

April 04, 2018

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

Re: CHPRC SAF F16-045  
Work Order: 445458  
SDG: GEL445458

Dear Mr. Fitzgerald:

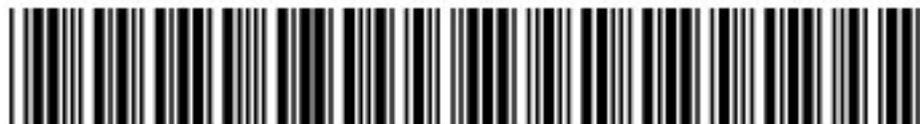
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 08, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Anna Dupree for  
Heather Shaffer  
Project Manager

Purchase Order: 304235 - 7C  
Chain of Custody: F16-045-1074, F16-045-1075, F16-045-1078 and F16-045-1079  
Enclosures



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# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF F16-045  
SDG: GEL445458**

**April 04, 2018**

**Laboratory Identification:**

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

**Summary**

**Sample receipt**

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on March 08, 2018, for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

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

**Sample Identification**

The laboratory received the following samples:

<b><u>Laboratory Identification</u></b>	<b><u>Sample Description</u></b>
445458001	B3HW93
445458002	B3HW94
445458003	B3HW97
445458004	B3HP57

**Case Narrative**

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

**Data Package**

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

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



Anna Dupree for  
Heather Shaffer  
Project Manager

**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL445458**  
**Work Order #: 445458**

## **GC/MS Volatile**

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

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.

## **Metals**

### **Determination of Metals by ICP**

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

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

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

The method blanks (MB) analyzed with this SDG met the acceptance criteria. However, where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

Sample	Analyte	Value
1203986126 (MB)	Potassium	54.4 between (50 - 75)

### **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.

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

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

The method blanks (MB) analyzed with this SDG met the acceptance criteria. However, where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

Sample	Analyte	Value
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1203986116 (MB)	Molybdenum	0.204 between (0.2 - 0.25)
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### 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.

#### Quality Control (QC) Information

##### **Matrix Spike (MS/MSD) Recovery Statement**

The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

Sample	Analyte	Value
1203993121 (Non SDG 445432003MS)	Zinc	74* (75%-125%)

## General Chemistry

### **Cyanide, Total**

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 following samples 1203986678 (Non SDG 445441001DUP) and 1203986680 (Non SDG 445441001MS) were diluted because target analyte concentrations exceeded the calibration range.

##### **Sample Re-analysis**

Sample445458002 (B3HW94) was re-analyzed due to instrument failure. The results from the reanalysis are reported.

### **Cyanide, Chlorinated**

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 following sample 1203986684 (Non SDG 445441001DUP) was diluted because target analyte concentrations exceeded the calibration range.

#### **Cyanide, Amenable to Chlorination**

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.

#### **Cyanide, Free**

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

### **Miscellaneous Information**

#### **Additional Comments**

Total CN levels above the MDL for Free CN were detected in samples 445458001 (B3HW93), 445458002 (B3HW94), 445458003 (B3HW97) and 445458004 (B3HP57). Free CN was performed per SOP (GL-GC-E-073).

## **Radiochemistry**

#### **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.

#### **TC99\_EIE\_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**

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 1203986389 (Non SDG 445297005DUP) was recounted due to results more negative than the three sigma TPU. The second count is reported.

**TRITIUM\_DIST\_LSC: COMMON**

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

**Technical Information****Recounts**

Sample 1203986413 (MB) was recounted due to a suspected blank false positive. The recount is reported.

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

The matrix spike, 1203986415 (Non SDG 445294001MS), aliquot was reduced to conserve sample volume.

**Certification Statement**

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

# **Chain of Custody and Supporting Documentation**

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST <b>445458</b>				F16-045-1074	PAGE 1 OF 1	
COLLECTOR Kathy Turner /CHPRC	COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR SUMNER, LC		REQUIRED TAT 30 Days			
SAMPLING LOCATION Valve V14-YE31, 299-E33-360		PROJECT DESIGNATION 200W Pump & Treat - Extraction Well Water Sampling		SAF NO. F16-045	ORIGINAL			
ICE CHEST NO. <b>6WS-508</b>	FIELD LOGBOOK NO. <b>HNF-N-491 19</b>	ACTUAL SAMPLE DEPTH N/A		PURCHASE ORDER/CHARGE CODE 304235	METHOD OF SHIPMENT FEDERAL EXPRESS			
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO. <b>9130</b>		BILL OF LADING/AIR BILL NO. <b>7717 4421 0691</b>				
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	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.	PRESERVATION	HCl or H2SO4 to pH <2/Cool <=6C	HNO3 to pH <2	HNO3 to pH <2	None	None	NaOH to pH >=12/Cool <=6C
		HOLDING TIME	14 Days	6 Months	6 Months	6 Months	6 Months	14 Days
		TYPE OF CONTAINER	aGs*	G/P	G/P	P	G/P	aG
		NO. OF CONTAINER(S)	4	1	1	1	4	1
		VOLUME	40mL	500mL	500mL	1L	1L	500mL
SPECIAL HANDLING AND/OR STORAGE N/A		SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	TC99_EIE_LSC: COMMON;	TRITIUM_DIST_LSC: COMMON; C14_LSC: COMMON;	I129LL_SEP_LE_PS_GS: COMMON;	SEE ITEM (3) IN SPECIAL INSTRUCTIONS
SAMPLE NO.	FILTERED	MATRIX*	SAMPLE DATE	SAMPLE TIME				
B3HW93	N/A	WATER	MAR 07 2018	0905	✓	✓	✓	✓

APRIL 4, 2018

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
Kathy Turner /CHPRC	MAR 07 2018 1025	Kathy Turner /CHPRC	MAR 07 2018 1025	TRVL-18-083	
Lesly Wall /CHPRC	MAR 07 2018 1400	FEDEX		(1) 8260_VOA_GCMS: COMMON {Carbon tetrachloride, Chloroform, Methylene chloride, Trichloroethene, Vinyl chloride}; 8260_VOA_GCMS: CH 01 {Chloromethane}; 8260_VOA_GCMS: COMMON (Add-on) {cis-1,2-Dichloroethylene};	
		C. Tarplin /CHPRC	3/8/18 1850	(2) 6020_METALS_ICPMS: COMMON {Aluminum, Cadmium, Chromium, Cobalt, Copper, Molybdenum, Selenium}; 6020_METALS_ICPMS: COMMON (Add-on) {Arsenic, Manganese, Nickel, Uranium, Zinc}; 6010_METALS_ICP: COMMON {Calcium, Iron, Magnesium, Potassium, Sodium}; 6010_METALS_ICP: COMMON (Add-on) {Boron};	
				(3) 9012_CYANIDE (TOTAL): COMMON; 9012_CN (AMENABLE): COMMON; 9014_CN (FREE): COMMON;	
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY		DATE/TIME	

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CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST <b>445458</b>		F16-045-1075	PAGE 1 OF 1
COLLECTOR Kathy Turner /CHPRC		COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR SUMNER, LC	REQUIRED TAT 30 Days
SAMPLING LOCATION Valve V14-YE31, 299-E33-360		PROJECT DESIGNATION 200W Pump & Treat - Extraction Well Water Sampling		SAF NO. F16-045	<b>ORIGINAL</b>
ICE CHEST NO. <b>GWS-534</b>	FIELD LOGBOOK NO. <b>HNF-N-49119</b>	ACTUAL SAMPLE DEPTH N/A	PURCHASE ORDER/CHARGE CODE 304235	METHOD OF SHIPMENT FEDERAL EXPRESS	
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO. <b>9128</b>		BILL OF LADING/AIR BILL NO. <b>7717 4279 5143</b>	

