



March 22, 2018

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

Re: CHPRC SAF F18-022  
Work Order: 446038  
SDG: GEL446038

Dear Mr. Fitzgerald:

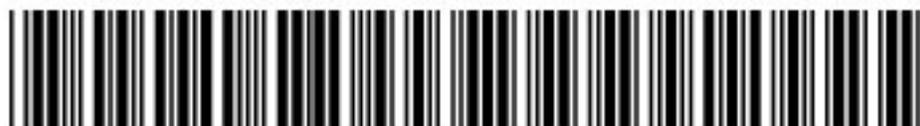
GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 16, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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,

Heather Shaffer  
Project Manager

Purchase Order: 303607  
Chain of Custody: F18-022-001 and F18-022-002  
Enclosures



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# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF F18-022  
SDG: GEL446038**

**March 22, 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 16, 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>
446038001	B3J517
446038002	B3J522
446038003	B3J522

**Case Narrative**

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

**Data Package**

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: GC Semivolatile Herbicide, GC Semivolatile PCB, GC Semivolatile Pesticide, GC/MS Semivolatile, 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.



Heather Shaffer  
Project Manager

**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL446038**  
**Work Order #: 446038**

## GC/MS Volatile

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

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

#### Quality Control (QC) Information

##### **Matrix Spike/Matrix Spike Duplicate Recovery Statement**

The spike and/or spike duplicate (See Below) recoveries were not all within the acceptance limits.

Sample	Analyte	Value
1203992473 (B3J517PS)	Tetrachloroethylene	66* (70%-130%)

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

Sample	Analyte	Value
1203992473 (B3J517PS)	Bromomethane	35* (70%-130%)
	Chloroethane	0* (70%-130%)
1203992474 (B3J517PSD)	Bromomethane	35* (70%-130%)
	Chloroethane	1* (70%-130%)

##### **Relative Percent Difference (RPD) Statement**

The RPD between the matrix spike pair (See Below) were not all within the acceptance limits. The unacceptable RPD may be attributed to matrix interference and/or sample non-homogeneity.

Sample	Analyte	Value
1203992473PS and 1203992474PSD (B3J517)	Chloroethane	RPD 200* (0%-20%)

The RPD between the matrix spike pair (See Below) were not all within the acceptance limits. However, the spike recoveries passed. The unacceptable RPD may be attributed to matrix interference and/or sample non-homogeneity.

Sample	Analyte	Value
1203992473PS and 1203992474PSD (B3J517)	2-Butanone	RPD 23* (0%-20%)
	2-Hexanone	RPD 25* (0%-20%)

	Acetone	RPD 32* (0%-20%)
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### **Technical Information**

#### **Sample Preservation and Integrity**

Sample 446038001 (B3J517) contained head-space greater than pea size. The Project Manager was notified and the results are reported.

#### **Sample Dilutions/Methanol Dilutions**

Samples 1203992473 (B3J517PS), 1203992474 (B3J517PSD) and 446038001 (B3J517) were analyzed using a methanol dilution extraction procedure because the sample matrices were not amenable to more concentrated analyses.

	<b>446038</b>
Analyte	<b>001</b>
Several	50X

### **Miscellaneous Information**

#### **Additional Comments**

QC sample 1203992474 (B3J517PSD) was analyzed 6 minutes out of the tune window. The Project Manager notified. The results are reported.

## **GC/MS Semivolatile**

### **Analysis of Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry**

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**

#### **CCV Requirements**

All Calibration Verification Standards (CCV) did not meet the acceptance criteria as outlined in Method 8270D for sample 446038002 (B3J522) and the associated QC. Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, and Benzo(ghi)perylene exceeded the %Drift criteria with a positive bias. Since there were no detects of the analytes in the associated client sample, the biased high response had no adverse impact on the reported data.

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

#### **Laboratory Control Sample (LCS) Recovery**

The LCS and/or LCSD (See Below) spike recoveries were not within the acceptance limits. The client established the limits of 70%-130%. Failures are expected. The data were reported per client request.

Sample	Analyte	Value
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1203993390 (LCS)	Several	See applicable report
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The LCS (See Below) did not meet spike recovery acceptance criteria for Hexachlorocyclopentadiene. The failure is known to be poor responding analyte as stated per the Method. This may account for the low recovery in the LCS, as well as the low recovery in the MSD. The data were reported.

Sample	Analyte	Value
1203993390 (LCS)	Several	See applicable report

#### **Spike Recovery Statement**

The MSD (See Below) did not meet spike recovery acceptance criteria for Hexachlorocyclopentadiene. The failure is known to be poor responding analyte as stated per the Method. This may account for the low recovery in the MSD, as well as the low, but passing, recovery in the MS. The data were reported.

Sample	Analyte	Value
1203993394 (B3J522MSD)	Hexachlorocyclopentadiene	6* (10%-100%)

#### **MS/MSD Relative Percent Difference (RPD) Statement**

The relative percent difference (RPD) between the MS and MSD (See Below) did not meet acceptance limits. As the individual MS and MSD recoveries were within the acceptance limits, the failures had no adverse impact on the reported sample data.

Sample	Analyte	Value
1203993393MS and 1203993394MSD (B3J522)	4-Chloroaniline	34* (0%-30%)

The relative percent difference (RPD) between the MS and MSD (See Below) did not meet acceptance limits for Hexachlorocyclopentadiene. The failure is known to be poor responding analyte as stated per the Method. This may account for the low recovery in the MSD which attributed to the RPD failure. The data were reported.

Sample	Analyte	Value
1203993393MS and 1203993394MSD (B3J522)	Hexachlorocyclopentadiene	89* (0%-30%)

#### **Technical Information**

##### **Sample Re-extraction/Re-analysis**

Sample 1203993390 (LCS) was re-analyzed for ISTD failure.

## **GC Semivolatile Pesticide**

### **Organochlorine Pesticides and Chlorinated Hydrocarbons**

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

applicable, with the following exceptions.

### Quality Control (QC) Information

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

The MS (See Below) did not meet spike recovery limits due to a co-elution with a non-target peak on one column.

Sample	Analyte	Value
1203993409 (B3J522MSD)	Aldrin	146* (21%-119%)

#### **MS/MSD Relative Percent Difference (RPD) Statement**

The RPD values between the MS and MSD, (See Below), were not within the acceptance limits due to the large difference between the individual recoveries in each MS and MSD analyte pair.

Sample	Analyte	Value
1203993408MS and 1203993409MSD (B3J522)	Several	See applicable report

### Technical Information

#### **Sample Dilutions**

Samples 1203993408 (B3J522MS), 1203993409 (B3J522MSD) and 446038002 (B3J522) were diluted due to high concentrations of non-target analytes within the retention time window of interest.

#### **Florisil**

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

### Miscellaneous Information

#### **Manual Integrations**

Sample (See Below) required manual integration to correctly position the baseline as set in the calibration standard injections.

Sample	Analyte	Value
446038002 (B3J522)	4cmx	Result 23ug/kg

## GC Semivolatile PCB

### **Analysis of The Analysis of Polychlorinated Biphenyls by GC/ECD by ECD**

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

### Technical Information

**Preparation/Analytical Method Verification**

All samples and QC in this batch were cleaned using alumina in order to remove oil and other high molecular weight interferences. All samples and QC in this batch were cleaned with activated copper in order to remove sulfur.

**Miscellaneous Information****Manual integrations**

Sample 446038002 (B3J522) required manual integration to correctly position the baseline as set in the calibration standard injections and to properly identify one or more peaks.

**GC Semivolatile Herbicide****Analysis of Chlorophenoxy Acid Herbicides by ECD**

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

**Quality Control (QC) Information****Laboratory Control Sample (LCS) Recovery**

The LCS (See Below) spike recovery for Dinoseb was marginally below the client established acceptance limits of 70%-130% on one analytical column. Dinoseb was not detected in the client sample and the data were reported.

Sample	Analyte	Value
1203990747 (LCS)	Dinoseb	69* (70%-130%)

**Spike Recovery Statement**

The MS and/or MSD (See Below) did not meet spike recovery acceptance limits. Since the MS and MSD displayed similar recoveries, the failures were attributed to sample matrix interference.

Sample	Analyte	Value
1203990748 (Non SDG 445560001MS)	Dinoseb	21* (23%-128%)
1203990749 (Non SDG 445560001MSD)	Dinoseb	19* (23%-128%)

**Technical Information****Holding Time Specifications**

Samples (See Below) were received from the client out of holding. The samples were analyzed and the data have been reported and qualified accordingly.

Sample	Value
1203990748 (Non SDG 445560001MS)	Received 09-MAR-18, out of holding 02-MAR-18
1203990749 (Non SDG 445560001MSD)	Received 09-MAR-18, out of holding 02-MAR-18

**Miscellaneous Information****Manual Integrations**

Samples 1203990747 (LCS) and 1203990748 (Non SDG 445560001MS) required manual integration to correctly position the baseline as set in the calibration standard injections.

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

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

**Quality Control (QC) Information****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
1203991322 (B3J522MS)	Calcium	294* (75%-125%)
	Sodium	132* (75%-125%)

**Duplicate Relative Percent Difference (RPD) Statement**

Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203991321 (B3J522DUP)	Calcium	36.5* (0%-35%)
	Sodium	abs(176000 - 139000)* (+/-30700 ug/kg)
	Vanadium	35.6* (0%-35%)

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

**Determination of Metals by ICP**

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**

##### **Preparation Information**

The samples and associated matrix QC were prepared at a ten times or greater dilution factor to minimize potential interferences arising from the high sodium content in the TCLP leaching solution.

#### **Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer**

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.

#### **Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer**

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**

##### **Preparation Information**

The samples and associated matrix QC were prepared at a ten times or greater dilution factor to minimize potential interferences arising from the high sodium content in the TCLP leaching solution.

### **General Chemistry**

#### **Hexavalent Chromium**

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

### **Radiochemistry**

#### **AMCMISO\_EIE\_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.

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

#### **Tracer/Carrier Yield**

Sample, (See Below), did not meet the client tracer yield requirements, however it is less than 110 percent and does meet the GEL standard tracer yield requirements.

Sample	Analyte	Value
1203991519 (MB)	Americium-243 Tracer	109* (30%-105%)

### **Technical Information**

#### **Recounts**

Sample 1203991521 (LCS) was recounted due to high carrier/tracer yield. The recount is reported. Sample 1203991519 (MB) was recounted due to high carrier/tracer yield. The original count is reported.

### **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.

### **Technical Information**

#### **Recounts**

Sample 1203991524 (LCS) was recounted due to a peak shift. The recount is reported.

### **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 1203991525 (MB) was recounted due to a peak shift. The recount is reported.

### **Dry Weight**

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

**Dry Weight**

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

**GAMMA\_GS: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.

**I129\_SEP\_LEPS\_GS**

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

**9310\_ALPHABETA\_GPC: COMMON**

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

**Technical Information****Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

**SRTOT\_SEP\_PRECIP\_GPC: COMMON**

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

**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 1203991748 (LCS) was recounted due to low recovery. The recount is reported.

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

The matrix spike, 1203991747 (B3J522MS), aliquot was reduced to conserve sample volume.

**Certification Statement**

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

# **Chain of Custody and Supporting Documentation**

CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST <b>446038</b>		F18-022-001	PAGE 1 OF 1
COLLECTOR Malcom Chunn CHPRC	COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR SUMNER, LC	REQUIRED TAT <b>15 Days</b> JLH 3/13/18 7	
SAMPLING LOCATION Modutank Sludge Sample	PROJECT DESIGNATION Modu Tank - Sludge Sampling	SAF NO. F18-022	ORIGINAL		
ICE CHEST NO. <b>GWS-567</b>	FIELD LOGBOOK NO. HNF-N-507-40-1	ACTUAL SAMPLE DEPTH N/A	PURCHASE ORDER/CHARGE CODE 303607	METHOD OF SHIPMENT FEDERAL EXPRESS	
SHIPPED TO GEL Laboratories, LLC	OFFSITE PROPERTY NO. <b>9176</b>	BILL OF LADING/AIR BILL NO. <b>7800 8736 7740</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> Cool <=6C
		<b>HOLDING TIME</b> 14 Days
		<b>TYPE OF CONTAINER</b> aG
		<b>NO. OF CONTAINER(S)</b> 1
		<b>VOLUME</b> 60mL
<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	
B3J517	N/A	OTHER SOLID	MAR 15 2018	0922	✓

3/22/2018

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	
Malcom Chunn CHPRC <b>MRC</b> MAR 15 2018 1015	Troy Bacon CHPRC <b>Troy L. Bacon</b> MAR 15 2018 015	TRVL-18-099 (1) 8260_VOA_GCMS: COMMON {1,1,1-Trichloroethane, 1,1,2-Trichloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, 1,2-Dichloroethane, 2-Butanone, 4-Methyl-2-pentanone, Acetone, Benzene, Carbon disulfide, Carbon tetrachloride, Chlorobenzene, Chloroform, Ethylbenzene, Methylene chloride, Tetrachloroethene, Toluene, Trichloroethene, Vinyl chloride, Xylenes (total)}; 8260_VOA_GCMS: CH 01 {1,1,2,2-Tetrachloroethane, 1,2-Dichloroethene (Total), 1,2-Dichloropropane, 2-Hexanone, Bromodichloromethane, Bromoform, Bromomethane, Chloroethane, Chloromethane, cis-1,3-Dichloropropene, Dibromochloromethane, Styrene, trans-1,3-Dichloropropene};
Troy Bacon CHPRC <b>Fed Ex</b> MAR 15 2018 1400	<b>FEDEX</b> Chakeris Tarplin GEL Laboratories <b>Chakeris</b> 3/16/18 0850	

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

CH2MHill Plateau Remediation Company		446038		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F18-022-002	PAGE 1 OF 2		
COLLECTOR Malcom Chunn CHPRC		COMPANY CONTACT SUMNER, LC		TELEPHONE NO. 376-3922		PROJECT COORDINATOR SUMNER, LC		REQUIRED TAT 15 Days			
SAMPLING LOCATION Modutank Sludge Sample		PROJECT DESIGNATION Modu Tank - Sludge Sampling		SAF NO. F18-022		ORIGINAL					
ICE CHEST NO. GWS-567		FIELD LOGBOOK NO. HNF-N-507-40-1		ACTUAL SAMPLE DEPTH N/A		PURCHASE ORDER/CHARGE CODE 303607		METHOD OF SHIPMENT FEDERAL EXPRESS			
SHIPPED TO GEL Laboratories, LLC		OFFSITE PROPERTY NO. 9176		BILL OF LADING/AIR BILL NO. 7800 8736 7740							
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		Cool <=6C	Cool <=6C	Cool <=6C	Cool <=6C	None	Cool <=6C
				HOLDING TIME		14/40 Days	6 Months	14/40 Days	28 Days	6 Months	30 Days
				TYPE OF CONTAINER		aG	aG	aG	G/P	G/P	G/P
				NO. OF CONTAINER(S)		1	1	1	1	1	1
				VOLUME		60mL	60mL	60mL	125mL	250mL	60mL
		SPECIAL HANDLING AND/OR STORAGE N/A		SAMPLE ANALYSIS		SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS	SEE ITEM (4) IN SPECIAL INSTRUCTIONS	SEE ITEM (5) IN SPECIAL INSTRUCTIONS	7196_CR6: COMMON {Hexavalent Chromium};
SAMPLE NO.	FILTERED	MATRIX*	SAMPLE DATE	SAMPLE TIME							
B3J522	N/A	OTHER SOLID	MAR 15 2018	0922	✓	✓	✓	✓	✓	✓	✓

3/22/2018

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM		RECEIVED BY/STORED IN		SEE PAGE 2 FOR ALL SPECIAL INSTRUCTIONS	
Malcom Chunn CHPRC		Troy Bacon CHPRC			
DATE/TIME MAR 15 2018 1015		DATE/TIME MAR 15 2018 1015			
Troy Bacon CHPRC		FEDEX			
DATE/TIME MAR 15 2018 1400		Chakeris Tarplin, GEL Laboratories			
Fed Ex		3/16/18 0830			
FINAL SAMPLE DISPOSITION		DISPOSAL METHOD		DISPOSED BY	
				DATE/TIME	

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REV.0

<b>CH2M Hill Plateau Remediation Company</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b> 446038			<b>F18-022-002</b>	<b>PAGE 2 OF 2</b>
<b>COLLECTOR</b> Malcom Chunn CHPRC	<b>COMPANY CONTACT</b> SUMNER, LC	<b>TELEPHONE NO.</b> 376-3922	<b>PROJECT COORDINATOR</b> SUMNER, LC		<b>REQUIRED TAT</b> 15 Days JLH 3/13/18 7	
<b>SAMPLING LOCATION</b> Modutank Sludge Sample	<b>PROJECT DESIGNATION</b> Modu Tank - Sludge Sampling		<b>SAF NO.</b> F18-022		<b>ORIGINAL</b>	
<b>ICE CHEST NO.</b> GWS-567	<b>FIELD LOGBOOK NO.</b> HNF-N-507-40-1	<b>ACTUAL SAMPLE DEPTH</b> N/A	<b>PURCHASE ORDER/CHARGE CODE</b> 303607	<b>METHOD OF SHIPMENT</b> FEDERAL EXPRESS		
<b>SHIPPED TO</b> GEL Laboratories, LLC	<b>OFFSITE PROPERTY NO.</b> 9176	<b>BILL OF LADING/AIR BILL NO.</b> 7800 8736 7740				

**SPECIAL INSTRUCTIONS**

TRVL-18-099

(1) 8270\_SVOA\_GCMS: CH 01 {1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 2,4,5-Trichlorophenol, 2,4-Dimethylphenol, 2,4-Dinitrophenol, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, 2-Chloronaphthalene, 2-Chlorophenol, 2-Methylnaphthalene, 2-Nitroaniline, 3,3'-Dichlorobenzidine, 3-Nitroaniline, 4,6-Dinitro-2-methylphenol, 4-Bromophenylphenyl ether, 4-Chloro-3-methylphenol, 4-Chloroaniline, 4-Chlorophenylphenyl ether, 4-Nitroaniline, 4-Nitrophenol, Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g)hperylene, Benzo(k)fluoranthene, Bis(2-chloro-1-methylethyl)ether, Bis(2-Chloroethoxy)methane, Bis(2-chloroethyl) ether, Butylbenzylphthalate, Carbazole, Chrysene, Di-n-butylphthalate, Di-n-octylphthalate, Dibenzofuran, Dibenz[a,h]anthracene, Diethylphthalate, Dimethyl phthalate, Fluoranthene, Fluorene, Hexachlorobenzene, Hexachlorobutadiene, Hexachlorocyclopentadiene, Hexachloroethane, Indeno(1,2,3-cd)pyrene, Isophorone, n-Nitrosodi-n-propylamine, Nitrobenzene, Phenanthrene, Pyrene}; 8270\_SVOA\_GCMS: COMMON {2,4-Dichlorophenol, 2-Methylphenol (cresol, o-), 2-Nitrophenol, Bis(2-ethylhexyl) phthalate, Naphthalene, Pentachlorophenol, Phenol}; 8270\_SVOA\_GCMS: COMMON (Add-on) {2,4,6-Trichlorophenol, Diphenylamine+N-Nitrosodiphenylamine};

(2) 8081\_PEST\_GC: CH 01 {Alpha-Chlordane, Endrin ketone, gamma-Chlordane, Heptachlor}; 8081\_PEST\_GC: COMMON {4,4'-DDD (Dichlorodiphenyldichloroethane), 4,4'-DDE (Dichlorodiphenyldichloroethylene), 4,4'-DDT (Dichlorodiphenyltrichloroethane), Aldrin, Alpha-BHC, beta-1,2,3,4,5,6-Hexachlorocyclohexane (beta-BHC), Delta-BHC, Dieldrin, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin aldehyde, Gamma-BHC (Lindane), Heptachlor epoxide, Methoxychlor, Toxaphene}; 8082\_PCB\_GC: COMMON {Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260};

(3) 8151\_HERBICIDE\_GC: COMMON {2,4,5-T(2,4,5-Trichlorophenoxyacetic acid), 2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid)Silvex, 2,4-D(2,4-Dichlorophenoxyacetic acid), 2,4-DB(4-(2,4-Dichlorophenoxy)butanoic acid), 2-(2-methyl-4-chlorophenoxy) propionic acid, 2-Methyl-4 chlorophenoxyacetic acid, Dalapon, Dicamba, Dichloroprop, Dinoseb(2-secButyl-4,6-dinitrophenol)};

(4) 7471\_MERCURY\_CV: COMMON (SOLIDS) {Mercury}; 6010\_METALS\_ICP: COMMON {Antimony, Barium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Silver, Sodium, Vanadium, Zinc}; 6010\_METALS\_ICP: COMMON (Add-on) {Aluminum}; 1311/7470\_TCLP\_METALS\_MERCURY\_CV: COMMON {Mercury}; 1311/6010\_TCLP\_METALS: COMMON {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver};

(5) GAMMA\_GS: COMMON {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; 9310\_ALPHABETA\_GPC: COMMON {Gross alpha, Gross beta}; AMCMISO\_EIE\_PRECIP\_AEA: COMMON {Americium-241}; I129\_SEP\_LEPS\_GS: COMMON {Iodine-129}; PUIISO\_IE\_PRECIP\_AEA: COMMON {Plutonium-238, Plutonium-239/240}; SRTOT\_SEP\_PRECIP\_GPC: COMMON {Total beta radiostromtium}; TRITIUM\_DIST\_LSC: COMMON {Tritium}; UIISO\_IE\_PRECIP\_AEA: COMMON {Uranium-233/234, Uranium-235, Uranium-238};

3/22/2018

REV.0

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# **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 22 March 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	SC000122017-25
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# **Volatile Analysis**

# Case Narrative

**GC/MS Volatile  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL446038  
Work Order #: 446038**

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

**Analytical Method: SW846 5035A/8260C**

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

**Analytical Batch: 1748469**

**Preparation Method: SW846 5035A**

**Preparation Procedure: GL-OA-E-039 REV# 12**

**Preparation Batch: 1748468**

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>
446038001	B3J517
1203992470	Method Blank (MB)
1203992471	High Blank (HB)
1203992472	Laboratory Control Sample (LCS)
1203992473	446038001(B3J517) Post Spike (PS)
1203992474	446038001(B3J517) Post Spike Duplicate (PSD)

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

**Data Summary:**

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

**Quality Control (QC) Information**

**Matrix Spike/Matrix Spike Duplicate Recovery Statement**

The spike and/or spike duplicate (See Below) recoveries were not all within the acceptance limits.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203992473 (B3J517PS)	Tetrachloroethylene	66* (70%-130%)

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

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203992473 (B3J517PS)	Bromomethane	35* (70%-130%)
	Chloroethane	0* (70%-130%)
1203992474 (B3J517PSD)	Bromomethane	35* (70%-130%)
	Chloroethane	1* (70%-130%)

**Relative Percent Difference (RPD) Statement**

The RPD between the matrix spike pair (See Below) were not all within the acceptance limits. The unacceptable RPD may be attributed to matrix interference and/or sample non-homogeneity.

