

7/15/2016



a member of **The GEL Group** INC



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July 14, 2016

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

Re: CHPRC SAF F16-043  
Work Order: 400512  
SDG: GEL400512

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 01, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

*B Luthman*  
Brielle Luthman for  
Heather Shaffer  
Project Manager

Purchase Order: 304070 - 8C  
Chain of Custody: F16-043-041  
Enclosures



## Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	8
Data Review Qualifier Definitions.....	11
Laboratory Certifications.....	13
Metals Analysis.....	15
Case Narrative.....	16
Sample Data Summary.....	21
Quality Control Summary.....	23
General Chem Analysis.....	31
Case Narrative.....	32
Sample Data Summary.....	35
Quality Control Summary.....	37
Radiological Analysis.....	39
Case Narrative.....	40
Sample Data Summary.....	43
Quality Control Summary.....	45

# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF F16-043  
SDG: GEL400512**

**July 14, 2016**

**Laboratory Identification:**

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

**Summary**

**Sample receipt**

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on July 01, 2016, for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

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

**Sample Identification**

The laboratory received the following sample:

<b>Laboratory Identification</b>	<b>Sample Description</b>
400512001	B35VN2

**Case Narrative**

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

**Data Package**

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

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

7/15/2016

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

**Technical Case Narrative**  
**CH2M Hill Plateau Remediation Company (CPRC)**  
**SDG #: GEL400512**  
**Work Order #: 400512**

## 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.

#### Calibration Information

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

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 400512001 (B35VN2).

#### 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 also did not meet the required control limits; thus, confirming matrix interferences and/or sample non-homogeneity.

Sample	Analyte	Value
1203578133 (B35VN2MS)	Sodium	153* (75%-125%)

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

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

Sample	Analyte	Value
1203578132 (B35VN2DUP)	Calcium	144* (0%-20%)
	Silver	590* (+/-575 ug/kg)

##### **Post Spike (PS) Recovery Statement**

The PS did not meet the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the presence of matrix interferences.

Sample	Analyte	Value
1203578657 (B35VN2PS)	Sodium	154* (80%-120%)

#### Technical Information

**Sample Dilutions**

Sample was diluted for titanium in order to bring raw values within the linear range of the instrument, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for antimony. 400512001 (B35VN2).

Analyte	400512
	001
Antimony	5X

**Determination of Metals by ICP-MS**

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

**Calibration Information****CRDL/PQL Requirements**

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

**Quality Control (QC) Information****Method Blank (MB) Statement**

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of zinc. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203578166 (MB).

**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 analytes. The post spike recoveries were within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recoveries may be attributed to possible sample matrix interference and/or non-homogeneity.

Sample	Analyte	Value
1203578169 (B35VN2MS)	Molybdenum	-182* (75%-125%)
	Nickel	-22* (75%-125%)

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

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

Sample	Analyte	Value
1203578168 (B35VN2DUP)	Aluminum	22.2* (0%-20%)
	Chromium	169* (0%-20%)
	Cobalt	20.3* (0%-20%)

	Copper	22.7* (0%-20%)
	Molybdenum	14011* (+/-219 ug/kg)

### Serial Dilution % Difference Statement

Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified.

Sample	Analyte	Value
1203578170 (B35VN2SDILT)	Zinc	11.5 *(0%-10%)

### Technical Information

#### Sample Dilutions

Sample 400512001 (B35VN2) was diluted to ensure that the analyte concentration was within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	400512
	001
Several	50X 2X 10X

## General Chemistry

### pH

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

#### Holding Times

Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

Sample	Analyte	Value
1203578549 (B35VN2DUP)	pH	Received 01-JUL-16, out of holding 30-JUN-16
400512001 (B35VN2)	pH	Received 01-JUL-16, out of holding 30-JUN-16

## Radiochemistry

**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.

**Certification Statement**

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

# **Chain of Custody and Supporting Documentation**

CH2M Hill Plateau Remediation Company  
 CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 400512  
 F16-043-041 PAGE 1 OF 1  
 COLLECTOR: Juan Aguilar  
 COMPANY CONTACT: TODAY, D  
 TELEPHONE NO.: 376-6427  
 PROJECT COORDINATOR: TODAY, D  
 PRICE CODE: 8C  
 DATA TURNAROUND: 15 Days / 15 Days  
 SAFETY: SAF NO. F16-043  
 AIR QUALITY:   
 METHOD OF SHIPMENT: FEDERAL EXPRESS  
 ORIGINAL  
 ICE CHEST NO.: GWS-498  
 FIELD LOGBOOK NO.: 32.00' - 34.50'  
 ACTUAL SAMPLE DEPTH: 32.00' - 34.50'  
 OFFSITE PROPERTY NO.: 6788  
 SHIPPED TO: GEL Laboratories, LLC  
 BILL OF LADING/AIR BILL NO.: 776650613192