<b>MATRIX*</b> 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	<b>POSSIBLE SAMPLE HAZARDS/ REMARKS</b> *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.	<b>PRESERVATION</b> NaOH to pH >=12/Cool <=6C
		<b>HOLDING TIME</b> 14 Days
		<b>TYPE OF CONTAINER</b> aG
		<b>NO. OF CONTAINER(S)</b> 1
		<b>VOLUME</b> 500mL
<b>SPECIAL HANDLING AND/OR STORAGE</b> N/A		<b>SAMPLE ANALYSIS</b> SEE ITEM (1) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	FILTERED	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B3HW94	Yes	WATER	MAR 07 2018	0905	✓

APRIL 4, 2018

<b>CHAIN OF POSSESSION</b> RELINQUISHED BY/REMOVED FROM		DATE/TIME	SIGN/ PRINT NAMES RECEIVED BY/STORED IN		DATE/TIME	<b>SPECIAL INSTRUCTIONS</b> TRVL-18-083 (1) 9012_CYANIDE (TOTAL): COMMON; 9012_CN (AMENABLE): COMMON; 9014_CN (FREE): COMMON;
Kathy Turner /CHPRC		MAR 07 2018 1025	Leahy Wall /CHPRC		MAR 07 2018 1025	
Leahy Wall /CHPRC		MAR 07 2018 1400	FEDEX			
			C. Tarplin (Signature)		3/8/18 ORSU	

<b>FINAL SAMPLE DISPOSITION</b>	<b>DISPOSAL METHOD</b>	<b>DISPOSED BY</b>	<b>DATE/TIME</b>
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CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST <b>445458</b>		F16-045-1079	PAGE 1 OF 1
COLLECTOR Kathy Turner /CHPRC		COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR SUMNER, LC	REQUIRED TAT 30 Days
SAMPLING LOCATION Valve V14-YE31, 299-E33-360 DUP		PROJECT DESIGNATION 200W Pump & Treat - Extraction Well Water Sampling		SAF NO. F16-045	<b>ORIGINAL</b>
ICE CHEST NO. <b>6WS-534</b>		FIELD LOGBOOK NO. <b>HNF-N-491 19</b>	ACTUAL SAMPLE DEPTH N/A	PURCHASE ORDER/CHARGE CODE 304235	METHOD OF SHIPMENT FEDERAL EXPRESS
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO. <b>9128</b>		BILL OF LADING/AIR BILL NO. <b>771742795143</b>	

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	<b>POSSIBLE SAMPLE HAZARDS/ REMARKS</b> *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.	<b>PRESERVATION</b> NaOH to pH >=12/Cool <=6C			
		<b>HOLDING TIME</b> 14 Days			
		<b>TYPE OF CONTAINER</b> aG			
		<b>NO. OF CONTAINER(S)</b> 1			
		<b>VOLUME</b> 500mL			
<b>SPECIAL HANDLING AND/OR STORAGE</b> N/A		<b>SAMPLE ANALYSIS</b> SEE ITEM (1) IN SPECIAL INSTRUCTIONS			
<b>SAMPLE NO.</b> B3HW97	<b>FILTERED</b> Yes	<b>MATRIX*</b> WATER	<b>SAMPLE DATE</b> MAR 07 2018	<b>SAMPLE TIME</b> 0905	<input checked="" type="checkbox"/>

APRIL 4, 2018

<b>CHAIN OF POSSESSION</b> RELINQUISHED BY/REMOVED FROM Kathy Turner /CHPRC		DATE/TIME MAR 07 2018 10:05	SIGN/ PRINT NAMES RECEIVED BY/STORED IN Kathy Turner		DATE/TIME MAR 07 2018 10:25	<b>SPECIAL INSTRUCTIONS</b> TRVL-18-083 (1) 9012_CYANIDE (TOTAL): COMMON; 9012_CN (AMENABLE): COMMON; 9014_CN (FREE): COMMON;
Kathy Turner /CHPRC		MAR 07 2018 1400	Leahy Wall /CHPRC		MAR 07 2018 10:25	
Leahy Wall /CHPRC		Fed Ex	FEDEX		3/8/18 0850	
Fed Ex		C. Tampin	C. Tampin		3/8/18 0850	
Fed Ex		C. Tampin	C. Tampin		3/8/18 0850	

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<b>FINAL SAMPLE DISPOSITION</b>	<b>DISPOSAL METHOD</b>	<b>DISPOSED BY</b>	<b>DATE/TIME</b>
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REV. 0

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST <b>445458</b>		F16-045-1078	PAGE 1 OF 1
COLLECTOR Kathy Turner /CHPRC	COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR SUMNER, LC	REQUIRED TAT 30 Days	
SAMPLING LOCATION Valve V14-YE31, 299-E33-360 DUP		PROJECT DESIGNATION 200W Pump & Treat - Extraction Well Water Sampling		SAF NO. F16-045	<b>ORIGINAL</b>
ICE CHEST NO. <b>GWS-534</b>	FIELD LOGBOOK NO. <b>HNF-N-491 19</b>	ACTUAL SAMPLE DEPTH N/A	PURCHASE ORDER/CHARGE CODE 304235	METHOD OF SHIPMENT FEDERAL EXPRESS	
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO. <b>9128</b>	BILL OF LADING/AIR BILL NO. <b>771742795143</b>		

<b>MATRIX*</b> 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	<b>POSSIBLE SAMPLE HAZARDS/ REMARKS</b> *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.	<b>PRESERVATION</b> NaOH to pH >=12/Cool <=6C
		<b>HOLDING TIME</b> 14 Days
		<b>TYPE OF CONTAINER</b> aG
		<b>NO. OF CONTAINER(S)</b> 1
		<b>VOLUME</b> 500mL
<b>SPECIAL HANDLING AND/OR STORAGE</b> N/A		<b>SAMPLE ANALYSIS</b> SEE ITEM (1) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	FILTERED	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B3FP57	N/A	WATER	MAR 07 2018	0905	✓

APRIL 4, 2018

<b>CHAIN OF POSSESSION</b> RELINQUISHED BY/REMOVED FROM Kathy Turner /CHPRC DATE/TIME MAR 07 2018 1025		SIGN/ PRINT NAMES RECEIVED BY/STORED IN Leahy Wall /CHPRC DATE/TIME MAR 07 2018 1025		<b>SPECIAL INSTRUCTIONS</b> TRVL-18-083 (1) 9012_CYANIDE (TOTAL): COMMON; 9012_CN (AMENABLE): COMMON; 9014_CN (FREE): COMMON;
Kathy Turner /CHPRC DATE/TIME MAR 07 2018 1400		Leahy Wall /CHPRC DATE/TIME MAR 07 2018 1400		
Fed Ex		FEDEX		
C-Tuplin Carter DATE/TIME 3/8/18 0850		C-Tuplin Carter DATE/TIME 3/8/18 0850		
DATE/TIME		DATE/TIME		

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FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME
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REV. 0



