

8/10/2016



August 10, 2016

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

Re: CHPRC SAF S16-007  
Work Order: 401516  
SDG: GEL401516

Dear Mr. Fitzgerald:

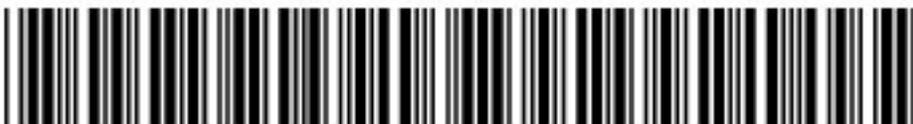
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 14, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

*B Luthman*  
Brielle Luthman for  
Heather Shaffer  
Project Manager

Purchase Order: 300072 - 7H  
Chain of Custody: S16-007-138  
Enclosures



## Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	7
Data Review Qualifier Definitions.....	10
Laboratory Certifications.....	12
Metals Analysis.....	14
Case Narrative.....	15
Sample Data Summary.....	18
Quality Control Summary.....	20
Radiological Analysis.....	23
Case Narrative.....	24
Sample Data Summary.....	32
Quality Control Summary.....	44

# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF S16-007  
SDG: GEL401516**

**August 10, 2016**

**Laboratory Identification:**

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

**Summary**

**Sample receipt**

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on July 14, 2016, 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 and DER.

**Sample Identification**

The laboratory received the following sample:

<b>Laboratory Identification</b>	<b>Sample Description</b>
401516001	B35TN7

**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: 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.

8/10/2016

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

**Technical Case Narrative**  
**CH2M Hill Plateau Remediation Company (CPRC)**  
**SDG #: GEL401516**  
**Work Order #: 401516**

## **Metals**

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

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

#### **Calibration Information**

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

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

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

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

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of molybdenum, zinc, and arsenic. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203585093 (MB).

## **Radiochemistry**

### **AMCMISO\_EIE\_PRECIP\_AEA: 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.

### **PUISO\_PRECIP\_AEA: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**

### **UIISO\_IE\_PRECIP\_AEA:COMMON**

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

### **Technical Information**

#### **Recounts**

Sample 1203587314 (MB) was recounted due to a suspected blank false positive. The recount is reported.

#### **I129LL\_SEP\_LEPS\_GS: COMMON (low level)**

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.

#### **GAMMA\_GS:COMMON + GW 01**

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

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

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.

#### **PU241\_IE\_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.

### **Miscellaneous Information**

#### **SE79\_SEP\_IE\_LSC: COMMON**

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

applicable, with the following exceptions.

### **Technical Information**

#### **Recounts**

Samples were recounted due to the quench number being outside the calibration range. The recounts are reported.

### **TC99\_EIE\_LSC: COMMON**

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

### **Technical Information**

#### **Recounts**

Sample 1203585993 (Non SDG 400884001DUP) was recounted to verify sample results. Recount is reported.

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

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

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

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

### **Certification Statement**

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

# **Chain of Custody and Supporting Documentation**



**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>OPRC</u>	SDG/AR/COC/Work Order: <u>40516</u>
Received By: <u>MLC</u>	Date Received: <u>7-14-16</u>
Suspected Hazard Information	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No *If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>cpm</u>
Classified Radioactive II or III by RSO?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius <u>2 C</u>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>130462962</u> Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH:
6 Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Preservation added, Lot#: Sample ID's and containers affected:
7 VOA vials contain acid preservation?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
16 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7767 3999 3840 2 C</u> <u>3689 2 C</u> <u>3932 1 C</u>

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials DS Date 7/15/16 Page 1 of 1

# **Data Review Qualifier Definitions**

## Project Specific Qualifier Definitions for GEL Client Code: CPRC

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

# Laboratory Certifications

## List of current GEL Certifications as of 10 August 2016

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA160006
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-16-11
Utah NELAP	SC000122016-20
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# Metals Analysis

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL401516**  
**Work Order #: 401516**

**Product:** Determination of Metals by ICP-MS

**Analytical Method:** 6020\_METALS\_ICPMS

**Analytical Procedure:** GL-MA-E-014 REV# 28

**Analytical Batch:** 1581828

**Preparation Method:** SW846 3005A

**Preparation Procedure:** GL-MA-E-006 REV# 13

**Preparation Batch:** 1581826

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203585093	Method Blank (MB)ICP-MS
1203585094	Laboratory Control Sample (LCS)
1203585097	401514001(NonSDGL) Serial Dilution (SD)
1203585095	401514001(NonSDGS) Matrix Spike (MS)
1203585096	401514001(NonSDGSD) Matrix Spike Duplicate (MSD)

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

**Data Summary:**

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

**Calibration Information**

**CRDL/PQL Requirements**

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

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of molybdenum, zinc, and arsenic. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203585093 (MB).