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	HOLDING TIME	TYPE OF CONTAINER	NO. OF CONTAINER(S)	VOLUME	SAMPLE ANALYSIS	SAMPLE DATE	SAMPLE TIME
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	*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. NA	None	6 Months	G/P	1	250mL	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	JUN 30 2016	0855
B35VN2	SPECIAL HANDLING AND/OR STORAGE	None	ASAP	Moisture Resistant Cont.	1	60mL	SEE ITEM (2) IN SPECIAL INSTRUCTIONS		

CH2M Hill Plateau Remediation Company  
 CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 400512  
 F16-043-041 PAGE 1 OF 1  
 COLLECTOR: Juan Aguilar  
 COMPANY CONTACT: TODAY, D  
 TELEPHONE NO.: 376-6427  
 PROJECT COORDINATOR: TODAY, D  
 PRICE CODE: 8C  
 DATA TURNAROUND: 15 Days / 15 Days  
 SAFETY: SAF NO. F16-043  
 AIR QUALITY:   
 METHOD OF SHIPMENT: FEDERAL EXPRESS  
 ORIGINAL  
 ICE CHEST NO.: GWS-498  
 FIELD LOGBOOK NO.: 32.00' - 34.50'  
 ACTUAL SAMPLE DEPTH: 32.00' - 34.50'  
 OFFSITE PROPERTY NO.: 6788  
 SHIPPED TO: GEL Laboratories, LLC  
 BILL OF LADING/AIR BILL NO.: 776650613192

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM Juan Aguilar DATE/TIME: JUN 30 2016 0945	RECEIVED BY/STORED IN Janella Zunker CHPRC DATE/TIME: JUN 30 2016 0945	RECEIVED BY/STORED IN M. K. Rowlow DATE/TIME: 7/16 0:35	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME
RELINQUISHED BY/REMOVED FROM Janella Zunker CHPRC DATE/TIME: JUN 30 2016 1400	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME
RELINQUISHED BY/REMOVED FROM DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME
RELINQUISHED BY/REMOVED FROM DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME
RELINQUISHED BY/REMOVED FROM DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME	RECEIVED BY/STORED IN DATE/TIME: DATE/TIME

SPECIAL INSTRUCTIONS  
 SPLIT SPOON PARTS B & A WILL BE COMBINED TO ENSURE ADEQUATE SAMPLE MATERIAL FOR ANALYSIS; SAMPLE A AND B PORTION SAMPLES B35VN2, B35VPO, B35VPS  
 (1) 6020\_METALS\_ICPMS: COMMON {Aluminum, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Molybdenum, Selenium};  
 6020\_METALS\_ICPMS: COMMON (Add-on) {Antimony, Arsenic, Manganese, Nickel, Silver, Strontium, Vanadium, Zinc};  
 6010\_METALS\_ICP: COMMON {Calcium, Iron, Magnesium, Potassium, Sodium}; 6010\_METALS\_ICP: COMMON (Add-on) {Phosphorus};  
 (2) Moisture Content - D2216 {Percent moisture (wet sample)};

LABORATORY SECTION: RECEIVED BY: TITLE: DATE/TIME:  
 FINAL SAMPLE DISPOSITION: DISPOSAL METHOD: DATE/TIME:  
 PRINTED ON 6/2/2016 FSR ID = FSR33023 TRVL NUM = TRVL-16-165 A-6003-618 (REV 2)

**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>OPRC</u>		SDG/AR/COC/Work Order:	
Received By: <u>ML</u>		Date Received: <u>7-1-16</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
COC/Samples marked as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>920</u>	
Classified Radioactive II or III by RSO?	<input checked="" type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?	
COC/Samples marked containing PCBs?	<input checked="" type="checkbox"/>		
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input checked="" type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group	
Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped: UN#:	
Samples identified as Foreign Soil?	<input checked="" type="checkbox"/>		

