 Days	Cool <=6C
B3HRJ6	N			4x1-L aG	8081_PEST_GC: COMMON	7/40 Days	Cool <=6C
B3HRJ6	N			4x1-L aG	8151_HERBICIDE_GC: COMMON	7/40 Days	Cool <=6C
B3HRJ6	N			1x1-L G/P	903.1_RA226_LUC: COMMON	6 Months	HNO3 to pH <2
B3HRJ6	N			1x1-L P	9310_ALPHABETA_GPC: COMMON	6 Months	HNO3 to pH <2
B3HRJ6	N	4-12-18	0905	1x1-L G/P	RAISO_SEP_GPC: COMMON	6 Months	HNO3 to pH <2

DM-4/12/18

Relinquished By: Larry Rosane ACHRC	Signature	Date/Time APR 12 2018 1400	Received By: FEDEX	Signature	Date/Time APR 12 2018 1400
Relinquished By: Larry Rosane ACHRC	Signature	Date/Time APR 12 2018 1400	Received By: SBOONK	Signature	Date/Time 4/13/18 905
Relinquished By: Larry Rosane ACHRC	Signature	Date/Time APR 12 2018 1400	Received By: SBOONK	Signature	Date/Time 4/13/18 905
Relinquished By: Larry Rosane ACHRC	Signature	Date/Time APR 12 2018 1400	Received By: SBOONK	Signature	Date/Time 4/13/18 905

Matrix *

S = Soil
 SE = Sediment
 SO = Solid
 SL = Sludge
 W = Water
 O = Oil
 A = Air

DS = Drum Solids
 DL = Drum Liquid
 T = Tissue
 WI = Wipe
 L = Liquid
 V = Vegetation
 X = Other

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



SAMPLE RECEIPT & REVIEW FORM

Client: CPRC		SDG/AR/COC/Work Order: 447944		
Received By: STACY BOONE		Date Received: APR 13, 2018		
Carrier and Tracking Number		Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other 7719 8116 5066 - ic 7719 8476 6642 - ic		
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.		
Shipped as a DOT Hazardous?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____		
COC/Samples marked or classified as radioactive?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM / mR/Hr Classified as: <u>Rnd 1</u> Rnd 2 Rnd 3		
Is package, COC, and/or Samples marked HAZ?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____		
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 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: <u>Wet Ice</u> Ice Packs Dry Ice None Other: *all temperatures are recorded in Celsius TEMP: _____
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>1R3-17</u> Secondary Temperature Device Serial # (If Applicable): _____
5 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)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Yes, Are Encores or Soil Kits present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A (If unknown, select No) VOA vials free of headspace? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9 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: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: _____
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: _____
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Comments (Use Continuation Form if needed):				

PM (or PMA) review: Initials ASJ Date 4/16/18 Page 1 of 1

Data Review Qualifier Definitions

GEL LABORATORIES LLC

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

Report Date: 10-MAY-18

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 analyte was detected in the associated method blank \geq MDC or $>5\%$ sample activity.	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 10 May 2018

State	Certification
Alaska	17-018
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	LA180011
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
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
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-18-13
Utah NELAP	SC000122018-26
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Pesticide Analysis

Case Narrative

**GC Semivolatile Pesticide
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL447944
Work Order #: 447944**

Product: Organochlorine Pesticides and Chlorinated Hydrocarbons

Analytical Method: SW846 3535A/8081B

Analytical Procedure: GL-OA-E-041 REV# 19

Analytical Batch: 1756268

Preparation Method: SW846 3535A

Preparation Procedure: GL-OA-E-070 REV# 9

Preparation Batch: 1756267

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
447944003	B3HRJ6
1204010333	Method Blank (MB)
1204010334	Laboratory Control Sample (LCS)
1204010335	447944003(B3HRJ6) Matrix Spike (MS)
1204010336	447944003(B3HRJ6) Matrix Spike Duplicate (MSD)

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

Data Summary:

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

Calibration Information

Continuing Calibration Verification (CCV) Requirements

Calibration verification standards (ICV or CCV) requirements have not been met for samples in this batch in this SDG. One or more target analytes failed acceptance criteria with a positive bias in the standards bracketing the samples in this SDG. These target analytes were not detected above the PQL in the associated environmental samples; therefore, the non-compliance had no adverse effect on the data.

Technical Information

Florisil

Florisil clean-up was not performed on client and quality control samples in this batch.

Miscellaneous Information

Additional Comments

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The following additional comments were required:

Detected target analytes were reported from the analytical column with the lower concentration. Results below the method detection limit (non-detects) were reported from column one.

Due to software issue, the surrogate recovery range was not indicated or possibly indicated incorrectly in Quantitation Report. Please see Surrogate Recovery Report for correct surrogate recovery acceptance limits.

The Toxaphene and/or Chlordane standards were analyzed for this SDG as a retention time marker and pattern reference. A five-point calibration curve and calibration verification standard forms were not submitted in the data package since Toxaphene and/or Chlordane were not detected in the client samples.

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: GEL447944 GEL Work Order: 447944

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.

DL Indicates that sample is diluted.

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

RE Indicates that sample is re-extracted.

Review/Validation

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

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

Signature: 

Name: Jimin Cao

Date: 20 APR 2018

Title: Data Validator

Sample Data Summary

Pesticide
Certificate of Analysis
Sample Summary

Page 1 of 1

SDG Number: GEL447944
Lab Sample ID: 447944003

Client ID: B3HRJ6
Batch ID: 1756268
Run Date: 04/17/2018 19:32
Prep Date: 04/17/2018 07:28
Data File: 041718\E6D1721.D
041718\E6D1721.D

Date Collected: 04/12/2018 09:05
Date Received: 04/13/2018 09:05
Client: CPRC001
Method: SW846 3535A/8081B
Inst: ECD6A.I
Analyst: RXE1
Aliquot: 1130 mL
Column: 1 CLP
2 CLP2

