

**SAF-RC-236**  
**100N Groundwater Sample**  
**Collection Supporting UPR-100-N-17**  
**FINAL DATA PACKAGE**

**COMPLETE COPY OF DATA PACKAGE TO:**

Kathy Wendt

H4-21

KW 6/30/14  
INITIAL/DATE

**COMMENTS:**

**SDG X0054**

**SAF-RC-236**

Rad only

Chem only

Rad & Chem

Complete

Partial

**Sample Location: 100-N Groundwater Samples,  
C6132, 116mArray-0A**



June 26, 2014

Joan Kessner  
WC-Hanford, Inc.  
2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington 99354

Re: RC-236A Groundwater  
Work Order: 350505  
SDG: X0054

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on June 12, 2014. 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. 1616.

Sincerely,

Orlette Johnson  
Project Manager

Purchase Order: 1510  
Chain of Custody: RC-236A-111, RC-236A-112, RC-236A-113 and RC-236A-114  
Enclosures

## Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	3
Laboratory Certifications.....	9
Volatile Analysis.....	11
Case Narrative.....	12
Sample Data Summary.....	18
Quality Control Summary.....	21
HPLC Polynuclear Aromatic Hydrocarbon Analysis.....	28
Sample Data Summary.....	34
QC Summary.....	37
Miscellaneous Data.....	42
FID Diesel Range Organics Analysis.....	44
Case Narrative.....	45
Sample Data Summary.....	50
Quality Control Summary.....	53
Miscellaneous.....	56
GC Volatiles (GRO) Analysis.....	58
Case Narrative.....	59
Sample Data Summary.....	64
Quality Control Summary.....	67

Metals Analysis.....	70
Case Narrative.....	71
Sample Data Summary.....	76
Quality Control Summary.....	82
Miscellaneous.....	92
General Chem Analysis.....	95
Case Narrative.....	96
Sample Data Summary.....	105
Quality Control Summary.....	111

# Case Narrative

**Receipt Narrative  
for  
WC-HANFORD, INC.  
SDG: X0054  
Work Order: 350505**

**June 26, 2014**

**Laboratory Identification:**

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

**Summary:**

**Sample receipt:** The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on June 12, 2014 for analysis.

**Sample Identification:** The laboratory received the following samples:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
350505001	B2WVW1
350505002	B2WVW2
350505003	B2WVW4
350505004	B2WVW5

**Case Narrative:**

Sample analyses were conducted using methodology as outlined in GEL's 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.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Diesel Range Organics, GC Volatiles (GRO), GC/MS Volatile, General Chemistry, HPLC Polynuclear Aromatic Hydrocarbon and Metals.



Orlette Johnson  
Project Manager

# **Chain of Custody and Supporting Documentation**

350505 '14 605

C.O.C. # RC-236A-111

Page 1 of 1

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

CH2MHill Plateau Remediation Company

Collector	J.R. Aguilar CHPRC	Contact/Requester	THOMPSON, WS	Telephone No.	372-9597
SAF No.	RC-236A	Sampling Origin	C6132	Purchase Order/Charge Code	303382ES20
Project Title	100-N Groundwater Sample Collection S	Logbook No.	HNF-N-506 59 / 77	Ice Chest No.	6005-323
Shipped To (Lab)	GEL Laboratories, LLC	Method of Shipment	Commercial Carrier	Bill of Lading/Air Bill No.	77027239485
Protocol	CHARACTERIZATION	Priority:	15 Days	Offsite Property No.	4857

**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.  
 \*\* The RCCC acknowledges that the analytical holding time for Nitrate, Nitrite, and Phosphate by EPA methods 300.0 or 9056 will not be met.

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix *
J.R. Aguilar CHPRC			JUN 11 2014 1215	L.D. Wall CHPRC			JUN 11 2014 1215	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air
Relinquished By			JUN 11 2014 1400	FEDEX				DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
Relinquished By				J.P. Pellegriani			4-12-14 0900	

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix *
J.R. Aguilar CHPRC			JUN 11 2014 0826	L.D. Wall CHPRC			JUN 11 2014 1215	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air
Relinquished By			JUN 11 2014 0826	FEDEX				DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
Relinquished By				J.P. Pellegriani			4-12-14 0900	

**FINAL SAMPLE DISPOSITION**  
 Disposal Method (e.g., Return to customer, per lab procedure, used in process)  
 Disposed By  
 Date/Time

**Collector** J.R. Aguilar CHPRC  
**SAF No.** RC-236A  
**Project Title** 100-N Groundwater Sample Collection S  
**Shipped To (Lab)** GEL Laboratories, LLC  
**Protocol** CHARACTERIZATION  
**Contact/Requester** THOMPSON, WS  
**Sampling Origin** C6132  
**Logbook No.** HNF-N-506 59 / 77  
**Method of Shipment** Commercial Carrier  
**Priority:** 15 Days **PRIORITY**  
**Telephone No.** 372-9597  
**Purchase Order/Charge Code** 303382ES20  
**Ice Chest No.** 605-533  
**Bill of Lading/Air Bill No.** 770278394620  
**Offsite Property No.** 4857

**POSSIBLE SAMPLE HAZARDS/REMARKS**  
 \*Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR/JATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.  
**SPECIAL INSTRUCTIONS** Hold Time  
 \*\* The field NCOs prior to purging the well for sample collection, will use a transparent bailer to collect a grab sample to evaluate the presence of an oil sheen. They are to record their observations, along with any odors observed on the Field Sampling Report provided.  
 \*\* The RCCC acknowledges that the analytical holding time for Nitrate, Nitrite, and Phosphate by EPA methods 300.0 or 9056 will not be met.