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: <u>Ice bags</u> Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius <u>2C</u>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>130462962</u> Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7 VOA vials contain acid preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>7766 5061 3192</u>

Comments (Use Continuation Form if needed):

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

# **Data Review Qualifier Definitions**

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

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

# Laboratory Certifications

## List of current GEL Certifications as of 14 July 2016

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

# Metals Analysis

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**CH2MHill Plateau Remediation Company (CPRC)**  
**SDG #: GEL400512**  
**Work Order #: 400512**

**Product: Determination of Metals by ICP****Analytical Method:** 6010\_METALS\_ICP**Analytical Procedure:** GL-MA-E-013 REV# 26**Analytical Batch:** 1578854**Product: Determination of Metals by ICP-MS****Analytical Method:** 6020\_METALS\_ICPMS**Analytical Procedure:** GL-MA-E-014 REV# 28**Analytical Batch:** 1578870**Preparation Method:** SW846 3050B**Preparation Procedure:** GL-MA-E-009 REV# 26**Preparation Batches:** 1578853 and 1578867

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>
400512001	B35VN2
1203578130	Method Blank (MB)ICP
1203578131	Laboratory Control Sample (LCS)
1203578134	400512001(B35VN2L) Serial Dilution (SD)
1203578132	400512001(B35VN2D) Sample Duplicate (DUP)
1203578133	400512001(B35VN2S) Matrix Spike (MS)
1203578657	400512001(B35VN2PS) Post Spike (PS)
1203578166	Method Blank (MB)ICP-MS
1203578167	Laboratory Control Sample (LCS)
1203578170	400512001(B35VN2L) Serial Dilution (SD)
1203578168	400512001(B35VN2D) Sample Duplicate (DUP)
1203578169	400512001(B35VN2S) Matrix Spike (MS)
1203579912	400512001(B35VN2PS) Post Spike (PS)

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****CRDL/PQL Requirements**

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 400512001 (B35VN2)-ICP. The CRDL standard recoveries for SW846 6020A/6020B met the advisory control limits with the exception of molybdenum. Client sample concentrations were greater

than two times the PQL; therefore the data were not adversely affected. ICP-MS.

### Quality Control (QC) Information

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

The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of sodium. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203578130 (MB)-ICP. The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of zinc. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203578166 (MB)-ICP-MS.

#### **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 also did not meet the required control limits; thus, confirming matrix interferences and/or sample non-homogeneity.

Sample	Analyte	Value
1203578133 (B35VN2MS)	Sodium	153* (75%-125%)

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

Sample	Analyte	Value
1203578169 (B35VN2MS)	Molybdenum	-182* (75%-125%)
	Nickel	-22* (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
1203578132 (B35VN2DUP)	Calcium	144* (0%-20%)
	Silver	590* (+/-575 ug/kg)
1203578168 (B35VN2DUP)	Aluminum	22.2* (0%-20%)
	Chromium	169* (0%-20%)
	Cobalt	20.3* (0%-20%)
	Copper	22.7* (0%-20%)
	Molybdenum	14011* (+/-219 ug/kg)

#### **Post Spike (PS) Recovery Statement**

The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less

than four times (4X) the spike concentration added. The PS did not meet the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the presence of matrix interferences.

Sample	Analyte	Value
1203578657 (B35VN2PS)	Sodium	154* (80%-120%)

#### **Serial Dilution % Difference Statement**

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 25x the IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified.

Sample	Analyte	Value
1203578170 (B35VN2SDILT)	Zinc	11.5 *(0%-10%)

#### **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.

##### **Sample Dilutions**

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Sample was diluted for titanium in order to bring raw values within the linear range of the instrument, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for antimony. 400512001 (B35VN2)-ICP. Sample 400512001 (B35VN2)-ICP-MS was diluted to ensure that the analyte concentration was within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times. ICP-MS.