Sample	Analyte	Value
1203992473PS and 1203992474PSD (B3J517)	Chloroethane	RPD 200* (0%-20%)

The RPD between the matrix spike pair (See Below) were not all within the acceptance limits. However, the spike recoveries passed. The unacceptable RPD may be attributed to matrix interference and/or sample non-homogeneity.

Sample	Analyte	Value
1203992473PS and 1203992474PSD (B3J517)	2-Butanone	RPD 23* (0%-20%)
	2-Hexanone	RPD 25* (0%-20%)
	Acetone	RPD 32* (0%-20%)

**Technical Information****Sample Preservation and Integrity**

Sample 446038001 (B3J517) contained head-space greater than pea size. The Project Manager was notified and the results are reported.

**Sample Dilutions/Methanol Dilutions**

Samples 1203992473 (B3J517PS), 1203992474 (B3J517PSD) and 446038001 (B3J517) were analyzed using a methanol dilution extraction procedure because the sample matrices were not amenable to more concentrated analyses.

Analyte	446038
	001
Several	50X

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

QC sample 1203992474 (B3J517PSD) was analyzed 6 minutes out of the tune window. The Project Manager notified. The results are reported.

**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: GEL446038 GEL Work Order: 446038

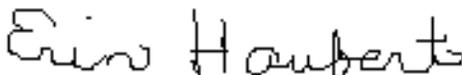
**The Qualifiers in this report are defined as follows:**

- D Results are reported from a diluted aliquot of sample.
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

**Review/Validation**

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

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

**Signature:** **Name:** Erin Haubert**Date:** 21 MAR 2018**Title:** Data Validator

# Sample Data Summary

Volatile  
Certificate of Analysis  
Sample Summary

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<b>SDG Number:</b> GEL446038	<b>Date Collected:</b> 03/15/2018 09:22	<b>Matrix:</b> OTHER SOLID
<b>Lab Sample ID:</b> 446038001	<b>Date Received:</b> 03/16/2018 08:50	<b>%Moisture:</b> 25.5
<b>Client ID:</b> B3J517	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F18022
<b>Batch ID:</b> 1748469	<b>Method:</b> SW846 5035A/8260C	<b>SOP Ref:</b> GL-OA-E-038
<b>Run Date:</b> 03/19/2018 20:04	<b>Inst:</b> VOA3.I	<b>Dilution:</b> 50
<b>Prep Date:</b> 03/19/2018 15:15	<b>Analyst:</b> JP1	<b>Purge Vol:</b> 5 mL
<b>Data File:</b> 031918V3\3A118.D	<b>Aliquot:</b> 5.2 g	<b>Final Volume:</b> 5 mL
	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-55-6	1,1,1-Trichloroethane	DU	19.4	ug/kg	19.4	129
79-34-5	1,1,2,2-Tetrachloroethane	DU	19.4	ug/kg	19.4	129
79-00-5	1,1,2-Trichloroethane	DU	19.4	ug/kg	19.4	129
75-34-3	1,1-Dichloroethane	DU	19.4	ug/kg	19.4	129
75-35-4	1,1-Dichloroethylene	DU	19.4	ug/kg	19.4	129
107-06-2	1,2-Dichloroethane	DU	19.4	ug/kg	19.4	129
540-59-0	1,2-Dichloroethylene (total)	DU	19.4	ug/kg	19.4	258
78-87-5	1,2-Dichloropropane	DU	19.4	ug/kg	19.4	129
78-93-3	2-Butanone	DU	194	ug/kg	194	645
591-78-6	2-Hexanone	DU	194	ug/kg	194	645
108-10-1	4-Methyl-2-pentanone	DU	194	ug/kg	194	645
67-64-1	Acetone	DU	194	ug/kg	194	645
71-43-2	Benzene	DU	19.4	ug/kg	19.4	129
75-27-4	Bromodichloromethane	DU	19.4	ug/kg	19.4	129
75-25-2	Bromoform	DU	19.4	ug/kg	19.4	129
74-83-9	Bromomethane	DTU	19.4	ug/kg	19.4	129
75-15-0	Carbon disulfide	DU	103	ug/kg	103	645
56-23-5	Carbon tetrachloride	DU	19.4	ug/kg	19.4	129
108-90-7	Chlorobenzene	DU	19.4	ug/kg	19.4	129
75-00-3	Chloroethane	DTU	19.4	ug/kg	19.4	129
67-66-3	Chloroform	DU	19.4	ug/kg	19.4	129
74-87-3	Chloromethane	DU	19.4	ug/kg	19.4	129
124-48-1	Dibromochloromethane	DU	19.4	ug/kg	19.4	129
100-41-4	Ethylbenzene	DU	19.4	ug/kg	19.4	129
75-09-2	Methylene chloride	DU	103	ug/kg	103	323
100-42-5	Styrene	DU	19.4	ug/kg	19.4	129
127-18-4	Tetrachloroethylene	DTU	19.4	ug/kg	19.4	129
108-88-3	Toluene	DU	19.4	ug/kg	19.4	129
79-01-6	Trichloroethylene	DU	19.4	ug/kg	19.4	129
75-01-4	Vinyl chloride	DU	19.4	ug/kg	19.4	129
1330-20-7	Xylenes (total)	DU	19.4	ug/kg	19.4	387
10061-01-5	cis-1,3-Dichloropropylene	DU	19.4	ug/kg	19.4	129
10061-02-6	trans-1,3-Dichloropropylene	DU	19.4	ug/kg	19.4	129

# Quality Control Summary

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**QC Summary**

Report Date: March 21, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 446038

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1748469										
QC1203992471	HB										
1,1,1-Trichloroethane			DU	15.0	ug/kg				JP1	03/19/18	19:32
1,1,2,2-Tetrachloroethane			DU	15.0	ug/kg						
1,1,2-Trichloroethane			DU	15.0	ug/kg						
1,1-Dichloroethane			DU	15.0	ug/kg						
1,1-Dichloroethylene			DU	15.0	ug/kg						
1,2-Dichloroethane			DU	15.0	ug/kg						
1,2-Dichloroethylene (total)			DU	15.0	ug/kg						
1,2-Dichloropropane			DU	15.0	ug/kg						
2-Butanone			DU	150	ug/kg						
2-Hexanone			DU	150	ug/kg						
4-Methyl-2-pentanone			DU	150	ug/kg						
Acetone			DU	150	ug/kg						
Benzene			DU	15.0	ug/kg						

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**QC Summary**

Workorder: 446038

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<b>Parmname</b>	<b>NOM</b>	<b>Sample</b>	<b>Qual</b>	<b>QC</b>	<b>Units</b>	<b>RPD%</b>	<b>REC%</b>	<b>Range</b>	<b>Anlst</b>	<b>Date</b>	<b>Time</b>
<b>Volatile-GC/MS</b>											
Batch	1748469										
Bromodichloromethane			DU	15.0	ug/kg				JP1	03/19/18	19:32
Bromoform			DU	15.0	ug/kg						
Bromomethane			DU	15.0	ug/kg						
Carbon disulfide			DU	80.0	ug/kg						
Carbon tetrachloride			DU	15.0	ug/kg						
Chlorobenzene			DU	15.0	ug/kg						
Chloroethane			DU	15.0	ug/kg						
Chloroform			DU	15.0	ug/kg						
Chloromethane			DU	15.0	ug/kg						
Dibromochloromethane			DU	15.0	ug/kg						
Ethylbenzene			DU	15.0	ug/kg						
Methylene chloride			DU	80.0	ug/kg						
Styrene			DU	15.0	ug/kg						
Tetrachloroethylene			DU	15.0	ug/kg						
Toluene			DU	15.0	ug/kg						

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1748469										
Trichloroethylene			DU	15.0	ug/kg				JP1	03/19/18	19:32
Vinyl chloride			DU	15.0	ug/kg						
Xylenes (total)			DU	15.0	ug/kg						
cis-1,3-Dichloropropylene			DU	15.0	ug/kg						
trans-1,3-Dichloropropylene			DU	15.0	ug/kg						
**1,2-Dichloroethane-d4	50.0			55.2	ug/L		110	(70%-130%)			
**Bromofluorobenzene	50.0			48.3	ug/L		97	(70%-130%)			
**Toluene-d8	50.0			48.0	ug/L		96	(70%-130%)			
QC1203992472 LCS											
1,1,1-Trichloroethane	50.0			44.0	ug/kg		88	(70%-130%)		03/19/18	12:37
1,1,2,2-Tetrachloroethane	50.0			44.7	ug/kg		89	(70%-130%)			
1,1,2-Trichloroethane	50.0			44.7	ug/kg		89	(70%-130%)			
1,1-Dichloroethane	50.0			44.8	ug/kg		90	(70%-130%)			
1,1-Dichloroethylene	50.0			46.3	ug/kg		93	(70%-130%)			
1,2-Dichloroethane	50.0			44.3	ug/kg		89	(70%-130%)			
1,2-Dichloroethylene (total)	100			89.3	ug/kg		89	(70%-130%)			

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**QC Summary**

Workorder: 446038

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<b>Parmname</b>	<b>NOM</b>	<b>Sample</b>	<b>Qual</b>	<b>QC</b>	<b>Units</b>	<b>RPD%</b>	<b>REC%</b>	<b>Range</b>	<b>Anlst</b>	<b>Date</b>	<b>Time</b>
<b>Volatile-GC/MS</b>											
Batch	1748469										
1,2-Dichloropropane	50.0			42.5	ug/kg		85	(70%-130%)	JP1	03/19/18	12:37
2-Butanone	250			305	ug/kg		122	(70%-130%)			
2-Hexanone	250			311	ug/kg		124	(70%-130%)			
4-Methyl-2-pentanone	250			239	ug/kg		96	(70%-130%)			
Acetone	250			317	ug/kg		127	(70%-130%)			
Benzene	50.0			38.6	ug/kg		77	(70%-130%)			
Bromodichloromethane	50.0			42.6	ug/kg		85	(70%-130%)			
Bromoform	50.0			46.9	ug/kg		94	(70%-130%)			
Bromomethane	50.0			48.1	ug/kg		96	(70%-130%)			
Carbon disulfide	250			217	ug/kg		87	(70%-130%)			
Carbon tetrachloride	50.0			43.9	ug/kg		88	(70%-130%)			
Chlorobenzene	50.0			42.1	ug/kg		84	(70%-130%)			
Chloroethane	50.0			47.9	ug/kg		96	(70%-130%)			
Chloroform	50.0			42.4	ug/kg		85	(70%-130%)			
Chloromethane	50.0			46.8	ug/kg		94	(70%-130%)			

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**QC Summary**

Workorder: 446038

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1748469										
Dibromochloromethane	50.0			45.6	ug/kg		91	(70%-130%)	JP1	03/19/18	12:37
Ethylbenzene	50.0			45.1	ug/kg		90	(70%-130%)			
Methylene chloride	50.0			40.3	ug/kg		81	(70%-130%)			
Styrene	50.0			46.6	ug/kg		93	(70%-130%)			
Tetrachloroethylene	50.0			41.4	ug/kg		83	(70%-130%)			
Toluene	50.0			42.1	ug/kg		84	(70%-130%)			
Trichloroethylene	50.0			43.8	ug/kg		88	(70%-130%)			
Vinyl chloride	50.0			50.0	ug/kg		100	(70%-130%)			
Xylenes (total)	150			135	ug/kg		90	(70%-130%)			
cis-1,3-Dichloropropylene	50.0			43.5	ug/kg		87	(70%-130%)			
trans-1,3-Dichloropropylene	50.0			48.0	ug/kg		96	(70%-130%)			
**1,2-Dichloroethane-d4	50.0			52.6	ug/L		105	(70%-130%)			
**Bromofluorobenzene	50.0			46.7	ug/L		93	(70%-130%)			
**Toluene-d8	50.0			49.1	ug/L		98	(70%-130%)			
QC1203992470 MB											
1,1,1-Trichloroethane			U	0.300	ug/kg					03/19/18	14:44

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**QC Summary**

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1748469										
1,1,2,2-Tetrachloroethane			U	0.300	ug/kg				JP1	03/19/18	14:44
1,1,2-Trichloroethane			U	0.300	ug/kg						
1,1-Dichloroethane			U	0.300	ug/kg						
1,1-Dichloroethylene			U	0.300	ug/kg						
1,2-Dichloroethane			U	0.300	ug/kg						
1,2-Dichloroethylene (total)			U	0.300	ug/kg						
1,2-Dichloropropane			U	0.300	ug/kg						
2-Butanone			U	3.00	ug/kg						
2-Hexanone			U	3.00	ug/kg						
4-Methyl-2-pentanone			U	3.00	ug/kg						
Acetone			U	3.00	ug/kg						
Benzene			U	0.300	ug/kg						
Bromodichloromethane			U	0.300	ug/kg						
Bromoform			U	0.300	ug/kg						
Bromomethane			U	0.300	ug/kg						

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**QC Summary**

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<b>Parmname</b>	<b>NOM</b>	<b>Sample</b>	<b>Qual</b>	<b>QC</b>	<b>Units</b>	<b>RPD%</b>	<b>REC%</b>	<b>Range</b>	<b>Anlst</b>	<b>Date</b>	<b>Time</b>
<b>Volatile-GC/MS</b>											
Batch	1748469										
Carbon disulfide			U	1.60	ug/kg				JP1	03/19/18	14:44
Carbon tetrachloride			U	0.300	ug/kg						
Chlorobenzene			U	0.300	ug/kg						
Chloroethane			U	0.300	ug/kg						
Chloroform			U	0.300	ug/kg						
Chloromethane			U	0.300	ug/kg						
Dibromochloromethane			U	0.300	ug/kg						
Ethylbenzene			U	0.300	ug/kg						
Methylene chloride			U	1.60	ug/kg						
Styrene			U	0.300	ug/kg						
Tetrachloroethylene			U	0.300	ug/kg						
Toluene			U	0.300	ug/kg						
Trichloroethylene			U	0.300	ug/kg						
Vinyl chloride			U	0.300	ug/kg						
Xylenes (total)			U	0.300	ug/kg						

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1748469										
cis-1,3-Dichloropropylene			U	0.300	ug/kg				JP1	03/19/18	14:44
trans-1,3-Dichloropropylene			U	0.300	ug/kg						
**1,2-Dichloroethane-d4	50.0			58.2	ug/L		116	(70%-130%)			
**Bromofluorobenzene	50.0			49.8	ug/L		100	(70%-130%)			
**Toluene-d8	50.0			49.2	ug/L		98	(70%-130%)			
QC1203992473 446038001 PS											
1,1,1-Trichloroethane	50.0	DU	0.00	D	40.6	ug/L	81	(70%-130%)		03/19/18	22:44
1,1,2,2-Tetrachloroethane	50.0	DU	0.00	D	44.1	ug/L	88	(70%-130%)			
1,1,2-Trichloroethane	50.0	DU	0.00	D	41.4	ug/L	83	(70%-130%)			
1,1-Dichloroethane	50.0	DU	0.00	D	42.4	ug/L	85	(70%-130%)			
1,1-Dichloroethylene	50.0	DU	0.00	D	40.9	ug/L	82	(70%-130%)			
1,2-Dichloroethane	50.0	DU	0.00	D	45.3	ug/L	91	(70%-130%)			
1,2-Dichloroethylene (total)	100	DU	0.00	D	85.7	ug/L	86	(70%-130%)			
1,2-Dichloropropane	50.0	DU	0.00	D	40.0	ug/L	80	(70%-130%)			
2-Butanone	250	DU	0.00	D	229	ug/L	92	(70%-130%)			
2-Hexanone	250	DU	0.00	D	230	ug/L	92	(70%-130%)			

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**QC Summary**

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<b>Parmname</b>	<b>NOM</b>	<b>Sample</b>	<b>Qual</b>	<b>QC</b>	<b>Units</b>	<b>RPD%</b>	<b>REC%</b>	<b>Range</b>	<b>Anlst</b>	<b>Date</b>	<b>Time</b>
<b>Volatile-GC/MS</b>											
Batch	1748469										
4-Methyl-2-pentanone	250	DU	0.00	D	232	ug/L	93	(70%-130%)	JP1	03/19/18	22:44
Acetone	250	DU	0.00	D	205	ug/L	82	(70%-130%)			
Benzene	50.0	DU	0.00	D	40.0	ug/L	80	(70%-130%)			
Bromodichloromethane	50.0	DU	0.00	D	42.1	ug/L	84	(70%-130%)			
Bromoform	50.0	DU	0.00	D	44.3	ug/L	89	(70%-130%)			
Bromomethane	50.0	DTU	0.00	DT	17.5	ug/L	35*	(70%-130%)			
Carbon disulfide	250	DU	0.00	D	195	ug/L	78	(70%-130%)			
Carbon tetrachloride	50.0	DU	0.00	D	38.9	ug/L	78	(70%-130%)			
Chlorobenzene	50.0	DU	0.00	D	36.7	ug/L	73	(70%-130%)			
Chloroethane	50.0	DTU	0.00	DTU	19.4	ug/L	0*	(70%-130%)			
Chloroform	50.0	DU	0.00	D	40.9	ug/L	82	(70%-130%)			
Chloromethane	50.0	DU	0.00	D	48.4	ug/L	97	(70%-130%)			
Dibromochloromethane	50.0	DU	0.00	D	41.0	ug/L	82	(70%-130%)			
Ethylbenzene	50.0	DU	0.00	D	35.1	ug/L	70	(70%-130%)			
Methylene chloride	50.0	DU	0.00	D	39.0	ug/L	78	(70%-130%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1748469										
Styrene	50.0	DU	0.00	D	35.7	ug/L	71	(70%-130%)	JP1	03/19/18	22:44
Tetrachloroethylene	50.0	DTU	0.00	DT	33.1	ug/L	66*	(70%-130%)			
Toluene	50.0	DU	0.00	D	36.7	ug/L	73	(70%-130%)			
Trichloroethylene	50.0	DU	0.00	D	37.6	ug/L	75	(70%-130%)			
Vinyl chloride	50.0	DU	0.00	D	48.1	ug/L	96	(70%-130%)			
Xylenes (total)	150	DU	0.00	D	106	ug/L	71	(70%-130%)			
cis-1,3-Dichloropropylene	50.0	DU	0.00	D	41.7	ug/L	83	(70%-130%)			
trans-1,3-Dichloropropylene	50.0	DU	0.00	D	44.4	ug/L	89	(70%-130%)			
**1,2-Dichloroethane-d4	50.0		58.0		54.3	ug/L	109	(70%-130%)			
**Bromofluorobenzene	50.0		51.6		48.3	ug/L	97	(70%-130%)			
**Toluene-d8	50.0		46.5		51.4	ug/L	103	(70%-130%)			
QC1203992474 446038001 PSD											
1,1,1-Trichloroethane	50.0	DU	0.00	D	42.4	ug/L	4	85	(0%-20%)	03/19/18	23:16
1,1,2,2-Tetrachloroethane	50.0	DU	0.00	D	45.2	ug/L	3	90	(0%-20%)		
1,1,2-Trichloroethane	50.0	DU	0.00	D	45.6	ug/L	10	91	(0%-20%)		
1,1-Dichloroethane	50.0	DU	0.00	D	44.3	ug/L	4	89	(0%-20%)		