**Certification Statement**

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

**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: GEL401516 GEL Work Order: 401516

**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 AUG 2016

**Title:** Data Validator

# Sample Data Summary

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

SDG No: GEL401516

CONTRACT: CPRC0S16007

METHOD TYPE: SW846

SAMPLE ID: 401516001

BASIS: As Received

DATE COLLECTED 13-JUL-16

CLIENT ID: B35TN7

LEVEL: Low

DATE RECEIVED 14-JUL-16

MATRIX: WATER

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-61-1	Uranium	4.6	ug/L		0.067	0.2	15	1	MS	SKJ	08/04/16 18:04	160804-1	1581828

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1581828	1581826	SW846 3005A	50	mL	50	mL	07/15/16	SXW1

**\*Analytical Methods:**

MS SW846 3005A/6020A

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: August 10, 2016

**CH2M Hill Plateau Remediation Company**

**MSIN R3-50 CHPRC**

**PO Box 1600**

**Richland, Washington**

**Contact: Mr. Scot Fitzgerald**

**Workorder: 401516**

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1581828										
QC1203585094	LCS										
Uranium	50.0			51.1	ug/L		102	(80%-120%)	SKJ	08/04/16	18:00
QC1203585093	MB										
Uranium			U	0.067	ug/L					08/04/16	17:56
QC1203585095	401514001	MS									
Uranium	50.0	0.398		54.6	ug/L		108	(75%-125%)		08/04/16	18:28
QC1203585096	401514001	MSD									
Uranium	50.0	0.398		53.5	ug/L	1.95	106	(0%-20%)		08/04/16	18:32
QC1203585097	401514001	SDILT									
Uranium		0.398	BD	0.082	ug/L	3.02		(0%-10%)		08/04/16	18:39

**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

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401516

Page 2 of 2

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

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 #: GEL401516**  
**Work Order #: 401516**

**Product:** AMCMISO\_EIE\_PRECIP\_AEA: COMMON

**Analytical Method:** AMCMISO\_EIE\_PREC\_AEA

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

**Analytical Batch:** 1582736

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203587305	Method Blank (MB)
1203587306	401494001(NonSDG) Sample Duplicate (DUP)
1203587307	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:** PUIISO\_PRECIP\_AEA:COMMON

**Analytical Method:** PUIISO\_PRECIP\_AEA

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

**Analytical Batch:** 1582738

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203587311	Method Blank (MB)
1203587312	401494001(NonSDG) Sample Duplicate (DUP)
1203587313	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**

1. The Pu-242 tracer for sample 1203587312 does not meet the resolution requirements of having a full width half maximum of 100 keV or less. 1. The tracer peak is within the Pu-242 ROI and the tracer yield requirements do meet the client acceptance criteria. Reporting results.

**Product:** UISO\_IE\_PRECIP\_AEA:COMMON

**Analytical Method:** UISO\_IE\_PRECIP\_AEA

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

**Analytical Batch:** 1582739

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203587314	Method Blank (MB)
1203587315	401494001(NonSDG) Sample Duplicate (DUP)
1203587316	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Technical Information**

**Recounts**

Sample 1203587314 (MB) was recounted due to a suspected blank false positive. The recount is reported.

**Product:** I129LL\_SEP\_LEPS\_GS: COMMON (low level)

**Analytical Method:** DOE EML HASL-300,I-01 Modified

**Analytical Procedure:** GL-RAD-A-006 REV# 21

**Analytical Batch:** 1581778

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203584985	Method Blank (MB)
1203584986	401492001(NonSDG) Sample Duplicate (DUP)
1203584987	401492001(NonSDG) Matrix Spike (MS)
1203584988	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:** GAMMA\_GS:COMMON + GW 01

**Analytical Method:** 901.1\_GAMMA\_GS

**Analytical Procedure:** GL-RAD-A-013 REV# 25

**Analytical Batch:** 1581790

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203585022	Method Blank (MB)
1203585023	401494001(NonSDG) Sample Duplicate (DUP)
1203585024	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

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

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

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

**Analytical Batch:** 1582477

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203586675	Method Blank (MB)
1203586676	401516001(B35TN7) Sample Duplicate (DUP)
1203586677	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:** PU241\_IE\_LSC: COMMON

**Analytical Method:** PU241\_IE\_LSC

**Analytical Procedure:** GL-RAD-A-035 REV# 17

**Analytical Batch:** 1582740

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203587317	Method Blank (MB)
1203587318	401494001(NonSDG) Sample Duplicate (DUP)
1203587319	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**

1. Sample 1203587318 does not meet the resolution requirement of having a full width half maximum of 100 keV or less for the Pu-242 tracer. 1. The sample does meet the tracer yield requirement, the detection limits, and its tracer peak is within the Pu-242 region of interest. Reporting results.