Analyte	400512
	001
Several	50X 5X 2X 10X 1X

#### **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: GEL400512 GEL Work Order: 400512

**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.
- M Duplicate precision not met.
- 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: 14 JUL 2016**

**Title: Data Validator**

# Sample Data Summary

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

SDG No: GEL400512

CONTRACT: CPCR0F16043

METHOD TYPE: SW846

SAMPLE ID:400512001

BASIS: Dry Weight

DATE COLLECTED 30-JUN-16

CLIENT ID: B35VN2

LEVEL: Low

DATE RECEIVED 01-JUL-16

MATRIX: SOIL

%SOLIDS: 87

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	7110000	ug/kg	D*	3430	11400	50	2	MS	SKJ	07/07/16 00:27	160706-6	1578870
7440-36-0	Antimony	1750	ug/kg	UD	1750	5300	5300	5	P	HSC	07/05/16 17:57	070516A-3	1578854
7440-38-2	Arsenic	1180	ug/kg	D	229	1140	10	2	MS	PRB	07/07/16 23:43	160707-4	1578870
7440-39-3	Barium	71300	ug/kg	D	571	2290	20	10	MS	PRB	07/07/16 23:59	160707-4	1578870
7440-43-9	Cadmium	334	ug/kg	D	22.9	229	5	2	MS	SKJ	07/07/16 00:27	160706-6	1578870
7440-70-2	Calcium	5830000	ug/kg	*	8490	26500	26500	1	P	HSC	07/06/16 19:39	070616-1	1578854
7440-47-3	Chromium	66000	ug/kg	D*	229	686	10	2	MS	SKJ	07/07/16 00:27	160706-6	1578870
7440-48-4	Cobalt	10600	ug/kg	D*	68.6	229	20	2	MS	SKJ	07/07/16 00:27	160706-6	1578870
7440-50-8	Copper	26100	ug/kg	D*	377	1140	8	10	MS	PRB	07/07/16 23:59	160707-4	1578870
7439-89-6	Iron	26900000	ug/kg		8490	26500	26500	1	P	HSC	07/06/16 19:39	070616-1	1578854
7439-92-1	Lead	2010	ug/kg	D	114	457	15	2	MS	SKJ	07/07/16 00:27	160706-6	1578870
7439-95-4	Magnesium	4070000	ug/kg		9020	31800	31800	1	P	HSC	07/06/16 19:39	070616-1	1578854
7439-96-5	Manganese	481000	ug/kg	D	5710	28600	5	50	MS	SKJ	07/12/16 15:34	160712-7	1578870
7439-98-7	Molybdenum	15000	ug/kg	D*N	68.6	229	20	2	MS	PRB	07/07/16 23:43	160707-4	1578870
7440-02-0	Nickel	13600	ug/kg	DN	114	457	40	2	MS	SKJ	07/07/16 00:27	160706-6	1578870
7723-14-0	Phosphorous	1220000	ug/kg		5300	15900	15900	1	P	HSC	07/06/16 19:39	070616-1	1578854
7440-09-7	Potassium	475000	ug/kg		6790	26500	26500	1	P	HSC	07/06/16 19:39	070616-1	1578854
7782-49-2	Selenium	1700	ug/kg	D	377	1140	50	2	MS	PRB	07/11/16 17:57	160711-5	1578870
7440-22-4	Silver	1110	ug/kg	*	106	530	530	1	P	HSC	07/06/16 19:39	070616-1	1578854
7440-23-5	Sodium	663000	ug/kg	N	7420	26500	26500	1	P	HSC	07/06/16 19:39	070616-1	1578854
7440-24-6	Strontium	33600	ug/kg	D	457	2290	10	2	MS	SKJ	07/07/16 00:27	160706-6	1578870
7440-62-2	Vanadium	90200	ug/kg	D	1710	5710	5710	10	MS	PRB	07/07/16 23:59	160707-4	1578870
7440-66-6	Zinc	52200	ug/kg	DM	457	2290	25	2	MS	SKJ	07/07/16 00:27	160706-6	1578870

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1578854	1578853	SW846 3050B	0.542	g	50	mL	07/01/16	JP1
1578870	1578867	SW846 3050B	0.503	g	50	mL	07/05/16	SXW1