**SAMPLE RECEIPT & REVIEW FORM**

45

Client: <u>CPRC</u>		SDG/AR/COC/Work Order: <u>445458</u>	
Received By: <u>Chakeris Tarplin</u>		Date Received: <u>MARCH 08, 2018</u>	
Carrier and Tracking Number		Circle Applicable: <input type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other	
		<u>771744210691</u> <u>771745910057</u> <u>771742795143</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____	
COC/Samples marked or classified as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> (CPM) /mR/Hr Classified as: ( <u>Rad 3</u> ) Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?	<input checked="" type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method ( <u>Wet Ice</u> ) Ice Packs Dry Ice None Other: *all temperatures are recorded in Celsius TEMP: <u>2C</u>
4 Daily check performed and passed on IR temperature:gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: <u>IR4-17</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>			If Yes, Are Encores or Soil Kits present? Yes _____ No <input checked="" type="checkbox"/> (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes <input checked="" type="checkbox"/> No _____ N/A _____ (If unknown, select No) VOA vials free of headspace? Yes <input checked="" type="checkbox"/> No _____ N/A _____ Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
12 Are sample containers identifiable as GEL provided?			<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials AT Date 3/9/18 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 analyte was detected in the associated method blank $\geq$ MDC or $>$ 5% sample activity.	Radiological	
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier		
+	Correlation coefficient for Method of Standard Additions (MSA) is < 0.995	Inorganics	
B	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).	General Chemistry	
C	Target analyte was detected in the sample and the associated blank. The associated blank concentration is $\geq$ EQL or is $>$ 5% of the measured concentration and/or decision level for associated samples.	Inorganics	Metals
C	Target analyte was detected in the sample and the associated blank. The associated blank concentration is $\geq$ EQL or is $>$ 5% of the measured concentration and/or decision level for associated samples.	General Chemistry	
<	Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide	General Chemistry	
UX	Gamma Spectroscopy--Uncertain identification	Radiological	

# Laboratory Certifications

**List of current GEL Certifications as of 04 April 2018**

<b>State</b>	<b>Certification</b>
Alaska	17-018
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-18-13
Utah NELAP	SC000122018-26
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# **Volatile Analysis**

# Case Narrative

**GC/MS Volatile  
Technical Case Narrative  
CH2M Hill Plateau Remediation Company (CPRC)  
SDG #: GEL445458  
Work Order #: 445458**

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

**Analytical Method: SW846 8260C**

**Analytical Procedure: GL-OA-E-038 REV# 26**

**Analytical Batch: 1747154**

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>
445458001	B3HW93
1203989627	445458001(B3HW93) Post Spike (PS)
1203989628	445458001(B3HW93) Post Spike Duplicate (PSD)
1203992144	Method Blank (MB)
1203992145	Method Blank (MB)
1203992146	Laboratory Control Sample (LCS)
1203992147	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Certification Statement**

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

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL445458 GEL Work Order: 445458

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

T Spike and/or spike duplicate sample recovery is outside control limits.

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

DL Indicates that sample is diluted.

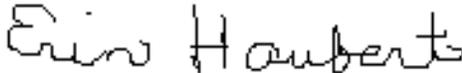
RA Indicates that sample is re-analyzed without re-extraction.

RE Indicates that sample is re-extracted.

**Review/Validation**

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

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

Signature: 

Name: Erin Haubert

Date: 04 APR 2018

Title: Data Validator

# Sample Data Summary

Volatile  
Certificate of Analysis  
Sample Summary

Page 1 of 1

<b>SDG Number:</b> GEL445458	<b>Date Collected:</b> 03/07/2018 09:05	<b>Matrix:</b> WATER
<b>Lab Sample ID:</b> 445458001	<b>Date Received:</b> 03/08/2018 08:50	
<b>Client ID:</b> B3HW93	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F16045
<b>Batch ID:</b> 1747154	<b>Method:</b> SW846 8260C	<b>SOP Ref:</b> GL-OA-E-038
<b>Run Date:</b> 03/16/2018 13:46	<b>Inst:</b> VOA3.I	<b>Dilution:</b> 1
<b>Prep Date:</b> 03/16/2018 13:46	<b>Analyst:</b> JP1	<b>Purge Vol:</b> 5 mL
<b>Data File:</b> 031618V3\3Z510.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	RDL
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	2.00	5.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	2.00	5.00
75-09-2	Methylene chloride	U	1.60	ug/L	1.60	5.00	5.00
79-01-6	Trichloroethylene	U	0.300	ug/L	0.300	2.00	5.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	2.00	10.0
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	2.00	10.0
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	2.00	

# Quality Control Summary

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**QC Summary**

Report Date: March 27, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 445458

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1747154										
QC1203992146	LCS										
Carbon tetrachloride	50.0			44.7	ug/L		89	(70%-130%)	JP1	03/16/18	10:35
Chloroform	50.0			45.5	ug/L		91	(70%-130%)			
Chloromethane	50.0			50.1	ug/L		100	(70%-130%)			
Methylene chloride	50.0			41.0	ug/L		82	(70%-130%)			
Trichloroethylene	50.0			45.2	ug/L		90	(70%-130%)			
Vinyl chloride	50.0			50.9	ug/L		102	(70%-130%)			
cis-1,2-Dichloroethylene	50.0			46.1	ug/L		92	(70%-130%)			
**1,2-Dichloroethane-d4	50.0			51.0	ug/L		102	(70%-130%)			
**Bromofluorobenzene	50.0			49.1	ug/L		98	(70%-130%)			
**Toluene-d8	50.0			51.6	ug/L		103	(70%-130%)			
QC1203992147	LCS										
Carbon tetrachloride	50.0			47.3	ug/L		95	(70%-130%)		03/19/18	12:05
Chloroform	50.0			43.9	ug/L		88	(70%-130%)			
Chloromethane	50.0			51.3	ug/L		103	(70%-130%)			

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**QC Summary**

Workorder: 445458

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1747154										
Methylene chloride	50.0			41.9	ug/L		84	(70%-130%)	JP1	03/19/18	12:05
Trichloroethylene	50.0			45.8	ug/L		92	(70%-130%)			
Vinyl chloride	50.0			53.8	ug/L		108	(70%-130%)			
cis-1,2-Dichloroethylene	50.0			46.3	ug/L		93	(70%-130%)			
**1,2-Dichloroethane-d4	50.0			55.3	ug/L		111	(70%-130%)			
**Bromofluorobenzene	50.0			47.8	ug/L		96	(70%-130%)			
**Toluene-d8	50.0			49.2	ug/L		98	(70%-130%)			
QC1203992144	MB										
Carbon tetrachloride			U	0.300	ug/L					03/16/18	12:10
Chloroform			U	0.300	ug/L						
Chloromethane			U	0.300	ug/L						
Methylene chloride			U	1.60	ug/L						
Trichloroethylene			U	0.300	ug/L						
Vinyl chloride			U	0.300	ug/L						
cis-1,2-Dichloroethylene			U	0.300	ug/L						
**1,2-Dichloroethane-d4	50.0			55.1	ug/L		110	(70%-130%)			

