

July 13, 2017



PO Box 30712 Charleston, SC 29417
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gel.com

July 13, 2017

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

Re: CHPRC SAF F16-037
Work Order: 426736
SDG: GEL426736

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, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

B Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

Purchase Order: 300085 - 8C
Chain of Custody: F16-037-089
Enclosures

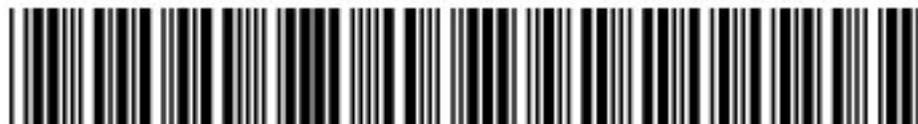


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July 13, 2017

Case Narrative

July 13, 2017

General Narrative
for
CH2MHill Plateau Remediation Company
CHPRC SAF F16-037
SDG: GEL426736

July 13, 2017

Laboratory Identification:

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

Summary

Sample receipt

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on June 30, 2017, for analysis. The sample was 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 sample:

Laboratory Identification	Sample Description
426736001	B39HY1

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: 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.

July 13, 2017

B. Luthman
Brielle Luthman for
Heather Shaffer
Project Manager

July 13, 2017

Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL426736
Work Order #: 426736

Metals

Determination of Metals by ICP

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.

Determination of Metals by ICP-MS

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

Technical Information

Sample Dilutions

The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	426736
	001
Chromium	2X
Lead	2X

General Chemistry

Hexavalent Chromium

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

UIISO_IE_PRECIP_AEA:COMMON

July 13, 2017

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 1203824495 (MB) was recounted due to a peak shift. The recount is reported.

Dry Weight

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

SRTOT_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.

TC99_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.

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

Sample Re-prep/Re-analysis

Samples were reprepared due to low recovery. The re-analysis is being reported.

Miscellaneous Information

Additional Comments

The matrix spike, 1203827285 (Non SDG 426775001MS), aliquot was reduced to conserve sample volume.

July 13, 2017

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

July 13, 2017

CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F16-037-089	PAGE 1 OF 1
COLLECTOR	DAVE WIGHT CHPRC	COMPANY CONTACT	TODAK, D	PROJECT COORDINATOR	TODAK, D
SAMPLING LOCATION	C9711, I-013	PROJECT DESIGNATION	100-KR-4 Long Term & Interim Action Monitoring - Soil	SAF NO.	F16-037
ICE CHEST NO.	605-298	FIELD LOGBOOK NO.	HNF-N-645-7 7965	COA	300085
SHIPPED TO	GEL Laboratories, LLC	OFFSITE PROPERTY NO.	8120	BILL OF LADING/AIR BILL NO. 7795 2388 9133	
MATRIX*	A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	PRESERVATION	None	None	None
POSSIBLE SAMPLE HAZARDS/ REMARKS	*Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	HOLDING TIME	6 Months	6 Months	6 Months
SPECIAL HANDLING AND/OR STORAGE	NA-RADIOACTIVE-TIE-100-89937 1/1A 342 6-28-17	TYPE OF CONTAINER	aGs	G/P	G/P
		NO. OF CONTAINER(S)	1	1	1
		VOLUME	250ml	125ml	60ml
		SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	7196 CR6: COMMON;	TRITIUM_DIST_LSC: COMMON;
SAMPLE NO.	B39HY1	MATRIX*	SOIL		
		SAMPLE DATE	JUN 28 2017	SAMPLE TIME	1215

420736

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	TRVL-17-101 (1) 6020_METALS_ICPMS: COMMON {Chromium, Lead}; 6020_METALS_ICPMS: COMMON (Add-on) {Antimony, Nickel, Vanadium, Zinc};	
DAVE WIGHT CHPRC	JUN 28 2017 1500	SSU-1	JUN 28 2017 1500		
Janelle Zunker CHPRC	JUN 29 2017 0700	Janelle Zunker CHPRC	JUN 29 2017 0700		
Janelle Zunker CHPRC	JUN 29 2017 1400	MEDEX			
Janelle Zunker CHPRC	JUN 29 2017 1400	STACY BOONTE	6/30/17 9:05		
LABORATORY SECTION	RECEIVED BY	TITLE		DATE/TIME	
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY		DATE/TIME	
PRINTED ON 4/19/2017	FSR ID = FSR43439	TRVL NUM = TRVL-17-101		A-6003-618 (REV 2)	