**\*Analytical Methods:**

**P** SW846 3050B/6010C  
**MS** SW846 3050B/6020A

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: July 14, 2016

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 400512

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1578870										
QC1203578168 400512001 DUP											
Aluminum	*D	7110000	*D	8890000	ug/kg	22.2*		(0%-20%)	SKJ	07/07/16	00:31
Arsenic	D	1180	BD	951	ug/kg	21.9 ^		(+/-1100)	PRB	07/07/16	23:46
Barium	D	71300	D	66700	ug/kg	6.66		(0%-20%)		07/08/16	00:02
Cadmium	D	334	D	378	ug/kg	12.5 ^		(+/-219)	SKJ	07/07/16	00:31
Chromium	*D	66000	*D	5610	ug/kg	169*		(0%-20%)			
Cobalt	*D	10600	*D	13000	ug/kg	20.3*		(0%-20%)			
Copper	*D	26100	*D	20700	ug/kg	22.7*		(0%-20%)	PRB	07/08/16	00:02
Lead	D	2010	D	2140	ug/kg	6.5 ^		(+/-438)	SKJ	07/07/16	00:31
Manganese	D	481000	D	451000	ug/kg	6.41		(0%-20%)		07/12/16	15:36
Molybdenum	*DN	15000	*D	989	ug/kg	175*^		(+/-219)	PRB	07/07/16	23:46
Nickel	DN	13600	D	15200	ug/kg	11		(0%-20%)	SKJ	07/07/16	00:31
Selenium	D	1700	D	1540	ug/kg	9.72 ^		(+/-1100)	PRB	07/11/16	18:00
Strontium	D	33600	D	39300	ug/kg	15.7		(0%-20%)	SKJ	07/07/16	00:31
Vanadium	D	90200	D	91200	ug/kg	1.08		(0%-20%)	PRB	07/08/16	00:02
Zinc	DM	52200	D	57400	ug/kg	9.57		(0%-20%)	SKJ	07/07/16	00:31
QC1203578167 LCS											
Aluminum		187000	D	184000	ug/kg		98.4	(80%-120%)		07/07/16	00:15
Arsenic		4680	D	4070	ug/kg		86.9	(80%-120%)	PRB	07/07/16	23:34
Barium		4680	D	4710	ug/kg		101	(80%-120%)			
Cadmium		4680	D	4420	ug/kg		94.4	(80%-120%)	SKJ	07/07/16	00:15

7/15/2016

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## QC Summary

Workorder: 400512

Page 2 of 7

Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1578870										
Chromium	4680		D	4800	ug/kg		103	(80%-120%)			
Cobalt	4680		D	4670	ug/kg		99.7	(80%-120%)	SKJ	07/07/16	00:15
Copper	4680		D	4770	ug/kg		102	(80%-120%)	PRB	07/07/16	23:34
Lead	4680		D	4890	ug/kg		105	(80%-120%)	SKJ	07/07/16	00:15
Manganese	4680		D	4840	ug/kg		103	(80%-120%)		07/12/16	15:32
Molybdenum	4680		D	4670	ug/kg		99.7	(80%-120%)	PRB	07/07/16	23:34
Nickel	4680		D	4740	ug/kg		101	(80%-120%)	SKJ	07/07/16	00:15
Selenium	4680		D	4050	ug/kg		86.4	(80%-120%)	PRB	07/11/16	17:55
Strontium	4680		D	4560	ug/kg		97.4	(80%-120%)	SKJ	07/07/16	00:15
Vanadium	4680		D	4720	ug/kg		101	(80%-120%)	PRB	07/07/16	23:34
Zinc	4680		D	5230	ug/kg		112	(80%-120%)	SKJ	07/07/16	00:15
QC1203578166 MB											
Aluminum			DU	2700	ug/kg					07/07/16	00:11
Arsenic			DU	180	ug/kg				PRB	07/07/16	23:31
Barium			DU	89.9	ug/kg						
Cadmium			DU	18.0	ug/kg				SKJ	07/07/16	00:11
Chromium			DU	180	ug/kg						
Cobalt			DU	54.0	ug/kg						
Copper			DU	59.4	ug/kg				PRB	07/07/16	23:31
Lead			DU	89.9	ug/kg				SKJ	07/07/16	00:11
Manganese			DU	180	ug/kg					07/12/16	15:30
Molybdenum			DU	54.0	ug/kg				PRB	07/07/16	23:31
Nickel			DU	89.9	ug/kg				SKJ	07/07/16	00:11