**Product:** SE79\_SEP\_IE\_LSC: COMMON

**Analytical Method:** SE79\_SEP\_IE\_LSC

**Analytical Procedure:** GL-RAD-A-031 REV# 11

**Analytical Batch:** 1582184

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203585985	Method Blank (MB)
1203585986	400884001(NonSDG) Sample Duplicate (DUP)
1203585987	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

applicable, with the following exceptions.

**Technical Information**

**Recounts**

Samples were recounted due to the quench number being outside the calibration range. The recounts are reported.

**Product:** TC99\_EIE\_LSC: COMMON

**Analytical Method:** TC99\_EIE\_LSC

**Analytical Procedure:** GL-RAD-A-059 REV# 4

**Analytical Batch:** 1582186

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203585992	Method Blank (MB)
1203585993	400884001(NonSDG) Sample Duplicate (DUP)
1203585994	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Technical Information**

**Recounts**

Sample 1203585993 (Non SDG 400884001DUP) was recounted to verify sample results. Recount is reported.

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

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

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

**Analytical Batch:** 1582195

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203586023	Method Blank (MB)
1203586024	400884001(NonSDG) Sample Duplicate (DUP)
1203586025	400884001(NonSDG) Matrix Spike (MS)

1203586026                      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:** C14\_LSC: COMMON

**Analytical Method:** C14\_LSC

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

**Analytical Batch:** 1583613

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401516001	B35TN7
1203589378	Method Blank (MB)
1203589379	401206001(NonSDG) Sample Duplicate (DUP)
1203589380	401206001(NonSDG) Matrix Spike (MS)
1203589381	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Certification Statement**

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

**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: GEL401516 GEL Work Order: 401516

**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:** 10 AUG 2016

**Title:** Group Leader

# Sample Data Summary

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

<b>SDG Number:</b> GEL401516	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0S16007
<b>Lab Sample ID:</b> 401516001	<b>Date Collected:</b> 07/13/2016 09:40	<b>Matrix:</b> WATER
	<b>Date Received:</b> 07/14/2016 09:05	
<b>Client ID:</b> B35TN7	<b>Method:</b> AMCMISO_EIE_PREC_AEA	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1582736	<b>Analyst:</b> MXS2	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 07/20/2016 10:06	<b>Aliquot:</b> 0.4 L	<b>Instrument:</b> 1097
<b>Data File:</b> S0401516001_AM.1A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, Am-05	<b>Count Time:</b> 239.9998 min
<b>Prep Batch:</b> 1582736		
<b>Prep Date:</b> 07/18/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.005	pCi/L	+/-0.0523	0.0524	0.109	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	4.03	5.34	pCi/L	75.5	(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**

<b>SDG Number:</b> GEL401516	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0S16007
<b>Lab Sample ID:</b> 401516001	<b>Date Collected:</b> 07/13/2016 09:40	<b>Matrix:</b> WATER
	<b>Date Received:</b> 07/14/2016 09:05	
<b>Client ID:</b> B35TN7	<b>Method:</b> PUIISO_PRECIP_AEA	<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1582738	<b>Analyst:</b> MXS2	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 07/20/2016 10:09	<b>Aliquot:</b> 0.4 L	<b>Instrument:</b> 1212
<b>Data File:</b> S0401516001_PU.1A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, Pu-11-	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1582738		
<b>Prep Date:</b> 07/18/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	0.0365	pCi/L	+/-0.101	0.101	0.174	1.00
OER-100-70	Plutonium-239/240	U	-0.00571	pCi/L	+/-0.0857	0.0858	0.200	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	3.11	4.93	pCi/L	63.2	(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: GEL401516	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401516001	Date Collected: 07/13/2016 09:40	Matrix: WATER
	Date Received: 07/14/2016 09:05	
Client ID: B35TN7	Method: UIISO_IE_PRECIP_AEA	Prep Basis: "As Received"
Batch ID: 1582739	Analyst: MXS2	SOP Ref: GL-RAD-A-011
Run Date: 07/20/2016 09:51	Aliquot: 0.1 L	Instrument: 1012
Data File: S0401516001_UU.1A.gcnf	Prep Method: DOE EML HASL-300, U-02-R	Count Time: 239.9998 min
Prep Batch: 1582739		
Prep Date: 07/18/2016 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		3.49	pCi/L	+/-0.989	1.10	0.511	1.00
15117-96-1/13982-7	Uranium-235/236	U	0.174	pCi/L	+/-0.346	0.347	0.562	1.00
7440-61-1	Uranium-238		2.92	pCi/L	+/-0.912	0.995	0.535	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	19.4	20.8	pCi/L	93.3	(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.