10 of 50

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 13 July 2017

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	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122017-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-22
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Metals Analysis

Case Narrative

July 13, 2017

Metals

Technical Case Narrative

CH2M Hill Plateau Remediation Company (CPRC)

SDG #: GEL426736

Work Order #: 426736

Product: Determination of Metals by ICP

Analytical Method: SW846 3050B/6010D

Analytical Procedure: GL-MA-E-013 REV# 28

Analytical Batch: 1678798

Product: Determination of Metals by ICP-MS

Analytical Method: SW846 3050B/6020B

Analytical Procedure: GL-MA-E-014 REV# 30

Analytical Batch: 1678808

Preparation Method: SW846 3050B

Preparation Procedure: GL-MA-E-009 REV# 26

Preparation Batches: 1678797 and 1678807

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
426736001	B39HY1
1203822689	Method Blank (MB)ICP
1203822690	Laboratory Control Sample (LCS)
1203822693	426775002(NonSDGL) Serial Dilution (SD)
1203822691	426775002(NonSDGD) Sample Duplicate (DUP)
1203822692	426775002(NonSDGS) Matrix Spike (MS)
1203822714	Method Blank (MB)ICP-MS
1203822715	Laboratory Control Sample (LCS)
1203822718	426775002(NonSDGL) Serial Dilution (SD)
1203822716	426775002(NonSDGD) Sample Duplicate (DUP)
1203822717	426775002(NonSDGS) Matrix Spike (MS)

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

Data Summary:

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

Calibration Information

ICSA/ICSAB Statement

For the ICP-MS analysis, the ICSA solution contains analyte concentrations which are verified trace impurities indigenous to the purchased standard.

Technical Information

Preparation/Analytical Method Verification

July 13, 2017

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

Sample Dilutions

Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range. The ICPMS solid samples in this SDG were diluted the standard two times. ICP-MS.

Analyte	426736
	001
Chromium	2X
Lead	2X

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.

July 13, 2017

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: GEL426736 GEL Work Order: 426736

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: 13 JUL 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: GEL426736

CONTRACT: CPRC0F16037

METHOD TYPE: SW846

SAMPLE ID:426736001

BASIS: Dry Weight

DATE COLLECTED 28-JUN-17

CLIENT ID: B39HY1

LEVEL: Low

DATE RECEIVED 30-JUN-17

MATRIX: SOIL

%SOLIDS: 78

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-36-0	Antimony	400	ug/kg	U	400	1210	1210	1	P	HSC	07/10/17 14:22	071017A-2	1678798
7440-47-3	Chromium	15900	ug/kg	D	242	727	10	2	MS	PRB	07/08/17 00:28	170707-3	1678808
7439-92-1	Lead	2180	ug/kg	D	121	484	15	2	MS	PRB	07/08/17 00:28	170707-3	1678808

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1678798	1678797	SW846 3050B	0.527	g	50	mL	07/03/17	CXW4
1678808	1678807	SW846 3050B	0.527	g	50	mL	07/03/17	CXW4

***Analytical Methods:**

P SW846 3050B/6010D
MS SW846 3050B/6020B

Quality Control Summary

July 13, 2017 GEL LABORATORIES LLC

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

QC Summary

Report Date: July 13, 2017

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

Contact: Mr. Scot Fitzgerald

Workorder: 426736

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch 1678808											
QC1203822716 426775002 DUP											
Chromium		D	6580	D	6060	ug/kg	8.14	(0%-35%)	PRB	07/08/17	00:34
Lead		D	4110	D	4150	ug/kg	0.902	(0%-35%)			
QC1203822715 LCS											
Chromium	4890			D	5380	ug/kg		110	(80%-120%)	07/08/17	00:25
Lead	4890			D	5740	ug/kg		117	(80%-120%)		
QC1203822714 MB											
Chromium				DU	186	ug/kg				07/08/17	00:22
Lead				DU	93.1	ug/kg					
QC1203822717 426775002 MS											
Chromium	5090	D	6580	D	10500	ug/kg		77.7	(75%-125%)	07/08/17	00:37
Lead	5090	D	4110	D	10400	ug/kg		123	(75%-125%)		
QC1203822718 426775002 SDILT											
Chromium		D	31.3	D	6.21	ug/L	.913		(0%-10%)	07/08/17	00:44
Lead		D	19.6	D	3.78	ug/L	3.6		(0%-10%)		
Metals Analysis-ICP											
Batch 1678798											
QC1203822691 426775002 DUP											
Antimony		DU	1730	DU	1640	ug/kg	N/A		HSC	07/10/17	14:29