7/15/2016

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**QC Summary**

Workorder: 400512

Page 3 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1578870										
Selenium			DU	297	ug/kg				PRB	07/11/16	17:52
Strontium			DU	360	ug/kg				SKJ	07/07/16	00:11
Vanadium			DU	270	ug/kg				PRB	07/07/16	23:31
Zinc			BD	805	ug/kg				SKJ	07/07/16	00:11
QC1203578169 400512001 MS											
Aluminum	197000	*D	7110000	D	8190000	ug/kg	N/A	(75%-125%)		07/07/16	00:35
Arsenic	4930	D	1180	D	5120	ug/kg	79.8	(75%-125%)	PRB	07/07/16	23:50
Barium	4930	D	71300	D	65000	ug/kg	N/A	(75%-125%)		07/08/16	00:05
Cadmium	4930	D	334	D	5000	ug/kg	94.6	(75%-125%)	SKJ	07/07/16	00:35
Chromium	4930	*D	66000	D	10400	ug/kg	N/A	(75%-125%)			
Cobalt	4930	*D	10600	D	15600	ug/kg	102	(75%-125%)			
Copper	4930	*D	26100	D	21300	ug/kg	N/A	(75%-125%)	PRB	07/08/16	00:05
Lead	4930	D	2010	D	6710	ug/kg	95.4	(75%-125%)	SKJ	07/07/16	00:35
Manganese	4930	D	481000	D	399000	ug/kg	N/A	(75%-125%)		07/12/16	15:38
Molybdenum	4930	*DN	15000	DN	6010	ug/kg	0*	(75%-125%)	PRB	07/07/16	23:50
Nickel	4930	DN	13600	DN	12600	ug/kg	0*	(75%-125%)	SKJ	07/07/16	00:35
Selenium	4930	D	1700	D	5410	ug/kg	75.2	(75%-125%)	PRB	07/11/16	18:03
Strontium	4930	D	33600	D	41100	ug/kg	N/A	(75%-125%)	SKJ	07/07/16	00:35
Vanadium	4930	D	90200	D	94300	ug/kg	N/A	(75%-125%)	PRB	07/08/16	00:05
Zinc	4930	DM	52200	D	58100	ug/kg	N/A	(75%-125%)	SKJ	07/07/16	00:35
QC1203579912 400512001 PS											
Molybdenum	25.0	*DN	65.5	D	92.1	ug/L	106	(80%-120%)	PRB	07/07/16	23:53
Nickel	25.0	DN	59.7	D	86.6	ug/L	108	(80%-120%)	SKJ	07/07/16	00:39

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**QC Summary**

Workorder: 400512

Page 4 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1578870										
QC1203578170	400512001	SDILT									
Aluminum	*D	31100	D	6390	ug/L	2.72		(0%-10%)	SKJ	07/07/16	00:43
Arsenic	D	5.18	DU	1140	ug/L	N/A		(0%-10%)	PRB	07/07/16	23:56
Barium	D	62.4	D	12.5	ug/L	.0481		(0%-10%)		07/08/16	00:08
Cadmium	D	1.46	BD	0.323	ug/L	10.5		(0%-10%)	SKJ	07/07/16	00:43
Chromium	*D	289	D	61.3	ug/L	6.15		(0%-10%)			
Cobalt	*D	46.4	D	10.2	ug/L	9.66		(0%-10%)			
Copper	*D	22.8	D	4.44	ug/L	2.64		(0%-10%)	PRB	07/08/16	00:08
Lead	D	8.79	BD	1.81	ug/L	2.84		(0%-10%)	SKJ	07/07/16	00:43
Manganese	D	84.2	D	17.1	ug/L	1.34		(0%-10%)		07/12/16	15:40
Molybdenum	*DN	65.5	D	13.0	ug/L	.788		(0%-10%)	PRB	07/07/16	23:56
Nickel	DN	59.7	D	12.9	ug/L	8.01		(0%-10%)	SKJ	07/07/16	00:43
Selenium	D	7.43	BD	2.21	ug/L	48.6		(0%-10%)	PRB	07/11/16	18:08
Strontium	D	147	D	33.3	ug/L	13.2		(0%-10%)	SKJ	07/07/16	00:43
Vanadium	D	78.9	D	15.4	ug/L	2.37		(0%-10%)	PRB	07/08/16	00:08
Zinc	DM	228	DM	50.9	ug/L	11.5*		(0%-10%)	SKJ	07/07/16	00:43

**Metals Analysis-ICP**

Batch 1578854

QC1203578132	400512001	DUP									
Antimony	DU	1750	DU	1900	ug/kg	N/A			HSC	07/05/16	18:00
Calcium	*	5830000	*	36100000	ug/kg	144*		(0%-20%)		07/06/16	19:43
Iron		26900000		22900000	ug/kg	16		(0%-20%)			
Magnesium		4070000		3420000	ug/kg	17.4		(0%-20%)			