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1748469										
1,1-Dichloroethylene	50.0	DU	0.00	D	44.0	ug/L	7	88	(0%-20%)	JP1	03/19/18 23:16
1,2-Dichloroethane	50.0	DU	0.00	D	44.5	ug/L	2	89	(0%-20%)		
1,2-Dichloroethylene (total)	100	DU	0.00	D	87.2	ug/L	2	87	(0%-20%)		
1,2-Dichloropropane	50.0	DU	0.00	D	41.5	ug/L	4	83	(0%-20%)		
2-Butanone	250	DU	0.00	D	287	ug/L	23*	115	(0%-20%)		
2-Hexanone	250	DU	0.00	D	296	ug/L	25*	118	(0%-20%)		
4-Methyl-2-pentanone	250	DU	0.00	D	253	ug/L	8	101	(0%-20%)		
Acetone	250	DU	0.00	D	285	ug/L	32*	114	(0%-20%)		
Benzene	50.0	DU	0.00	D	40.8	ug/L	2	82	(0%-20%)		
Bromodichloromethane	50.0	DU	0.00	D	42.8	ug/L	2	86	(0%-20%)		
Bromoform	50.0	DU	0.00	D	44.4	ug/L	0	89	(0%-20%)		
Bromomethane	50.0	DTU	0.00	DT	17.5	ug/L	0	35*	(0%-20%)		
Carbon disulfide	250	DU	0.00	D	204	ug/L	5	82	(0%-20%)		
Carbon tetrachloride	50.0	DU	0.00	D	40.4	ug/L	4	81	(0%-20%)		
Chlorobenzene	50.0	DU	0.00	D	40.1	ug/L	9	80	(0%-20%)		

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**QC Summary**

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1748469										
Chloroethane	50.0	DTU	0.00	DJT	0.560	ug/L	200*	1*	(0%-20%)	JP1	03/19/18 23:16
Chloroform	50.0	DU	0.00	D	42.5	ug/L	4	85	(0%-20%)		
Chloromethane	50.0	DU	0.00	D	47.7	ug/L	2	95	(0%-20%)		
Dibromochloromethane	50.0	DU	0.00	D	43.7	ug/L	6	87	(0%-20%)		
Ethylbenzene	50.0	DU	0.00	D	39.5	ug/L	12	79	(0%-20%)		
Methylene chloride	50.0	DU	0.00	D	40.1	ug/L	3	80	(0%-20%)		
Styrene	50.0	DU	0.00	D	40.3	ug/L	12	81	(0%-20%)		
Tetrachloroethylene	50.0	DTU	0.00	D	38.0	ug/L	14	76	(0%-20%)		
Toluene	50.0	DU	0.00	D	41.6	ug/L	13	83	(0%-20%)		
Trichloroethylene	50.0	DU	0.00	D	41.8	ug/L	10	84	(0%-20%)		
Vinyl chloride	50.0	DU	0.00	D	49.9	ug/L	4	100	(0%-20%)		
Xylenes (total)	150	DU	0.00	D	118	ug/L	11	79	(0%-20%)		
cis-1,3-Dichloropropylene	50.0	DU	0.00	D	43.6	ug/L	5	87	(0%-20%)		
trans-1,3-Dichloropropylene	50.0	DU	0.00	D	47.9	ug/L	8	96	(0%-20%)		
**1,2-Dichloroethane-d4	50.0		58.0		52.2	ug/L		104	(70%-130%)		

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1748469										
**Bromofluorobenzene	50.0	51.6		50.1	ug/L		100	(70%-130%)	JP1	03/19/18	23:16
**Toluene-d8	50.0	46.5		53.6	ug/L		107	(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.

## Surrogate Recovery Report

SDG Number: GEL446038

Matrix Type: SOLID

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203992472	LCS for batch 1748468	105	98	93
1203992470	MB for batch 1748468	116	98	100
1203992471	HB for batch 1748468	110 D	96 D	97 D
446038001	B3J517	116 D	93 D	103 D
1203992473	B3J517PS	109 D	103 D	97 D
1203992474	B3J517PSD	104 D	107 D	100 D

**Surrogate**

DCED4 = 1,2-Dichloroethane-d4

TOL = Toluene-d8

BFB = Bromofluorobenzene

**Acceptance Limits**

(70%-130%)

(70%-130%)

(70%-130%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

# **Semi-Volatile Analysis**

# Case Narrative

**GC/MS Semivolatile  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL446038  
Work Order #: 446038**

**Product:** Analysis of Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry

**Analytical Method:** 8270\_SVOA\_GCMS

**Analytical Procedure:** GL-OA-E-009 REV# 40

**Analytical Batch:** 1748849

**Preparation Method:** SW846 3541

**Preparation Procedure:** GL-OA-E-066 REV# 8

**Preparation Batch:** 1748846

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>
446038002	B3J522
1203993389	Method Blank (MB)
1203993390	Laboratory Control Sample (LCS)
1203993393	446038002(B3J522) Matrix Spike (MS)
1203993394	446038002(B3J522) Matrix Spike Duplicate (MSD)

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

**Data Summary:**

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

**Calibration Information**

**CCV Requirements**

All Calibration Verification Standards (CCV) did not meet the acceptance criteria as outlined in Method 8270D for sample 446038002 (B3J522) and the associated QC. Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, and Benzo(ghi)perylene exceeded the %Drift criteria with a positive bias. Since there were no detects of the analytes in the associated client sample, the biased high response had no adverse impact on the reported data.

**Quality Control (QC) Information**

**Laboratory Control Sample (LCS) Recovery**

The LCS and/or LCSD (See Below) spike recoveries were not within the acceptance limits. The client established the limits of 70%-130%. Failures are expected. The data were reported per client request.

Sample	Analyte	Value
1203993390 (LCS)	Several	See applicable report

The LCS (See Below) did not meet spike recovery acceptance criteria for Hexachlorocyclopentadiene. The

failure is known to be poor responding analyte as stated per the Method. This may account for the low recovery in the LCS, as well as the low recovery in the MSD. The data were reported.

Sample	Analyte	Value
1203993390 (LCS)	Several	See applicable report

#### **Spike Recovery Statement**

The MSD (See Below) did not meet spike recovery acceptance criteria for Hexachlorocyclopentadiene. The failure is known to be poor responding analyte as stated per the Method. This may account for the low recovery in the MSD, as well as the low, but passing, recovery in the MS. The data were reported.

Sample	Analyte	Value
1203993394 (B3J522MSD)	Hexachlorocyclopentadiene	6* (10%-100%)

#### **MS/MSD Relative Percent Difference (RPD) Statement**

The relative percent difference (RPD) between the MS and MSD (See Below) did not meet acceptance limits. As the individual MS and MSD recoveries were within the acceptance limits, the failures had no adverse impact on the reported sample data.

Sample	Analyte	Value
1203993393MS and 1203993394MSD (B3J522)	4-Chloroaniline	34* (0%-30%)

The relative percent difference (RPD) between the MS and MSD (See Below) did not meet acceptance limits for Hexachlorocyclopentadiene. The failure is known to be poor responding analyte as stated per the Method. This may account for the low recovery in the MSD which attributed to the RPD failure. The data were reported.

Sample	Analyte	Value
1203993393MS and 1203993394MSD (B3J522)	Hexachlorocyclopentadiene	89* (0%-30%)

#### **Technical Information**

##### **Sample Re-extraction/Re-analysis**

Sample 1203993390 (LCS) was re-analyzed for ISTD failure.

##### **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: GEL446038 GEL Work Order: 446038

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

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

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

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

DL Indicates that sample is diluted.

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

RE Indicates that sample is re-extracted.

**Review/Validation**

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

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

Signature: 

Name: **Barbara Bailey**

Date: **22 MAR 2018**

Title: **Data Validator**

# Sample Data Summary

**Semi-Volatile  
Certificate of Analysis  
Sample Summary**

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**SDG Number:** GEL446038  
**Lab Sample ID:** 446038002  
**Client ID:** B3J522  
**Batch ID:** 1748849  
**Run Date:** 03/22/2018 00:52  
**Prep Date:** 03/21/2018 09:40  
**Data File:** s032118a.s\3c2123.D

**Date Collected:** 03/15/2018 09:22  
**Date Received:** 03/16/2018 08:50  
**Client:** CPRC001  
**Method:** 8270\_SVOA\_GCMS  
**Inst:** MSD3.I  
**Analyst:** JLD1  
**Aliquot:** 30.02 g  
**Column:** DB-5ms

**Matrix:** OTHER SOLID  
**%Moisture:** 20.9  
**Project:** CPRC0F18022  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
120-82-1	1,2,4-Trichlorobenzene	U	126	ug/kg	126	421
95-50-1	1,2-Dichlorobenzene	U	126	ug/kg	126	421
541-73-1	1,3-Dichlorobenzene	U	126	ug/kg	126	421
106-46-7	1,4-Dichlorobenzene	U	126	ug/kg	126	421
95-95-4	2,4,5-Trichlorophenol	U	126	ug/kg	126	421
88-06-2	2,4,6-Trichlorophenol	U	126	ug/kg	126	421
120-83-2	2,4-Dichlorophenol	U	126	ug/kg	126	421
105-67-9	2,4-Dimethylphenol	U	126	ug/kg	126	421
51-28-5	2,4-Dinitrophenol	U	126	ug/kg	126	843
121-14-2	2,4-Dinitrotoluene	U	126	ug/kg	126	421
606-20-2	2,6-Dinitrotoluene	U	126	ug/kg	126	421
91-58-7	2-Chloronaphthalene	U	12.6	ug/kg	12.6	42.1
95-57-8	2-Chlorophenol	U	126	ug/kg	126	421
534-52-1	2-Methyl-4,6-dinitrophenol	U	126	ug/kg	126	421
91-57-6	2-Methylnaphthalene	U	12.6	ug/kg	12.6	42.1
88-75-5	2-Nitrophenol	U	126	ug/kg	126	421
91-94-1	3,3'-Dichlorobenzidine	U	126	ug/kg	126	421
101-55-3	4-Bromophenylphenylether	U	126	ug/kg	126	421
59-50-7	4-Chloro-3-methylphenol	U	169	ug/kg	169	421
106-47-8	4-Chloroaniline	U	126	ug/kg	126	421
7005-72-3	4-Chlorophenylphenylether	U	126	ug/kg	126	421
100-02-7	4-Nitrophenol	U	126	ug/kg	126	421
83-32-9	Acenaphthene	U	12.6	ug/kg	12.6	42.1
208-96-8	Acenaphthylene	U	12.6	ug/kg	12.6	42.1
120-12-7	Anthracene	U	12.6	ug/kg	12.6	42.1
56-55-3	Benzo(a)anthracene	U	12.6	ug/kg	12.6	42.1
50-32-8	Benzo(a)pyrene	U	12.6	ug/kg	12.6	42.1
205-99-2	Benzo(b)fluoranthene	U	12.6	ug/kg	12.6	42.1
191-24-2	Benzo(ghi)perylene	U	12.6	ug/kg	12.6	42.1
207-08-9	Benzo(k)fluoranthene	U	12.6	ug/kg	12.6	42.1
85-68-7	Butylbenzylphthalate	U	12.6	ug/kg	12.6	42.1
86-74-8	Carbazole	U	12.6	ug/kg	12.6	42.1
218-01-9	Chrysene	U	12.6	ug/kg	12.6	42.1
84-74-2	Di-n-butylphthalate	U	12.6	ug/kg	12.6	42.1
117-84-0	Di-n-octylphthalate	U	12.6	ug/kg	12.6	42.1
53-70-3	Dibenzo(a,h)anthracene	U	12.6	ug/kg	12.6	42.1
132-64-9	Dibenzofuran	U	126	ug/kg	126	421
84-66-2	Diethylphthalate	U	12.6	ug/kg	12.6	42.1

Semi-Volatile  
Certificate of Analysis  
Sample Summary

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SDG Number: GEL446038  
Lab Sample ID: 446038002  
  
Client ID: B3J522  
Batch ID: 1748849  
Run Date: 03/22/2018 00:52  
Prep Date: 03/21/2018 09:40  
Data File: s032118a.s\3c2123.D

Date Collected: 03/15/2018 09:22  
Date Received: 03/16/2018 08:50  
Client: CPRC001  
Method: 8270\_SVOA\_GCMS  
Inst: MSD3.I  
Analyst: JLD1  
Aliquot: 30.02 g  
Column: DB-5ms

Matrix: OTHER SOLID  
%Moisture: 20.9  
Project: CPRC0F18022  
SOP Ref: GL-OA-E-009  
Dilution: 1  
Inj. Vol: 1 uL  
Final Volume: 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
131-11-3	Dimethylphthalate	U	12.6	ug/kg	12.6	42.1
206-44-0	Fluoranthene	U	12.6	ug/kg	12.6	42.1
86-73-7	Fluorene	U	12.6	ug/kg	12.6	42.1
118-74-1	Hexachlorobenzene	U	126	ug/kg	126	421
87-68-3	Hexachlorobutadiene	U	126	ug/kg	126	421
77-47-4	Hexachlorocyclopentadiene	TU	126	ug/kg	126	421
67-72-1	Hexachloroethane	U	126	ug/kg	126	421
193-39-5	Indeno(1,2,3-cd)pyrene	U	12.6	ug/kg	12.6	42.1
78-59-1	Isophorone	U	126	ug/kg	126	421
621-64-7	N-Nitrosodipropylamine	U	126	ug/kg	126	421
91-20-3	Naphthalene	U	12.6	ug/kg	12.6	42.1
98-95-3	Nitrobenzene	U	126	ug/kg	126	421
87-86-5	Pentachlorophenol	U	126	ug/kg	126	421
85-01-8	Phenanthrene	U	12.6	ug/kg	12.6	42.1
108-95-2	Phenol	U	126	ug/kg	126	421
129-00-0	Pyrene	U	12.6	ug/kg	12.6	42.1
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	126	ug/kg	126	421
111-91-1	bis(2-Chloroethoxy)methane	U	126	ug/kg	126	421
111-44-4	bis(2-Chloroethyl) ether	U	126	ug/kg	126	421
117-81-7	bis(2-Ethylhexyl)phthalate	U	12.6	ug/kg	12.6	42.1
DPA+NNDDPA	diphenylamine+N-nitrosodiphenylamine	U	126	ug/kg	126	421
122-39-4	<i>Diphenylamine</i>					
99-09-2	m-Nitroaniline	U	126	ug/kg	126	421
95-48-7	o-Cresol	U	126	ug/kg	126	421
88-74-4	o-Nitroaniline	U	139	ug/kg	139	421
100-01-6	p-Nitroaniline	U	126	ug/kg	126	421

# Quality Control Summary

**GEL LABORATORIES LLC**

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**QC Summary**

Report Date: March 22, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 446038

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>										
Batch	1748849									
QC1203993390	LCS									
1,2,4-Trichlorobenzene	1670		1280	ug/kg		77	(70%-130%)	JLD1	03/21/18	22:23
1,2-Dichlorobenzene	1670		1220	ug/kg		74	(70%-130%)			
1,3-Dichlorobenzene	1670		1190	ug/kg		71	(70%-130%)			
1,4-Dichlorobenzene	1670		1200	ug/kg		72	(70%-130%)			
2,4,5-Trichlorophenol	1670		1150	ug/kg		69 *	(70%-130%)			
2,4,6-Trichlorophenol	1670		1150	ug/kg		69 *	(70%-130%)			
2,4-Dichlorophenol	1670		1280	ug/kg		77	(70%-130%)			
2,4-Dimethylphenol	1670		1080	ug/kg		65 *	(70%-130%)			
2,4-Dinitrophenol	1670		865	ug/kg		52 *	(70%-130%)			
2,4-Dinitrotoluene	1670		1180	ug/kg		71	(70%-130%)			
2,6-Dinitrotoluene	1670		1140	ug/kg		68 *	(70%-130%)			
2-Chloronaphthalene	1670		1160	ug/kg		70	(70%-130%)			
2-Chlorophenol	1670		1290	ug/kg		77	(70%-130%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
2-Methyl-4,6-dinitrophenol	1670			841	ug/kg		50 *	(70%-130%)	JLD1	03/21/18	22:23
2-Methylnaphthalene	1670			1190	ug/kg		71	(70%-130%)			
2-Nitrophenol	1670			1200	ug/kg		72	(70%-130%)			
3,3'-Dichlorobenzidine	1670			1150	ug/kg		69 *	(70%-130%)			
4-Bromophenylphenylether	1670			1210	ug/kg		73	(70%-130%)			
4-Chloro-3-methylphenol	1670			1270	ug/kg		77	(70%-130%)			
4-Chloroaniline	1670			1080	ug/kg		65 *	(70%-130%)			
4-Chlorophenylphenylether	1670			1320	ug/kg		80	(70%-130%)			
4-Nitrophenol	1670			1040	ug/kg		62 *	(70%-130%)			
Acenaphthene	1670			1260	ug/kg		76	(70%-130%)			
Acenaphthylene	1670			1200	ug/kg		72	(70%-130%)			
Anthracene	1670			1190	ug/kg		71	(70%-130%)			
Benzo(a)anthracene	1670			1200	ug/kg		72	(70%-130%)			
Benzo(a)pyrene	1670			1230	ug/kg		74	(70%-130%)			
Benzo(b)fluoranthene	1670			1190	ug/kg		72	(70%-130%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
Benzo(ghi)perylene	1670			1010	ug/kg		61 *	(70%-130%)	JLD1	03/21/18	22:23
Benzo(k)fluoranthene	1670			1230	ug/kg		74	(70%-130%)			
Butylbenzylphthalate	1670			1200	ug/kg		72	(70%-130%)			
Carbazole	1670			1270	ug/kg		76	(70%-130%)			
Chrysene	1670			1220	ug/kg		73	(70%-130%)			
Di-n-butylphthalate	1670			1450	ug/kg		87	(70%-130%)			
Di-n-octylphthalate	1670			1310	ug/kg		79	(70%-130%)			
Dibenzo(a,h)anthracene	1670			1110	ug/kg		66 *	(70%-130%)			
Dibenzofuran	1670			1260	ug/kg		76	(70%-130%)			
Diethylphthalate	1670			1290	ug/kg		77	(70%-130%)			
Dimethylphthalate	1670			1250	ug/kg		75	(70%-130%)			
Fluoranthene	1670			1430	ug/kg		86	(70%-130%)			
Fluorene	1670			1240	ug/kg		75	(70%-130%)			
Hexachlorobenzene	1670			1240	ug/kg		74	(70%-130%)			
Hexachlorobutadiene	1670			1270	ug/kg		76	(70%-130%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
Hexachlorocyclopentadiene	1670			618	ug/kg		37*	(70%-130%)	JLD1	03/21/18	22:23
Hexachloroethane	1670			1160	ug/kg		70	(70%-130%)			
Indeno(1,2,3-cd)pyrene	1670			1090	ug/kg		65*	(70%-130%)			
Isophorone	1670			1120	ug/kg		67*	(70%-130%)			
N-Nitrosodipropylamine	1670			1420	ug/kg		85	(70%-130%)			
Naphthalene	1670			1230	ug/kg		74	(70%-130%)			
Nitrobenzene	1670			1260	ug/kg		76	(70%-130%)			
Pentachlorophenol	1670			1160	ug/kg		70	(70%-130%)			
Phenanthrene	1670			1200	ug/kg		72	(70%-130%)			
Phenol	1670			1390	ug/kg		84	(70%-130%)			
Pyrene	1670			993	ug/kg		60*	(70%-130%)			
bis(2-Chloro-1-methylethyl)ether	1670			1360	ug/kg		82	(70%-130%)			
bis(2-Chloroethoxy)methane	1670			1220	ug/kg		73	(70%-130%)			
bis(2-Chloroethyl) ether	1670			1320	ug/kg		79	(70%-130%)			
bis(2-Ethylhexyl)phthalate	1670			1350	ug/kg		81	(70%-130%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
diphenylamine+N-nitrosodiphenylamine	1670			1180	ug/kg		71	(70%-130%)	JLD1	03/21/18	22:23
m-Nitroaniline	1670			1140	ug/kg		68*	(70%-130%)			
o-Cresol	1670			1290	ug/kg		78	(70%-130%)			
o-Nitroaniline	1670			1280	ug/kg		77	(70%-130%)			
p-Nitroaniline	1670			1160	ug/kg		70	(70%-130%)			
**2,4,6-Tribromophenol	3330			2780	ug/kg		83	(39%-115%)			
**2-Fluorobiphenyl	1670			1240	ug/kg		75	(35%-107%)			
**2-Fluorophenol	3330			2940	ug/kg		88	(36%-104%)			
**Nitrobenzene-d5	1670			1340	ug/kg		80	(34%-109%)			
**Phenol-d5	3330			2860	ug/kg		86	(39%-106%)			
**p-Terphenyl-d14	1670			1190	ug/kg		71	(45%-119%)			
QC1203993389 MB											
1,2,4-Trichlorobenzene			U	100	ug/kg					03/21/18	20:55
1,2-Dichlorobenzene			U	100	ug/kg						
1,3-Dichlorobenzene			U	100	ug/kg						
1,4-Dichlorobenzene			U	100	ug/kg						