July 13, 2017

GEL LABORATORIES LLC

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

QC Summary

Workorder: 426736

Page 2 of 3

Table with columns: Parmname, NOM, Sample, Qual, QC, Units, RPD/D%, REC%, Range, Anlst, Date, Time. Rows include Metals Analysis-ICP, Batch 1678798, and various Antimony samples with their respective QC values and dates.

Notes:

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
+ Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
C Target analyte was detected in the sample and the associated blank. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
D Results are reported from a diluted aliquot of sample.
E Reported value is estimated due to interferences. See comment in narrative.
M Duplicate precision not met.
N Spike Sample recovery is outside control limits.
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

July 13, 2017

GEL LABORATORIES LLC

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

QC Summary

Workorder: 426736

Page 3 of 3

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

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

July 13, 2017

General Chemistry
Technical Case Narrative
CH2MHill Plateau Remediation Company (CPRC)
SDG #: GEL426736
Work Order #: 426736

Product: Hexavalent Chromium

Analytical Method: 7196_CR6

Analytical Procedure: GL-GC-E-044 REV# 22

Analytical Batch: 1678669

Preparation Method: SW846 3060A

Preparation Procedure: GL-GC-E-044 REV# 22

Preparation Batch: 1678668

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
426736001	B39HY1
1203822319	Method Blank (MB)
1203822320	Laboratory Control Sample (LCS)
1203822322	Insoluble Lab Control Sample (ILCS)
1203823008	426736001(B39HY1) Sample Duplicate (DUP)
1203823009	426775001(NonSDG) Sample Duplicate (DUP)
1203823010	426736001(B39HY1) Matrix Spike (MS)
1203823011	426775001(NonSDG) Matrix Spike (MS)
1203823014	426736001(B39HY1) Matrix Spike Duplicate (MSD)
1203823015	426775001(NonSDG) Matrix Spike Duplicate (MSD)

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

July 13, 2017

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: GEL426736 GEL Work Order: 426736

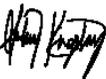
The Qualifiers in this report are defined as follows:

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: 07 JUL 2017

Title: Analyst I

Sample Data Summary

Certificate of Analysis

Report Date: July 7, 2017

Company : CH2MHill Plateau Remediation Company
 Address : MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352
 Contact: Mr. Scot Fitzgerald
 Project: CHPRC SAF F16-037

Client Sample ID: B39HY1	Project: CPRC0F16037
Sample ID: 426736001	Client ID: CPRC001
Matrix: SOIL	
Collect Date: 28-JUN-17 12:15	
Receive Date: 30-JUN-17	
Collector: Client	
Moisture: 21.6%	

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Spectrometric Analysis												
7196_CR6: COMMON "Dry Weight Corrected"												
Hexavalent Chromium	U	194	194	485	ug/Kg	38.0	1	VH1	07/06/17	1523	1678669	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	RXB5	07/05/17	1218	1678668