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**QC Summary**

Workorder: 445458

Page 3 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1747154										
**Bromofluorobenzene	50.0			50.2	ug/L		100	(70%-130%)	JP1	03/16/18	12:10
**Toluene-d8	50.0			48.8	ug/L		98	(70%-130%)			
QC1203992145	MB										
Carbon tetrachloride			U	0.300	ug/L					03/19/18	14:12
Chloroform			U	0.300	ug/L						
Chloromethane			U	0.300	ug/L						
Methylene chloride			U	1.60	ug/L						
Trichloroethylene			U	0.300	ug/L						
Vinyl chloride			U	0.300	ug/L						
cis-1,2-Dichloroethylene			U	0.300	ug/L						
**1,2-Dichloroethane-d4	50.0			56.0	ug/L		112	(70%-130%)			
**Bromofluorobenzene	50.0			50.4	ug/L		101	(70%-130%)			
**Toluene-d8	50.0			50.2	ug/L		100	(70%-130%)			
QC1203989627	445458001 PS										
Carbon tetrachloride	50.0	U	0.00	48.5	ug/L		97	(70%-130%)		03/19/18	20:36
Chloroform	50.0	U	0.00	44.7	ug/L		89	(70%-130%)			
Chloromethane	50.0	U	0.00	44.9	ug/L		90	(70%-130%)			

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**QC Summary**

Workorder: 445458

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1747154										
Methylene chloride	50.0	U	0.00	39.6	ug/L		79	(70%-130%)	JP1	03/19/18	20:36
Trichloroethylene	50.0	U	0.00	45.0	ug/L		90	(70%-130%)			
Vinyl chloride	50.0	U	0.00	46.8	ug/L		94	(70%-130%)			
cis-1,2-Dichloroethylene	50.0	U	0.00	45.1	ug/L		90	(70%-130%)			
**1,2-Dichloroethane-d4	50.0		53.9	55.2	ug/L		110	(70%-130%)			
**Bromofluorobenzene	50.0		53.4	46.5	ug/L		93	(70%-130%)			
**Toluene-d8	50.0		51.3	50.8	ug/L		102	(70%-130%)			
QC1203989628 445458001 PSD											
Carbon tetrachloride	50.0	U	0.00	47.3	ug/L	3	95	(0%-20%)		03/19/18	21:08
Chloroform	50.0	U	0.00	45.5	ug/L	2	91	(0%-20%)			
Chloromethane	50.0	U	0.00	47.7	ug/L	6	95	(0%-20%)			
Methylene chloride	50.0	U	0.00	42.1	ug/L	6	84	(0%-20%)			
Trichloroethylene	50.0	U	0.00	47.1	ug/L	4	94	(0%-20%)			
Vinyl chloride	50.0	U	0.00	51.6	ug/L	10	103	(0%-20%)			
cis-1,2-Dichloroethylene	50.0	U	0.00	45.5	ug/L	1	91	(0%-20%)			
**1,2-Dichloroethane-d4	50.0		53.9	58.2	ug/L		116	(70%-130%)			

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**QC Summary**

Workorder: 445458

Page 5 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1747154										
**Bromofluorobenzene	50.0	53.4		48.0	ug/L		96	(70%-130%)	JP1	03/19/18	21:08
**Toluene-d8	50.0	51.3		52.6	ug/L		105	(70%-130%)			

**Notes:**

The Qualifiers in this report are defined as follows:

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

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.

Volatile  
Surrogate Recovery Report

SDG Number: GEL445458

Matrix Type: LIQUID

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203992146	LCS for batch 1747154	102	103	98
1203992144	MB for batch 1747154	110	98	100
445458001	B3HW93	108	103	107
1203992147	LCS for batch 1747154	111	98	96
1203992145	MB for batch 1747154	112	100	101
1203989627	B3HW93PS	110	102	93
1203989628	B3HW93PSD	116	105	96

**Surrogate****Acceptance Limits**

DCED4 = 1,2-Dichloroethane-d4	(70%-130%)
TOL = Toluene-d8	(70%-130%)
BFB = Bromofluorobenzene	(70%-130%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

# Metals Analysis

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL445458**  
**Work Order #: 445458**

**Product: Determination of Metals by ICP****Analytical Method:** SW846 3005A/6010D**Analytical Procedure:** GL-MA-E-013 REV# 30**Analytical Batch:** 1745497**Product: Determination of Metals by ICP-MS****Analytical Method:** SW846 3005A/6020B**Analytical Procedure:** GL-MA-E-014 REV# 32**Analytical Batches:** 1745491 and 1748724**Preparation Method:** SW846 3005A**Preparation Procedure:** GL-MA-E-006 REV# 14**Preparation Batches:** 1745490, 1745496 and 1748719

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>
445458001	B3HW93
1203986126	Method Blank (MB) <b>ICP</b>
1203986127	Laboratory Control Sample (LCS)
1203986130	445432003(NonSDGL) Serial Dilution (SD)
1203986128	445432003(NonSDGS) Matrix Spike (MS)
1203986129	445432003(NonSDGSD) Matrix Spike Duplicate (MSD)
1203986116	Method Blank (MB) <b>ICP-MS</b>
1203993119	Method Blank (MB) <b>ICP-MS</b>
1203986117	Laboratory Control Sample (LCS)
1203993120	Laboratory Control Sample (LCS)
1203986120	445432003(NonSDGL) Serial Dilution (SD)
1203993123	445432003(NonSDGL) Serial Dilution (SD)
1203986118	445432003(NonSDGS) Matrix Spike (MS)
1203993121	445432003(NonSDGS) Matrix Spike (MS)
1203986119	445432003(NonSDGSD) Matrix Spike Duplicate (MSD)
1203993122	445432003(NonSDGSD) Matrix Spike Duplicate (MSD)
1203993699	445432003(NonSDGPS) Post Spike (PS)

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****ICSA/ICSAB Statement**

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

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

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

The method blanks (MB) analyzed with this SDG met the acceptance criteria. However, where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203986116 (MB)	Molybdenum	0.204 between (0.2 - 0.25)
1203986126 (MB)	Potassium	54.4 between (50 - 75)

#### **Matrix Spike (MS/MSD) Recovery Statement**

The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203993121 (Non SDG 445432003MS)	Zinc	74* (75%-125%)

### **Certification Statement**

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

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL445458 GEL Work Order: 445458

**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: 04 APR 2018****Title: Data Validator**

# Sample Data Summary

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

SDG No: GEL445458

CONTRACT: CPRC0F16045

METHOD TYPE: SW846

SAMPLE ID: 445458001

BASIS: As Received

DATE COLLECTED 07-MAR-18

CLIENT ID: B3HW93

LEVEL: Low

DATE RECEIVED 08-MAR-18

MATRIX: WATER

%SOLIDS: 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	19.3	ug/L	U	19.3	50	50	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7440-38-2	Arsenic	9.66	ug/L		2	5	5	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7440-42-8	Boron	16.6	ug/L	B	15	50	50	1	P	HSC	03/15/18 12:59	031518-1	1745497
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7440-70-2	Calcium	69700	ug/L		50	200	200	1	P	HSC	03/15/18 12:59	031518-1	1745497
7440-47-3	Chromium	7.04	ug/L	B	3	10	10	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7440-48-4	Cobalt	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7440-50-8	Copper	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7439-89-6	Iron	80.3	ug/L	B	30	100	100	1	P	HSC	03/15/18 12:59	031518-1	1745497
7439-95-4	Magnesium	20400	ug/L		110	300	300	1	P	HSC	03/15/18 12:59	031518-1	1745497
7439-96-5	Manganese	1	ug/L	U	1	5	5	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7439-98-7	Molybdenum	6.79	ug/L		0.2	0.5	0.5	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7440-02-0	Nickel	0.649	ug/L	B	0.6	2	2	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7440-09-7	Potassium	7970	ug/L		50	150	150	1	P	HSC	03/15/18 12:59	031518-1	1745497
7782-49-2	Selenium	6.56	ug/L		2	5	5	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7440-23-5	Sodium	72300	ug/L		100	300	300	1	P	HSC	03/15/18 12:59	031518-1	1745497
7440-61-1	Uranium	90.2	ug/L		0.067	0.2	0.2	1	MS	BAJ	03/19/18 18:16	180319-2	1745491
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	MS	SKJ	03/21/18 13:47	180321-4	1748724