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

SDG Number: GEL401516	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401516001	Date Collected: 07/13/2016 09:40	Matrix: WATER
	Date Received: 07/14/2016 09:05	
Client ID: B35TN7		Prep Basis: "As Received"
Batch ID: 1582740	Method: PU241_IE_LSC	SOP Ref: GL-RAD-A-035
Run Date: 07/22/2016 13:47	Analyst: MXS2	Instrument: LSCGREEN
Data File: PU1582740.xls	Aliquot: 0.4 L	Count Time: 45 min
Prep Batch: 1582740	Prep Method: DOE EML HASL-300, Pu-11-	
Prep Date: 07/18/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14119-32-5	Plutonium-241	U	9.73	pCi/L	+/-8.64	8.92	14.4	25.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	3.11	4.93	pCi/L	63.2	(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: GEL401516	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401516001	Date Collected: 07/13/2016 09:40	Matrix: WATER
	Date Received: 07/14/2016 09:05	
Client ID: B35TN7	Method: SRISO_SEP_PRECIP_GPC	Prep Basis: "As Received"
Batch ID: 1582477	Analyst: KSD1	SOP Ref: GL-RAD-A-004
Run Date: 07/30/2016 16:14	Aliquot: 300 mL	Instrument: PIC4A
Data File: S1582477r.xls	Prep Method: EPA 905.0 Modified/DOE RP5	Count Time: 60 min
Prep Batch: 1582477		
Prep Date: 07/28/2016 11:01		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10098-97-2	Strontium-90	U	-0.666	pCi/L	+/-0.623	0.623	1.33	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	7.10	7.37	mg	96.4	(40%-110%)

**Comments:**

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

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

SDG Number: GEL401516	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401516001	Date Collected: 07/13/2016 09:40	Matrix: WATER
	Date Received: 07/14/2016 09:05	
Client ID: B35TN7		Prep Basis: "As Received"
Batch ID: 1581778	Method: DOE EML HASL-300,I-01 Mo	SOP Ref: GL-RAD-A-006
Run Date: 08/05/2016 18:35	Analyst: MJH1	Instrument: XRAY1
Data File: I401516001.CNF;1	Aliquot: 1.5 L	Count Time: 240 min
Prep Batch: 1581778	Prep Method: DOE EML HASL-300,I-01 M	
Prep Date: 08/04/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	U	-0.0155	pCi/L	+/-0.211	0.211	0.382	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

**Comments:**

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

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

**SDG Number:** GEL401516  
**Lab Sample ID:** 401516001  
  
**Client ID:** B35TN7  
**Batch ID:** 1581790  
**Run Date:** 07/27/2016 09:47  
**Data File:** G401516001.CNF;1  
**Prep Batch:** 1581790  
**Prep Date:** 07/18/2016 00:00

**Client:** CPRC001  
**Date Collected:** 07/13/2016 09:40  
**Date Received:** 07/14/2016 09:05  
  
**Method:** 901.1\_GAMMA\_GS  
**Analyst:** MXR1  
**Aliquot:** 2 L  
**Prep Method:** EPA 901.1

**Project:** CPRC0S16007  
**Matrix:** WATER  
  
**Prep Basis:** "As Received"  
**SOP Ref:** GL-RAD-A-013  
**Instrument:** GAM27  
**Count Time:** 120 min

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14234-35-6	Antimony-125	U	-2.41	pCi/L	+/-6.45	6.54	11.1	
13967-70-9	Cesium-134	U	0.611	pCi/L	+/-2.53	2.55	4.76	
10045-97-3	Cesium-137	U	-2.18	pCi/L	+/-2.44	2.63	4.04	15.0
10198-40-0	Cobalt-60	U	-1.4	pCi/L	+/-2.91	2.98	5.10	
14683-23-9	Europium-152	U	1.99	pCi/L	+/-7.44	7.50	13.6	
15585-10-1	Europium-154	U	-3.31	pCi/L	+/-6.67	6.84	11.8	
14391-16-3	Europium-155	U	-6.56	pCi/L	+/-9.38	9.85	15.5	
13966-00-2	Potassium-40	U	45.9	pCi/L	+/-48.0	48.2	47.0	

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.

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

SDG Number: GEL401516	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401516001	Date Collected: 07/13/2016 09:40	Matrix: WATER
	Date Received: 07/14/2016 09:05	
Client ID: B35TN7		Prep Basis: "As Received"
Batch ID: 1582184	Method: SE79_SEP_IE_LSC	SOP Ref: GL-RAD-A-031
Run Date: 07/26/2016 13:12	Analyst: CXS7	Instrument: LSCBLUE
Data File: SE1582184R.xls	Aliquot: 0.1 L	Count Time: 90 min
Prep Batch: 1582184	Prep Method: NERC ORD	
Prep Date: 07/20/2016 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15758-45-9	Selenium-79	U	-16.5	pCi/L	+/-12.3	12.3	21.4	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Selenium Carrier	12.1	20.0	mg	60.5	(40%-110%)