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**QC Summary**

Workorder: 400512

Page 5 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1578854										
Phosphorous		1220000		1230000	ug/kg	0.641		(0%-20%)			
Potassium		475000		444000	ug/kg	6.79		(0%-20%)	HSC	07/06/16	19:43
Silver	*	1110	*B	520	ug/kg	72*^		(+/-575)			
Sodium	N	663000		575000	ug/kg	14.3		(0%-20%)			
QC1203578131	LCS										
Antimony	48100			43700	ug/kg		90.9	(80%-120%)		07/05/16	17:29
Calcium	481000			486000	ug/kg		101	(80%-120%)		07/06/16	19:36
Iron	481000			492000	ug/kg		102	(80%-120%)			
Magnesium	481000			485000	ug/kg		101	(80%-120%)			
Phosphorous	48100			41800	ug/kg		86.9	(80%-120%)			
Potassium	481000			450000	ug/kg		93.6	(80%-120%)			
Silver	48100			45900	ug/kg		95.5	(80%-120%)			
Sodium	481000			484000	ug/kg		101	(80%-120%)			
QC1203578130	MB										
Antimony			U	325	ug/kg					07/05/16	17:25
Calcium			U	7890	ug/kg					07/06/16	19:32
Iron			U	7890	ug/kg						
Magnesium			U	8380	ug/kg						
Phosphorous			U	4930	ug/kg						
Potassium			U	6310	ug/kg						
Silver			U	98.6	ug/kg						
Sodium			B	7130	ug/kg						
QC1203578133	400512001 MS										
Antimony	56900	DU	1750	D	51600	ug/kg	90.7	(75%-125%)		07/05/16	18:04

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**QC Summary**

Workorder: 400512

Page 6 of 7

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>												
Batch	1578854											
Calcium	569000	*	5830000		8250000	ug/kg		N/A	(75%-125%)		07/06/16	19:46
Iron	569000		26900000		30300000	ug/kg		N/A	(75%-125%)	HSC		
Magnesium	569000		4070000		5060000	ug/kg		N/A	(75%-125%)			
Phosphorous	56900		1220000		1610000	ug/kg		N/A	(75%-125%)			
Potassium	569000		475000		1070000	ug/kg		105	(75%-125%)			
Silver	56900	*	1110		55100	ug/kg		94.9	(75%-125%)			
Sodium	569000	N	663000	N	1530000	ug/kg		153*	(75%-125%)			
QC1203578657 400512001 PS												
Sodium	5000	N	6250		13900	ug/L		154*	(80%-120%)		07/07/16	10:16
QC1203578134 400512001 SDILT												
Antimony		DU	-1.73	DU	8750	ug/L	N/A		(0%-10%)		07/05/16	18:11
Calcium		*	55000	D	11700	ug/L	6.16		(0%-10%)		07/06/16	19:50
Iron			253000	D	54900	ug/L	8.34		(0%-10%)			
Magnesium			38400	D	8060	ug/L	5.07		(0%-10%)			
Phosphorous			11500	D	2460	ug/L	7.02		(0%-10%)			
Potassium			4480	D	951	ug/L	6.21		(0%-10%)			
Silver		*	10.4	BD	2.53	ug/L	21.2		(0%-10%)			
Sodium		N	6250	D	1250	ug/L	.387		(0%-10%)			

**Notes:**

The Qualifiers in this report are defined as follows:

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

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**QC Summary**

Workorder: 400512

Page 7 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
E	Reported value is estimated due to interferences. See comment in narrative.										
M	Duplicate precision not met.										
N	Spike Sample recovery is outside control limits.										
S	Reported value determined by the Method of Standard Additions (MSA)										
U	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.										
W	Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.										
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										

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

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

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

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

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

# General Chem Analysis

# Case Narrative

**General Chemistry  
 Technical Case Narrative  
 CH2MHill Plateau Remediation Company (CPRC)  
 SDG #: GEL400512  
 Work Order #: 400512**

**Product: pH****Analytical Method:** SW846 9045D**Analytical Procedure:** GL-GC-E-008 REV# 21**Analytical Batch:** 1579024

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>
400512001	B35VN2
1203578547	Laboratory Control Sample (LCS)
1203578549	400512001(B35VN2) Sample Duplicate (DUP)