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1745491	1745490	SW846 3005A	50	mL	50	mL	03/08/18	JXM8
1745497	1745496	SW846 3005A	50	mL	50	mL	03/08/18	JXM8
1748724	1748719	SW846 3005A	25	mL	25	mL	03/20/18	JXM8

**\*Analytical Methods:**

**P** SW846 3005A/6010D  
**MS** SW846 3005A/6020B

# Quality Control Summary

**GEL LABORATORIES LLC**

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**QC Summary**

Report Date: April 4, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 445458

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1745491										
QC1203986117	LCS										
Aluminum	2000			2060	ug/L		103	(80%-120%)	BAJ	03/19/18	17:26
Arsenic	50.0			51.3	ug/L		103	(80%-120%)			
Cadmium	50.0			50.3	ug/L		101	(80%-120%)			
Chromium	50.0			50.0	ug/L		100	(80%-120%)			
Cobalt	50.0			49.4	ug/L		98.8	(80%-120%)			
Copper	50.0			51.1	ug/L		102	(80%-120%)			
Manganese	50.0			49.0	ug/L		98	(80%-120%)			
Molybdenum	50.0			51.6	ug/L		103	(80%-120%)			
Nickel	50.0			51.7	ug/L		103	(80%-120%)			
Selenium	50.0			49.7	ug/L		99.4	(80%-120%)			
Uranium	50.0			46.5	ug/L		93.1	(80%-120%)			
QC1203986116	MB										
Aluminum			U	19.3	ug/L					03/19/18	17:23
Arsenic			U	2.00	ug/L						

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**QC Summary**

Workorder: 445458

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1745491										
Cadmium			U	0.300	ug/L				BAJ	03/19/18	17:23
Chromium			U	3.00	ug/L						
Cobalt			U	0.300	ug/L						
Copper			U	0.300	ug/L						
Manganese			U	1.00	ug/L						
Molybdenum			B	0.204	ug/L						
Nickel			U	0.600	ug/L						
Selenium			U	2.00	ug/L						
Uranium			U	0.067	ug/L						
QC1203986118 445432003 MS											
Aluminum	2000	U	19.3	1990	ug/L		99.3	(75%-125%)		03/19/18	17:33
Arsenic	50.0	U	2.00	52.5	ug/L		102	(75%-125%)			
Cadmium	50.0	U	0.300	50.0	ug/L		100	(75%-125%)			
Chromium	50.0	U	3.00	49.4	ug/L		96.8	(75%-125%)			
Cobalt	50.0	U	0.300	51.1	ug/L		102	(75%-125%)			
Copper	50.0	U	0.300	51.2	ug/L		102	(75%-125%)			

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**QC Summary**

Workorder: 445458

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Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>												
Batch	1745491											
Manganese	50.0	U	1.00		49.6	ug/L		98.9	(75%-125%)	BAJ	03/19/18	17:33
Molybdenum	50.0	U	0.200		51.1	ug/L		102	(75%-125%)			
Nickel	50.0	U	0.600		52.1	ug/L		103	(75%-125%)			
Selenium	50.0	U	2.00		51.4	ug/L		103	(75%-125%)			
Uranium	50.0	U	0.067		47.5	ug/L		94.9	(75%-125%)			
QC1203986119 445432003 MSD												
Aluminum	2000	U	19.3		2240	ug/L	11.7	112	(0%-20%)		03/19/18	17:36
Arsenic	50.0	U	2.00		54.9	ug/L	4.39	107	(0%-20%)			
Cadmium	50.0	U	0.300		52.5	ug/L	4.89	105	(0%-20%)			
Chromium	50.0	U	3.00		54.8	ug/L	10.4	108	(0%-20%)			
Cobalt	50.0	U	0.300		54.3	ug/L	6.08	108	(0%-20%)			
Copper	50.0	U	0.300		56.4	ug/L	9.57	113	(0%-20%)			
Manganese	50.0	U	1.00		55.0	ug/L	10.3	110	(0%-20%)			
Molybdenum	50.0	U	0.200		49.2	ug/L	3.77	98	(0%-20%)			
Nickel	50.0	U	0.600		57.0	ug/L	9	113	(0%-20%)			
Selenium	50.0	U	2.00		55.1	ug/L	6.89	110	(0%-20%)			

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**QC Summary**

Workorder: 445458

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1745491										
Uranium	50.0	U	0.067	50.2	ug/L	5.6	100	(0%-20%)	BAJ	03/19/18	17:36
QC1203986120 445432003 SDILT											
Aluminum		U	4.16 DU	96.5	ug/L	N/A		(0%-20%)		03/19/18	17:43
Arsenic		U	1.46 DU	10.0	ug/L	N/A		(0%-20%)			
Cadmium		U	0.002 DU	1.50	ug/L	N/A		(0%-20%)			
Chromium		U	0.987 DU	15.0	ug/L	N/A		(0%-20%)			
Cobalt		U	0.021 DU	1.50	ug/L	N/A		(0%-20%)			
Copper		U	0.057 DU	1.50	ug/L	N/A		(0%-20%)			
Manganese		U	0.122 DU	5.00	ug/L	N/A		(0%-20%)			
Molybdenum		U	0.169 DU	1.00	ug/L	N/A		(0%-20%)			
Nickel		U	0.484 DU	3.00	ug/L	N/A		(0%-20%)			
Selenium		U	-0.019 DU	10.0	ug/L	N/A		(0%-20%)			
Uranium		U	0.025 DU	0.335	ug/L	N/A		(0%-20%)			
Batch 1748724											
QC1203993120 LCS											
Zinc	50.0			56.6	ug/L		113	(80%-120%)	SKJ	03/21/18	13:21
QC1203993119 MB											
Zinc		U		3.30	ug/L					03/21/18	13:20

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**QC Summary**

Workorder: 445458

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1748724										
QC1203993121	445432003	MS									
Zinc	50.0	N	15.4	N	52.4	ug/L	74*	(75%-125%)	SKJ	03/21/18	13:24
QC1203993122	445432003	MSD									
Zinc	50.0	N	15.4		60.8	ug/L	14.9	90.9		(0%-20%)	03/21/18 13:26
QC1203993699	445432003	PS									
Zinc	50.0	N	15.4		64.7	ug/L		98.6		(75%-125%)	03/21/18 13:27
QC1203993123	445432003	SDILT									
Zinc		N	15.4	BD	4.56	ug/L	48.1			(0%-20%)	03/21/18 13:29
<b>Metals Analysis-ICP</b>											
Batch	1745497										
QC1203986127	LCS										
Boron	500				490	ug/L		98		(80%-120%)	HSC 03/15/18 12:19
Calcium	5000				4900	ug/L		98.1		(80%-120%)	
Iron	5000				4770	ug/L		95.4		(80%-120%)	
Magnesium	5000				4820	ug/L		96.4		(80%-120%)	
Potassium	5000				4680	ug/L		93.6		(80%-120%)	
Sodium	5000				4830	ug/L		96.6		(80%-120%)	
QC1203986126	MB										
Boron			U		15.0	ug/L					03/15/18 12:16
Calcium			U		50.0	ug/L					
Iron			U		30.0	ug/L					