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	7196_CR6	

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

July 13, 2017

GEL LABORATORIES LLC

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

QC Summary

Report Date: July 7, 2017

Page 1 of 2

CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 426736

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Spectrometric Analysis											
Batch	1678669										
QC1203823008	426736001	DUP									
Hexavalent Chromium		U	194	U	194	ug/Kg	N/A		VH1	07/06/17	15:23
QC1203823009	426775001	DUP									
Hexavalent Chromium		U	164	U	155	ug/Kg	N/A			07/06/17	15:24
QC1203822322	ILCS										
Hexavalent Chromium	6850				6310	ug/Kg	92.2	(80%-120%)		07/06/17	15:11
QC1203822320	LCS										
Hexavalent Chromium	3610				3490	ug/Kg	96.9	(80%-120%)		07/06/17	15:10
QC1203822319	MB										
Hexavalent Chromium			U		144	ug/Kg				07/06/17	15:10
QC1203823010	426736001	MS									
Hexavalent Chromium	5040	U	194		4790	ug/Kg	95	(75%-125%)		07/06/17	15:23
QC1203823011	426775001	MS									
Hexavalent Chromium	4220	U	164		3770	ug/Kg	89.4	(75%-125%)		07/06/17	15:24
QC1203823014	426736001	MSD									
Hexavalent Chromium	5040	U	194		4840	ug/Kg	0.985	94.1	(0%-35%)	07/06/17	15:23
QC1203823015	426775001	MSD									
Hexavalent Chromium	4220	U	164		3850	ug/Kg	2.07	91.3	(0%-35%)	07/06/17	15:24

Notes:

The Qualifiers in this report are defined as follows:

July 13, 2017

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QC Summary

Workorder: 426736

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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

July 13, 2017

Radiochemistry

Technical Case Narrative

CH2MHill Plateau Remediation Company (CPRC)

SDG #: GEL426736

Work Order #: 426736

Product: UISO_IE_PRECIP_AEA:COMMON

Analytical Method: UISO_IE_PRECIP_AEA

Analytical Procedure: GL-RAD-A-011 REV# 26

Analytical Batch: 1679643

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 21

Preparation Batch: 1678780

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
426736001	B39HY1
1203824495	Method Blank (MB)
1203824496	426775001(NonSDG) Sample Duplicate (DUP)
1203824497	Laboratory Control Sample (LCS)

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

Data Summary:

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

Technical Information

Recounts

Sample 1203824495 (MB) was recounted due to a peak shift. The recount is reported.

Product: Dry Weight

Analytical Method: Dry Soil Prep

Analytical Procedure: GL-OA-E-020 REV# 11

Analytical Batch: 1678780

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
426736001	B39HY1
1203822656	426736001(B39HY1) Sample Duplicate (DUP)

July 13, 2017

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: SRTOT_SEP_PRECIP_GPC: COMMON

Analytical Method: SRTOT_SEP_PRECIP_GPC

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

Analytical Batch: 1678784

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 21

Preparation Batch: 1678780

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
426736001	B39HY1
1203822661	Method Blank (MB)
1203822662	426736001(B39HY1) Sample Duplicate (DUP)
1203822663	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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: TC99_SEP_GPC

Analytical Method: TC99_EIE_LSC

Analytical Procedure: GL-RAD-A-059 REV# 5

Analytical Batch: 1678899

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
426736001	B39HY1
1203822903	Method Blank (MB)
1203822904	426736001(B39HY1) Sample Duplicate (DUP)
1203822906	Laboratory Control Sample (LCS)

July 13, 2017

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# 22

Analytical Batch: 1680886

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
426736001	B39HY1
1203827282	Method Blank (MB)
1203827283	426775001(NonSDG) Sample Duplicate (DUP)
1203827285	426775001(NonSDG) Matrix Spike (MS)
1203827287	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 were re-prepped due to low recovery. The re-analysis is being reported.

Miscellaneous Information

Additional Comments

The matrix spike, 1203827285 (Non SDG 426775001MS), 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.

July 13, 2017

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**Qualifier Definition Report
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL426736 GEL Work Order: 426736

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: 12 JUL 2017

Title: Group Leader

Sample Data Summary

July 13, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL426736	Client: CPRC001	Project: CPRC0F16037
Lab Sample ID: 426736001	Date Collected: 06/28/2017 12:15	Matrix: SOIL
	Date Received: 06/30/2017 09:05	%Moisture: 21.6
Client ID: B39HY1		Prep Basis: "Dry Weight Corrected"
Batch ID: 1679643	Method: UIISO_IE_PRECIP_AEA	SOP Ref: GL-RAD-A-011
Run Date: 07/08/2017 11:01	Analyst: BXA4	Instrument: 1134
Data File: S0426736001_UU.1A.gcnf	Aliquot: 0.102 g	Count Time: 240 min
Prep Batch: 1679643	Prep Method: DOE EML HASL-300, U-02-R	Prep SOP Ref: GL-RAD-A-021
Prep Date: 07/06/2017 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 <small>13968-55-3/13966-29-5</small>	Uranium-233/234	U	0.287	pCi/g	+/-0.363	0.366	0.451	1.00
15117-96-1/13982-7	Uranium-235/236	U	0.00	pCi/g	+/-0.203	0.204	0.302	1.00
7440-61-1	Uranium-238	U	0.388	pCi/g	+/-0.395	0.399	0.391	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	18.1	20.4	pCi/g	88.3	(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.