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

**Data Summary:**

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

**Technical Information****Holding Times**

Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203578549 (B35VN2DUP)	pH	Received 01-JUL-16, out of holding 30-JUN-16
400512001 (B35VN2)	pH	Received 01-JUL-16, out of holding 30-JUN-16

**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: GEL400512 GEL Work Order: 400512

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

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: Kristen Mizzell

Date: 08 JUL 2016

Title: Analyst I

# Sample Data Summary

7/15/2016

**GEL LABORATORIES LLC**

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

**Certificate of Analysis**

Report Date: July 8, 2016

Company : CH2MHill Plateau Remediation Company  
Address : MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352  
Contact: Mr. Scot Fitzgerald  
Project: CHPRC SAF F16-043

Client Sample ID: B35VN2 Project: CPRC0F16043  
Sample ID: 400512001 Client ID: CPRC001  
Matrix: SOIL  
Collect Date: 30-JUN-16 08:55  
Receive Date: 01-JUL-16  
Collector: Client  
Moisture: 13%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis											
9045_pH (Non-Aqueous):COMMON "As Received"											
pH at Temp 24.6C	X	9.25	0.010	0.100	SU	1	RXB5	07/06/16	1822	1579024	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9045D	

Notes:

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: July 8, 2016

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

**Contact: Mr. Scot Fitzgerald**

**Workorder: 400512**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Titration and Ion Analysis</b>											
Batch	1579024										
QC1203578549	400512001	DUP									
pH	X	9.25	X	9.37	SU	1.29		(0%-30%)	RXB5	07/06/16	18:23
QC1203578547	LCS										
pH	7.00			6.99	SU		99.9	(70%-130%)		07/06/16	18:08

**Notes:**

The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.  
 ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.  
 \* Indicates that a Quality Control parameter was not within specifications.  
 For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

# Radiological Analysis

# Case Narrative

**Radiochemistry  
Technical Case Narrative  
CH2M Hill Plateau Remediation Company (CPRC)  
SDG #: GEL400512  
Work Order #: 400512**

**Product: Dry Weight**

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

**Analytical Procedure:** GL-OA-E-020 REV# 10

**Analytical Batch:** 1578919

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>
400512001	B35VN2
1203578290	400489002(NonSDG) Sample Duplicate (DUP)

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

**Data Summary:**

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

**Certification Statement**

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

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL400512 GEL Work Order: 400512

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

**Review/Validation**

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

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

**Signature:** 

**Name:** Theresa Austin

**Date:** 06 JUL 2016

**Title:** Group Leader

# Sample Data Summary

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

<b>SDG Number:</b> GEL400512	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F16043
<b>Lab Sample ID:</b> 400512001	<b>Date Collected:</b> 06/30/2016 08:55	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 07/01/2016 09:05	<b>%Moisture:</b> 13
<b>Client ID:</b> B35VN2		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1578919	<b>Method:</b> ASTM D 2216 (Modified)	<b>SOP Ref:</b> GL-OA-E-020
<b>Run Date:</b> 07/05/2016 14:00	<b>Analyst:</b> CXC1	<b>Instrument:</b> SP-39020004
<b>Data File:</b>		<b>Count Time:</b>
<b>Prep Batch:</b> 1578919		
<b>Prep Date:</b> 07/05/2016 14:00		

CAS No.	Parmname	Qual	Result	Units	Recovery%	Acceptable Limits	MDC
	Moisture		13.0	percent	+/-		
<b>Surrogate/Tracer recovery</b>			<b>Result</b>	<b>Nominal</b>	<b>Units</b>	<b>Recovery%</b>	<b>Acceptable Limits</b>

**Comments:**

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

# Quality Control Summary

7/15/2016

# GEL LABORATORIES LLC

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## QC Summary

Report Date: July 6, 2016

Page 1 of 1

Client : CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington 99352

Contact: Mr. Scot Fitzgerald

Workorder: 400512

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
<b>Gravimetric Solids</b>										
Batch	1578919									
QC1203578290	400489002	DUP								
Moisture		87.3		87.9	percent			CXC1	07/05/16	14:00
						RPD:	1 (0%-20%)			

### Notes:

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

The Qualifiers in this report are defined as follows:

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

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

\*\* Indicates analyte is a surrogate compound.

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

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

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