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1745497										
Magnesium			U	110	ug/L				HSC	03/15/18	12:16
Potassium			B	54.4	ug/L						
Sodium			U	100	ug/L						
QC1203986128 445432003 MS											
Boron	500	U	15.0	493	ug/L		98.4	(75%-125%)		03/15/18	12:24
Calcium	5000	U	50.0	4990	ug/L		99.6	(75%-125%)			
Iron	5000	U	30.0	4940	ug/L		98.6	(75%-125%)			
Magnesium	5000	U	110	4990	ug/L		99.8	(75%-125%)			
Potassium	5000	BC	50.2	4740	ug/L		93.9	(75%-125%)			
Sodium	5000	U	100	4930	ug/L		97.8	(75%-125%)			
QC1203986129 445432003 MSD											
Boron	500	U	15.0	496	ug/L	0.593	99	(0%-20%)		03/15/18	12:26
Calcium	5000	U	50.0	4950	ug/L	0.883	98.7	(0%-20%)			
Iron	5000	U	30.0	4890	ug/L	1.04	97.5	(0%-20%)			
Magnesium	5000	U	110	4960	ug/L	0.687	99.2	(0%-20%)			
Potassium	5000	BC	50.2	4720	ug/L	0.509	93.4	(0%-20%)			
Sodium	5000	U	100	4890	ug/L	0.782	97.1	(0%-20%)			

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Workorder: 445458

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1745497										
QC1203986130	445432003	SDILT									
Boron	U	0.642	DU	75.0	ug/L	N/A		(0%-20%)	HSC	03/15/18	12:28
Calcium	U	15.4	DU	250	ug/L	N/A		(0%-20%)			
Iron	U	11.3	DU	150	ug/L	N/A		(0%-20%)			
Magnesium	U	0.0399	DU	550	ug/L	N/A		(0%-20%)			
Potassium	BC	50.2	DU	250	ug/L	N/A		(0%-20%)			
Sodium	U	40.1	DU	500	ug/L	N/A		(0%-20%)			

**Notes:**

The Qualifiers in this report are defined as follows:

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

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**QC Summary**

Workorder: 445458

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<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>
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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.

# General Chem Analysis

# Case Narrative

**General Chemistry  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL445458  
Work Order #: 445458**

**Product:** Cyanide, Free

**Analytical Method:** 9014\_CYANIDE

**Analytical Procedure:** GL-GC-E-073 REV# 8

**Analytical Batch:** 1745740

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>
445458001	B3HW93
445458002	B3HW94
445458003	B3HW97
445458004	B3HP57
1203986685	Method Blank (MB)
1203986686	Laboratory Control Sample (LCS)
1203986687	445441001(NonSDG) Sample Duplicate (DUP)
1203988663	445458001(B3HW93) Sample Duplicate (DUP)

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

**Data Summary:**

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

**Miscellaneous Information**

**Additional Comments**

Total CN levels above the MDL for Free CN were detected in samples 445458001 (B3HW93), 445458002 (B3HW94), 445458003 (B3HW97) and 445458004 (B3HP57). Free CN was performed per SOP (GL-GC-E-073).

**Product:** Cyanide, Amenable to Chlorination

**Analytical Method:** 9012\_CYANIDE

**Analytical Procedure:** GL-GC-E-107 REV# 10

**Analytical Batches:** 1745739, 1745738 and 1745737

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>
445458001	B3HW93
445458002	B3HW94
445458003	B3HW97
445458004	B3HP57

**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:** Cyanide, Total

**Analytical Method:** 9012\_CYANIDE

**Analytical Procedure:** GL-GC-E-095 REV# 21

**Analytical Batches:** 1745736 and 1745735

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>
445458001	B3HW93
445458002	B3HW94
445458003	B3HW97
445458004	B3HP57
1203986676	Method Blank (MB)
1203986677	Laboratory Control Sample (LCS)
1203986678	445441001(NonSDG) Sample Duplicate (DUP)
1203986680	445441001(NonSDG) Matrix Spike (MS)

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 Dilutions**

The following samples 1203986678 (Non SDG 445441001DUP) and 1203986680 (Non SDG 445441001MS) were diluted because target analyte concentrations exceeded the calibration range. 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.

##### **Sample Re-analysis**

Sample 445458002 (B3HW94) was re-analyzed due to instrument failure. The results from the reanalysis are reported.

**Product:** Cyanide, Chlorinated

**Analytical Method:** 9012\_CYANIDE

**Analytical Procedure:** GL-GC-E-095 REV# 21

**Analytical Batches:** 1745738 and 1745737

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>
445458001	B3HW93
445458002	B3HW94
445458003	B3HW97
445458004	B3HP57
1203986682	Method Blank (MB)
1203986683	Laboratory Control Sample (LCS)
1203986684	445441001(NonSDG) Sample Duplicate (DUP)

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 Dilutions**

The following sample 1203986684 (Non SDG 445441001DUP) was diluted because target analyte concentrations exceeded the calibration range. 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.

#### **Certification Statement**

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

**GEL LABORATORIES LLC**

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL445458 GEL Work Order: 445458

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

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).

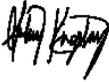
D Results are reported from a diluted aliquot of sample.

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: 16 MAR 2018****Title: Analyst I**

# Sample Data Summary

**GEL LABORATORIES LLC**

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

**Certificate of Analysis**

Report Date: March 16, 2018

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF F16-045

Client Sample ID: B3HW93 Project: CPRC0F16045  
 Sample ID: 445458001 Client ID: CPRC001  
 Matrix: WATER  
 Collect Date: 07-MAR-18 09:05  
 Receive Date: 08-MAR-18  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis												
9012_CYANIDE (TOTAL): COMMON "As Received"												
Cyanide, Total		165	1.67	5.00	ug/L	1.00	1	AXH3	03/09/18	0655	1745736	1
9014_CN (FREE): COMMON "As Received"												
Free Cyanide	U	1.00	1.00	2.00	ug/L		1	AXH3	03/15/18	1037	1745740	2
9012_CN (AMENABLE): COMMON "See Parent Products"												
Cyanide amenable to chlorination	U	1.67	1.67	5.00	ug/L		1	AXH3	03/09/18	0854	1745739	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010C Distillation	SW846 9010C Prep	AXH3	03/09/18	0617	1745735
SW846 9012B	SW846 9012B Cyanide, Chlorinated Prep	AXH3	03/09/18	0651	1745737

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9012_CYANIDE	
2	9014_CYANIDE	
3	9012_CYANIDE	

**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

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**Certificate of Analysis**

Report Date: March 16, 2018

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF F16-045

Client Sample ID: B3HW94 Project: CPRC0F16045  
 Sample ID: 445458002 Client ID: CPRC001  
 Matrix: WATER  
 Collect Date: 07-MAR-18 09:05  
 Receive Date: 08-MAR-18  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis												
9012_CYANIDE (TOTAL): COMMON "As Received"												
Cyanide, Total		171	1.67	5.00	ug/L	1.00	1	AXH3	03/09/18	0716	1745736	1
9014_CN (FREE): COMMON "As Received"												
Free Cyanide	U	1.00	1.00	2.00	ug/L		1	AXH3	03/15/18	1037	1745740	2
9012_CN (AMENABLE): COMMON "See Parent Products"												
Cyanide amenable to chlorination	U	1.67	1.67	5.00	ug/L		1	AXH3	03/09/18	0854	1745739	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010C Distillation	SW846 9010C Prep	AXH3	03/09/18	0617	1745735
SW846 9012B	SW846 9012B Cyanide, Chlorinated Prep	AXH3	03/09/18	0651	1745737