July 13, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL426736	Client: CPRC001	Project: CPRC0F16037
Lab Sample ID: 426736001	Date Collected: 06/28/2017 12:15	Matrix: SOIL
	Date Received: 06/30/2017 09:05	%Moisture: 21.6
Client ID: B39HY1	Method: SRTOT_SEP_PRECIP_GPC	Prep Basis: "Dry Weight Corrected"
Batch ID: 1678784	Analyst: KSD1	SOP Ref: GL-RAD-A-004
Run Date: 07/06/2017 16:03	Aliquot: 0.306 g	Instrument: PIC10B
Data File: S1678784.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 1678784		Prep SOP Ref: GL-RAD-A-021
Prep Date: 07/05/2017 11:15		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium	U	0.235	pCi/g	+/-0.845	0.847	1.56	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	6.20	7.75	mg	80	(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.

July 13, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL426736	Client: CPRC001	Project: CPRC0F16037
Lab Sample ID: 426736001	Date Collected: 06/28/2017 12:15	Matrix: SOIL
	Date Received: 06/30/2017 09:05	%Moisture: 21.6
Client ID: B39HY1		Prep Basis: "As Received"
Batch ID: 1678899	Method: TC99_EIE_LSC	SOP Ref: GL-RAD-A-059
Run Date: 07/10/2017 06:31	Analyst: GXR1	Instrument: LSCGREEN
Data File: E1678899.xls	Aliquot: 1.222 g	Count Time: 25 min
Prep Batch: 1678899	Prep Method: DOE EML HASL-300, Tc-02-	
Prep Date: 07/06/2017 11:53		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	0.575	pCi/g	+/-1.58	1.59	2.71	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	25700	25800	CPM	99.9	(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.

July 13, 2017

**Certificate of Analysis
Sample Summary**

SDG Number: GEL426736	Client: CPRC001	Project: CPRC0F16037
Lab Sample ID: 426736001	Date Collected: 06/28/2017 12:15	Matrix: SOIL
	Date Received: 06/30/2017 09:05	%Moisture: 21.6
Client ID: B39HY1		Prep Basis: "As Received"
Batch ID: 1680886	Method: TRITIUM_DIST_LSC	SOP Ref: GL-RAD-A-002
Run Date: 07/11/2017 19:04	Analyst: BXM4	Instrument: LSCRED
Data File: T1680886.xls	Aliquot: 1.252 g	Count Time: 20 min
Prep Batch: 1680886	Prep Method: EPA 906.0 Modified	
Prep Date: 07/11/2017 10:05		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		251	pCi/g	+/-26.3	62.7	22.9	30.0