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
2,4,5-Trichlorophenol			U	100	ug/kg				JLD1	03/21/18	20:55
2,4,6-Trichlorophenol			U	100	ug/kg						
2,4-Dichlorophenol			U	100	ug/kg						
2,4-Dimethylphenol			U	100	ug/kg						
2,4-Dinitrophenol			U	100	ug/kg						
2,4-Dinitrotoluene			U	100	ug/kg						
2,6-Dinitrotoluene			U	100	ug/kg						
2-Chloronaphthalene			U	10.0	ug/kg						
2-Chlorophenol			U	100	ug/kg						
2-Methyl-4,6-dinitrophenol			U	100	ug/kg						
2-Methylnaphthalene			U	10.0	ug/kg						
2-Nitrophenol			U	100	ug/kg						
3,3'-Dichlorobenzidine			U	100	ug/kg						
4-Bromophenylphenylether			U	100	ug/kg						
4-Chloro-3-methylphenol			U	133	ug/kg						

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
4-Chloroaniline			U	100	ug/kg				JLD1	03/21/18	20:55
4-Chlorophenylphenylether			U	100	ug/kg						
4-Nitrophenol			U	100	ug/kg						
Acenaphthene			U	10.0	ug/kg						
Acenaphthylene			U	10.0	ug/kg						
Anthracene			U	10.0	ug/kg						
Benzo(a)anthracene			U	10.0	ug/kg						
Benzo(a)pyrene			U	10.0	ug/kg						
Benzo(b)fluoranthene			U	10.0	ug/kg						
Benzo(ghi)perylene			U	10.0	ug/kg						
Benzo(k)fluoranthene			U	10.0	ug/kg						
Butylbenzylphthalate			U	10.0	ug/kg						
Carbazole			U	10.0	ug/kg						
Chrysene			U	10.0	ug/kg						
Di-n-butylphthalate			U	10.0	ug/kg						

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
Di-n-octylphthalate			U	10.0	ug/kg				JLD1	03/21/18	20:55
Dibenzo(a,h)anthracene			U	10.0	ug/kg						
Dibenzofuran			U	100	ug/kg						
Diethylphthalate			U	10.0	ug/kg						
Dimethylphthalate			U	10.0	ug/kg						
Fluoranthene			U	10.0	ug/kg						
Fluorene			U	10.0	ug/kg						
Hexachlorobenzene			U	100	ug/kg						
Hexachlorobutadiene			U	100	ug/kg						
Hexachlorocyclopentadiene			U	100	ug/kg						
Hexachloroethane			U	100	ug/kg						
Indeno(1,2,3-cd)pyrene			U	10.0	ug/kg						
Isophorone			U	100	ug/kg						
N-Nitrosodipropylamine			U	100	ug/kg						
Naphthalene			U	10.0	ug/kg						

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
Nitrobenzene			U	100	ug/kg				JLD1	03/21/18	20:55
Pentachlorophenol			U	100	ug/kg						
Phenanthrene			U	10.0	ug/kg						
Phenol			U	100	ug/kg						
Pyrene			U	10.0	ug/kg						
bis(2-Chloro-1-methylethyl)ether			U	100	ug/kg						
bis(2-Chloroethoxy)methane			U	100	ug/kg						
bis(2-Chloroethyl) ether			U	100	ug/kg						
bis(2-Ethylhexyl)phthalate			U	10.0	ug/kg						
diphenylamine+N-nitrosodiphenylamine			U	100	ug/kg						
m-Nitroaniline			U	100	ug/kg						
o-Cresol			U	100	ug/kg						
o-Nitroaniline			U	110	ug/kg						
p-Nitroaniline			U	100	ug/kg						
**2,4,6-Tribromophenol	3330			2100	ug/kg		63	(39%-115%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
**2-Fluorobiphenyl	1670			1210	ug/kg		72	(35%-107%)	JLD1	03/21/18	20:55
**2-Fluorophenol	3330			2450	ug/kg		74	(36%-104%)			
**Nitrobenzene-d5	1670			1240	ug/kg		74	(34%-109%)			
**Phenol-d5	3330			2400	ug/kg		72	(39%-106%)			
**p-Terphenyl-d14	1670			1270	ug/kg		76	(45%-119%)			
QC1203993393 446038002 MS											
1,2,4-Trichlorobenzene	2110	U	126	1300	ug/kg		62	(26%-104%)		03/22/18	01:21
1,2-Dichlorobenzene	2110	U	126	1300	ug/kg		62	(26%-98%)			
1,3-Dichlorobenzene	2110	U	126	1230	ug/kg		58	(27%-92%)			
1,4-Dichlorobenzene	2110	U	126	1250	ug/kg		60	(27%-95%)			
2,4,5-Trichlorophenol	2110	U	126	1200	ug/kg		57	(26%-120%)			
2,4,6-Trichlorophenol	2110	U	126	1190	ug/kg		56	(25%-117%)			
2,4-Dichlorophenol	2110	U	126	1370	ug/kg		65	(21%-119%)			
2,4-Dimethylphenol	2110	U	126	1180	ug/kg		56	(27%-111%)			
2,4-Dinitrophenol	2110	U	126	1350	ug/kg		64	(12%-112%)			
2,4-Dinitrotoluene	2110	U	126	1260	ug/kg		60	(32%-118%)			

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**QC Summary**

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
2,6-Dinitrotoluene	2110	U	126	1190	ug/kg		56	(32%-114%)	JLD1	03/22/18	01:21
2-Chloronaphthalene	2110	U	12.6	1200	ug/kg		57	(25%-111%)			
2-Chlorophenol	2110	U	126	1420	ug/kg		67	(20%-114%)			
2-Methyl-4,6-dinitrophenol	2110	U	126	1210	ug/kg		58	(17%-115%)			
2-Methylnaphthalene	2110	U	12.6	1250	ug/kg		59	(25%-112%)			
2-Nitrophenol	2110	U	126	1260	ug/kg		60	(23%-115%)			
3,3'-Dichlorobenzidine	2110	U	126	875	ug/kg		42	(21%-107%)			
4-Bromophenylphenylether	2110	U	126	1200	ug/kg		57	(29%-121%)			
4-Chloro-3-methylphenol	2110	U	169	1390	ug/kg		66	(29%-119%)			
4-Chloroaniline	2110	U	126	929	ug/kg		44	(22%-120%)			
4-Chlorophenylphenylether	2110	U	126	1360	ug/kg		65	(29%-119%)			
4-Nitrophenol	2110	U	126	1290	ug/kg		61	(20%-120%)			
Acenaphthene	2110	U	12.6	1290	ug/kg		61	(27%-111%)			
Acenaphthylene	2110	U	12.6	1240	ug/kg		59	(26%-117%)			
Anthracene	2110	U	12.6	1250	ug/kg		59	(29%-118%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
Benzo(a)anthracene	2110	U	12.6	1300	ug/kg		62	(25%-126%)	JLD1	03/22/18	01:21
Benzo(a)pyrene	2110	U	12.6	1360	ug/kg		65	(28%-122%)			
Benzo(b)fluoranthene	2110	U	12.6	1450	ug/kg		69	(28%-127%)			
Benzo(ghi)perylene	2110	U	12.6	1100	ug/kg		52	(22%-113%)			
Benzo(k)fluoranthene	2110	U	12.6	1470	ug/kg		70	(28%-131%)			
Butylbenzylphthalate	2110	U	12.6	1490	ug/kg		70	(26%-133%)			
Carbazole	2110	U	12.6	1410	ug/kg		67	(27%-123%)			
Chrysene	2110	U	12.6	1300	ug/kg		62	(26%-122%)			
Di-n-butylphthalate	2110	U	12.6	1630	ug/kg		77	(26%-126%)			
Di-n-octylphthalate	2110	U	12.6	1240	ug/kg		59	(29%-130%)			
Dibenzo(a,h)anthracene	2110	U	12.6	1170	ug/kg		55	(19%-133%)			
Dibenzofuran	2110	U	126	1320	ug/kg		62	(30%-119%)			
Diethylphthalate	2110	U	12.6	1380	ug/kg		65	(26%-124%)			
Dimethylphthalate	2110	U	12.6	1290	ug/kg		61	(27%-120%)			
Fluoranthene	2110	U	12.6	1640	ug/kg		78	(24%-123%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
Fluorene	2110	U	12.6		1300	ug/kg	62	(27%-117%)	JLD1	03/22/18	01:21
Hexachlorobenzene	2110	U	126		1240	ug/kg	59	(30%-113%)			
Hexachlorobutadiene	2110	U	126		1280	ug/kg	61	(25%-109%)			
Hexachlorocyclopentadiene	2110	TU	126	J	341	ug/kg	16	(10%-100%)			
Hexachloroethane	2110	U	126		1190	ug/kg	56	(23%-98%)			
Indeno(1,2,3-cd)pyrene	2110	U	12.6		1150	ug/kg	54	(21%-126%)			
Isophorone	2110	U	126		1170	ug/kg	56	(29%-107%)			
N-Nitrosodipropylamine	2110	U	126		1580	ug/kg	75	(25%-113%)			
Naphthalene	2110	U	12.6		1280	ug/kg	61	(23%-111%)			
Nitrobenzene	2110	U	126		1300	ug/kg	62	(26%-109%)			
Pentachlorophenol	2110	U	126		1370	ug/kg	65	(17%-119%)			
Phenanthrene	2110	U	12.6		1240	ug/kg	59	(26%-121%)			
Phenol	2110	U	126		1570	ug/kg	75	(28%-111%)			
Pyrene	2110	U	12.6		1160	ug/kg	55	(23%-127%)			
bis(2-Chloro-1-methylethyl)ether	2110	U	126		1480	ug/kg	70	(21%-116%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
bis(2-Chloroethoxy)methane	2110	U	126	1270	ug/kg		60	(30%-111%)	JLD1	03/22/18	01:21
bis(2-Chloroethyl) ether	2110	U	126	1440	ug/kg		68	(27%-110%)			
bis(2-Ethylhexyl)phthalate	2110	U	12.6	1610	ug/kg		77	(27%-131%)			
diphenylamine+N-nitrosodiphenylamine	2110	U	126	1170	ug/kg		55	(32%-109%)			
m-Nitroaniline	2110	U	126	1050	ug/kg		50	(24%-137%)			
o-Cresol	2110	U	126	1470	ug/kg		70	(28%-114%)			
o-Nitroaniline	2110	U	139	1380	ug/kg		66	(27%-120%)			
p-Nitroaniline	2110	U	126	1030	ug/kg		49	(19%-140%)			
**2,4,6-Tribromophenol	4210		2590	2970	ug/kg		70	(39%-115%)			
**2-Fluorobiphenyl	2110		1210	1220	ug/kg		58	(35%-107%)			
**2-Fluorophenol	4210		2970	3110	ug/kg		74	(36%-104%)			
**Nitrobenzene-d5	2110		1340	1340	ug/kg		63	(34%-109%)			
**Phenol-d5	4210		2890	3080	ug/kg		73	(39%-106%)			
**p-Terphenyl-d14	2110		1380	1390	ug/kg		66	(45%-119%)			
QC1203993394 446038002 MSD											
1,2,4-Trichlorobenzene	2100	U	126	1190	ug/kg	8	57	(0%-30%)		03/22/18	01:51

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
1,2-Dichlorobenzene	2100	U	126	1110	ug/kg	15	53	(0%-30%)	JLD1	03/22/18	01:51
1,3-Dichlorobenzene	2100	U	126	1030	ug/kg	17	49	(0%-30%)			
1,4-Dichlorobenzene	2100	U	126	1070	ug/kg	16	51	(0%-30%)			
2,4,5-Trichlorophenol	2100	U	126	1140	ug/kg	5	54	(0%-30%)			
2,4,6-Trichlorophenol	2100	U	126	1110	ug/kg	7	53	(0%-30%)			
2,4-Dichlorophenol	2100	U	126	1290	ug/kg	6	61	(0%-30%)			
2,4-Dimethylphenol	2100	U	126	1120	ug/kg	6	53	(0%-30%)			
2,4-Dinitrophenol	2100	U	126	1140	ug/kg	16	54	(0%-30%)			
2,4-Dinitrotoluene	2100	U	126	1220	ug/kg	3	58	(0%-30%)			
2,6-Dinitrotoluene	2100	U	126	1140	ug/kg	4	54	(0%-30%)			
2-Chloronaphthalene	2100	U	12.6	1140	ug/kg	5	54	(0%-30%)			
2-Chlorophenol	2100	U	126	1240	ug/kg	13	59	(0%-30%)			
2-Methyl-4,6-dinitrophenol	2100	U	126	1080	ug/kg	11	52	(0%-30%)			
2-Methylnaphthalene	2100	U	12.6	1160	ug/kg	7	55	(0%-30%)			
2-Nitrophenol	2100	U	126	1130	ug/kg	10	54	(0%-30%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
3,3'-Dichlorobenzidine	2100	U	126	1100	ug/kg	22	52	(0%-30%)	JLD1	03/22/18	01:51
4-Bromophenylphenylether	2100	U	126	1180	ug/kg	2	56	(0%-30%)			
4-Chloro-3-methylphenol	2100	U	169	1310	ug/kg	6	62	(0%-30%)			
4-Chloroaniline	2100	U	126	1310	ug/kg	34*	62	(0%-30%)			
4-Chlorophenylphenylether	2100	U	126	1310	ug/kg	4	62	(0%-30%)			
4-Nitrophenol	2100	U	126	1160	ug/kg	10	55	(0%-30%)			
Acenaphthene	2100	U	12.6	1230	ug/kg	4	59	(0%-30%)			
Acenaphthylene	2100	U	12.6	1190	ug/kg	4	57	(0%-30%)			
Anthracene	2100	U	12.6	1210	ug/kg	4	57	(0%-30%)			
Benzo(a)anthracene	2100	U	12.6	1290	ug/kg	1	61	(0%-30%)			
Benzo(a)pyrene	2100	U	12.6	1370	ug/kg	1	65	(0%-30%)			
Benzo(b)fluoranthene	2100	U	12.6	1420	ug/kg	2	67	(0%-30%)			
Benzo(ghi)perylene	2100	U	12.6	1220	ug/kg	10	58	(0%-30%)			
Benzo(k)fluoranthene	2100	U	12.6	1470	ug/kg	0	70	(0%-30%)			
Butylbenzylphthalate	2100	U	12.6	1480	ug/kg	0	70	(0%-30%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
Carbazole	2100	U	12.6	1350	ug/kg	5	64	(0%-30%)	JLD1	03/22/18	01:51
Chrysene	2100	U	12.6	1290	ug/kg	1	61	(0%-30%)			
Di-n-butylphthalate	2100	U	12.6	1570	ug/kg	3	75	(0%-30%)			
Di-n-octylphthalate	2100	U	12.6	1300	ug/kg	4	62	(0%-30%)			
Dibenzo(a,h)anthracene	2100	U	12.6	1280	ug/kg	9	61	(0%-30%)			
Dibenzofuran	2100	U	126	1240	ug/kg	6	59	(0%-30%)			
Diethylphthalate	2100	U	12.6	1330	ug/kg	4	63	(0%-30%)			
Dimethylphthalate	2100	U	12.6	1240	ug/kg	4	59	(0%-30%)			
Fluoranthene	2100	U	12.6	1500	ug/kg	9	71	(0%-30%)			
Fluorene	2100	U	12.6	1250	ug/kg	4	59	(0%-30%)			
Hexachlorobenzene	2100	U	126	1210	ug/kg	2	58	(0%-30%)			
Hexachlorobutadiene	2100	U	126	1150	ug/kg	10	55	(0%-30%)			
Hexachlorocyclopentadiene	2100	TU	126 JT	130	ug/kg	89*	6*	(0%-30%)			
Hexachloroethane	2100	U	126	968	ug/kg	20	46	(0%-30%)			
Indeno(1,2,3-cd)pyrene	2100	U	12.6	1240	ug/kg	7	59	(0%-30%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
Isophorone	2100	U	126	1100	ug/kg	7	52	(0%-30%)	JLD1	03/22/18	01:51
N-Nitrosodipropylamine	2100	U	126	1390	ug/kg	13	66	(0%-30%)			
Naphthalene	2100	U	12.6	1180	ug/kg	8	56	(0%-30%)			
Nitrobenzene	2100	U	126	1200	ug/kg	8	57	(0%-30%)			
Pentachlorophenol	2100	U	126	1280	ug/kg	7	61	(0%-30%)			
Phenanthrene	2100	U	12.6	1200	ug/kg	3	57	(0%-30%)			
Phenol	2100	U	126	1400	ug/kg	12	67	(0%-30%)			
Pyrene	2100	U	12.6	1180	ug/kg	2	56	(0%-30%)			
bis(2-Chloro-1-methylethyl)ether	2100	U	126	1270	ug/kg	15	61	(0%-30%)			
bis(2-Chloroethoxy)methane	2100	U	126	1180	ug/kg	7	56	(0%-30%)			
bis(2-Chloroethyl) ether	2100	U	126	1250	ug/kg	14	59	(0%-30%)			
bis(2-Ethylhexyl)phthalate	2100	U	12.6	1590	ug/kg	1	76	(0%-30%)			
diphenylamine+N-nitrosodiphenylamine	2100	U	126	1150	ug/kg	2	55	(0%-30%)			
m-Nitroaniline	2100	U	126	1330	ug/kg	24	63	(0%-30%)			
o-Cresol	2100	U	126	1310	ug/kg	12	62	(0%-30%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1748849										
o-Nitroaniline	2100	U	139	1310	ug/kg	6	62	(0%-30%)	JLD1	03/22/18	01:51
p-Nitroaniline	2100	U	126	1340	ug/kg	27	64	(0%-30%)			
**2,4,6-Tribromophenol	4210		2590	2680	ug/kg		64	(39%-115%)			
**2-Fluorobiphenyl	2100		1210	1150	ug/kg		55	(35%-107%)			
**2-Fluorophenol	4210		2970	2670	ug/kg		63	(36%-104%)			
**Nitrobenzene-d5	2100		1340	1200	ug/kg		57	(34%-109%)			
**Phenol-d5	4210		2890	2680	ug/kg		64	(39%-106%)			
**p-Terphenyl-d14	2100		1380	1370	ug/kg		65	(45%-119%)			

**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)

### GEL LABORATORIES LLC

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## QC Summary

Workorder: 446038

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

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

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

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

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

## Surrogate Recovery Report

SDG Number: GEL446038

Matrix Type: SOLID

Sample ID	Client ID	2FP %REC	PHL %REC	NBZ %REC	FBP %REC	TBP %REC	TPH %REC
1203993389	MB for batch 1748846	74	72	74	72	63	76
1203993390	LCS for batch 1748846	88	86	80	75	83	71
446038002	B3J522	70	69	64	58	62	65
1203993393	B3J522MS	74	73	63	58	70	66
1203993394	B3J522MSD	63	64	57	55	64	65

## Surrogate

## Acceptance Limits

2FP	= 2-Fluorophenol	(36%-104%)
PHL	= Phenol-d5	(39%-106%)
NBZ	= Nitrobenzene-d5	(34%-109%)
FBP	= 2-Fluorobiphenyl	(35%-107%)
TBP	= 2,4,6-Tribromophenol	(39%-115%)
TPH	= p-Terphenyl-d14	(45%-119%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

# Pesticide Analysis

# Case Narrative

**GC Semivolatile Pesticide  
Technical Case Narrative  
CH2M Hill Plateau Remediation Company (CPRC)  
SDG #: GEL446038  
Work Order #: 446038**

**Product:** Organochlorine Pesticides and Chlorinated Hydrocarbons

**Analytical Method:** SW846 3541/8081B

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

**Analytical Batch:** 1748853

**Preparation Method:** SW846 3541

**Preparation Procedure:** GL-OA-E-066 REV# 8

**Preparation Batch:** 1748851

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>
446038002	B3J522
1203993404	Method Blank (MB)
1203993405	Laboratory Control Sample (LCS)
1203993408	446038002(B3J522) Matrix Spike (MS)
1203993409	446038002(B3J522) Matrix Spike Duplicate (MSD)
1203993413	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Quality Control (QC) Information**

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

The MS (See Below) did not meet spike recovery limits due to a co-elution with a non-target peak on one column.