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9012_CYANIDE	
2	9014_CYANIDE	
3	9012_CYANIDE	

**Notes:**

Column headers are defined as follows:

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

**GEL LABORATORIES LLC**

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

**Certificate of Analysis**

Report Date: March 16, 2018

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF F16-045

Client Sample ID: B3HW97 Project: CPRC0F16045  
 Sample ID: 445458003 Client ID: CPRC001  
 Matrix: WATER  
 Collect Date: 07-MAR-18 09:05  
 Receive Date: 08-MAR-18  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis												
9012_CYANIDE (TOTAL): COMMON "As Received"												
Cyanide, Total		172	1.67	5.00	ug/L	1.00	1	AXH3	03/09/18	0702	1745736	1
9014_CN (FREE): COMMON "As Received"												
Free Cyanide	B	1.61	1.00	2.00	ug/L		1	AXH3	03/15/18	1037	1745740	2
9012_CN (AMENABLE): COMMON "See Parent Products"												
Cyanide amenable to chlorination	B	3.00	1.67	5.00	ug/L		1	AXH3	03/09/18	0854	1745739	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010C Distillation	SW846 9010C Prep	AXH3	03/09/18	0617	1745735
SW846 9012B	SW846 9012B Cyanide, Chlorinated Prep	AXH3	03/09/18	0651	1745737

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9012_CYANIDE	
2	9014_CYANIDE	
3	9012_CYANIDE	

**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

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

**Certificate of Analysis**

Report Date: March 16, 2018

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF F16-045

Client Sample ID: B3HP57 Project: CPRC0F16045  
 Sample ID: 445458004 Client ID: CPRC001  
 Matrix: WATER  
 Collect Date: 07-MAR-18 09:05  
 Receive Date: 08-MAR-18  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis												
9012_CYANIDE (TOTAL): COMMON "As Received"												
Cyanide, Total		185	1.67	5.00	ug/L	1.00	1	AXH3	03/09/18	0703	1745736	1
9014_CN (FREE): COMMON "As Received"												
Free Cyanide	U	1.00	1.00	2.00	ug/L		1	AXH3	03/15/18	1037	1745740	2
9012_CN (AMENABLE): COMMON "See Parent Products"												
Cyanide amenable to chlorination		26.0	1.67	5.00	ug/L		1	AXH3	03/09/18	0854	1745739	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010C Distillation	SW846 9010C Prep	AXH3	03/09/18	0617	1745735
SW846 9012B	SW846 9012B Cyanide, Chlorinated Prep	AXH3	03/09/18	0651	1745737

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	9012_CYANIDE	
2	9014_CYANIDE	
3	9012_CYANIDE	

**Notes:**Column headers are defined as follows:

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

# Quality Control Summary

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: March 16, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 445458

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Flow Injection Analysis</b>											
Batch	1745736										
QC1203986678	445441001	DUP									
Cyanide, Total		D	220	D	206	ug/L	6.57	(0%-20%)	AXH3	03/09/18	07:53
QC1203986677	LCS										
Cyanide, Total	50.0				48.9	ug/L		97.8	(80%-120%)		03/09/18 06:47
QC1203986676	MB										
Cyanide, Total				U	1.67	ug/L					03/09/18 06:46
QC1203986680	445441001	MS									
Cyanide, Total	100	D	220	D	304	ug/L		84	(75%-125%)		03/09/18 07:54
Batch	1745738										
QC1203986684	445441001	DUP									
Cyanide, Chlorinated		D	214	D	214	ug/L	0		(0%-20%)	AXH3	03/09/18 07:35
QC1203986683	LCS										
Cyanide, Chlorinated	50.0			U	1.67	ug/L		0	(-200%-200%)		03/09/18 07:18
QC1203986682	MB										
Cyanide, Chlorinated				U	1.67	ug/L					03/09/18 07:17
Batch	1745740										
QC1203986687	445441001	DUP									
Free Cyanide			3.66		2.64	ug/L	32.7	^	(+/-2.00)	AXH3	03/15/18 10:37
QC1203988663	445458001	DUP									
Free Cyanide		U	1.00	U	1.00	ug/L	N/A				03/15/18 10:37

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**QC Summary**

Workorder: 445458

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Flow Injection Analysis</b>											
Batch	1745740										
QC1203986686		LCS									
Free Cyanide	25.0			24.4	ug/L		97.8	(80%-120%)	AXH3	03/15/18	10:37
QC1203986685		MB									
Free Cyanide			U	1.00	ug/L					03/15/18	10:37

**Notes:**

The Qualifiers in this report are defined as follows:

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

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

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

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

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

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

# Radiological Analysis

# Case Narrative

**Radiochemistry**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL445458**  
**Work Order #: 445458**

**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:** 1745261

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>
445458001	B3HW93
1203985644	Method Blank (MB)
1203985645	445297001(NonSDG) Sample Duplicate (DUP)
1203985646	445297001(NonSDG) Matrix Spike (MS)
1203985647	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:** TC99\_EIE\_LSC: COMMON

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

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

**Analytical Batch:** 1745596

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>
445458001	B3HW93
1203986370	Method Blank (MB)
1203986371	445294001(NonSDG) Sample Duplicate (DUP)
1203986372	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:** 1745608

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>
445458001	B3HW93
1203986388	Method Blank (MB)
1203986389	445297005(NonSDG) Sample Duplicate (DUP)
1203986390	445297005(NonSDG) Matrix Spike (MS)
1203986391	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 1203986389 (Non SDG 445297005DUP) was recounted due to results more negative than the three sigma TPU. The second count is reported.

**Product: TRITIUM\_DIST\_LSC: COMMON****Analytical Method:** TRITIUM\_DIST\_LSC**Analytical Procedure:** GL-RAD-A-002 REV# 22**Analytical Batch:** 1745617

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>
445458001	B3HW93
1203986413	Method Blank (MB)
1203986414	445294001(NonSDG) Sample Duplicate (DUP)
1203986415	445294001(NonSDG) Matrix Spike (MS)
1203986416	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 1203986413 (MB) was recounted due to a suspected blank false positive. The recount is reported.

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

The matrix spike, 1203986415 (Non SDG 445294001MS), 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.