Matrix: WATER

Project: CPRC0W18004
SOP Ref: GL-OA-E-041
Dilution: 1
Inj. Vol: 1 uL
Final Volume: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	RDL	Column
309-00-2	Aldrin	U	0.00588	ug/L	0.00588	0.0177	0.050	1
60-57-1	Dieldrin	U	0.00885	ug/L	0.00885	0.0354	0.050	1
959-98-8	Endosulfan I	U	0.00588	ug/L	0.00588	0.0177	0.050	1
1024-57-3	Heptachlor epoxide	U	0.00588	ug/L	0.00588	0.0177	0.050	1
319-84-6	alpha-BHC	U	0.00588	ug/L	0.00588	0.0177	0.050	1
319-85-7	beta-BHC	U	0.00588	ug/L	0.00588	0.0177	0.050	1
319-86-8	delta-BHC	U	0.00588	ug/L	0.00588	0.0177	0.050	1
58-89-9	gamma-BHC (Lindane)	U	0.00588	ug/L	0.00588	0.0177	0.050	1
72-54-8	4,4'-DDD	U	0.00885	ug/L	0.00885	0.0354	0.100	1
72-55-9	4,4'-DDE	U	0.00885	ug/L	0.00885	0.0354	0.100	1
50-29-3	4,4'-DDT	U	0.00885	ug/L	0.00885	0.0354	0.100	1
33213-65-9	Endosulfan II	U	0.00885	ug/L	0.00885	0.0354	0.100	1
1031-07-8	Endosulfan sulfate	U	0.00885	ug/L	0.00885	0.0354	0.100	1
72-20-8	Endrin	U	0.00885	ug/L	0.00885	0.0354	0.100	1
7421-93-4	Endrin aldehyde	U	0.00588	ug/L	0.00588	0.0354	0.100	1
72-43-5	Methoxychlor	U	0.0442	ug/L	0.0442	0.177	0.500	1
8001-35-2	Toxaphene	U	0.133	ug/L	0.133	0.442	2.00	1

Quality Control Summary

Surrogate Recovery Report

SDG Number: GEL447944

Matrix Type: LIQUID

Sample ID	Client ID	4CMX 1 %REC #	4CMX 2 %REC #	DCB 1 %REC #	DCB 2 %REC #
1204010333	MB for batch 1756267	84	80	100	98
1204010334	LCS for batch 1756267	83	80	105	102
447944003	B3HRJ6	68	64	81	80
1204010335	B3HRJ6MS	84	81	91	90
1204010336	B3HRJ6MSD	83	79	94	92

Surrogate

Acceptance Limits

4CMX = 4cmx (34%-109%)
 DCB = Decachlorobiphenyl (34%-133%)

* Recovery outside Acceptance Limits
 # Column to be used to flag recovery values
 D Sample Diluted

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QC Summary

Report Date: April 19, 2018

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 447944

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1756268										
QC1204010334	LCS										
4,4'-DDD	1.25			1.12	ug/L		90	(70%-130%)	RXE1	04/17/18	18:34
4,4'-DDE	1.25			0.981	ug/L		78	(70%-130%)			
4,4'-DDT	1.25			1.19	ug/L		95	(70%-130%)			
Aldrin	0.500			0.395	ug/L		79	(70%-130%)			
Dieldrin	1.25			1.07	ug/L		86	(70%-130%)			
Endosulfan I	0.500			0.413	ug/L		83	(70%-130%)			
Endosulfan II	1.25			1.08	ug/L		86	(70%-130%)			
Endosulfan sulfate	1.25			1.18	ug/L		94	(70%-130%)			
Endrin	1.25			1.12	ug/L		90	(70%-130%)			
Endrin aldehyde	1.25			1.09	ug/L		88	(70%-130%)			
Heptachlor epoxide	0.500			0.413	ug/L		83	(70%-130%)			
Methoxychlor	5.00			5.08	ug/L		102	(70%-130%)			
alpha-BHC	0.500			0.403	ug/L		81	(70%-130%)			

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QC Summary

Workorder: 447944

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1756268										
beta-BHC	0.500			0.376	ug/L		75	(70%-130%)	RXE1	04/17/18	18:34
delta-BHC	0.500			0.431	ug/L		86	(70%-130%)			
gamma-BHC (Lindane)	0.500			0.410	ug/L		82	(70%-130%)			
**4cmx	1.00			0.797	ug/L		80	(34%-109%)			
**Decachlorobiphenyl	1.00			1.02	ug/L		102	(34%-133%)			
QC1204010333	MB										
4,4'-DDD			U	0.010	ug/L					04/17/18	18:15
4,4'-DDE			U	0.010	ug/L						
4,4'-DDT			U	0.010	ug/L						
Aldrin			U	0.00665	ug/L						
Dieldrin			U	0.010	ug/L						
Endosulfan I			U	0.00665	ug/L						
Endosulfan II			U	0.010	ug/L						
Endosulfan sulfate			U	0.010	ug/L						
Endrin			U	0.010	ug/L						
Endrin aldehyde			U	0.00665	ug/L						

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QC Summary

Workorder: 447944

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1756268										
Heptachlor epoxide			U	0.00665	ug/L				RXE1	04/17/18	18:15
Methoxychlor			U	0.050	ug/L						
Toxaphene			U	0.150	ug/L						
alpha-BHC			U	0.00665	ug/L						
beta-BHC			U	0.00665	ug/L						
delta-BHC			U	0.00665	ug/L						
gamma-BHC (Lindane)			U	0.00665	ug/L						
**4cmx	1.00			0.800	ug/L		80	(34%-109%)			
**Decachlorobiphenyl	1.00			0.983	ug/L		98	(34%-133%)			
QC1204010335 447944003 MS											
4,4'-DDD	1.25	U	0.00885	1.12	ug/L		90	(25%-151%)		04/17/18	19:51
4,4'-DDE	1.25	U	0.00885	1.04	ug/L		83	(32%-126%)			
4,4'-DDT	1.25	U	0.00885	1.29	ug/L		103	(24%-139%)			
Aldrin	0.500	U	0.00588	0.375	ug/L		75	(15%-128%)			
Dieldrin	1.25	U	0.00885	1.12	ug/L		90	(40%-134%)			
Endosulfan I	0.500	U	0.00588	0.445	ug/L		89	(26%-133%)			

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QC Summary

Workorder: 447944

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1756268										
Endosulfan II	1.25	U	0.00885	1.12	ug/L		90	(29%-133%)	RXE1	04/17/18	19:51
Endosulfan sulfate	1.25	U	0.00885	1.21	ug/L		96	(32%-151%)			
Endrin	1.25	U	0.00885	1.19	ug/L		95	(15%-151%)			
Endrin aldehyde	1.25	U	0.00588	0.919	ug/L		74	(15%-132%)			
Heptachlor epoxide	0.500	U	0.00588	0.440	ug/L		88	(33%-134%)			
Methoxychlor	5.00	U	0.0442	5.20	ug/L		104	(31%-148%)			
alpha-BHC	0.500	U	0.00588	0.452	ug/L		90	(30%-133%)			
beta-BHC	0.500	U	0.00588	0.413	ug/L		83	(29%-138%)			
delta-BHC	0.500	U	0.00588	0.478	ug/L		96	(33%-141%)			
gamma-BHC (Lindane)	0.500	U	0.00588	0.459	ug/L		92	(35%-131%)			
**4cmx	1.00		0.570	0.806	ug/L		81	(34%-109%)			
**Decachlorobiphenyl	1.00		0.712	0.902	ug/L		90	(34%-133%)			
QC1204010336 447944003 MSD											
4,4'-DDD	1.25	U	0.00885	1.23	ug/L	9	98	(0%-20%)		04/17/18	20:10
4,4'-DDE	1.25	U	0.00885	1.11	ug/L	6	89	(0%-20%)			
4,4'-DDT	1.25	U	0.00885	1.34	ug/L	4	107	(0%-20%)			