Sample	Analyte	Value
1203993409 (B3J522MSD)	Aldrin	146* (21%-119%)

**MS/MSD Relative Percent Difference (RPD) Statement**

The RPD values between the MS and MSD, (See Below), were not within the acceptance limits due to the large difference between the individual recoveries in each MS and MSD analyte pair.

Sample	Analyte	Value
1203993408MS and 1203993409MSD (B3J522)	Several	See applicable report

**Technical Information****Sample Dilutions**

Samples 1203993408 (B3J522MS), 1203993409 (B3J522MSD) and 446038002 (B3J522) were diluted due to high concentrations of non-target analytes within the retention time window of interest.

**Florisil**

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

**Miscellaneous Information****Manual Integrations**

Sample (See Below) required manual integration to correctly position the baseline as set in the calibration standard injections.

Sample	Analyte	Value
446038002 (B3J522)	4cmx	Result 23ug/kg

**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: GEL446038 GEL Work Order: 446038

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

- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- 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.
- 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:** Cameron Bearden**Date:** 22 MAR 2018**Title:** Group Leader

# Sample Data Summary

**Pesticide  
Certificate of Analysis  
Sample Summary**

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**SDG Number:** GEL446038  
**Lab Sample ID:** 446038002  
  
**Client ID:** B3J522  
**Batch ID:** 1748853  
**Run Date:** 03/22/2018 00:46  
**Prep Date:** 03/21/2018 11:04  
**Data File:** 032118\7c2142.D  
032118\7c2142.D

**Date Collected:** 03/15/2018 09:22  
**Date Received:** 03/16/2018 08:50  
**Client:** CPRC001  
**Method:** SW846 3541/8081B  
**Inst:** ECD7A.I  
**Analyst:** LOF  
**Aliquot:** 30 g  
**Column:** 1 CLPesticides  
2 CLPesticides2

**Matrix:** OTHER SOLID  
**%Moisture:** 20.9  
**Project:** CPRC0F18022  
**SOP Ref:** GL-OA-E-041  
**Dilution:** 5  
**Inj. Vol:** 1 uL  
**Final Volume:** 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
72-54-8	4,4'-DDD	DU	2.11	ug/kg	2.11	8.43	1
72-55-9	4,4'-DDE	DU	2.11	ug/kg	2.11	8.43	1
50-29-3	4,4'-DDT	DU	2.11	ug/kg	2.11	8.43	1
309-00-2	Aldrin	DTU	1.05	ug/kg	1.05	4.22	1
60-57-1	Dieldrin	DU	2.11	ug/kg	2.11	8.43	1
959-98-8	Endosulfan I	DU	1.05	ug/kg	1.05	4.22	1
33213-65-9	Endosulfan II	DU	2.11	ug/kg	2.11	8.43	1
1031-07-8	Endosulfan sulfate	DU	2.11	ug/kg	2.11	8.43	1
72-20-8	Endrin	DU	2.11	ug/kg	2.11	8.43	1
7421-93-4	Endrin aldehyde	DU	2.11	ug/kg	2.11	8.43	1
53494-70-5	Endrin ketone	DU	2.11	ug/kg	2.11	8.43	1
76-44-8	Heptachlor	DU	1.05	ug/kg	1.05	4.22	1
1024-57-3	Heptachlor epoxide	DU	1.05	ug/kg	1.05	4.22	1
72-43-5	Methoxychlor	DU	10.5	ug/kg	10.5	42.2	1
8001-35-2	Toxaphene	DU	35.1	ug/kg	35.1	105	1
319-84-6	alpha-BHC	DU	1.05	ug/kg	1.05	4.22	1
319-85-7	beta-BHC	DU	1.05	ug/kg	1.05	4.22	1
5103-71-9	cis-Chlordane	DU	1.05	ug/kg	1.05	4.22	1
319-86-8	delta-BHC	DU	1.05	ug/kg	1.05	4.22	1
58-89-9	gamma-BHC (Lindane)	DU	1.05	ug/kg	1.05	4.22	1
5103-74-2	trans-Chlordane	DU	1.05	ug/kg	1.05	4.22	1

# Quality Control Summary

**Surrogate Recovery Report**

**SDG Number: GEL446038**

**Matrix Type: SOLID**

Sample ID	Client ID	4CMX 1	4CMX 2	DCB 1	DCB 2
		%REC #	%REC #	%REC #	%REC #
1203993404	MB for batch 1748851	63	66	69	66
1203993405	LCS for batch 1748851	91	91	89	91
1203993413	LCS for batch 1748851	74	74	78	80
446038002	B3J522	57 D	55 D	69 D	79 D
1203993408	B3J522MS	42 D	47 D	53 D	50 D
1203993409	B3J522MSD	58 D	66 D	75 D	74 D

**Surrogate**

4CMX = 4cmx

DCB = Decachlorobiphenyl

**Acceptance Limits**

(27%-121%)

(30%-136%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

**GEL LABORATORIES LLC**

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**QC Summary**

Report Date: March 22, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 446038

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>											
Batch	1748853										
QC1203993405	LCS										
4,4'-DDD	41.7			36.7	ug/kg		88	(70%-130%)	LOF	03/21/18	20:12
4,4'-DDE	41.7			37.8	ug/kg		91	(70%-130%)			
4,4'-DDT	41.7			38.6	ug/kg		93	(70%-130%)			
Aldrin	16.7			14.5	ug/kg		87	(70%-130%)			
Dieldrin	41.7			36.0	ug/kg		86	(70%-130%)			
Endosulfan I	16.7			14.1	ug/kg		84	(70%-130%)			
Endosulfan II	41.7			34.3	ug/kg		82	(70%-130%)			
Endosulfan sulfate	41.7			35.5	ug/kg		85	(70%-130%)			
Endrin	41.7			37.3	ug/kg		89	(70%-130%)			
Endrin aldehyde	41.7			30.3	ug/kg		73	(70%-130%)			
Endrin ketone	41.7			36.6	ug/kg		88	(70%-130%)			
Heptachlor	16.7			14.3	ug/kg		86	(70%-130%)			
Heptachlor epoxide	16.7			13.9	ug/kg		83	(70%-130%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>											
Batch	1748853										
Methoxychlor	167			146	ug/kg		88	(70%-130%)	LOF	03/21/18	20:12
alpha-BHC	16.7			14.3	ug/kg		86	(70%-130%)			
beta-BHC	16.7			12.4	ug/kg		75	(70%-130%)			
cis-Chlordane	16.7			15.2	ug/kg		91	(70%-130%)			
delta-BHC	16.7			14.0	ug/kg		84	(70%-130%)			
gamma-BHC (Lindane)	16.7			13.9	ug/kg		83	(70%-130%)			
trans-Chlordane	16.7			13.6	ug/kg		82	(70%-130%)			
**4cmx	33.3			30.2	ug/kg		91	(27%-121%)			
**Decachlorobiphenyl	33.3			29.8	ug/kg		89	(30%-136%)			
QC1203993413	LCS										
Toxaphene	133			102	ug/kg		76	(70%-130%)		03/21/18	20:28
**4cmx	33.3			24.6	ug/kg		74	(27%-121%)			
**Decachlorobiphenyl	33.3			25.9	ug/kg		78	(30%-136%)			
QC1203993404	MB										
4,4'-DDD			U	0.333	ug/kg					03/21/18	19:56
4,4'-DDE			U	0.333	ug/kg						
4,4'-DDT			U	0.333	ug/kg						

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>											
Batch	1748853										
Aldrin			U	0.167	ug/kg				LOF	03/21/18	19:56
Dieldrin			U	0.333	ug/kg						
Endosulfan I			U	0.167	ug/kg						
Endosulfan II			U	0.333	ug/kg						
Endosulfan sulfate			U	0.333	ug/kg						
Endrin			U	0.333	ug/kg						
Endrin aldehyde			U	0.333	ug/kg						
Endrin ketone			U	0.333	ug/kg						
Heptachlor			U	0.167	ug/kg						
Heptachlor epoxide			U	0.167	ug/kg						
Methoxychlor			U	1.67	ug/kg						
Toxaphene			U	5.55	ug/kg						
alpha-BHC			U	0.167	ug/kg						
beta-BHC			U	0.167	ug/kg						
cis-Chlordane			U	0.167	ug/kg						

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>											
Batch	1748853										
delta-BHC			U	0.167	ug/kg				LOF	03/21/18	19:56
gamma-BHC (Lindane)			U	0.167	ug/kg						
trans-Chlordane			U	0.167	ug/kg						
**4cmx	33.3			21.1	ug/kg		63	(27%-121%)			
**Decachlorobiphenyl	33.3			22.1	ug/kg		66	(30%-136%)			
QC1203993408 446038002 MS											
4,4'-DDD	52.7	DU	2.11 D	21.5	ug/kg		41	(17%-156%)		03/22/18	01:02
4,4'-DDE	52.7	DU	2.11 D	22.5	ug/kg		43	(15%-139%)			
4,4'-DDT	52.7	DU	2.11 D	21.0	ug/kg		40	(11%-137%)			
Aldrin	21.1	DTU	1.05 D	13.4	ug/kg		63	(21%-119%)			
Dieldrin	52.7	DU	2.11 D	20.7	ug/kg		39	(22%-134%)			
Endosulfan I	21.1	DU	1.05 D	8.04	ug/kg		38	(15%-126%)			
Endosulfan II	52.7	DU	2.11 D	20.9	ug/kg		40	(20%-132%)			
Endosulfan sulfate	52.7	DU	2.11 D	21.2	ug/kg		40	(17%-138%)			
Endrin	52.7	DU	2.11 D	22.5	ug/kg		43	(24%-148%)			
Endrin aldehyde	52.7	DU	2.11 D	21.2	ug/kg		40	(18%-132%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>											
Batch	1748853										
Endrin ketone	52.7	DU	2.11	D	22.1	ug/kg	42	(17%-135%)	LOF	03/22/18	01:02
Heptachlor	21.1	DU	1.05	D	10.9	ug/kg	52	(16%-128%)			
Heptachlor epoxide	21.1	DU	1.05	D	9.37	ug/kg	44	(14%-133%)			
Methoxychlor	211	DU	10.5	D	95.3	ug/kg	45	(15%-156%)			
alpha-BHC	21.1	DU	1.05	D	9.12	ug/kg	43	(14%-126%)			
beta-BHC	21.1	DU	1.05	D	16.0	ug/kg	76	(14%-143%)			
cis-Chlordane	21.1	DU	1.05	D	8.90	ug/kg	42	(14%-138%)			
delta-BHC	21.1	DU	1.05	D	8.62	ug/kg	41	(17%-138%)			
gamma-BHC (Lindane)	21.1	DU	1.05	D	8.44	ug/kg	40	(16%-126%)			
trans-Chlordane	21.1	DU	1.05	DP	8.13	ug/kg	39	(15%-137%)			
**4cmx	42.2		23.0		20.0	ug/kg	47	(27%-121%)			
**Decachlorobiphenyl	42.2		29.0		22.3	ug/kg	53	(30%-136%)			
QC1203993409 446038002 MSD											
4,4'-DDD	52.6	DU	2.11	D	37.1	ug/kg	53*	71	(0%-30%)		03/22/18 01:18
4,4'-DDE	52.6	DU	2.11	D	38.1	ug/kg	51*	72	(0%-30%)		
4,4'-DDT	52.6	DU	2.11	D	32.3	ug/kg	42*	61	(0%-30%)		

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>											
Batch	1748853										
Aldrin	21.1	DTU	1.05	DPT	30.7	ug/kg	79*	146*	(0%-30%)	LOF	03/22/18 01:18
Dieldrin	52.6	DU	2.11	D	34.6	ug/kg	50*	66	(0%-30%)		
Endosulfan I	21.1	DU	1.05	D	13.5	ug/kg	51*	64	(0%-30%)		
Endosulfan II	52.6	DU	2.11	D	33.3	ug/kg	46*	63	(0%-30%)		
Endosulfan sulfate	52.6	DU	2.11	D	32.6	ug/kg	42*	62	(0%-30%)		
Endrin	52.6	DU	2.11	D	37.1	ug/kg	49*	70	(0%-30%)		
Endrin aldehyde	52.6	DU	2.11	D	28.6	ug/kg	30	54	(0%-30%)		
Endrin ketone	52.6	DU	2.11	D	34.4	ug/kg	43*	65	(0%-30%)		
Heptachlor	21.1	DU	1.05	D	16.2	ug/kg	39*	77	(0%-30%)		
Heptachlor epoxide	21.1	DU	1.05	D	14.5	ug/kg	43*	69	(0%-30%)		
Methoxychlor	211	DU	10.5	D	141	ug/kg	38*	67	(0%-30%)		
alpha-BHC	21.1	DU	1.05	D	14.8	ug/kg	47*	70	(0%-30%)		
beta-BHC	21.1	DU	1.05	D	14.4	ug/kg	10	69	(0%-30%)		
cis-Chlordane	21.1	DU	1.05	D	14.8	ug/kg	50*	70	(0%-30%)		
delta-BHC	21.1	DU	1.05	D	13.0	ug/kg	41*	62	(0%-30%)		

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>											
Batch	1748853										
gamma-BHC (Lindane)	21.1	DU	1.05	D	12.5	ug/kg	39*	59	(0%-30%)	LOF	03/22/18 01:18
trans-Chlordane	21.1	DU	1.05	DP	13.3	ug/kg	48*	63	(0%-30%)		
**4cmx	42.1		23.0		27.9	ug/kg		66	(27%-121%)		
**Decachlorobiphenyl	42.1		29.0		31.6	ug/kg		75	(30%-136%)		

**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.

# PCB Analysis

# Case Narrative

**GC Semivolatile PCB  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL446038  
Work Order #: 446038**

**Product:** Analysis of The Analysis of Polychlorinated Biphenyls by GC/ECD by ECD

**Analytical Method:** 8082\_PCB\_GC

**Analytical Procedure:** GL-OA-E-040 REV# 25

**Analytical Batch:** 1748844

**Preparation Method:** SW846 3541

**Preparation Procedure:** GL-OA-E-066 REV# 8

**Preparation Batch:** 1748841

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>
446038002	B3J522
1203993374	Method Blank (MB)
1203993375	Laboratory Control Sample (LCS)
1203993378	446038002(B3J522) Matrix Spike (MS)
1203993379	446038002(B3J522) Matrix Spike Duplicate (MSD)

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

**Data Summary:**

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

**Technical Information**

**Preparation/Analytical Method Verification**

All samples and QC in this batch were cleaned using alumina in order to remove oil and other high molecular weight interferences. All samples and QC in this batch were cleaned with activated copper in order to remove sulfur. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported analyte concentrations were confirmed on dissimilar columns.

**Miscellaneous Information**

**Manual integrations**

Sample 446038002 (B3J522) required manual integration to correctly position the baseline as set in the calibration standard injections and to properly identify one or more peaks.

**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: GEL446038 GEL Work Order: 446038

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

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

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

DL Indicates that sample is diluted.

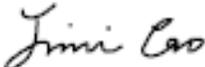
RA Indicates that sample is re-analyzed without re-extraction.

RE Indicates that sample is re-extracted.

**Review/Validation**

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

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

Signature: 

Name: Jimin Cao

Date: 22 MAR 2018

Title: Data Validator

# Sample Data Summary

**PCB**  
**Certificate of Analysis**  
**Sample Summary**

<b>SDG Number:</b> GEL446038	<b>Date Collected:</b> 03/15/2018 09:22	<b>Matrix:</b> OTHER SOLID
<b>Lab Sample ID:</b> 446038002	<b>Date Received:</b> 03/16/2018 08:50	<b>%Moisture:</b> 20.9
<b>Client ID:</b> B3J522	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F18022
<b>Batch ID:</b> 1748844	<b>Method:</b> 8082_PCB_GC	<b>SOP Ref:</b> GL-OA-E-040
<b>Run Date:</b> 03/22/2018 09:03	<b>Inst:</b> ECD8A.I	<b>Dilution:</b> 1
<b>Prep Date:</b> 03/21/2018 08:48	<b>Analyst:</b> JXM	<b>Inj. Vol:</b> 1 uL
<b>Data File:</b> 032218.B\8c2218.D	<b>Aliquot:</b> 30.063 g	<b>Final Volume:</b> 1 mL
032218.B\8c2218.D	<b>Column:</b> 1 RTX-CLPEST1	
	2 RTX-CLPEST2	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
12674-11-2	Aroclor-1016	U	1.40	ug/kg	1.40	4.21	1
11104-28-2	Aroclor-1221	U	1.40	ug/kg	1.40	4.21	1
11141-16-5	Aroclor-1232	U	1.40	ug/kg	1.40	4.21	1
53469-21-9	Aroclor-1242	U	1.40	ug/kg	1.40	4.21	1
12672-29-6	Aroclor-1248	J	3.73	ug/kg	1.40	4.21	1
11097-69-1	Aroclor-1254	J	1.62	ug/kg	1.40	4.21	1
11096-82-5	Aroclor-1260	U	1.40	ug/kg	1.40	4.21	1

# Quality Control Summary

**Surrogate Recovery Report**

**SDG Number: GEL446038**

**Matrix Type: SOLID**

Sample ID	Client ID	4CMX 1 %REC #	4CMX 2 %REC #	DCB 1 %REC #	DCB 2 %REC #
1203993374	MB for batch 1748841	79	80	81	84
1203993375	LCS for batch 1748841	87	88	94	91
446038002	B3J522	79	77	78	63
1203993378	B3J522MS	57	57	58	50
1203993379	B3J522MSD	63	63	64	54

**Surrogate**

**Acceptance Limits**

4CMX = 4cmx

(30%-120%)

DCB = Decachlorobiphenyl

(32%-139%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

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**QC Summary**

Report Date: March 22, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 446038

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-PCB</b>											
Batch	1748844										
QC1203993375	LCS										
Aroclor-1016	33.3			27.2	ug/kg		82	(70%-130%)	JXM	03/22/18	08:32
Aroclor-1260	33.3			30.1	ug/kg		90	(70%-130%)			
**4cmx	6.66			5.79	ug/kg		87	(30%-120%)			
**Decachlorobiphenyl	6.66			6.24	ug/kg		94	(32%-139%)			
QC1203993374	MB										
Aroclor-1016			U	1.11	ug/kg					03/22/18	08:19
Aroclor-1221			U	1.11	ug/kg						
Aroclor-1232			U	1.11	ug/kg						
Aroclor-1242			U	1.11	ug/kg						
Aroclor-1248			U	1.11	ug/kg						
Aroclor-1254			U	1.11	ug/kg						
Aroclor-1260			U	1.11	ug/kg						
**4cmx	6.66			5.24	ug/kg		79	(30%-120%)			
**Decachlorobiphenyl	6.66			5.43	ug/kg		81	(32%-139%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-PCB</b>											
Batch	1748844										
QC1203993378	446038002	MS									
Aroclor-1016	42.1	U	1.40	22.5	ug/kg		53	(23%-121%)	JXM	03/22/18	09:17
Aroclor-1260	42.1	U	1.40	26.8	ug/kg		64	(35%-135%)			
**4cmx	8.42		6.61	4.84	ug/kg		57	(30%-120%)			
**Decachlorobiphenyl	8.42		6.52	4.89	ug/kg		58	(32%-139%)			
QC1203993379	446038002	MSD									
Aroclor-1016	42.1	U	1.40	24.0	ug/kg	6	57	(0%-30%)		03/22/18	09:32
Aroclor-1260	42.1	U	1.40	29.3	ug/kg	9	70	(0%-30%)			
**4cmx	8.43		6.61	5.32	ug/kg		63	(30%-120%)			
**Decachlorobiphenyl	8.43		6.52	5.41	ug/kg		64	(32%-139%)			

**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

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
o	Analyte failed to recover within LCS limits (Organics only)										

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

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

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

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

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

# Herbicide Analysis

# Case Narrative

**GC Semivolatile Herbicide  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL446038  
Work Order #: 446038**

**Product:** Analysis of Chlorophenoxy Acid Herbicides by ECD

**Analytical Method:** SW846 8151A

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

**Analytical Batches:** 1747709 and 1747707

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>
446038002	B3J522
1203990746	Method Blank (MB)
1203990747	Laboratory Control Sample (LCS)
1203990748	445560001(NonSDG) Matrix Spike (MS)
1203990749	445560001(NonSDG) Matrix Spike Duplicate (MSD)

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

**Data Summary:**

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

**Quality Control (QC) Information**

**Laboratory Control Sample (LCS) Recovery**

The LCS (See Below) spike recovery for Dinoseb was marginally below the client established acceptance limits of 70%-130% on one analytical column. Dinoseb was not detected in the client sample and the data were reported.