**Comments:**

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

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

SDG Number: GEL401516	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401516001	Date Collected: 07/13/2016 09:40	Matrix: WATER
	Date Received: 07/14/2016 09:05	
Client ID: B35TN7		Prep Basis: "As Received"
Batch ID: 1582186	Method: TC99_EIE_LSC	SOP Ref: GL-RAD-A-059
Run Date: 07/26/2016 12:18	Analyst: GXR1	Instrument: LSCBROWN
Data File: E1582186.xls	Aliquot: 100 mL	Count Time: 30 min
Prep Batch: 1582186	Prep Method: DOE EML HASL-300, Tc-02-	
Prep Date: 07/22/2016 13:25		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	-4.35	pCi/L	+/-20.8	20.8	36.1	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	25300	28900	CPM	87.4	(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: GEL401516	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401516001	Date Collected: 07/13/2016 09:40	Matrix: WATER
	Date Received: 07/14/2016 09:05	
Client ID: B35TN7		Prep Basis: "As Received"
Batch ID: 1582195	Method: TRITIUM_DIST_LSC	SOP Ref: GL-RAD-A-002
Run Date: 07/25/2016 15:55	Analyst: TXJ1	Instrument: LSCRED
Data File: T1582195.xls	Aliquot: 50 mL	Count Time: 40 min
Prep Batch: 1582195	Prep Method: EPA 906.0 Modified	
Prep Date: 07/22/2016 12:17		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	59.3	pCi/L	+/-187	187	324	400

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

**Comments:**

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

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

SDG Number: GEL401516	Client: CPRC001	Project: CPRC0S16007
Lab Sample ID: 401516001	Date Collected: 07/13/2016 09:40	Matrix: WATER
	Date Received: 07/14/2016 09:05	
Client ID: B35TN7	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1583613	Analyst: TXJ1	SOP Ref: GL-RAD-A-003
Run Date: 08/02/2016 01:47	Aliquot: 60 mL	Instrument: LSCGOLD
Data File: C1583613.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 30 min
Prep Batch: 1583613		
Prep Date: 08/01/2016 09:39		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	5.74	pCi/L	+/-20.5	20.5	35.2	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits

**Comments:**

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

# Quality Control Summary

8/10/2016

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: August 8, 2016

Page 1 of 7

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

Contact: Mr. Scot Fitzgerald

Workorder: 401516

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time	
<b>Rad Alpha Spec</b>										
Batch	1582736									
QC1203587305	MB									
Americium-241			U	-0.0109	pCi/L			MXS2	07/20/1610:06	
				Uncert: +/-0.0484						
				TPU: +/-0.0485						
**Americium-243 Tracer	5.34			3.61	pCi/L	REC: 68	(30%-105%)			
				Uncert: +/-0.681						
				TPU: +/-1.03						
QC1203587306	401494001	DUP								
Americium-241		U	0.030	U	0.0784	pCi/L				
				Uncert: +/-0.0597	+/-0.0971	RPD: 0	N/A			
				TPU: +/-0.0599	+/-0.0977	RER: 0.827	(0-2)			
**Americium-243 Tracer	5.34	5.28		4.54	pCi/L	REC: 85	(30%-105%)			
				Uncert: +/-0.548	+/-0.608					
				TPU: +/-0.851	+/-0.929					
QC1203587307	LCS									
Americium-241				4.92		4.78	pCi/L	REC: 97	(80%-120%)	07/20/1610:09
				Uncert: +/-0.606						
				TPU: +/-0.889						
**Americium-243 Tracer	5.34			5.13	pCi/L	REC: 96	(30%-105%)			
				Uncert: +/-0.635						
				TPU: +/-0.965						
Batch	1582738									
QC1203587311	MB									
Plutonium-238			U	0.00	pCi/L			MXS2	07/20/1610:09	
				Uncert: +/-0.0506						
				TPU: +/-0.0507						
Plutonium-239/240			U	-0.0532	pCi/L					
				Uncert: +/-0.0824						
				TPU: +/-0.0825						
**Plutonium-242 Tracer	4.93			4.04	pCi/L	REC: 82	(30%-105%)			
				Uncert: +/-0.698						
				TPU: +/-1.02						
QC1203587312	401494001	DUP								
Plutonium-238		U	0.0777	U	0.0272	pCi/L			07/20/1610:46	
				Uncert: +/-0.0916	+/-0.0766	RPD: 0	N/A			
				TPU: +/-0.0922	+/-0.0767	RER: 0.824	(0-2)			
Plutonium-239/240			10.3		11.0	pCi/L				
				Uncert: +/-0.907	+/-1.08	RPD: 7	(0% - 20%)			
				TPU: +/-1.69	+/-2.05	RER: 0.557	(0-2)			
**Plutonium-242 Tracer	4.93	4.45		3.35	pCi/L	REC: 68	(30%-105%)			
				Uncert: +/-0.628	+/-0.727					
				TPU: +/-0.930	+/-1.06					
QC1203587313	LCS									
Plutonium-238			U	0.0792	pCi/L				07/20/1610:09	
				Uncert: +/-0.108						