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QC Summary

Workorder: 447944

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch	1756268										
Aldrin	0.500	U	0.00588	0.393	ug/L	5	79	(0%-20%)	RXE1	04/17/18	20:10
Dieldrin	1.25	U	0.00885	1.20	ug/L	7	96	(0%-20%)			
Endosulfan I	0.500	U	0.00588	0.476	ug/L	7	95	(0%-20%)			
Endosulfan II	1.25	U	0.00885	1.19	ug/L	7	96	(0%-20%)			
Endosulfan sulfate	1.25	U	0.00885	1.29	ug/L	7	103	(0%-20%)			
Endrin	1.25	U	0.00885	1.26	ug/L	6	101	(0%-20%)			
Endrin aldehyde	1.25	U	0.00588	1.05	ug/L	13	84	(0%-20%)			
Heptachlor epoxide	0.500	U	0.00588	0.469	ug/L	6	94	(0%-20%)			
Methoxychlor	5.00	U	0.0442	5.51	ug/L	6	110	(0%-20%)			
alpha-BHC	0.500	U	0.00588	0.471	ug/L	4	94	(0%-20%)			
beta-BHC	0.500	U	0.00588	0.429	ug/L	4	86	(0%-20%)			
delta-BHC	0.500	U	0.00588	0.505	ug/L	6	101	(0%-20%)			
gamma-BHC (Lindane)	0.500	U	0.00588	0.482	ug/L	5	96	(0%-20%)			
**4cmx	1.00		0.570	0.792	ug/L		79	(34%-109%)			
**Decachlorobiphenyl	1.00		0.712	0.919	ug/L		92	(34%-133%)			

Notes:

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QC Summary

Workorder: 447944

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

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- N Spike Sample recovery is outside control limits.
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- o Analyte failed to recover within LCS limits (Organics only)

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

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

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

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

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

Herbicide Analysis

Case Narrative

**GC Semivolatile Herbicide
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL447944
Work Order #: 447944**

Product: Analysis of Chlorophenoxy Acid Herbicides by ECD

Analytical Method: SW846 8151A

Analytical Procedure: GL-OA-E-011 REV# 24

Analytical Batches: 1755732 and 1755729

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
447944003	B3HRJ6
447944004	B3HRK1
1204008884	Method Blank (MB)
1204008885	Laboratory Control Sample (LCS)
1204008888	447944003(B3HRJ6) Matrix Spike (MS)
1204008889	447944003(B3HRJ6) Matrix Spike Duplicate (MSD)

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

Data Summary:

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

Calibration Information

Continuing Calibration Verification (CCV) Requirements

The calibration verification standards (CCV) did not meet acceptance criteria. MCPP failed acceptance criteria with a negative bias on one analytical column in the standards bracketing samples 447944003 (B3HRJ6) and 447944004 (B3HRK1) and associated QC. The negative bias for the analytical data is a result of instrument response decreasing after the initial calibration. The instrument response never decreased to a point where the target analytes would not be detected. All analytes were within the established retention time windows for this method.

Quality Control (QC) Information

Surrogate Recoveries

Samples (See Below) did not meet surrogate recovery acceptance criteria. Since there were no target analytes detected in the associated samples above the reporting limits, the biased high surrogate recoveries had no adverse impact on the reported data.

Sample	Analyte	Value
1204008888 (B3HRJ6MS)	2, 4-Dichlorophenylacetic acid	266* (42%-136%)
1204008889 (B3HRJ6MSD)	2, 4-Dichlorophenylacetic acid	245* (42%-136%)

Laboratory Control Sample (LCS) Recovery

The LCS (See Below) did not meet spike recovery acceptance criteria for Dinoseb. The client established the limits of 70%-130%. However, Dinoseb was within GEL SPC limits. The PM was notified and instructed the lab to report.

Sample	Analyte	Value
1204008885 (LCS)	Dinoseb	54* (70%-130%)

Miscellaneous Information**Manual Integrations**

Samples 1204008888 (B3HRJ6MS) and 1204008889 (B3HRJ6MSD) required manual integration to correctly position the baseline as set in the calibration standard injections.

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: GEL447944 GEL Work Order: 447944

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.

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: **Barbara Bailey**

Date: **08 MAY 2018**

Title: **Data Validator**

Sample Data Summary

**Herbicide
Certificate of Analysis
Sample Summary**

SDG Number: GEL447944
 Lab Sample ID: 447944003

 Client ID: B3HRJ6
 Batch ID: 1755732
 Run Date: 04/18/2018 11:36
 Prep Date: 04/17/2018 09:45
 Data File: 041818a\E3d1809.D
 041818a\E3d1809.D

Date Collected: 04/12/2018 09:05
 Date Received: 04/13/2018 09:05
 Client: CPCR001
 Method: SW846 8151A
 Inst: ECD3A.I
 Analyst: LOF
 Aliquot: 1000 mL
 Column: 1 RTX-CLPEST 1
 2 RTX-CLPEST 2

Matrix: WATER

 Project: CPCR0W18004
 SOP Ref: GL-OA-E-011
 Dilution: 1
 Inj. Vol: 1 uL
 Final Volume: 10 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
93-76-5	2,4,5-T	U	0.0833	ug/L	0.0833	0.250	1
93-72-1	2,4,5-TP	U	0.0833	ug/L	0.0833	0.250	1
94-75-7	2,4-D	U	0.0833	ug/L	0.0833	0.250	1
94-82-6	2,4-DB	U	0.0923	ug/L	0.0923	0.250	1
75-99-0	Dalapon	U	1.67	ug/L	1.67	5.00	1
1918-00-9	Dicamba	U	0.0833	ug/L	0.0833	0.250	1
120-36-5	Dichlorprop	U	0.0833	ug/L	0.0833	0.250	1
88-85-7	Dinoseb	U	0.0833	ug/L	0.0833	0.250	1
94-74-6	MCPA	U	16.7	ug/L	16.7	50.0	1
93-65-2	MCPP	U	16.7	ug/L	16.7	50.0	1