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL445458 GEL Work Order: 445458

**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: Kate Gellatly****Date: 30 MAR 2018****Title: Analyst I**

# Sample Data Summary

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

SDG Number: GEL445458	Client: CPRC001	Project: CPRC0F16045
Lab Sample ID: 445458001	Date Collected: 03/07/2018 09:05	Matrix: WATER
	Date Received: 03/08/2018 08:50	
Client ID: B3HW93	Method: DOE EML HASL-300,I-01 Mo	Prep Basis: "As Received"
Batch ID: 1745261	Analyst: BSW1	SOP Ref: GL-RAD-A-006
Run Date: 03/14/2018 15:56	Aliquot: 1.2 L	Instrument: XRAY6
Data File: I445458001.CNF;1	Prep Method: DOE EML HASL-300,I-01 M	Count Time: 120 min
Prep Batch: 1745261		
Prep Date: 03/13/2018 10:04		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129		2.95	pCi/L	+/-1.23	1.26	0.935	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: GEL445458	Client: CPRC001	Project: CPRC0F16045
Lab Sample ID: 445458001	Date Collected: 03/07/2018 09:05	Matrix: WATER
	Date Received: 03/08/2018 08:50	
Client ID: B3HW93	Method: TC99_EIE_LSC	Prep Basis: "As Received"
Batch ID: 1745596	Analyst: CXS7	SOP Ref: GL-RAD-A-059
Run Date: 03/28/2018 11:06	Aliquot: 100 mL	Instrument: LSCYELLOW
Data File: E1745596.xls	Prep Method: DOE EML HASL-300, Tc-02-	Count Time: 15 min
Prep Batch: 1745596		
Prep Date: 03/23/2018 15:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99		5190	pCi/L	+/-104	581	29.4	50.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	1.04E+05	1.16E+05	CPM	89.7	(30%-105%)

**Comments:**

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

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

SDG Number: GEL445458	Client: CPRC001	Project: CPRC0F16045
Lab Sample ID: 445458001	Date Collected: 03/07/2018 09:05	Matrix: WATER
	Date Received: 03/08/2018 08:50	
Client ID: B3HW93	Method: C14_LSC	Prep Basis: "As Received"
Batch ID: 1745608	Analyst: BXM4	SOP Ref: GL-RAD-A-003
Run Date: 03/12/2018 14:34	Aliquot: 100 mL	Instrument: LSCGOLD
Data File: C1745608R.xls	Prep Method: EPA EERF C-01 Modified	Count Time: 15 min
Prep Batch: 1745608		
Prep Date: 03/09/2018 14:24		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	16.3	pCi/L	+/-20.4	20.7	34.5	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.

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

SDG Number: GEL445458	Client: CPRC001	Project: CPRC0F16045
Lab Sample ID: 445458001	Date Collected: 03/07/2018 09:05	Matrix: WATER
	Date Received: 03/08/2018 08:50	
Client ID: B3HW93	Method: TRITIUM_DIST_LSC	Prep Basis: "As Received"
Batch ID: 1745617	Analyst: MXH8	SOP Ref: GL-RAD-A-002
Run Date: 03/15/2018 09:29	Aliquot: 50 mL	Instrument: LSCPURPLE
Data File: T1745617R.xls	Prep Method: EPA 906.0 Modified	Count Time: 50 min
Prep Batch: 1745617		
Prep Date: 03/14/2018 07:42		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium		3490	pCi/L	+/-289	734	313	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.

# Quality Control Summary

**GEL LABORATORIES LLC**

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**QC Summary**

Report Date: March 30, 2018  
Page 1 of 3

**Client :** CH2MHill Plateau Remediation Company  
MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352  
**Contact:** Mr. Scot Fitzgerald  
**Workorder:** 445458

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1745261								
QC1203985644	MB								
Iodine-129			U	-0.121	pCi/L			BSW1	03/14/1815:57
				Uncert: +/-0.310					
				TPU: +/-0.315					
QC1203985645	445297001	DUP							
Iodine-129		U	-0.311	U	-0.117	pCi/L			03/15/1806:16
				Uncert: +/-0.405		RPD: 0	N/A		
				TPU: +/-0.430		RER: 0.678	(0-2)		
QC1203985646	445297001	MS							
Iodine-129		U	-0.311		31.6	pCi/L	REC: 92 (75%-125%)		03/15/1806:32
				Uncert: +/-0.405					
				TPU: +/-0.430					
QC1203985647	LCS								
Iodine-129					38.5	pCi/L	REC: 111 (80%-120%)		03/15/1806:33
				Uncert: +/-4.93					
				TPU: +/-6.26					
<b>Rad Liquid Scintillation</b>									
Batch	1745596								
QC1203986370	MB								
Technetium-99			U	-12	pCi/L			CXS7	03/28/1811:22
				Uncert: +/-15.6					
				TPU: +/-15.6					
**Technetium-99m Tracer	1.16E+05				1.04E+05	CPM	REC: 90 (30%-105%)		
QC1203986371	445294001	DUP							
Technetium-99		U	0.208	U	-14.6	pCi/L			03/28/1811:38
				Uncert: +/-15.3		RPD: 0	N/A		
				TPU: +/-15.3		RER: 1.34	(0-2)		
**Technetium-99m Tracer	1.16E+05	1.10E+05			1.05E+05	CPM	REC: 91 (30%-105%)		
QC1203986372	LCS								
Technetium-99					883	pCi/L	REC: 99 (80%-120%)		03/28/1811:54
				Uncert: +/-44.6					
				TPU: +/-107					
**Technetium-99m Tracer	1.16E+05				1.07E+05	CPM	REC: 93 (30%-105%)		
Batch	1745608								
QC1203986388	MB								
Carbon-14			U	10.9	pCi/L			BXM4	03/12/1814:52
				Uncert: +/-20.3					
				TPU: +/-20.4					
QC1203986389	445297005	DUP							
Carbon-14		U	-1.2	U	24.5	pCi/L			03/13/1808:40
				Uncert: +/-19.6		RPD: 0	N/A		
				TPU: +/-19.6		RER: 1.8	(0-2)		
QC1203986390	445297005	MS							
Carbon-14		U	-1.2		706	pCi/L	REC: 94 (75%-125%)		03/12/1815:29

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**QC Summary**

Workorder: 445458

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Liquid Scintillation</b>									
Batch	1745608								
		Uncert:	+/-19.6	+/-38.8					
		TPU:	+/-19.6	+/-137					
QC1203986391	LCS								
Carbon-14	751			634	pCi/L	REC: 84	(80%-120%)		03/12/1815:46
		Uncert:		+/-37.5					
		TPU:		+/-123					
Batch	1745617								
QC1203986413	MB								
Tritium			U	-4.59	pCi/L			MXH8	03/16/1808:35
		Uncert:		+/-148					
		TPU:		+/-148					
QC1203986414	445294001	DUP							
Tritium		U	-43.2	U	86.1				03/15/1811:13
		Uncert:	+/-171		+/-178	RPD: 0	N/A		
		TPU:	+/-171		+/-178	RER: 1.03	(0-2)		
QC1203986415	445294001	MS							
Tritium	5150	U	-43.2		4850	pCi/L	REC: 94	(75%-125%)	03/15/1812:05
		Uncert:	+/-171		+/-510				
		TPU:	+/-171		+/-1070				
QC1203986416	LCS								
Tritium	2570			2410	pCi/L	REC: 94	(80%-120%)		03/15/1812:57
		Uncert:		+/-255					
		TPU:		+/-530					

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- A The TIC is a suspected aldol-condensation product
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- B The analyte was detected in both the associated QC blank and in the sample.
- B The analyte was detected in the associated method blank >= MDC or >5% sample activity.
- C Analyte has been confirmed by GC/MS analysis
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- E Reported value is estimated due to interferences. See comment in narrative.
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- P Aroclor target analyte with greater than 25% difference between column analyses.

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**QC Summary**

Workorder: 445458

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
S	Reported value determined by the Method of Standard Additions (MSA)									
T	Spike and/or spike duplicate sample recovery is outside control limits.									
U	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.									
UX	Gamma Spectroscopy--Uncertain identification									
W	Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.									
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
o	Analyte failed to recover within LCS limits (Organics only)									

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

\*\* Indicates analyte is a surrogate compound.

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

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

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