8/10/2016

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401516

Page 2 of 7

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1582738								
Plutonium-239/240	4.94	TPU:		+/-0.109					
		Uncert:		4.70	pCi/L	REC: 95	(80%-120%)		
		TPU:		+/-0.665					
**Plutonium-242 Tracer	4.93	TPU:		+/-0.965					
		Uncert:		3.67	pCi/L	REC: 75	(30%-105%)		
		TPU:		+/-0.681					
		TPU:		+/-1.00					
Batch	1582739								
QC1203587314	MB								
Uranium-233/234			U	0.150	pCi/L			MXS2	07/21/1610:37
		Uncert:		+/-0.498					
		TPU:		+/-0.498					
Uranium-235/236			U	0.252	pCi/L				
		Uncert:		+/-0.445					
		TPU:		+/-0.447					
Uranium-238			U	0.322	pCi/L				
		Uncert:		+/-0.484					
		TPU:		+/-0.486					
**Uranium-232 Tracer	20.8			16.9	pCi/L	REC: 81	(30%-105%)		
		Uncert:		+/-2.68					
		TPU:		+/-4.09					
QC1203587315	401494001	DUP							
Uranium-233/234				7.78	pCi/L				07/20/1609:51
		Uncert:	+/-1.32	+/-1.43		RPD: 5	(0% - 20%)		
		TPU:	+/-1.65	+/-1.79		RER: 0.322	(0-2)		
Uranium-235/236				0.515	pCi/L				
		Uncert:	+/-0.421	+/-0.535		RPD: 44	(0% - 100%)		
		TPU:	+/-0.426	+/-0.545		RER: 0.814	(0-2)		
Uranium-238				8.84	pCi/L				
		Uncert:	+/-1.40	+/-1.36		RPD: 16	(0% - 20%)		
		TPU:	+/-1.80	+/-1.68		RER: 1.07	(0-2)		
**Uranium-232 Tracer	20.8			19.8	pCi/L	REC: 91	(30%-105%)		
		Uncert:	+/-2.18	+/-2.27					
		TPU:	+/-3.43	+/-3.55					
QC1203587316	LCS								
Uranium-233/234				23.8	pCi/L				
		Uncert:		+/-2.45					
		TPU:		+/-4.00					
Uranium-235/236				1.66	pCi/L				
		Uncert:		+/-0.749					
		TPU:		+/-0.781					
Uranium-238	26.9			25.5	pCi/L	REC: 95	(80%-120%)		
		Uncert:		+/-2.54					
		TPU:		+/-4.24					
**Uranium-232 Tracer	20.8			18.0	pCi/L	REC: 86	(30%-105%)		
		Uncert:		+/-2.32					
		TPU:		+/-3.61					
Batch	1582740								
QC1203587317	MB								

8/10/2016

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401516

Page 3 of 7

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1582740								
Plutonium-241			U	5.85	pCi/L			MXS2	07/22/1615:21
				Uncert: +/-6.68					
				TPU: +/-6.81					
**Plutonium-242 Tracer	4.93			4.04	pCi/L	REC: 82 (30%-105%)			
				Uncert: +/-0.698					
				TPU: +/-1.02					
QC1203587318 401494001 DUP									
Plutonium-241		U 4.86	U	9.17	pCi/L				07/22/1616:07
				Uncert: +/-5.98		RPD: 0 N/A			
				TPU: +/-6.07		RER: 0.819 (0-2)			
**Plutonium-242 Tracer	4.93			4.45	pCi/L	REC: 68 (30%-105%)			
				Uncert: +/-0.628					
				TPU: +/-0.930					
QC1203587319 LCS									
Plutonium-241	192			194	pCi/L	REC: 101 (80%-120%)			07/22/1616:54
				Uncert: +/-12.5					
				TPU: +/-45.2					
**Plutonium-242 Tracer	4.93			3.71	pCi/L	REC: 75 (30%-105%)			
				Uncert: +/-0.687					
				TPU: +/-1.01					
<b>Rad Gamma Spec</b>									
Batch	1581778								
QC1203584985 MB									
Iodine-129			U	-0.117	pCi/L			MJH1	08/06/1615:24
				Uncert: +/-0.234					
				TPU: +/-0.240					
QC1203584986 401492001 DUP									
Iodine-129		U -0.105	U	-0.0243	pCi/L				08/06/1615:24
				Uncert: +/-0.242		RPD: 0 N/A			
				TPU: +/-0.247		RER: 0.465 (0-2)			
QC1203584987 401492001 MS									
Iodine-129	27.7	U		-0.105	pCi/L	REC: 92 (75%-125%)			08/06/1615:25
				Uncert: +/-0.242					
				TPU: +/-0.247					
QC1203584988 LCS									
Iodine-129	27.7			29.0	pCi/L	REC: 104 (80%-120%)			08/06/1615:27
				Uncert: +/-2.01					
				TPU: +/-3.53					
Batch	1581790								
QC1203585022 MB									
Antimony-125			U	8.19	pCi/L			MXR1	07/27/1611:35
				Uncert: +/-8.30					
				TPU: +/-9.09					
Cesium-134			U	-2.91	pCi/L				
				Uncert: +/-3.49					
				TPU: +/-3.73					
Cesium-137			U	-0.917	pCi/L				
				Uncert: +/-3.26					
				TPU: +/-3.29					
Cobalt-60			U	0.427	pCi/L				