Sample	Analyte	Value
1203990747 (LCS)	Dinoseb	69* (70%-130%)

**Spike Recovery Statement**

The MS and/or MSD (See Below) did not meet spike recovery acceptance limits. Since the MS and MSD displayed similar recoveries, the failures were attributed to sample matrix interference.

Sample	Analyte	Value
1203990748 (Non SDG 445560001MS)	Dinoseb	21* (23%-128%)
1203990749 (Non SDG 445560001MSD)	Dinoseb	19* (23%-128%)

**Technical Information**

**Holding Time Specifications**

Samples (See Below) were received from the client out of holding. The samples were analyzed and the data have been reported and qualified accordingly.

Sample	Value
1203990748 (Non SDG 445560001MS)	Received 09-MAR-18, out of holding 02-MAR-18
1203990749 (Non SDG 445560001MSD)	Received 09-MAR-18, out of holding 02-MAR-18

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

#### **Miscellaneous Information**

##### **Manual Integrations**

Samples 1203990747 (LCS) and 1203990748 (Non SDG 445560001MS) required manual integration to correctly position the baseline as set in the calibration standard injections.

##### **Certification Statement**

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

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL446038 GEL Work Order: 446038

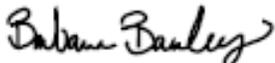
**The Qualifiers in this report are defined as follows:**

- 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.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

**Review/Validation**

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

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

**Signature:** **Name:** Barbara Bailey**Date:** 22 MAR 2018**Title:** Data Validator

# Sample Data Summary

**Herbicide**  
**Certificate of Analysis**  
**Sample Summary**

Page 1 of 1

**SDG Number:** GEL446038  
**Lab Sample ID:** 446038002  
  
**Client ID:** B3J522  
**Batch ID:** 1747709  
**Run Date:** 03/22/2018 02:13  
**Prep Date:** 03/19/2018 12:31  
**Data File:** 032118\E3c2133.D  
032118\E3c2133.D

**Date Collected:** 03/15/2018 09:22  
**Date Received:** 03/16/2018 08:50  
**Client:** CPRC001  
**Method:** SW846 8151A  
**Inst:** ECD3A.I  
**Analyst:** LOF  
**Aliquot:** 50.13 g  
**Column:** 1 RTX-CLPEST 1  
2 RTX-CLPEST 2

**Matrix:** OTHER SOLID  
**%Moisture:** 20.9  
**Project:** CPRC0F18022  
**SOP Ref:** GL-OA-E-011  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 10 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
93-76-5	2,4,5-T	U	2.09	ug/kg	2.09	6.31	1
93-72-1	2,4,5-TP	U	2.09	ug/kg	2.09	6.31	1
94-75-7	2,4-D	U	2.09	ug/kg	2.09	6.31	1
94-82-6	2,4-DB	U	2.09	ug/kg	2.09	6.31	1
75-99-0	Dalapon	U	44.2	ug/kg	44.2	126	1
1918-00-9	Dicamba	U	2.52	ug/kg	2.52	6.31	1
120-36-5	Dichlorprop	U	2.85	ug/kg	2.85	6.31	1
88-85-7	Dinoseb	U	2.09	ug/kg	2.09	6.31	1
94-74-6	MCPA	U	290	ug/kg	290	1260	1
93-65-2	MCPP	U	252	ug/kg	252	1260	1

# Quality Control Summary

## Surrogate Recovery Report

SDG Number: GEL446038

Matrix Type: SOLID

---

Sample ID	Client ID	DCAA 1 %REC #	DCAA 2 %REC #
1203990746	MB for batch 1747707	105	101
1203990747	LCS for batch 1747707	108	106
1203990748	WST03-18-151838MS	85	88
1203990749	WST03-18-151838MSD	83	85
446038002	B3J522	83	86

---

**Surrogate**

DCAA = 2,4-Dichlorophenylacetic acid

**Acceptance Limits**

(33%-143%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

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**QC Summary**

Report Date: March 22, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 446038

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-HERB</b>											
Batch	1747709										
QC1203990747	LCS										
2,4,5-T	40.0			38.5	ug/kg		96	(70%-130%)	LOF	03/21/18	16:30
2,4,5-TP	40.0			39.5	ug/kg		99	(70%-130%)			
2,4-D	40.0			40.3	ug/kg		101	(70%-130%)			
2,4-DB	40.0			39.0	ug/kg		98	(70%-130%)			
Dalapon	400			391	ug/kg		98	(70%-130%)			
Dicamba	40.0			36.9	ug/kg		92	(70%-130%)			
Dichlorprop	40.0			35.2	ug/kg		88	(70%-130%)			
Dinoseb	40.0			27.7	ug/kg		69*	(70%-130%)			
MCPA	4000			3710	ug/kg		93	(70%-130%)			
MCPP	4000			3230	ug/kg		81	(70%-130%)			
**2,4-Dichlorophenylacetic acid	99.9			106	ug/kg		106	(33%-143%)			
QC1203990746	MB										
2,4,5-T			U	1.66	ug/kg					03/21/18	16:10
2,4,5-TP			U	1.66	ug/kg						

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-HERB</b>											
Batch	1747709										
2,4-D			U	1.66	ug/kg				LOF	03/21/18	16:10
2,4-DB			U	1.66	ug/kg						
Dalapon			U	35.0	ug/kg						
Dicamba			U	2.00	ug/kg						
Dichlorprop			U	2.26	ug/kg						
Dinoseb			U	1.66	ug/kg						
MCPA			U	230	ug/kg						
MCPP			U	200	ug/kg						
**2,4-Dichlorophenylacetic acid	99.9			101	ug/kg		101	(33%-143%)			
QC1203990748 445560001 MS											
2,4,5-T	44.8	UX	1.85	X	42.1	ug/kg	94	(45%-143%)		03/21/18	21:38
2,4,5-TP	44.8	UX	1.85	X	43.1	ug/kg	96	(48%-141%)			
2,4-D	44.8	UX	1.85	X	47.3	ug/kg	106	(35%-144%)			
2,4-DB	44.8	UX	1.85	X	38.2	ug/kg	85	(34%-154%)			
Dalapon	448	UX	39.1	X	301	ug/kg	67	(23%-111%)			
Dicamba	44.8	UX	2.23	X	39.7	ug/kg	89	(37%-128%)			

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**QC Summary**

Workorder: 446038

Page 3 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-HERB</b>											
Batch	1747709										
Dichlorprop	44.8	UX	2.52	X	37.6	ug/kg	84	(48%-134%)	LOF	03/21/18	21:38
Dinoseb	44.8	TUX	1.85	TX	9.39	ug/kg	21 *	(23%-128%)			
MCPA	4480	UX	257	X	4850	ug/kg	108	(34%-135%)			
MCPP	4480	UX	223	X	4980	ug/kg	111	(22%-125%)			
*2,4-Dichlorophenylacetic acid	112		95.7		95.3	ug/kg	85	(33%-143%)			
QC1203990749	445560001 MSD										
2,4,5-T	44.6	UX	1.85	X	41.7	ug/kg	1	94	(0%-30%)	03/21/18	22:11
2,4,5-TP	44.6	UX	1.85	X	40.0	ug/kg	7	90	(0%-30%)		
2,4-D	44.6	UX	1.85	X	43.9	ug/kg	8	99	(0%-30%)		
2,4-DB	44.6	UX	1.85	X	44.0	ug/kg	14	99	(0%-30%)		
Dalapon	446	UX	39.1	X	267	ug/kg	12	60	(0%-30%)		
Dicamba	44.6	UX	2.23	X	36.7	ug/kg	8	82	(0%-30%)		
Dichlorprop	44.6	UX	2.52	X	34.9	ug/kg	7	78	(0%-30%)		
Dinoseb	44.6	TUX	1.85	TX	8.59	ug/kg	9	19 *	(0%-30%)		
MCPA	4460	UX	257	X	4510	ug/kg	7	101	(0%-30%)		
MCPP	4460	UX	223	X	4640	ug/kg	7	104	(0%-30%)		

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**QC Summary**

Workorder: 446038

Page 4 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-HERB</b>											
Batch	1747709										
**2,4-Dichlorophenylacetic acid	111	95.7		92.2	ug/kg		83	(33%-143%)	LOF	03/21/18	22:11

**Notes:**

The Qualifiers in this report are defined as follows:

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

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

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

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

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

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

# Metals Analysis

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL446038**  
**Work Order #: 446038**

**Product: Determination of Metals by ICP****Analytical Method:** SW846 3050B/6010D**Analytical Procedure:** GL-MA-E-013 REV# 30**Analytical Batch:** 1747948**Product: Determination of Metals by ICP****Analytical Method:** SW846 3010A/6010D**Analytical Procedure:** GL-MA-E-013 REV# 30**Analytical Batch:** 1748610**Product: Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer****Analytical Method:** 7471\_HG\_CVAA**Analytical Procedure:** GL-MA-E-010 REV# 36**Analytical Batch:** 1748280**Product: Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer****Analytical Method:** 7470\_HG\_CVAA**Analytical Procedure:** GL-MA-E-010 REV# 36**Analytical Batch:** 1748629**TCLP Preparation Method:** SW846 1311**TCLP Preparation Procedure:** GL-LB-E-006 REV# 22**TCLP Preparation Batch:** 1747987**Preparation Method:** SW846 3050B**Preparation Procedure:** GL-MA-E-009 REV# 27**Preparation Batch:** 1747947**Preparation Method:** SW846 7471B Prep**Preparation Procedure:** GL-MA-E-010 REV# 36**Preparation Batch:** 1748279**Preparation Method:** SW846 3010A**Preparation Procedure:** GL-MA-E-008 REV# 19**Preparation Batch:** 1748609**Preparation Method:** SW846 7470A Prep**Preparation Procedure:** GL-MA-E-010 REV# 36**Preparation Batch:** 1748628

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>
446038002	B3J522
446038003	B3J522
1203991419	Tumble Blank (TB)

1203991418	446038003(B3J522S) Matrix Spike (MS)
1203991319	Method Blank (MB)ICP
1203992848	Method Blank (MB)ICP
1203991320	Laboratory Control Sample (LCS)
1203992849	Laboratory Control Sample (LCS)
1203991323	446038002(B3J522L) Serial Dilution (SD)
1203992852	446038003(B3J522L) Serial Dilution (SD)
1203991321	446038002(B3J522D) Sample Duplicate (DUP)
1203992850	446038003(B3J522D) Sample Duplicate (DUP)
1203991322	446038002(B3J522S) Matrix Spike (MS)
1203991418	446038003(B3J522S) Matrix Spike (MS)
1203994271	446038002(B3J522PS) Post Spike (PS)
1203992029	Method Blank (MB)CVAA
1203992895	Method Blank (MB)CVAA
1203992030	Laboratory Control Sample (LCS)
1203992896	Laboratory Control Sample (LCS)
1203992033	446038002(B3J522L) Serial Dilution (SD)
1203992899	446038003(B3J522L) Serial Dilution (SD)
1203992031	446038002(B3J522D) Sample Duplicate (DUP)
1203992897	446038003(B3J522D) Sample Duplicate (DUP)
1203991418	446038003(B3J522S) Matrix Spike (MS)
1203992032	446038002(B3J522S) Matrix Spike (MS)

Sample 446038002 in this SDG was analyzed for metals and mercury on a "dry weight corrected" basis. Sample leachate 446038003 in this SDG was analyzed for mercury, for metals on an "as received" basis.

#### **Data Summary:**

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

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

##### **Matrix Spike (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.

Sample	Analyte	Value
1203991322 (B3J522MS)	Calcium	294* (75%-125%)
	Sodium	132* (75%-125%)

##### **Duplicate Relative Percent Difference (RPD) Statement**

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
--------	---------	-------

1203991321 (B3J522DUP)	Calcium	36.5* (0%-35%)
	Sodium	abs(176000 - 139000)* (+/-30700 ug/kg)
	Vanadium	35.6* (0%-35%)

### **Technical Information**

#### **Preparation/Analytical Method Verification**

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

#### **Preparation Information**

The samples and associated matrix QC were prepared at a ten times or greater dilution factor to minimize potential interferences arising from the high sodium content in the TCLP leaching solution. ICP and CVAA.

#### **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: GEL446038 GEL Work Order: 446038

**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: 22 MAR 2018****Title: Data Validator**

# Sample Data Summary

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

SDG No: GEL446038

CONTRACT: CPRC0F18022

METHOD TYPE: SW846

SAMPLE ID:446038002

BASIS: Dry Weight

DATE COLLECTED 15-MAR-18

CLIENT ID: B3J522

LEVEL: Low

DATE RECEIVED 16-MAR-18

MATRIX: OTHER SOLID

%SOLIDS: 79

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	4270000	ug/kg		8580	25200	25200	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-36-0	Antimony	800	ug/kg	B	417	1260	1260	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-39-3	Barium	30000	ug/kg		126	631	631	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-43-9	Cadmium	126	ug/kg	U	126	631	631	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-70-2	Calcium	1800000	ug/kg	*N	10100	31600	31600	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-47-3	Chromium	11100	ug/kg		189	631	631	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-48-4	Cobalt	23700	ug/kg		189	631	631	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-50-8	Copper	10300	ug/kg		379	1260	1260	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7439-89-6	Iron	10800000	ug/kg		10100	31600	31600	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7439-95-4	Magnesium	3100000	ug/kg		10700	37900	37900	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7439-96-5	Manganese	210000	ug/kg		252	1260	1260	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7439-97-6	Mercury	4.49	ug/kg	U	4.49	13.4	13.4	1	AV	MTMI	03/20/18 12:19	032018S1-3	1748280
7440-02-0	Nickel	12300	ug/kg		189	631	631	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-09-7	Potassium	959000	ug/kg		8080	31600	31600	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-22-4	Silver	197	ug/kg	B	126	631	631	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-23-5	Sodium	139000	ug/kg	*N	8840	31600	31600	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-62-2	Vanadium	18300	ug/kg	*	126	631	631	1	P	JWJ	03/21/18 16:34	032118-2	1747948
7440-66-6	Zinc	27700	ug/kg		505	1260	1260	1	P	JWJ	03/21/18 16:34	032118-2	1747948

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1747948	1747947	SW846 3050B	0.501	g	50	mL	03/16/18	JXM8
1748280	1748279	SW846 7471B Prep	0.566	g	30	mL	03/19/18	MTM1

**\*Analytical Methods:**

AV SW846 7471B  
P SW846 3050B/6010D

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

**SDG No:** GEL446038

**CONTRACT:** CPRC0F18022

**METHOD TYPE:** SW846

**SAMPLE ID:**446038003

**BASIS:** Leachate

**DATE COLLECTED** 15-MAR-18

**CLIENT ID:** B3J522

**LEVEL:** Low

**DATE RECEIVED** 16-MAR-18

**MATRIX:** OTHER SOLID (TCLP)

**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440-38-2	Arsenic	50	ug/L	U	50	300	300	1	P	JWJ	03/20/18 22:31	032018-1	1748610
7440-39-3	Barium	108	ug/L		10	50	50	1	P	JWJ	03/20/18 22:31	032018-1	1748610
7440-43-9	Cadmium	10	ug/L	U	10	50	50	1	P	JWJ	03/20/18 22:31	032018-1	1748610
7440-47-3	Chromium	10	ug/L	U	10	50	50	1	P	JWJ	03/20/18 22:31	032018-1	1748610
7439-92-1	Lead	33	ug/L	U	33	100	100	1	P	JWJ	03/20/18 22:31	032018-1	1748610
7439-97-6	Mercury	0.670	ug/L	U	0.67	2	2	1	AV	MTM1	03/21/18 12:23	032118W1-4	1748629
7782-49-2	Selenium	60	ug/L	U	60	300	300	1	P	JWJ	03/20/18 22:31	032018-1	1748610
7440-22-4	Silver	10	ug/L	U	10	50	50	1	P	JWJ	03/20/18 22:31	032018-1	1748610

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1748610	1748609	SW846 3010A	5	mL	50	mL	03/20/18	SXW1
1748629	1748628	SW846 7470A Prep	2	mL	20	mL	03/20/18	AXS5

**\*Analytical Methods:**

**P** SW846 3010A/6010D  
**AV** SW846 7470A

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: March 22, 2018

Page 1 of 11

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 446038

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1747948										
QC1203991321 446038002 DUP											
Aluminum		4270000		4080000	ug/kg	4.63		(0%-35%)	JWJ	03/21/18	16:36
Antimony	B	800		1400	ug/kg	54.2 ^		(+/-1230)			
Barium	*	30000	*	39300	ug/kg	27		(0%-35%)			
Cadmium	U	126	B	182	ug/kg	88.4 ^		(+/-614)			
Calcium	*N	1800000	*	2610000	ug/kg	36.5*		(0%-35%)			
Chromium	*	11100	*	14400	ug/kg	25.6		(0%-35%)			
Cobalt		23700		27800	ug/kg	15.7		(0%-35%)			
Copper		10300		11100	ug/kg	7.76		(0%-35%)			
Iron		10800000		11700000	ug/kg	8.32		(0%-35%)			
Magnesium		3100000		2890000	ug/kg	6.94		(0%-35%)			
Manganese		210000		229000	ug/kg	8.32		(0%-35%)			
Nickel		12300		13600	ug/kg	9.86		(0%-35%)			
Potassium	*	959000	*	746000	ug/kg	25		(0%-35%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1747948										
Silver	B	197	B	267	ug/kg	30 ^		(+/-614)	JWJ	03/21/18	16:36
Sodium	*N	139000	*	176000	ug/kg	23.3*^		(+/-30700)			
Vanadium	*	18300	*	26300	ug/kg	35.6*		(0%-35%)			
Zinc		27700		33000	ug/kg	17.7		(0%-35%)			
QC1203991320	LCS										
Aluminum	499000			496000	ug/kg		99.3	(80%-120%)		03/21/18	16:31
Antimony	49900			49700	ug/kg		99.7	(80%-120%)			
Barium	49900			46600	ug/kg		93.4	(80%-120%)			
Cadmium	49900			46100	ug/kg		92.4	(80%-120%)			
Calcium	499000			495000	ug/kg		99.3	(80%-120%)			
Chromium	49900			47400	ug/kg		95	(80%-120%)			
Cobalt	49900			49700	ug/kg		99.7	(80%-120%)			
Copper	49900			47600	ug/kg		95.4	(80%-120%)			
Iron	499000			510000	ug/kg		102	(80%-120%)			
Magnesium	499000			501000	ug/kg		100	(80%-120%)			
Manganese	49900			47000	ug/kg		94.2	(80%-120%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1747948										
Nickel	49900			47300	ug/kg		94.7	(80%-120%)	JWJ	03/21/18	16:31
Potassium	499000			494000	ug/kg		99	(80%-120%)			
Silver	49900			45900	ug/kg		91.9	(80%-120%)			
Sodium	499000			482000	ug/kg		96.6	(80%-120%)			
Vanadium	49900			48200	ug/kg		96.5	(80%-120%)			
Zinc	49900			47300	ug/kg		94.7	(80%-120%)			
QC1203991319	MB										
Aluminum			U	6450	ug/kg					03/21/18	16:28
Antimony			U	313	ug/kg						
Barium			U	94.9	ug/kg						
Cadmium			U	94.9	ug/kg						
Calcium			U	7590	ug/kg						
Chromium			U	142	ug/kg						
Cobalt			U	142	ug/kg						
Copper			U	285	ug/kg						
Iron			U	7590	ug/kg						