**Herbicide
Certificate of Analysis
Sample Summary**

SDG Number: GEL447944
Lab Sample ID: 447944004

Client ID: B3HRK1
Batch ID: 1755732
Run Date: 04/18/2018 13:17
Prep Date: 04/17/2018 09:45
Data File: 041818a\E3d1812.D
 041818a\E3d1812.D

Date Collected: 04/12/2018 10:40
Date Received: 04/13/2018 09:05
Client: CPRC001
Method: SW846 8151A
Inst: ECD3A.I
Analyst: LOF
Aliquot: 1000 mL
Column: 1 RTX-CLPEST 1
 2 RTX-CLPEST 2

Matrix: WATER

Project: CPRC0W18004
SOP Ref: GL-OA-E-011
Dilution: 1
Inj. Vol: 1 uL
Final Volume: 10 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
93-76-5	2,4,5-T	U	0.0833	ug/L	0.0833	0.250	1
93-72-1	2,4,5-TP	U	0.0833	ug/L	0.0833	0.250	1
94-75-7	2,4-D	U	0.0833	ug/L	0.0833	0.250	1
94-82-6	2,4-DB	U	0.0923	ug/L	0.0923	0.250	1
75-99-0	Dalapon	U	1.67	ug/L	1.67	5.00	1
1918-00-9	Dicamba	U	0.0833	ug/L	0.0833	0.250	1
120-36-5	Dichlorprop	U	0.0833	ug/L	0.0833	0.250	1
88-85-7	Dinoseb	U	0.0833	ug/L	0.0833	0.250	1
94-74-6	MCPA	U	16.7	ug/L	16.7	50.0	1
93-65-2	MCPP	U	16.7	ug/L	16.7	50.0	1

Quality Control Summary

Surrogate Recovery Report

SDG Number: GEL447944

Matrix Type: LIQUID

Sample ID	Client ID	DCAA 1 %REC #	DCAA 2 %REC #
1204008884	MB for batch 1755729	121	124
1204008885	LCS for batch 1755729	110	118
447944003	B3HRJ6	105	108
1204008888	B3HRJ6MS	119	266 *
1204008889	B3HRJ6MSD	113	245 *
447944004	B3HRK1	111	114

Surrogate

DCAA = 2,4-Dichlorophenylacetic acid

Acceptance Limits

(42%-136%)

* Recovery outside Acceptance Limits

Column to be used to flag recovery values

D Sample Diluted

GEL LABORATORIES LLC

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

QC Summary

Report Date: April 20, 2018

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 447944

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1755732										
QC1204008885	LCS										
2,4,5-T	2.00			2.02	ug/L		101	(70%-130%)	LOF	04/18/18	09:36
2,4,5-TP	2.00			1.93	ug/L		97	(70%-130%)			
2,4-D	2.00			1.87	ug/L		93	(70%-130%)			
2,4-DB	2.00			2.36	ug/L		118	(70%-130%)			
Dalapon	20.0			17.9	ug/L		89	(70%-130%)			
Dicamba	2.00			1.92	ug/L		96	(70%-130%)			
Dichlorprop	2.00			1.79	ug/L		89	(70%-130%)			
Dinoseb	2.00			1.08	ug/L		54*	(70%-130%)			
MCPA	200			163	ug/L		82	(70%-130%)			
MCPP	200			170	ug/L		85	(70%-130%)			
**2,4-Dichlorophenylacetic acid	5.00			5.50	ug/L		110	(42%-136%)			
QC1204008884	MB										
2,4,5-T			U	0.0833	ug/L					04/18/18	09:16
2,4,5-TP			U	0.0833	ug/L						

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QC Summary

Workorder: 447944

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1755732										
2,4-D			U	0.0833	ug/L				LOF	04/18/18	09:16
2,4-DB			U	0.0923	ug/L						
Dalapon			U	1.67	ug/L						
Dicamba			U	0.0833	ug/L						
Dichlorprop			U	0.0833	ug/L						
Dinoseb			U	0.0833	ug/L						
MCPA			U	16.7	ug/L						
MCPP			U	16.7	ug/L						
**2,4-Dichlorophenylacetic acid	5.00			6.06	ug/L		121	(42%-136%)			
QC1204008888 447944003 MS											
2,4,5-T	2.00	U	0.0833	2.07	ug/L		104	(25%-143%)		04/18/18	12:09
2,4,5-TP	2.00	U	0.0833	2.01	ug/L		101	(34%-141%)			
2,4-D	2.00	U	0.0833	2.05	ug/L		102	(43%-138%)			
2,4-DB	2.00	U	0.0923	1.93	ug/L		97	(29%-154%)			
Dalapon	20.0	U	1.67	17.8	ug/L		89	(26%-129%)			
Dicamba	2.00	U	0.0833	2.00	ug/L		100	(35%-138%)			

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QC Summary

Workorder: 447944

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1755732										
Dichlorprop	2.00	U	0.0833	2.05	ug/L		102	(37%-144%)	LOF	04/18/18	12:09
Dinoseb	2.00	U	0.0833	1.56	ug/L		78	(19%-107%)			
MCPA	200	U	16.7	193	ug/L		97	(25%-140%)			
MCPP	200	U	16.7	212	ug/L		106	(23%-143%)			
*2,4-Dichlorophenylacetic acid	5.00		5.27	5.97	ug/L		119	(42%-136%)			
QC1204008889 447944003 MSD											
2,4,5-T	2.00	U	0.0833	2.00	ug/L	4	100	(0%-20%)		04/18/18	12:43
2,4,5-TP	2.00	U	0.0833	1.94	ug/L	4	97	(0%-20%)			
2,4-D	2.00	U	0.0833	1.96	ug/L	4	98	(0%-20%)			
2,4-DB	2.00	U	0.0923	1.75	ug/L	10	88	(0%-20%)			
Dalapon	20.0	U	1.67	18.2	ug/L	2	91	(0%-20%)			
Dicamba	2.00	U	0.0833	1.98	ug/L	1	99	(0%-20%)			
Dichlorprop	2.00	U	0.0833	1.95	ug/L	5	98	(0%-20%)			
Dinoseb	2.00	U	0.0833	1.56	ug/L	0	78	(0%-20%)			
MCPA	200	U	16.7	164	ug/L	17	82	(0%-20%)			
MCPP	200	U	16.7	189	ug/L	12	95	(0%-20%)			

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QC Summary

Workorder: 447944

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch	1755732										
**2,4-Dichlorophenylacetic acid	5.00	5.27		5.67	ug/L		113	(42%-136%)	LOF	04/18/18	12:43

Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- N Spike Sample recovery is outside control limits.
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
 - o Analyte failed to recover within LCS limits (Organics only)

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

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

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

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

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

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL447944
Work Order #: 447944

Product: Determination of Metals by ICP

Analytical Method: SW846 3005A/6010D

Analytical Procedure: GL-MA-E-013 REV# 30

Analytical Batch: 1755673

Preparation Method: SW846 3005A

Preparation Procedure: GL-MA-E-006 REV# 14

Preparation Batch: 1755672

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
447944001	B3HR12
447944002	B3HR10
1204008783	Method Blank (MB) ICP
1204008784	Laboratory Control Sample (LCS)
1204008787	447944001(B3HR12L) Serial Dilution (SD)
1204008785	447944001(B3HR12S) Matrix Spike (MS)
1204008786	447944001(B3HR12SD) 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 acceptance criteria. However, where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

Sample	Analyte	Value
1204008783 (MB)	Antimony	4.24 between (3.5 - 5)

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: GEL447944 GEL Work Order: 447944

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: 10 MAY 2018

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL447944

CONTRACT: CPRCOW18004

METHOD TYPE: SW846

SAMPLE ID: 447944001

BASIS: As Received

DATE COLLECTED 12-APR-18

CLIENT ID: B3HR12

LEVEL: Low

DATE RECEIVED 13-APR-18

MATRIX: WATER

%SOLIDS: 0

CAS	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	JWJ	04/18/18 19:28	041818-1	1755673
7440-38-2	Arsenic	5	ug/L	U	5	30	30	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-39-3	Barium	60.6	ug/L		1	5	5	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-43-9	Cadmium	1	ug/L	U	1	5	5	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-70-2	Calcium	55700	ug/L		50	200	200	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-47-3	Chromium	17.7	ug/L		1	5	5	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7439-95-4	Magnesium	17900	ug/L		110	300	300	1	P	JWJ	04/20/18 14:47	042018-2	1755673
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-02-0	Nickel	1.5	ug/L	U	1.5	5	5	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-09-7	Potassium	4660	ug/L		50	150	150	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-22-4	Silver	1	ug/L	U	1	5	5	1	P	JWJ	04/20/18 14:47	042018-2	1755673
7440-23-5	Sodium	24800	ug/L		100	300	300	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-62-2	Vanadium	23.6	ug/L		1	5	5	1	P	JWJ	04/18/18 19:28	041818-1	1755673
7440-66-6	Zinc	5.29	ug/L	B	3.3	10	10	1	P	JWJ	04/18/18 19:28	041818-1	1755673

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1755673	1755672	SW846 3005A	50	mL	50	mL	04/13/18	JXM8

***Analytical Methods:**

P SW846 3005A/6010D

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL447944

CONTRACT: CPRCOW18004

METHOD TYPE: SW846

SAMPLE ID: 447944002

BASIS: As Received

DATE COLLECTED 12-APR-18

CLIENT ID: B3HR10

LEVEL: Low

DATE RECEIVED 13-APR-18

MATRIX: WATER

%SOLIDS: 0

CAS	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	JWJ	04/18/18 19:42	041818-1	1755673
7440-38-2	Arsenic	5	ug/L	U	5	30	30	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-39-3	Barium	61.3	ug/L		1	5	5	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-43-9	Cadmium	1	ug/L	U	1	5	5	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-70-2	Calcium	54900	ug/L		50	200	200	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-47-3	Chromium	18.9	ug/L		1	5	5	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7439-89-6	Iron	105	ug/L		30	100	100	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7439-95-4	Magnesium	17300	ug/L		110	300	300	1	P	JWJ	04/20/18 14:58	042018-2	1755673
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-02-0	Nickel	1.5	ug/L	U	1.5	5	5	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-09-7	Potassium	4560	ug/L		50	150	150	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-22-4	Silver	1	ug/L	U	1	5	5	1	P	JWJ	04/20/18 14:58	042018-2	1755673
7440-23-5	Sodium	24500	ug/L		100	300	300	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-62-2	Vanadium	24.1	ug/L		1	5	5	1	P	JWJ	04/18/18 19:42	041818-1	1755673
7440-66-6	Zinc	4.12	ug/L	B	3.3	10	10	1	P	JWJ	04/18/18 19:42	041818-1	1755673

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1755673	1755672	SW846 3005A	50	mL	50	mL	04/13/18	JXM8

***Analytical Methods:**

P SW846 3005A/6010D

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: May 10, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 447944

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1755673										
QC1204008784	LCS										
Antimony	500			518	ug/L		104	(80%-120%)	JWJ	04/18/18	19:26
Arsenic	500			486	ug/L		97.2	(80%-120%)			
Barium	500			475	ug/L		95.1	(80%-120%)			
Cadmium	500			469	ug/L		93.8	(80%-120%)			
Calcium	5000			4820	ug/L		96.4	(80%-120%)			
Chromium	500			472	ug/L		94.3	(80%-120%)			
Cobalt	500			513	ug/L		103	(80%-120%)			
Copper	500			471	ug/L		94.2	(80%-120%)			
Iron	5000			4910	ug/L		98.1	(80%-120%)			
Magnesium	5000			5040	ug/L		101	(80%-120%)		04/20/18	14:44
Manganese	500			466	ug/L		93.2	(80%-120%)		04/18/18	19:26
Nickel	500			470	ug/L		94	(80%-120%)			
Potassium	5000			4950	ug/L		98.9	(80%-120%)			

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QC Summary

Workorder: 447944

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1755673										
Silver	500			492	ug/L		98.3	(80%-120%)	JWJ	04/20/18	14:44
Sodium	5000			4890	ug/L		97.8	(80%-120%)		04/18/18	19:26
Vanadium	500			482	ug/L		96.4	(80%-120%)			
Zinc	500			463	ug/L		92.6	(80%-120%)			
QC1204008783	MB										
Antimony			B	4.24	ug/L					04/18/18	19:22
Arsenic			U	5.00	ug/L						
Barium			U	1.00	ug/L						
Cadmium			U	1.00	ug/L						
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					04/20/18	14:41
Manganese			U	2.00	ug/L					04/18/18	19:22