## GEL LABORATORIES LLC

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

QC Summary

Workorder: 401516

Page 4 of 7

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1581790								
		Uncert:		+/-3.08					
		TPU:		+/-3.09					
Europium-152			U	2.33	pCi/L				
		Uncert:		+/-9.35					
		TPU:		+/-9.41					
Europium-154			U	0.500	pCi/L				
		Uncert:		+/-7.76					
		TPU:		+/-7.76					
Europium-155			U	0.730	pCi/L				
		Uncert:		+/-10.7					
		TPU:		+/-10.7					
Potassium-40			U	-29.8	pCi/L				
		Uncert:		+/-43.0					
		TPU:		+/-45.0					
QC1203585023 401494001 DUP									
Antimony-125		U	0.0855	U	-5.61	pCi/L			07/27/1612:04
		Uncert:	+/-13.9		+/-13.6		RPD: 0	N/A	
		TPU:	+/-13.9		+/-13.8		RER: 0.569	(0-2)	
Cesium-134		U	0.657	U	0.203	pCi/L			
		Uncert:	+/-3.05		+/-2.63		RPD: 0	N/A	
		TPU:	+/-3.06		+/-2.63		RER: 0.22	(0-2)	
Cesium-137			854		836	pCi/L			
		Uncert:	+/-25.1		+/-24.6		RPD: 2	(0% - 20%)	
		TPU:	+/-44.4		+/-70.6		RER: 0.411	(0-2)	
Cobalt-60		U	-0.333	U	0.514	pCi/L			
		Uncert:	+/-2.28		+/-2.28		RPD: 0	N/A	
		TPU:	+/-2.29		+/-2.30		RER: 0.513	(0-2)	
Europium-152		U	4.60	U	-8.27	pCi/L			
		Uncert:	+/-13.1		+/-12.7		RPD: 0	N/A	
		TPU:	+/-13.2		+/-13.2		RER: 1.35	(0-2)	
Europium-154		U	4.36	U	0.862	pCi/L			
		Uncert:	+/-6.66		+/-5.74		RPD: 0	N/A	
		TPU:	+/-6.95		+/-5.76		RER: 0.76	(0-2)	
Europium-155		U	4.06	U	-11.2	pCi/L			
		Uncert:	+/-13.5		+/-14.3		RPD: 0	N/A	
		TPU:	+/-13.7		+/-15.2		RER: 1.46	(0-2)	
Potassium-40		U	-2.44	U	-2.24	pCi/L			
		Uncert:	+/-30.6		+/-29.0		RPD: 0	N/A	
		TPU:	+/-30.6		+/-29.1		RER: 0.0091	(0-2)	
QC1203585024 LCS									
Americium-241	34400			35200	pCi/L	REC: 102	(80%-120%)		07/27/1611:07
		Uncert:		+/-840					
		TPU:		+/-3020					
Antimony-125			U	-143	pCi/L				
		Uncert:		+/-194					
		TPU:		+/-205					
Cesium-134			U	-35.3	pCi/L				
		Uncert:		+/-73.5					
		TPU:		+/-75.3					
Cesium-137	13400			14000	pCi/L	REC: 104	(80%-120%)		