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1747948										
Magnesium			U	8060	ug/kg				JWJ	03/21/18	16:28
Manganese			U	190	ug/kg						
Nickel			U	142	ug/kg						
Potassium			U	6070	ug/kg						
Silver			U	94.9	ug/kg						
Sodium			U	6640	ug/kg						
Vanadium			U	94.9	ug/kg						
Zinc			U	380	ug/kg						
QC1203991322	446038002	MS									
Aluminum	614000	4270000		6430000	ug/kg		N/A	(75%-125%)		03/21/18	16:39
Antimony	61400	B	800	58900	ug/kg		94.7	(75%-125%)			
Barium	61400	*	30000	105000	ug/kg		122	(75%-125%)			
Cadmium	61400	U	126	68100	ug/kg		111	(75%-125%)			
Calcium	614000	*N	1800000	N	3610000	ug/kg	294*	(75%-125%)			
Chromium	61400	*	11100	70800	ug/kg		97.3	(75%-125%)			
Cobalt	61400		23700	97500	ug/kg		120	(75%-125%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1747948										
Copper	61400	10300		70100	ug/kg		97.5	(75%-125%)	JWJ	03/21/18	16:39
Iron	614000	10800000		14200000	ug/kg		N/A	(75%-125%)			
Magnesium	614000	3100000		4050000	ug/kg		N/A	(75%-125%)			
Manganese	61400	210000		282000	ug/kg		117	(75%-125%)			
Nickel	61400	12300		74800	ug/kg		102	(75%-125%)			
Potassium	614000	* 959000		1620000	ug/kg		108	(75%-125%)			
Silver	61400	B 197		70100	ug/kg		114	(75%-125%)			
Sodium	614000	*N 139000	N	947000	ug/kg		132*	(75%-125%)			
Vanadium	61400	* 18300		84200	ug/kg		107	(75%-125%)			
Zinc	61400	27700		91200	ug/kg		104	(75%-125%)			
QC1203994271 446038002 PS											
Calcium	5000	*N 14300		19600	ug/L		107	(75%-125%)		03/21/18	16:41
Sodium	5000	*N 1100		6150	ug/L		101	(75%-125%)			
QC1203991323 446038002 SDILT											
Aluminum		33800	D	6650	ug/L	1.71		(0%-10%)		03/21/18	16:44
Antimony		B 6.34	DU	2080	ug/L	N/A		(0%-10%)			
Barium		* 238	D	52.6	ug/L	10.8		(0%-10%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1747948										
Cadmium	U	0.558	DU	631	ug/L	N/A		(0%-10%)	JWJ	03/21/18	16:44
Calcium	*N	14300	D	2820	ug/L	1.46		(0%-10%)			
Chromium	*	88.0	D	18.7	ug/L	5.96		(0%-10%)			
Cobalt		188	D	37.9	ug/L	.961		(0%-10%)			
Copper		81.5	D	16.1	ug/L	.984		(0%-10%)			
Iron		85500	D	17800	ug/L	4.18		(0%-10%)			
Magnesium		24600	D	4970	ug/L	1.13		(0%-10%)			
Manganese		1670	D	360	ug/L	8.03		(0%-10%)			
Nickel		97.7	D	20.5	ug/L	4.93		(0%-10%)			
Potassium	*	7600	D	1550	ug/L	1.71		(0%-10%)			
Silver	B	1.56	DU	631	ug/L	N/A		(0%-10%)			
Sodium	*N	1100	BD	240	ug/L	8.96		(0%-10%)			
Vanadium	*	145	D	34.0	ug/L	17		(0%-10%)			
Zinc		219	D	52.3	ug/L	19.3		(0%-10%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1748610										
QC1203992850	446038003	DUP									
Arsenic	U	50.0	U	50.0	ug/L	N/A			JWJ	03/20/18	22:33
Barium		108		111	ug/L	2.32 ^		(+/-50.0)			
Cadmium	U	10.0	U	10.0	ug/L	N/A					
Chromium	U	10.0	U	10.0	ug/L	N/A					
Lead	U	33.0	U	33.0	ug/L	N/A					
Selenium	U	60.0	U	60.0	ug/L	N/A					
Silver	U	10.0	U	10.0	ug/L	N/A					
QC1203992849	LCS										
Arsenic	5000			4510	ug/L		90.2	(80%-120%)		03/20/18	22:28
Barium	5000			4570	ug/L		91.4	(80%-120%)			
Cadmium	5000			4440	ug/L		88.8	(80%-120%)			
Chromium	5000			4550	ug/L		91.1	(80%-120%)			
Lead	5000			4520	ug/L		90.5	(80%-120%)			
Selenium	5000			4260	ug/L		85.1	(80%-120%)			
Silver	5000			4400	ug/L		88	(80%-120%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1748610										
QC1203992848	MB										
Arsenic			U	50.0	ug/L				JWJ	03/20/18	22:21
Barium			U	10.0	ug/L						
Cadmium			U	10.0	ug/L						
Chromium			U	10.0	ug/L						
Lead			U	33.0	ug/L						
Selenium			U	60.0	ug/L						
Silver			U	10.0	ug/L						
QC1203991418	446038003 MS										
Arsenic	5000	U	50.0	4700	ug/L		93.9	(75%-125%)		03/20/18	22:36
Barium	10000		108	9510	ug/L		94	(75%-125%)			
Cadmium	1000	U	10.0	897	ug/L		89.7	(75%-125%)			
Chromium	5000	U	10.0	4660	ug/L		93.2	(75%-125%)			
Lead	5000	U	33.0	4680	ug/L		93.6	(75%-125%)			
Selenium	1000	U	60.0	949	ug/L		91.4	(75%-125%)			
Silver	500	U	10.0	441	ug/L		86.7	(75%-125%)			

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1748610										
QC1203992852	446038003	SDILT									
Arsenic	U	0.658	DU	250	ug/L	N/A		(0%-20%)	JWJ	03/20/18	22:38
Barium		10.8	BD	2.22	ug/L	2.51		(0%-20%)			
Cadmium	U	-0.148	DU	50.0	ug/L	N/A		(0%-20%)			
Chromium	U	0.288	DU	50.0	ug/L	N/A		(0%-20%)			
Lead	U	-2.1	DU	165	ug/L	N/A		(0%-20%)			
Selenium	U	3.47	DU	300	ug/L	N/A		(0%-20%)			
Silver	U	0.777	DU	50.0	ug/L	N/A		(0%-20%)			
QC1203991419	TB										
Arsenic			U	50.0	ug/L					03/20/18	22:25
Barium			U	10.0	ug/L						
Cadmium			U	10.0	ug/L						
Chromium			U	10.0	ug/L						
Lead			U	33.0	ug/L						
Selenium			B	64.5	ug/L						
Silver			U	10.0	ug/L						

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-Mercury</b>											
Batch	1748280										
QC1203992031	446038002	DUP									
Mercury		U	4.49	U	5.03	ug/kg	N/A		MTM1	03/20/18	12:21
QC1203992030	LCS										
Mercury	116				112	ug/kg	95.9	(80%-120%)		03/20/18	14:04
QC1203992029	MB										
Mercury			U		3.73	ug/kg				03/20/18	14:02
QC1203992032	446038002	MS									
Mercury	129	U	4.49		122	ug/kg	92.2	(75%-125%)		03/20/18	12:23
QC1203992033	446038002	SDILT									
Mercury		U	0.049	DU	22.5	ug/L	N/A	(0%-10%)		03/20/18	12:28
Batch	1748629										
QC1203992897	446038003	DUP									
Mercury		U	0.670	U	0.670	ug/L	N/A		MTM1	03/21/18	12:26
QC1203992896	LCS										
Mercury	20.0				20.6	ug/L	103	(80%-120%)		03/21/18	12:21
QC1203992895	MB										
Mercury			U		0.670	ug/L				03/21/18	12:18
QC1203991418	446038003	MS									
Mercury	20.0	U	0.670		18.1	ug/L	90.3	(75%-125%)		03/21/18	12:24
QC1203992899	446038003	SDILT									
Mercury		U	-0.032	DU	3.35	ug/L	N/A	(0%-10%)		03/21/18	12:28
QC1203991419	TB										
Mercury			U		0.670	ug/L				03/21/18	12:19

Notes:

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**QC Summary**

Workorder: 446038

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

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

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

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

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

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

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

# General Chem Analysis

# Case Narrative

**General Chemistry  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL446038  
Work Order #: 446038**

**Product: Hexavalent Chromium****Analytical Method:** 7196\_CR6**Analytical Procedure:** GL-GC-E-044 REV# 22**Analytical Batch:** 1747659**Preparation Method:** SW846 3060A**Preparation Procedure:** GL-GC-E-044 REV# 22**Preparation Batch:** 1747657

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>
446038002	B3J522
1203990661	Method Blank (MB)
1203990662	Laboratory Control Sample (LCS)
1203990663	Insoluble Lab Control Sample (ILCS)
1203990664	445991013(NonSDG) Sample Duplicate (DUP)
1203990665	445991014(NonSDG) Sample Duplicate (DUP)
1203990666	445991013(NonSDG) Matrix Spike (MS)
1203990667	445991014(NonSDG) Matrix Spike (MS)

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

**Data Summary:**

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

**Certification Statement**

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

**GEL LABORATORIES LLC**

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL446038 GEL Work Order: 446038

**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).

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:** Kristen Mizzell

**Date:** 21 MAR 2018

**Title:** Team Leader

# Sample Data Summary

**GEL LABORATORIES LLC**

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

**Certificate of Analysis**

Report Date: March 21, 2018

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF F18-022

Client Sample ID: B3J522 Project: CPRC0F18022  
 Sample ID: 446038002 Client ID: CPRC001  
 Matrix: OTHER SOLID  
 Collect Date: 15-MAR-18 09:22  
 Receive Date: 16-MAR-18  
 Collector: Client  
 Moisture: 20.9%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Spectrometric Analysis												
7196_CR6: COMMON "Dry Weight Corrected"												
Hexavalent Chromium	B	138	136	340	ug/Kg	26.9	1	VH1	03/19/18	1055	1747659	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	RXB5	03/17/18	1324	1747657

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	7196_CR6	

**Notes:**

Column headers are defined as follows:

- DF: Dilution Factor
- DL: Detection Limit
- MDA: Minimum Detectable Activity
- MDC: Minimum Detectable Concentration
- Lc/LC: Critical Level
- PF: Prep Factor
- RL: Reporting Limit
- 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 21, 2018

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CH2M Hill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 446038

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Spectrometric Analysis</b>											
Batch	1747659										
QC1203990664	445991013	DUP									
Hexavalent Chromium	B	117	B	117	ug/Kg	0.00694	^	(+/-287)	VH1	03/19/18	10:53
QC1203990665	445991014	DUP									
Hexavalent Chromium	B	137	B	167	ug/Kg	0.0161	^	(+/-337)		03/19/18	10:54
QC1203990663	ILCS										
Hexavalent Chromium	5150			4350	ug/Kg			(80%-120%)		03/19/18	10:42
QC1203990662	LCS										
Hexavalent Chromium	3810			3630	ug/Kg			(80%-120%)		03/19/18	10:42
QC1203990661	MB										
Hexavalent Chromium			U	129	ug/Kg					03/19/18	10:41
QC1203990666	445991013	MS									
Hexavalent Chromium	3190	B	117	2980	ug/Kg			(75%-125%)		03/19/18	10:53
QC1203990667	445991014	MS									
Hexavalent Chromium	2740	B	137	2480	ug/Kg			(75%-125%)		03/19/18	10:55

**Notes:**

The Qualifiers in this report are defined as follows:

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 #: GEL446038**  
**Work Order #: 446038**

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

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

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

**Analytical Batch:** 1748022

**Preparation Method:** Dry Soil Prep

**Preparation Procedure:** GL-RAD-A-021 REV# 22

**Preparation Batch:** 1747976

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>
446038002	B3J522
1203991519	Method Blank (MB)
1203991520	446038002(B3J522) Sample Duplicate (DUP)
1203991521	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Quality Control (QC) Information**

**Tracer/Carrier Yield**

Sample, (See Below), did not meet the client tracer yield requirements, however it is less than 110 percent and does meet the GEL standard tracer yield requirements.

Sample	Analyte	Value
1203991519 (MB)	Americium-243 Tracer	109* (30%-105%)

**Technical Information**

**Recounts**

Sample 1203991521 (LCS) was recounted due to high carrier/tracer yield. The recount is reported. Sample 1203991519 (MB) was recounted due to high carrier/tracer yield. The original count is reported.

**Product:** PUISO\_PRECIP\_AEA:COMMON  
**Analytical Method:** PUISO\_PRECIP\_AEA  
**Analytical Procedure:** GL-RAD-A-011 REV# 26  
**Analytical Batch:** 1748024

**Preparation Method:** Dry Soil Prep  
**Preparation Procedure:** GL-RAD-A-021 REV# 22  
**Preparation Batch:** 1747976

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>
446038002	B3J522
1203991522	Method Blank (MB)
1203991523	446038002(B3J522) Sample Duplicate (DUP)
1203991524	Laboratory Control Sample (LCS)

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

#### **Data Summary:**

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

#### **Technical Information**

##### **Recounts**

Sample 1203991524 (LCS) was recounted due to a peak shift. The recount is reported.

**Product:** UISO\_IE\_PRECIP\_AEA:COMMON  
**Analytical Method:** UISO\_IE\_PRECIP\_AEA  
**Analytical Procedure:** GL-RAD-A-011 REV# 26  
**Analytical Batch:** 1748025

**Preparation Method:** Dry Soil Prep  
**Preparation Procedure:** GL-RAD-A-021 REV# 22  
**Preparation Batch:** 1747976

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>
446038002	B3J522
1203991525	Method Blank (MB)
1203991526	446038002(B3J522) Sample Duplicate (DUP)
1203991527	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Technical Information****Recounts**

Sample 1203991525 (MB) was recounted due to a peak shift. The recount is reported.

**Product: Dry Weight**

**Analytical Method:** ASTM D 2216 (Modified)

**Analytical Procedure:** GL-OA-E-020 REV# 12

**Analytical Batch:** 1747976

**Preparation Method:** Dry Soil Prep

**Preparation Procedure:** GL-RAD-A-021 REV# 22

**Preparation Batch:** 1747976

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>
446038002	B3J522
1203991392	446038002(B3J522) Sample Duplicate (DUP)

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

**Data Summary:**

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

**Product: Dry Weight**

**Analytical Method:** ASTM D 2216 (Modified)

**Analytical Procedure:** GL-OA-E-020 REV# 12

**Analytical Batch:** 1748224

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>
446038001	B3J517
1203991896	446038001(B3J517) Sample Duplicate (DUP)

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

**Data Summary:**

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

**Product:** GAMMA\_GS:COMMON

**Analytical Method:** GAMMA\_GS

**Analytical Procedure:** GL-RAD-A-013 REV# 27

**Analytical Batch:** 1748045

**Preparation Method:** Dry Soil Prep

**Preparation Procedure:** GL-RAD-A-021 REV# 22

**Preparation Batch:** 1747976

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>
446038002	B3J522
1203991559	Method Blank (MB)
1203991560	446038002(B3J522) Sample Duplicate (DUP)
1203991561	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Qualifier Information**

<b>Qualifier</b>	<b>Reason</b>	<b>Analyte</b>	<b>Sample</b>	<b>Client Sample</b>
X	Results are considered a false positive due to high counting uncertainty.	Cesium-137	1203991560	B3J522(446038002DUP)

**Product:** I129\_SEP\_LEPS\_GS

**Analytical Method:** I129\_SEP\_LEPS\_GS

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

**Analytical Batch:** 1748214

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
446038002	B3J522
1203991887	Method Blank (MB)
1203991888	445991003(NonSDG) Sample Duplicate (DUP)
1203991889	445991003(NonSDG) Matrix Spike (MS)
1203991890	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Product:** 9310\_ALPHABETA\_GPC: COMMON

**Analytical Method:** 9310\_ALPHABETA\_GPC

**Analytical Procedure:** GL-RAD-A-001B REV# 18

**Analytical Batch:** 1748253

**Preparation Method:** Dry Soil Prep

**Preparation Procedure:** GL-RAD-A-021 REV# 22

**Preparation Batch:** 1747976

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
446038002	B3J522
1203991958	Method Blank (MB)
1203991959	446038002(B3J522) Sample Duplicate (DUP)
1203991960	446038002(B3J522) Matrix Spike (MS)
1203991961	446038002(B3J522) Matrix Spike Duplicate (MSD)
1203991962	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Technical Information**

**Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium,

polonium and cesium may be lost during sample heating.

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

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

**Analytical Procedure:** GL-RAD-A-004 REV# 19

**Analytical Batch:** 1748254

**Preparation Method:** Dry Soil Prep

**Preparation Procedure:** GL-RAD-A-021 REV# 22

**Preparation Batch:** 1747976

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>
446038002	B3J522
1203991963	Method Blank (MB)
1203991964	446038002(B3J522) Sample Duplicate (DUP)
1203991965	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

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

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

**Analytical Procedure:** GL-RAD-A-002 REV# 22

**Analytical Batch:** 1748141

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>
446038002	B3J522
1203991745	Method Blank (MB)
1203991746	446038002(B3J522) Sample Duplicate (DUP)
1203991747	446038002(B3J522) Matrix Spike (MS)
1203991748	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 1203991748 (LCS) was recounted due to low recovery. The recount is reported.

**Miscellaneous Information**

**Additional Comments**

The matrix spike, 1203991747 (B3J522MS), aliquot was reduced to conserve sample volume.