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QC Summary

Workorder: 447944

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Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1755673										
Nickel			U	1.50	ug/L				JWJ	04/18/18	19:22
Potassium			U	50.0	ug/L						
Silver			U	1.00	ug/L					04/20/18	14:41
Sodium			U	100	ug/L					04/18/18	19:22
Vanadium			U	1.00	ug/L						
Zinc			U	3.30	ug/L						
QC1204008785 447944001 MS											
Antimony	500	U	3.50	494	ug/L		98.4	(75%-125%)		04/18/18	19:32
Arsenic	500	U	5.00	472	ug/L		94.4	(75%-125%)			
Barium	500		60.6	496	ug/L		87.1	(75%-125%)			
Cadmium	500	U	1.00	431	ug/L		86.1	(75%-125%)			
Calcium	5000		55700	54900	ug/L		N/A	(75%-125%)			
Chromium	500		17.7	453	ug/L		87.1	(75%-125%)			
Cobalt	500	U	1.00	454	ug/L		90.7	(75%-125%)			
Copper	500	U	3.00	440	ug/L		87.8	(75%-125%)			
Iron	5000	U	30.0	4600	ug/L		91.8	(75%-125%)			

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QC Summary

Workorder: 447944

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1755673										
Magnesium	5000	17900		22000	ug/L		82.9	(75%-125%)	JWJ	04/20/18	14:50
Manganese	500	U	2.00	429	ug/L		85.7	(75%-125%)		04/18/18	19:32
Nickel	500	U	1.50	469	ug/L		93.5	(75%-125%)			
Potassium	5000	4660		9110	ug/L		89	(75%-125%)			
Silver	500	B	-1.1	466	ug/L		93.2	(75%-125%)		04/20/18	14:50
Sodium	5000	24800		27500	ug/L		N/A	(75%-125%)		04/18/18	19:32
Vanadium	500	23.6		476	ug/L		90.6	(75%-125%)			
Zinc	500	B	5.29	432	ug/L		85.4	(75%-125%)			
QC1204008786	447944001 MSD										
Antimony	500	U	3.50	503	ug/L	1.91	100	(0%-20%)		04/18/18	19:34
Arsenic	500	U	5.00	484	ug/L	2.48	96.8	(0%-20%)			
Barium	500		60.6	509	ug/L	2.5	89.7	(0%-20%)			
Cadmium	500	U	1.00	442	ug/L	2.54	88.4	(0%-20%)			
Calcium	5000	55700		55900	ug/L	1.71	N/A	(0%-20%)			
Chromium	500		17.7	465	ug/L	2.46	89.4	(0%-20%)			
Cobalt	500	U	1.00	467	ug/L	2.83	93.3	(0%-20%)			

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QC Summary

Workorder: 447944

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1755673										
Copper	500	U	3.00		452	ug/L	2.79	90.3	(0%-20%)	JWJ	04/18/18 19:34
Iron	5000	U	30.0		4740	ug/L	3.07	94.7	(0%-20%)		
Magnesium	5000		17900		21800	ug/L	0.753	79.6	(0%-20%)		04/20/18 14:53
Manganese	500	U	2.00		439	ug/L	2.38	87.8	(0%-20%)		04/18/18 19:34
Nickel	500	U	1.50		424	ug/L	9.94	84.6	(0%-20%)		
Potassium	5000		4660		9350	ug/L	2.55	93.7	(0%-20%)		
Silver	500	B	-1.1		469	ug/L	0.665	93.8	(0%-20%)		04/20/18 14:53
Sodium	5000		24800		27900	ug/L	1.59	N/A	(0%-20%)		04/18/18 19:34
Vanadium	500		23.6		486	ug/L	2.06	92.5	(0%-20%)		
Zinc	500	B	5.29		443	ug/L	2.52	87.6	(0%-20%)		
QC1204008787 447944001 SDILT											
Antimony		U	1.85	DU	17.5	ug/L	N/A		(0%-20%)		04/18/18 19:39
Arsenic		U	-0.0043	DU	25.0	ug/L	N/A		(0%-20%)		
Barium			60.6	D	13.4	ug/L	10.2		(0%-20%)		
Cadmium		U	0.241	DU	5.00	ug/L	N/A		(0%-20%)		
Calcium			55700	D	11900	ug/L	6.89		(0%-20%)		

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QC Summary

Workorder: 447944

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1755673										
Chromium		17.7	BD	3.86	ug/L	8.92		(0%-20%)	JWJ	04/18/18	19:39
Cobalt	U	0.585	DU	5.00	ug/L	N/A		(0%-20%)			
Copper	U	0.635	DU	15.0	ug/L	N/A		(0%-20%)			
Iron	U	4.55	DU	150	ug/L	N/A		(0%-20%)			
Magnesium		17900	D	4010	ug/L	12.2		(0%-20%)		04/20/18	14:55
Manganese	U	0.142	DU	10.0	ug/L	N/A		(0%-20%)		04/18/18	19:39
Nickel	U	1.30	DU	7.50	ug/L	N/A		(0%-20%)			
Potassium		4660	D	971	ug/L	4.04		(0%-20%)			
Silver	B	-1.1	DU	5.00	ug/L	N/A		(0%-20%)		04/20/18	14:55
Sodium		24800	D	5360	ug/L	8.07		(0%-20%)		04/18/18	19:39
Vanadium		23.6	D	5.23	ug/L	10.7		(0%-20%)			
Zinc	B	5.29	DU	16.5	ug/L	N/A		(0%-20%)			

Notes:

The Qualifiers in this report are defined as follows:

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

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QC Summary

Workorder: 447944

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
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 #: GEL447944
Work Order #: 447944**

Product: Alkalinity**Analytical Method:** 2320_ALKALINITY**Analytical Procedure:** GL-GC-E-033 REV# 13**Analytical Batch:** 1757257

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
447944002	B3HR10
447944003	B3HRJ6
1204012750	Laboratory Control Sample (LCS)
1204012751	447585014(B3HPPH5) Sample Duplicate (DUP)

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

Data Summary:

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

Certification Statement

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

GEL LABORATORIES LLC

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL447944 GEL Work Order: 447944

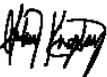
The Qualifiers in this report are defined as follows:

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: 02 MAY 2018

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: May 2, 2018

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF W18-004

Client Sample ID: B3HR10 Project: CPRCOW18004
 Sample ID: 447944002 Client ID: CPRC001
 Matrix: WATER
 Collect Date: 12-APR-18 08:19
 Receive Date: 13-APR-18
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis												
2320_ALKALINITY: COMMON (Alkalinity only) "As Received"												
Alkalinity, Total as CaCO3		89000	1450	4000	ug/L			RXB5	04/21/18	1327	1757257	1

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	2320_ALKALINITY		

Notes:

Column headers are defined as follows:

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

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: May 2, 2018

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF W18-004

Client Sample ID: B3HRJ6 Project: CPRCOW18004
 Sample ID: 447944003 Client ID: CPRC001
 Matrix: WATER
 Collect Date: 12-APR-18 09:05
 Receive Date: 13-APR-18
 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		110000	1450	4000	ug/L			RXB5	04/21/18	1329	1757257	1
Bicarbonate alkalinity (CaCO3)		110000	1450	4000	ug/L							
Carbonate alkalinity (CaCO3)	U	1450	1450	4000	ug/L							
Hydroxide alkalinity as CaCO3	U	1450	1450	4000	ug/L							

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	2320_ALKALINITY		

Notes:

Column headers are defined as follows:

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

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: May 2, 2018

Page 1 of 1

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

Contact: Mr. Scot Fitzgerald

Workorder: 447944

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1757257										
QC1204012751	447585014	DUP									
Alkalinity, Total as CaCO3		101000		100000	ug/L	1.19		(0%-20%)	RXB5	04/21/18	12:56
QC1204012750	LCS										
Alkalinity, Total as CaCO3	100000			108000	ug/L		108	(80%-120%)		04/21/18	12:43

Notes:

The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
 ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.
 For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL447944
Work Order #: 447944

Product: RAISO_SEP_GPC

Analytical Method: RAISO_SEP_GPC

Analytical Procedure: GL-RAD-A-063 REV# 1

Analytical Batch: 1755336

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
447944003	B3HRJ6
447944004	B3HRK1
1204007952	Method Blank (MB)
1204007953	447944003(B3HRJ6) Sample Duplicate (DUP)
1204007954	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: 9310_ALPHABETA_GPC: COMMON

Analytical Method: 9310_ALPHABETA_GPC

Analytical Procedure: GL-RAD-A-001 REV# 19

Analytical Batch: 1759607

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
447944003	B3HRJ6
447944004	B3HRK1
1204018051	Method Blank (MB)
1204018052	447944003(B3HRJ6) Sample Duplicate (DUP)
1204018053	447944003(B3HRJ6) Matrix Spike (MS)
1204018054	447944003(B3HRJ6) Matrix Spike Duplicate (MSD)
1204018055	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

Sample Re-prep/Re-analysis

Samples 447944003 (B3HRJ6) and 447944004 (B3HRK1) were reprepared due to high relative percent difference/relative error ratio. The re-analysis is being reported.

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.

Miscellaneous Information

Additional Comments

The matrix spike and matrix spike duplicate, 1204018053 (B3HRJ6MS) and 1204018054 (B3HRJ6MSD), aliquots were reduced to conserve sample volume.

Product: 903.1_RA-226_LUC:COMMON

Analytical Method: 903.1_RA-226_LUC

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 1755342

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
447944003	B3HRJ6
447944004	B3HRK1
1204007970	Method Blank (MB)
1204007971	447944003(B3HRJ6) Sample Duplicate (DUP)
1204007972	447944003(B3HRJ6) Matrix Spike (MS)
1204007973	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.

Miscellaneous Information

Additional Comments

The matrix spike, 1204007972 (B3HRJ6MS), aliquot was reduced to conserve sample volume.

Certification Statement

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

GEL LABORATORIES LLC

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL447944 GEL Work Order: 447944

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: Heather McCarty

Date: 08 MAY 2018

Title: Analyst II

Sample Data Summary

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL447944	Client: CPRC001	Project: CPRC0W18004
Lab Sample ID: 447944003	Date Collected: 04/12/2018 09:05	Matrix: WATER
	Date Received: 04/13/2018 09:05	
Client ID: B3HRJ6	Method: 903.1_RA-226_LUC	Prep Basis: "As Received"
Batch ID: 1755342	Analyst: PCW	SOP Ref: GL-RAD-A-008
Run Date: 04/25/2018 08:45	Aliquot: 500 mL	Instrument: LUCAS3
Data File: RA1755342.xls	Prep Method: EPA 903.1 Modified	Count Time: 30 min
Prep Batch: 1755342		
Prep Date: 04/19/2018 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13982-63-3	Radium-226		1.38	pCi/L	+/-0.476	0.522	0.436	1.00

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).
 The MDC is a sample specific MDC.

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL447944
 Lab Sample ID: 447944003

Client: CPRC001
 Date Collected: 04/12/2018 09:05
 Date Received: 04/13/2018 09:05

Project: CPRC0W18004
 Matrix: WATER

Client ID: B3HRJ6
 Batch ID: 1755336
 Run Date: 04/24/2018 13:00
 Data File: RA1755336.xls
 Prep Batch: 1755336
 Prep Date: 04/19/2018 11:35

Method: RAISO_SEP_GPC
 Analyst: JXC9
 Aliquot: 300 mL
 Prep Method: EPA 904.0/SW846 9320 Modifi

Prep Basis: "As Received"
 SOP Ref: GL-RAD-A-063
 Instrument: PIC7C
 Count Time: 60 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15262-20-1	Radium-228	U	0.638	pCi/L	+/-1.06	1.08	1.87	3.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Barium-133 Tracer	147	208	CPM	70.7	(30%-105%)

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: GEL447944	Client: CPRC001	Project: CPRC0W18004
Lab Sample ID: 447944003	Date Collected: 04/12/2018 09:05	Matrix: WATER
	Date Received: 04/13/2018 09:05	
Client ID: B3HRJ6		Prep Basis: "As Received"
Batch ID: 1759607	Method: 9310_ALPHABETA_GPC	SOP Ref: GL-RAD-A-001
Run Date: 04/28/2018 10:26	Analyst: JXK3	Instrument: PIC14A
Data File: AB1759607r1.xls	Aliquot: 150 mL	Count Time: 100 min
Prep Batch: 1759607	Prep Method: EPA 900.0/SW846 9310	
Prep Date: 04/27/2018 09:48		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha <i>ALPHA</i>	U	2.48	pCi/L	+/-1.86	1.90	2.67	3.00
12587-47-2	Beta <i>BETA</i>		5.33	pCi/L	+/-1.46	1.72	1.71	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). The MDC is a sample specific MDC.