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

July 13, 2017 GEL LABORATORIES LLC

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

QC Summary

Report Date: July 12, 2017
Page 1 of 3

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

Contact: Mr. Scot Fitzgerald

Workorder: 426736

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1679643								
QC1203824495	MB								
Uranium-233/234			U	0.0531	pCi/g			BXA4	07/10/1711:15
				Uncert: +/-0.199					
				TPU: +/-0.199					
Uranium-235/236			U	0.111	pCi/g				
				Uncert: +/-0.304					
				TPU: +/-0.305					
Uranium-238			U	0.176	pCi/g				
				Uncert: +/-0.280					
				TPU: +/-0.281					
**Uranium-232 Tracer	19.7			17.5	pCi/g	REC: 89	(30%-105%)		
				Uncert: +/-2.30					
				TPU: +/-3.57					
QC1203824496	426775001	DUP							
Uranium-233/234		0.446	U	0.421	pCi/g				07/08/1711:01
				Uncert: +/-0.405		RPD: 45	(0% - 100%)		
				TPU: +/-0.410		RER: 0.0775	(0-2)		
Uranium-235/236		U 0.00	U	-0.0466	pCi/g				
				Uncert: +/-0.193		RPD: 0	N/A		
				TPU: +/-0.193		RER: 0.323	(0-2)		
Uranium-238		0.387		0.393	pCi/g				
				Uncert: +/-0.374		RPD: 1	(0% - 100%)		
				TPU: +/-0.378		RER: 0.0201	(0-2)		
**Uranium-232 Tracer	19.7	19.3		17.6	pCi/g	REC: 89	(30%-105%)		
				Uncert: +/-2.47					
				TPU: +/-3.81					
QC1203824497	LCS								
Uranium-233/234				26.7	pCi/g				07/08/1711:01
				Uncert: +/-2.78					
				TPU: +/-4.72					
Uranium-235/236				1.58	pCi/g				
				Uncert: +/-0.775					
				TPU: +/-0.807					
Uranium-238	25.5			26.0	pCi/g	REC: 102	(80%-120%)		
				Uncert: +/-2.75					
				TPU: +/-4.62					
**Uranium-232 Tracer	19.7			17.8	pCi/g	REC: 91	(30%-105%)		
				Uncert: +/-2.40					
				TPU: +/-3.70					
Rad Gas Flow									
Batch	1678784								
QC1203822661	MB								
Total Strontium			U	0.00763	pCi/g			KSD1	07/06/1716:03
				Uncert: +/-0.449					

QC Summary

Workorder: 426736

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gas Flow									
Batch	1678784								
				TPU:	+/-0.449				
**Strontium Carrier	7.75			6.70	mg	REC: 87	(40%-110%)		
QC1203822662	426736001	DUP							
Total Strontium		U	0.235	U	-0.122	pCi/g			07/06/1716:04
				Uncert:	+/-0.845	+/-0.604			
				TPU:	+/-0.847	+/-0.604	RPD: 0	N/A	
						RER: 0.671	(0-2)		
**Strontium Carrier	7.75		6.20	6.80	mg	REC: 88	(40%-110%)		
QC1203822663	LCS								
Total Strontium	39.7			39.8	pCi/g	REC: 100	(80%-120%)	07/06/1716:04	
				Uncert:	+/-2.31				
				TPU:	+/-10.3				
**Strontium Carrier	7.75			6.70	mg	REC: 87	(40%-110%)		
Rad Liquid Scintillation									
Batch	1678899								
QC1203822903	MB								
Technetium-99			U	0.136	pCi/g			GXR1	07/10/1707:24
				Uncert:	+/-1.51				
				TPU:	+/-1.51				
**Technetium-99m Tracer	25800			24900	CPM	REC: 97	(30%-105%)		
QC1203822904	426736001	DUP							
Technetium-99		U	0.575	U	-0.15	pCi/g			07/10/1707:51
				Uncert:	+/-1.58	+/-1.57	RPD: 0	N/A	
				TPU:	+/-1.59	+/-1.57	RER: 0.637	(0-2)	
**Technetium-99m Tracer	25800		25700	25300	CPM	REC: 98	(30%-105%)		
QC1203822906	LCS								
Technetium-99	68.2			58.5	pCi/g	REC: 86	(80%-120%)	07/10/1708:17	
				Uncert:	+/-2.79				
				TPU:	+/-7.28				
**Technetium-99m Tracer	25800			25800	CPM	REC: 100	(30%-105%)		
Batch	1680886								
QC1203827282	MB								
Tritium			U	1.63	pCi/g			BXM4	07/11/1719:47
				Uncert:	+/-12.9				
				TPU:	+/-12.9				
QC1203827283	426775001	DUP							
Tritium		U	-1.22	U	-5.05	pCi/g			07/11/1720:08
				Uncert:	+/-12.6	+/-12.4	RPD: 0	N/A	
				TPU:	+/-12.6	+/-12.4	RER: 0.423	(0-2)	
QC1203827285	426775001	MS							
Tritium	148	U	-1.22	147	pCi/g	REC: 100	(75%-125%)	07/11/1720:30	
				Uncert:	+/-12.6	+/-31.6			
				TPU:	+/-12.6	+/-46.0			
QC1203827287	LCS								
Tritium	88.9			80.0	pCi/g	REC: 90	(80%-120%)	07/11/1720:51	
				Uncert:	+/-18.2				
				TPU:	+/-25.7				

Notes:

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

QC Summary

Workorder: 426736

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
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The Qualifiers in this report are defined as follows:

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

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

** Indicates analyte is a surrogate compound.

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

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

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