**Certification Statement**

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

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL446038 GEL Work Order: 446038

**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.

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

**Review/Validation**

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

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

Signature: 

Name: Heather McCarty

Date: 22 MAR 2018

Title: Analyst II

# Sample Data Summary

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

**SDG Number:** GEL446038  
**Lab Sample ID:** 446038001

**Client:** CPRC001  
**Date Collected:** 03/15/2018 09:22  
**Date Received:** 03/16/2018 08:50

**Project:** CPRC0F18022  
**Matrix:** OTHER SOLID  
**%Moisture:** 25.5

**Rad  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL446038	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F18022
<b>Lab Sample ID:</b> 446038002	<b>Date Collected:</b> 03/15/2018 09:22	<b>Matrix:</b> OTHER SOLID
	<b>Date Received:</b> 03/16/2018 08:50	<b>%Moisture:</b> 20.9
<b>Client ID:</b> B3J522		<b>Prep Basis:</b> "Dry Weight Corrected"
<b>Batch ID:</b> 1748022	<b>Method:</b> AMCMISO_EIE_PREC_AEA	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 03/20/2018 13:37	<b>Analyst:</b> EXC2	<b>Instrument:</b> 1073
<b>Data File:</b> S0446038002_AM.1A.gcnf	<b>Aliquot:</b> 0.104 g	<b>Count Time:</b> 239.9998 min
<b>Prep Batch:</b> 1748022	<b>Prep Method:</b> DOE EML HASL-300, Am-05	<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 03/19/2018 12:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.0588	pCi/g	+/-0.165	0.165	0.176	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	19.9	20.2	pCi/g	98.6	(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> GEL446038	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F18022
<b>Lab Sample ID:</b> 446038002	<b>Date Collected:</b> 03/15/2018 09:22	<b>Matrix:</b> OTHER SOLID
	<b>Date Received:</b> 03/16/2018 08:50	<b>%Moisture:</b> 20.9
<b>Client ID:</b> B3J522		<b>Prep Basis:</b> "Dry Weight Corrected"
<b>Batch ID:</b> 1748024	<b>Method:</b> PUIISO_PRECIP_AEA	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 03/20/2018 13:37	<b>Analyst:</b> EXC2	<b>Instrument:</b> 1084
<b>Data File:</b> S0446038002_PU.1A.gcnf	<b>Aliquot:</b> 0.104 g	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1748024	<b>Prep Method:</b> DOE EML HASL-300, Pu-11-	<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 03/19/2018 12:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	-0.123	pCi/g	+/-0.155	0.155	0.518	1.00
OER-100-70	Plutonium-239/240	U	0.00257	pCi/g	+/-0.190	0.190	0.423	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	15.4	19.0	pCi/g	81.2	(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**

<b>SDG Number:</b> GEL446038	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F18022
<b>Lab Sample ID:</b> 446038002	<b>Date Collected:</b> 03/15/2018 09:22	<b>Matrix:</b> OTHER SOLID
	<b>Date Received:</b> 03/16/2018 08:50	<b>%Moisture:</b> 20.9
<b>Client ID:</b> B3J522		<b>Prep Basis:</b> "Dry Weight Corrected"
<b>Batch ID:</b> 1748025	<b>Method:</b> UIISO_IE_PRECIP_AEA	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 03/20/2018 13:25	<b>Analyst:</b> EXC2	<b>Instrument:</b> 1128
<b>Data File:</b> S0446038002_UU.1A.gcnf	<b>Aliquot:</b> 0.104 g	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1748025	<b>Prep Method:</b> DOE EML HASL-300, U-02-R	<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 03/19/2018 12:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 <small>13968-55-3/13966-29-5</small>	Uranium-233/234		0.969	pCi/g	+/-0.584	0.602	0.531	1.00
15117-96-1/13982-7	Uranium-235/236	U	0.450	pCi/g	+/-0.458	0.463	0.453	1.00
7440-61-1	Uranium-238		0.575	pCi/g	+/-0.454	0.461	0.423	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	18.5	20.1	pCi/g	92.1	(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> GEL446038	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F18022
<b>Lab Sample ID:</b> 446038002	<b>Date Collected:</b> 03/15/2018 09:22	<b>Matrix:</b> OTHER SOLID
	<b>Date Received:</b> 03/16/2018 08:50	<b>%Moisture:</b> 20.9
<b>Client ID:</b> B3J522		<b>Prep Basis:</b> "Dry Weight Corrected"
<b>Batch ID:</b> 1748253	<b>Method:</b> 9310_ALPHABETA_GPC	<b>SOP Ref:</b> GL-RAD-A-001B
<b>Run Date:</b> 03/20/2018 10:54	<b>Analyst:</b> JXK3	<b>Instrument:</b> PIC3D
<b>Data File:</b> AB1748253.xls	<b>Aliquot:</b> 0.111 g	<b>Count Time:</b> 60 min
<b>Prep Batch:</b> 1748253	<b>Prep Method:</b> EPA 900.0/SW846 9310/SM 71	<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 03/19/2018 13:41		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
12587-46-1	Alpha ALPHA		18.7	pCi/g	+/-5.99	7.01	3.85	5.00
12587-47-2	Beta BETA		23.6	pCi/g	+/-3.96	5.23	2.79	10.0

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**

<b>SDG Number:</b> GEL446038	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F18022
<b>Lab Sample ID:</b> 446038002	<b>Date Collected:</b> 03/15/2018 09:22	<b>Matrix:</b> OTHER SOLID
	<b>Date Received:</b> 03/16/2018 08:50	<b>%Moisture:</b> 20.9
<b>Client ID:</b> B3J522		<b>Prep Basis:</b> "Dry Weight Corrected"
<b>Batch ID:</b> 1748254	<b>Method:</b> SRTOT_SEP_PRECIP_GPC	<b>SOP Ref:</b> GL-RAD-A-004
<b>Run Date:</b> 03/21/2018 13:25	<b>Analyst:</b> KSD1	<b>Instrument:</b> PIC9A
<b>Data File:</b> S1748254.xls	<b>Aliquot:</b> 0.324 g	<b>Count Time:</b> 60 min
<b>Prep Batch:</b> 1748254	<b>Prep Method:</b> EPA 905.0 Modified/DOE RP5	<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 03/20/2018 11:04		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium	U	0.298	pCi/g	+/-0.678	0.683	1.22	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	4.30	4.30	mg	100	(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: GEL446038  
 Lab Sample ID: 446038002  
  
 Client ID: B3J522  
 Batch ID: 1748045  
 Run Date: 03/19/2018 11:28  
 Data File: G446038002.CNF;1  
 Prep Batch: 1748045  
 Prep Date: 03/19/2018 00:00

Client: CPRC001  
 Date Collected: 03/15/2018 09:22  
 Date Received: 03/16/2018 08:50  
  
 Method: GAMMA\_GS  
 Analyst: MJH1  
 Aliquot: 148.948 g  
 Prep Method: DOE HASL 300, 4.5.2.3/Ga-01

Project: CPRC0F18022  
 Matrix: OTHER SOLID  
 %Moisture: 20.9  
  
 Prep Basis: "Dry Weight Corrected"  
 SOP Ref: GL-RAD-A-013  
 Instrument: GAM24  
 Count Time: 283 min  
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	U	0.0127	pCi/g	+/-0.0152	0.0162	0.0289	0.100
10198-40-0	Cobalt-60	U	0.0202	pCi/g	+/-0.0193	0.0214	0.030	0.100
14683-23-9	Europium-152	U	-0.00836	pCi/g	+/-0.0378	0.038	0.0651	0.100
15585-10-1	Europium-154	U	0.000634	pCi/g	+/-0.048	0.048	0.0878	0.100
14391-16-3	Europium-155	U	0.0394	pCi/g	+/-0.0366	0.0408	0.0683	0.100

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**

<b>SDG Number:</b> GEL446038	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F18022
<b>Lab Sample ID:</b> 446038002	<b>Date Collected:</b> 03/15/2018 09:22	<b>Matrix:</b> OTHER SOLID
	<b>Date Received:</b> 03/16/2018 08:50	<b>%Moisture:</b> 20.9
<b>Client ID:</b> B3J522		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1748214	<b>Method:</b> I129_SEP_LEPS_GS	<b>SOP Ref:</b> GL-RAD-A-006
<b>Run Date:</b> 03/19/2018 16:50	<b>Analyst:</b> BSW1	<b>Instrument:</b> XRAY1
<b>Data File:</b> I446038002.CNF;1	<b>Aliquot:</b> 1.6 g	<b>Count Time:</b> 120 min
<b>Prep Batch:</b> 1748214	<b>Prep Method:</b> DOE EML HASL-300,I-01 M	
<b>Prep Date:</b> 03/19/2018 08:54		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
15046-84-1	Iodine-129	U	0.0752	pCi/g	+/-0.275	0.277	0.515	2.00

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

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

**Rad  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL446038	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F18022
<b>Lab Sample ID:</b> 446038002	<b>Date Collected:</b> 03/15/2018 09:22	<b>Matrix:</b> OTHER SOLID
	<b>Date Received:</b> 03/16/2018 08:50	<b>%Moisture:</b> 20.9
<b>Client ID:</b> B3J522		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1748141	<b>Method:</b> TRITIUM_DIST_LSC	<b>SOP Ref:</b> GL-RAD-A-002
<b>Run Date:</b> 03/21/2018 01:14	<b>Analyst:</b> MXH8	<b>Instrument:</b> LSCGOLD
<b>Data File:</b> T1748141R.xls	<b>Aliquot:</b> 1.26 g	<b>Count Time:</b> 20 min
<b>Prep Batch:</b> 1748141	<b>Prep Method:</b> EPA 906.0 Modified	
<b>Prep Date:</b> 03/20/2018 07:26		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	-3.77	pCi/g	+/-11.6	11.6	21.8	30.0

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

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

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

**SDG Number:** GEL446038  
**Lab Sample ID:** 446038002

**Client:** CPRC001  
**Date Collected:** 03/15/2018 09:22  
**Date Received:** 03/16/2018 08:50

**Project:** CPRC0F18022  
**Matrix:** OTHER SOLID  
**%Moisture:** 20.9

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: March 22, 2018  
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**Client :** CH2MHill Plateau Remediation Company  
MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352  
**Contact:** Mr. Scot Fitzgerald  
**Workorder:** 446038

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1748022								
QC1203991519 MB									
Americium-241			U	0.0906	pCi/g			EXC2	03/20/1813:37
				Uncert: +/-0.208					
				TPU: +/-0.208					
**Americium-243 Tracer	19.6			21.4	pCi/g	REC: 109*	(30%-105%)		
				Uncert: +/-2.11					
				TPU: +/-3.26					
QC1203991520 446038002 DUP									
Americium-241		U	0.0588	U	-0.132	pCi/g			
			Uncert: +/-0.165		+/-0.150		RPD: 0	N/A	
			TPU: +/-0.165		+/-0.150		RER: 1.67	(0-2)	
**Americium-243 Tracer	19.6	19.9		18.1	pCi/g	REC: 93	(30%-105%)		
				Uncert: +/-2.12					
				TPU: +/-3.30					
QC1203991521 LCS									
Americium-241					15.8	pCi/g	REC: 86	(80%-120%)	03/21/1810:24
					Uncert: +/-2.01				
					TPU: +/-2.89				
**Americium-243 Tracer	19.6			20.6	pCi/g	REC: 105	(30%-105%)		
				Uncert: +/-2.22					
				TPU: +/-3.40					
Batch	1748024								
QC1203991522 MB									
Plutonium-238			U	0.0916	pCi/g			EXC2	03/20/1813:37
				Uncert: +/-0.287					
				TPU: +/-0.287					
Plutonium-239/240			U	-0.121	pCi/g				
				Uncert: +/-0.137					
				TPU: +/-0.138					
**Plutonium-242 Tracer	18.5			16.5	pCi/g	REC: 89	(30%-105%)		
				Uncert: +/-2.00					
				TPU: +/-3.02					
QC1203991523 446038002 DUP									
Plutonium-238		U	-0.123	U	0.0277	pCi/g			
			Uncert: +/-0.155		+/-0.330		RPD: 0	N/A	
			TPU: +/-0.155		+/-0.330		RER: 0.81	(0-2)	
Plutonium-239/240		U	0.00257	U	0.0914	pCi/g			
			Uncert: +/-0.190		+/-0.287		RPD: 0	N/A	
			TPU: +/-0.190		+/-0.287		RER: 0.506	(0-2)	
**Plutonium-242 Tracer	18.5	15.4		16.1	pCi/g	REC: 87	(30%-105%)		
				Uncert: +/-2.18					
				TPU: +/-3.27					
QC1203991524 LCS									
Plutonium-238			U	0.145	pCi/g				03/21/1810:21
				Uncert: +/-0.249					

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**QC Summary**

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1748024								
Plutonium-239/240	18.5	TPU:		+/-0.249					
		Uncert:		16.6	pCi/g	REC: 90	(80%-120%)		
		TPU:		+/-2.16					
**Plutonium-242 Tracer	18.5	TPU:		+/-3.13					
		Uncert:		18.0	pCi/g	REC: 98	(30%-105%)		
		TPU:		+/-2.28					
		TPU:		+/-3.39					
Batch	1748025								
QC1203991525	MB								
Uranium-233/234			U	0.281	pCi/g			EXC2	03/21/1810:20
		Uncert:		+/-0.418					
		TPU:		+/-0.421					
Uranium-235/236			U	0.290	pCi/g				
		Uncert:		+/-0.418					
		TPU:		+/-0.420					
Uranium-238			U	0.150	pCi/g				
		Uncert:		+/-0.294					
		TPU:		+/-0.295					
**Uranium-232 Tracer	19.5			18.2	pCi/g	REC: 93	(30%-105%)		
		Uncert:		+/-2.53					
		TPU:		+/-3.87					
QC1203991526	446038002	DUP							
Uranium-233/234				0.969	pCi/g				03/20/1813:25
		Uncert:		+/-0.584		RPD: 13	(0% - 100%)		
		TPU:		+/-0.602		RER: 0.288	(0-2)		
Uranium-235/236		U		0.450	pCi/g				
		Uncert:		+/-0.458		RPD: 0	N/A		
		TPU:		+/-0.463		RER: 0.195	(0-2)		
Uranium-238				0.575	pCi/g				
		Uncert:		+/-0.454		RPD: 30	(0% - 100%)		
		TPU:		+/-0.461		RER: 0.57	(0-2)		
**Uranium-232 Tracer	19.5			18.5	pCi/g	REC: 88	(30%-105%)		
		Uncert:		+/-2.44					
		TPU:		+/-3.76					
QC1203991527	LCS								
Uranium-233/234				23.9	pCi/g				03/20/1813:25
		Uncert:		+/-2.65					
		TPU:		+/-4.35					
Uranium-235/236				1.86	pCi/g				
		Uncert:		+/-0.847					
		TPU:		+/-0.889					
Uranium-238	25.2			24.0	pCi/g	REC: 95	(80%-120%)		
		Uncert:		+/-2.66					
		TPU:		+/-4.36					
**Uranium-232 Tracer	19.5			17.5	pCi/g	REC: 90	(30%-105%)		
		Uncert:		+/-2.40					
		TPU:		+/-3.70					
<b>Rad Gamma Spec</b>									
Batch	1748045								

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**QC Summary**

Workorder: 446038

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1748045								
QC1203991559	MB								
Cesium-137			U	0.000221	pCi/g			MJH1	03/19/1816:45
				Uncert: +/-0.00715					
				TPU: +/-0.00715					
Cobalt-60			U	-0.000228	pCi/g				
				Uncert: +/-0.00828					
				TPU: +/-0.00828					
Europium-152			U	-0.00201	pCi/g				
				Uncert: +/-0.0177					
				TPU: +/-0.0177					
Europium-154			U	0.0276	pCi/g				
				Uncert: +/-0.0383					
				TPU: +/-0.0404					
Europium-155			U	0.00761	pCi/g				
				Uncert: +/-0.0116					
				TPU: +/-0.0122					
QC1203991560	446038002	DUP							
Cesium-137		U 0.0127	X	0.0203	pCi/g				03/19/1816:46
		Uncert: +/-0.0152		+/-0.0187		RPD: 35	(0% - 100%)		
		TPU: +/-0.0162		+/-0.0188		RER: 0.598	(0-2)		
Cobalt-60		U 0.0202	U	0.00427	pCi/g				
		Uncert: +/-0.0193		+/-0.0128		RPD: 0	N/A		
		TPU: +/-0.0214		+/-0.0129		RER: 1.25	(0-2)		
Europium-152		U -0.00836	U	-0.00272	pCi/g				
		Uncert: +/-0.0378		+/-0.0265		RPD: 0	N/A		
		TPU: +/-0.038		+/-0.0266		RER: 0.239	(0-2)		
Europium-154		U 0.000634	U	-0.00425	pCi/g				
		Uncert: +/-0.048		+/-0.0356		RPD: 0	N/A		
		TPU: +/-0.048		+/-0.0356		RER: 0.16	(0-2)		
Europium-155		U 0.0394	U	0.0194	pCi/g				
		Uncert: +/-0.0366		+/-0.0296		RPD: 0	N/A		
		TPU: +/-0.0408		+/-0.0309		RER: 0.767	(0-2)		
QC1203991561	LCS								
Americium-241		488		561	pCi/g	REC: 115	(80%-120%)		03/19/1816:47
		Uncert: +/-10.3		+/-54.3					
Cesium-137		173		172	pCi/g	REC: 100	(80%-120%)		
		Uncert: +/-3.22		+/-14.6					
		TPU: +/-14.6							
Cobalt-60		132		132	pCi/g	REC: 100	(80%-120%)		
		Uncert: +/-3.29		+/-13.3					
		TPU: +/-13.3							
Europium-152			U	0.0557	pCi/g				
		Uncert: +/-1.43		+/-1.43					
		TPU: +/-1.43							
Europium-154			U	-0.127	pCi/g				
		Uncert: +/-0.913		+/-0.915					
		TPU: +/-0.915							
Europium-155			U	-0.173	pCi/g				
		Uncert: +/-1.26							

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1748045								
		TPU:		+/-1.26					
Batch	1748214								
QC1203991887	MB								
Iodine-129			U	0.109	pCi/g			BSW1	03/19/1816:50
		Uncert:		+/-0.256					
		TPU:		+/-0.260					
QC1203991888	445991003	DUP							
Iodine-129		U	-0.0201	U	-0.171	pCi/g			03/19/1816:51
		Uncert:	+/-0.350		+/-0.341		RPD: 0	N/A	
		TPU:	+/-0.350		+/-0.350		RER: 0.596	(0-2)	
QC1203991889	445991003	MS							
Iodine-129		U	-0.0201		37.8	pCi/g	REC: 106	(75%-125%)	03/19/1816:51
		Uncert:	+/-0.350		+/-3.55				
		TPU:	+/-0.350		+/-5.19				
QC1203991890	LCS								
Iodine-129			21.9		26.1	pCi/g	REC: 119	(80%-120%)	03/19/1816:52
		Uncert:			+/-2.27				
		TPU:			+/-3.46				
<b>Rad Gas Flow</b>									
Batch	1748253								
QC1203991958	MB								
Alpha			U	-0.0358	pCi/g			JXK3	03/20/1810:54
		Uncert:		+/-1.11					
		TPU:		+/-1.12					
Beta			U	1.05	pCi/g				
		Uncert:		+/-1.62					
		TPU:		+/-1.63					
QC1203991959	446038002	DUP							
Alpha			18.7		14.6	pCi/g			03/20/1810:54
		Uncert:	+/-5.99		+/-5.45		RPD: 25	(0% - 100%)	
		TPU:	+/-7.01		+/-6.17		RER: 0.867	(0-2)	
Beta			23.6		21.8	pCi/g			
		Uncert:	+/-3.96		+/-3.83		RPD: 8	(0%-30%)	
		TPU:	+/-5.23		+/-4.89		RER: 0.497	(0-2)	
QC1203991960	446038002	MS							
Alpha			113		144	pCi/g	REC: 111	(75%-125%)	03/20/1810:54
		Uncert:	+/-5.99		+/-15.8				
		TPU:	+/-7.01		+/-32.0				
Beta			439		431	pCi/g	REC: 93	(75%-125%)	
		Uncert:	+/-3.96		+/-15.8				
		TPU:	+/-5.23		+/-61.8				
QC1203991961	446038002	MSD							
Alpha			111		136	pCi/g	REC: 106	(75%-125%)	03/20/1810:54
		Uncert:	+/-5.99		+/-15.6		RPD: 6	(0%-30%)	
		TPU:	+/-7.01		+/-32.6		RER: 0.348	(0-2)	
Beta			431		432	pCi/g	REC: 95	(75%-125%)	
		Uncert:	+/-3.96		+/-15.6		RPD: 0	(0%-30%)	
		TPU:	+/-5.23		+/-61.5		RER: 0.00958	(0-2)	
QC1203991962	LCS								
Alpha			109		118	pCi/g	REC: 109	(80%-120%)	03/20/1810:54

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
<b>Rad Gas Flow</b>										
Batch	1748253									
				Uncert:						
				TPU:						
Beta	423			458	pCi/g	REC: 108	(80%-120%)			
				Uncert:						
				TPU:						
Batch	1748254									
QC1203991963	MB									
Total Strontium			U	-1.44	pCi/g			KSD1	03/21/1813:24	
				Uncert:						
				TPU:						
**Strontium Carrier	4.30			4.00	mg	REC: 93	(40%-110%)			
QC1203991964	446038002	DUP								
Total Strontium		U	0.298	U	-0.273	pCi/g			03/21/1813:25	
				Uncert:	+/-0.678			RPD: 0	N/A	
				TPU:	+/-0.683			RER: 1.16	(0-2)	
**Strontium Carrier	4.30	4.30		3.90	mg	REC: 91	(40%-110%)			
QC1203991965	LCS									
Total Strontium	72.5			79.7	pCi/g	REC: 110	(80%-120%)		03/21/1813:25	
				Uncert:	+/-4.58					
				TPU:	+/-21.5					
**Strontium Carrier	4.30			3.40	mg	REC: 79	(40%-110%)			
<b>Rad Liquid Scintillation</b>										
Batch	1748141									
QC1203991745	MB									
Tritium			U	0.0307	pCi/g			MXH8	03/21/1801:35	
				Uncert:						
				TPU:						
QC1203991746	446038002	DUP								
Tritium		U	-3.77	U	-3.58	pCi/g			03/21/1801:57	
				Uncert:	+/-11.6			RPD: 0	N/A	
				TPU:	+/-11.6			RER: 0.022	(0-2)	
QC1203991747	446038002	MS								
Tritium	161	U	-3.77		151	pCi/g	REC: 94	(75%-125%)	03/21/1802:18	
				Uncert:	+/-11.6					
				TPU:	+/-11.6					
QC1203991748	LCS									
Tritium	101				92.4	pCi/g	REC: 91	(80%-120%)	03/21/1808:27	
				Uncert:	+/-18.5					
				TPU:	+/-28.0					

**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
- 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.

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
B										
C										
C										
D										
E										
E										
J										
M										
N										
P										
S										
T										
U										
UX										
W										
X										
Y										
Z										
o										

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.