Rad
Certificate of Analysis
Sample Summary

SDG Number: GEL447944	Client: CPRC001	Project: CPRC0W18004
Lab Sample ID: 447944004	Date Collected: 04/12/2018 10:40	Matrix: WATER
	Date Received: 04/13/2018 09:05	
Client ID: B3HRK1	Method: 903.1_RA-226_LUC	Prep Basis: "As Received"
Batch ID: 1755342	Analyst: PCW	SOP Ref: GL-RAD-A-008
Run Date: 04/25/2018 08:45	Aliquot: 500 mL	Instrument: LUCAS4
Data File: RA1755342.xls	Prep Method: EPA 903.1 Modified	Count Time: 30 min
Prep Batch: 1755342		
Prep Date: 04/19/2018 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13982-63-3	Radium-226		1.05	pCi/L	+/-0.374	0.429	0.350	1.00

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

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: GEL447944	Client: CPRC001	Project: CPRC0W18004
Lab Sample ID: 447944004	Date Collected: 04/12/2018 10:40	Matrix: WATER
	Date Received: 04/13/2018 09:05	
Client ID: B3HRK1	Method: RAISO_SEP_GPC	Prep Basis: "As Received"
Batch ID: 1755336	Analyst: JXC9	SOP Ref: GL-RAD-A-063
Run Date: 04/24/2018 13:00	Aliquot: 300 mL	Instrument: PIC7D
Data File: RA1755336.xls	Prep Method: EPA 904.0/SW846 9320 Modifi	Count Time: 60 min
Prep Batch: 1755336		
Prep Date: 04/19/2018 11:35		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15262-20-1	Radium-228		1.94	pCi/L	+/-1.11	1.22	1.62	3.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Barium-133 Tracer	175	208	CPM	84.5	(30%-105%)

Comments:

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: GEL447944
Lab Sample ID: 447944004

Client: CPRC001
Date Collected: 04/12/2018 10:40
Date Received: 04/13/2018 09:05

Project: CPRC0W18004
Matrix: WATER

Client ID: B3HRK1
Batch ID: 1759607
Run Date: 04/28/2018 10:26
Data File: AB1759607r1.xls
Prep Batch: 1759607
Prep Date: 04/27/2018 09:48

Method: 9310_ALPHABETA_GPC
Analyst: JXK3
Aliquot: 150 mL
Prep Method: EPA 900.0/SW846 9310

Prep Basis: "As Received"
SOP Ref: GL-RAD-A-001
Instrument: PIC13D
Count Time: 90 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha ALPHA		6.77	pCi/L	+/-2.88	3.09	3.39	3.00
12587-47-2	Beta BETA		6.76	pCi/L	+/-1.64	1.99	1.73	4.00

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

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

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: May 8, 2018
Page 1 of 3

Client : CH2MHill Plateau Remediation Company
MSIN R3-50 CHPRC
PO Box 1600
Richland, Washington 99352
Contact: Mr. Scot Fitzgerald
Workorder: 447944

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gas Flow									
Batch	1755336								
QC1204007952	MB								
Radium-228			U	1.31	pCi/L			JXC9	04/24/1813:00
				Uncert: +/-1.10					
				TPU: +/-1.15					
**Barium-133 Tracer	208			204	CPM	REC: 98	(30%-105%)		
QC1204007953	447944003	DUP							
Radium-228		U	0.638	U	0.253				04/24/1813:00
				Uncert: +/-1.06	+/-0.684	RPD: 0	N/A		
				TPU: +/-1.08	+/-0.687	RER: 0.59	(0-2)		
**Barium-133 Tracer	208		147	186	CPM	REC: 89	(30%-105%)		
QC1204007954	LCS								
Radium-228		18.3		16.2	pCi/L	REC: 89	(80%-120%)		04/24/1813:00
				Uncert: +/-2.05					
				TPU: +/-4.68					
**Barium-133 Tracer	208			199	CPM	REC: 96	(30%-105%)		
Batch	1759607								
QC1204018051	MB								
Alpha			U	-0.701	pCi/L			JXK3	04/28/1810:47
				Uncert: +/-1.26					
				TPU: +/-1.26					
Beta			U	0.267	pCi/L				
				Uncert: +/-1.38					
				TPU: +/-1.38					
QC1204018052	447944003	DUP							
Alpha		U	2.48	3.46	pCi/L				04/28/1810:47
				Uncert: +/-1.86	+/-2.04	RPD: 33	(0% - 100%)		
				TPU: +/-1.90	+/-2.13	RER: 0.673	(0-2)		
Beta			5.33	3.64	pCi/L				
				Uncert: +/-1.46	+/-1.15	RPD: 38	(0% - 100%)		
				TPU: +/-1.72	+/-1.30	RER: 1.53	(0-2)		
QC1204018053	447944003	MS							
Alpha		402	U	2.48	364	pCi/L	REC: 91	(75%-125%)	04/28/1810:47
				Uncert: +/-1.86	+/-37.7				
				TPU: +/-1.90	+/-70.7				
Beta		1560		5.33	1500	pCi/L	REC: 96	(75%-125%)	
				Uncert: +/-1.46	+/-55.0				
				TPU: +/-1.72	+/-251				
QC1204018054	447944003	MSD							
Alpha		402	U	2.48	418	pCi/L	REC: 104	(75%-125%)	04/28/1810:47
				Uncert: +/-1.86	+/-41.6	RPD: 14	(0%-20%)		
				TPU: +/-1.90	+/-83.9	RER: 0.967	(0-2)		
Beta		1560		5.33	1680	pCi/L	REC: 107	(75%-125%)	
				Uncert: +/-1.46	+/-58.9	RPD: 11	(0%-20%)		
				TPU: +/-1.72	+/-283	RER: 0.891	(0-2)		
QC1204018055	LCS								

GEL LABORATORIES LLC

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

QC Summary

Workorder: 447944

Page 2 of 3

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Gas Flow										
Batch	1759607									
Alpha	80.5			83.8	pCi/L	REC: 104	(80%-120%)			
	Uncert:			+/-7.78						
	TPU:			+/-16.1						
Beta	313			314	pCi/L	REC: 100	(80%-120%)			
	Uncert:			+/-11.2						
	TPU:			+/-52.4						
Rad Ra-226										
Batch	1755342									
QC1204007970	MB									
Radium-226			U	0.117	pCi/L			PCW	04/25/1808:45	
	Uncert:			+/-0.229						
	TPU:			+/-0.229						
QC1204007971	447944003	DUP								
Radium-226			1.38	0.982	pCi/L					
	Uncert:	+/-0.476		+/-0.355		RPD: 34	(0% - 100%)			
	TPU:	+/-0.522		+/-0.399		RER: 1.19	(0-2)			
QC1204007972	447944003	MS								
Radium-226	130	1.38		134	pCi/L	REC: 102	(75%-125%)		04/25/1808:10	
	Uncert:	+/-0.476		+/-8.46						
	TPU:	+/-0.522		+/-31.0						
QC1204007973	LCS									
Radium-226	26.0			21.4	pCi/L	REC: 82	(80%-120%)			
	Uncert:			+/-1.56						
	TPU:			+/-4.40						

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 analyte was detected in the associated method blank >= MDC or >5% sample activity.
- 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.
- N Spike Sample recovery is outside control limits.

GEL LABORATORIES LLC

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QC Summary

Workorder: 447944

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