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401516

Page 5 of 7

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1581790								
				Uncert:					
				TPU:					
Cobalt-60	13400			13800	pCi/L	REC: 103	(80%-120%)		
				Uncert:					
				TPU:					
Europium-152			U	-19.5	pCi/L				
				Uncert:					
				TPU:					
Europium-154			U	-24.3	pCi/L				
				Uncert:					
				TPU:					
Europium-155			U	-84.6	pCi/L				
				Uncert:					
				TPU:					
Potassium-40			U	-115	pCi/L				
				Uncert:					
				TPU:					
<b>Rad Gas Flow</b>									
Batch	1582477								
QC1203586675	MB								
Strontium-90			U	-0.249	pCi/L			KSD1	07/30/1616:18
				Uncert:					
				TPU:					
**Strontium Carrier		7.37		6.60	mg	REC: 90	(40%-110%)		
QC1203586676	401516001	DUP							
Strontium-90		U	-0.666	U	-0.908	pCi/L			07/30/1616:18
			Uncert:	+/-0.623	+/-0.629	RPD: 0	N/A		
			TPU:	+/-0.623	+/-0.629	RER: 0.535	(0-2)		
**Strontium Carrier		7.37	7.10	6.70	mg	REC: 91	(40%-110%)		
QC1203586677	LCS								
Strontium-90		72.8		68.9	pCi/L	REC: 95	(80%-120%)		07/30/1616:18
				Uncert:	+/-3.55				
				TPU:	+/-11.3				
**Strontium Carrier		7.37		7.00	mg	REC: 95	(40%-110%)		
<b>Rad Liquid Scintillation</b>									
Batch	1582184								
QC1203585985	MB								
Selenium-79			U	-11.2	pCi/L			CXS7	07/26/1614:45
				Uncert:	+/-8.41				
				TPU:	+/-8.41				
**Selenium Carrier		20.0		17.7	mg	REC: 89	(40%-110%)		
QC1203585986	400884001	DUP							
Selenium-79		U	-5.91	U	-9.72	pCi/L			07/26/1616:18
			Uncert:	+/-9.19	+/-8.37	RPD: 0	N/A		
			TPU:	+/-9.19	+/-8.37	RER: 0.601	(0-2)		
**Selenium Carrier		20.0	16.4	17.9	mg	REC: 90	(40%-110%)		
QC1203585987	LCS								
Selenium-79		1450		1630	pCi/L	REC: 112	(80%-120%)		07/26/1617:50
				Uncert:	+/-35.8				

8/10/2016

## GEL LABORATORIES LLC

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

QC Summary

Workorder: 401516

Page 6 of 7

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Liquid Scintillation</b>									
Batch	1582184								
		TPU:		+/-58.7					
**Selenium Carrier	20.0			16.0	mg	REC:	80 (40%-110%)		
Batch	1582186								
QC1203585992	MB								
Technetium-99			U	1.14	pCi/L			GXR1	07/26/1613:22
		Uncert:		+/-21.7					
		TPU:		+/-21.7					
**Technetium-99m Tracer	28900			24100	CPM	REC:	83 (30%-105%)		
QC1203585993	400884001	DUP							
Technetium-99			41.3	55.8	pCi/L				07/27/1612:35
		Uncert:	+/-22.8	+/-22.8		RPD:	30 (0% - 100%)		
		TPU:	+/-23.2	+/-23.6		RER:	0.858 (0-2)		
**Technetium-99m Tracer	28900		24500	24400	CPM	REC:	84 (30%-105%)		
QC1203585994	LCS								
Technetium-99			861	837	pCi/L	REC:	97 (80%-120%)		07/26/1614:25
		Uncert:		+/-38.2					
		TPU:		+/-100					
**Technetium-99m Tracer	28900			25400	CPM	REC:	88 (30%-105%)		
Batch	1582195								
QC1203586023	MB								
Tritium			U	-22.9	pCi/L			TXJ1	07/25/1617:19
		Uncert:		+/-180					
		TPU:		+/-180					
QC1203586024	400884001	DUP							
Tritium		U	39.3	165	pCi/L				07/25/1618:01
		Uncert:	+/-195	+/-198		RPD:	0 N/A		
		TPU:	+/-195	+/-200		RER:	0.882 (0-2)		
QC1203586025	400884001	MS							
Tritium		2320	U	39.3	1900	pCi/L	REC:	82 (75%-125%)	07/25/1618:43
		Uncert:	+/-195	+/-275					
		TPU:	+/-195	+/-459					
QC1203586026	LCS								
Tritium		2320		1940	pCi/L	REC:	84 (80%-120%)		07/25/1619:25
		Uncert:		+/-274					
		TPU:		+/-464					
Batch	1583613								
QC1203589378	MB								
Carbon-14			U	15.7	pCi/L			TXJ1	08/02/1603:21
		Uncert:		+/-20.6					
		TPU:		+/-20.8					
QC1203589379	401206001	DUP							
Carbon-14			40100	40300	pCi/L				08/02/1603:52
		Uncert:	+/-394	+/-396		RPD:	0 (0% - 20%)		
		TPU:	+/-7460	+/-7490		RER:	0.0293 (0-2)		
QC1203589380	401206001	MS							
Carbon-14		1260	40100	41200	pCi/L	REC:	83 (75%-125%)		08/02/1604:04
		Uncert:	+/-394	+/-404					
		TPU:	+/-7460	+/-7650					
QC1203589381	LCS								
Carbon-14		1260		1240	pCi/L	REC:	99 (80%-120%)		08/02/1604:16

QC Summary

Workorder: 401516

Page 7 of 7

Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
<b>Rad Liquid Scintillation</b>										
Batch		1583613								
				Uncert:		+/-46.0				
				TPU:		+/-235				

**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
- 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.