B2WVW2	N	W	6-11-14	0826	1x250-mL G/P	9056_ANIONS_IC: COMMON; 9056_ANIONS_IC: COMMON (Add-on)	28 Days/48 Hours	Cool-4C
--------	---	---	---------	------	--------------	--	------------------	---------

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix *
J.R. Aguilar CHPRC			JUN 11 2014 1200	JC Fulton CHPRC			JUN 11 2014 1200	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air
J.C. Fulton CHPRC			JUN 11 2014 1400	FEDEX				DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
		FedEx		J.P. Pellegrini			6-12-14 0900	
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method (e.g., Return to customer, per lab procedure, used in process)							Date/Time
PRINTED O 5/20/2014	Disposed By							Date/Time
								A-6004-842 (REV 2)

**CH2M Hill Plateau Remediation Company**

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

C.O.C. #

**RC-236A-113**

Page 1 of 1

Collector	J.R. Aguilar CHPRC	Contact/Requester	THOMPSON, WS	Telephone No.	372-9597
SAF No.	RC-236A	Sampling Origin	116mArray-0A	Purchase Order/Charge Code	303382ES20
Project Title	100-N Groundwater Sample Collection S	Logbook No.	HNF-N-506 59 / 77	Ice Chest No.	6005-5333
Shipped To (Lab)	GEL Laboratories, LLC	Method of Shipment	Commercial Carrier	Bill of Lading/Air Bill No.	170272394620
Protocol	CHARACTERIZATION	Priority:	15 Days	Offsite Property No.	4857

**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.

**SPECIAL INSTRUCTIONS** Hold Time Total Activity Exemption: Yes  No

\*\* The field NCOs prior to purging the well for sample collection, will use a transparent bailer to collect a grab sample to evaluate the presence of an oil sheen. They are to record their observations, along with any odors observed on the Field Sampling Report provided.

\*\* The RCCC acknowledges that the analytical holding time for Nitrate, Nitrite, and Phosphate by EPA methods 300.0 or 9056 will not be met.

B2WVW4	N	W	6-11-14	1028	2x1-L G	1664A_OILGREASE: COMMON	28 Days	HCl to pH <2/Cool-4C
B2WVW4	N	W			1x1-L aG	WTPH_DIESEL: COMMON; WTPH_MOTOR OIL: COMMON	14/40 Days	HCl to pH <2/Cool-4C
B2WVW4	N	W			4x40-mL aGs*	WTPH_GASOLINE: COMMON	14 Days	HCl to pH <2/Cool-4C
B2WVW4	N	W			1x500-mL G/P	6010_METALS_ICP (Supertrace): COMMON; 6010_METALS_ICP (Supertrace): COMMON (Add-on)	6 Months	HNO3 to pH <2
B2WVW4	N	W			1x250-mL G/P	2320_ALKALINITY: COMMON	14 Days	Cool-4C
B2WVW4	N	W			2x1-L aG	8310_PAHs: COMMON	7/40 Days	Cool-4C
B2WVW4	N	W	6-11-14	1028	4x40-mL aGs*	8260_VOA_GCMS: COMMON	14 Days	HCl or H2SO4 to pH <2/Cool-4C

Relinquished By	J.R. Aguilar CHPRC	Print		Sign		Received By	L.D. Wall CHPRC	Print		Sign		Date/Time	JUN 11 2014 1200
Relinquished By	L.D. Wall CHPRC	Print		Sign		Received By	FEDEX	Print		Sign		Date/Time	JUN 11 2014 1400
Relinquished By		Print		Sign		Received By	J.Pellegrini	Print		Sign		Date/Time	6-12-14 0900
Relinquished By		Print		Sign		Received By		Print		Sign		Date/Time	
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method (e.g., Return to customer, per lab procedure, used in process)												
PRINTED O	5/20/2014											Disposed By	Date/Time

<b>CH2MHill Plateau Remediation Company</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>		C.O.C. # <b>RC-236A-114</b>
Collector <b>J.R. Aguilar CHPRC</b>		Contact/Requester <b>THOMPSON, WS</b>	Telephone No. <b>372-9597</b>	Page 1 of 1
SAF No. <b>RC-236A</b>	Sampling Origin <b>116mArray-0A</b>	Purchase Order/Charge Code <b>303382ES20</b>	Ice Chest No. <b>6WS-533</b>	
Project Title <b>100-N Groundwater Sample Collection S</b>	Logbook No. <b>HNF-N-506 59 / 77</b>	Method of Shipment <b>Commercial Carrier</b>	Bill of Lading/Air Bill No. <b>770272394620</b>	
Shipped To (Lab) <b>GEL Laboratories, LLC</b>	Priority: <b>15 Days</b>	Offsite Property No. <b>4857</b>		
Protocol <b>CHARACTERIZATION</b>	<b>PRIORITY</b>			
<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.				
SPECIAL INSTRUCTIONS      Hold Time      Total Activity Exemption: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
** The field NCOs prior to purging the well for sample collection, will use a transparent bailer to collect a grab sample to evaluate the presence of an oil sheen. They are to record their observations, along with any odors observed on the Field Sampling Report provided.				
** The RCCC acknowledges that the analytical holding time for Nitrate, Nitrite, and Phosphate by EPA methods 300.0 or 9056 will not be met.				

B2VVW5	N	W	6-11-14	1028	1x250-mL G/P	9056 ANIONS_IC: COMMON; 9056_ANIONS_IC: COMMON (Add-on)	28 Days/48 Hours	Cool~4C
--------	---	---	---------	------	--------------	--	------------------	---------

Relinquished By <b>J.R. Aguilar CHPRC</b>	Print 	Sign	Date/Time <b>JUN 11 2014 1200</b>	Received By <b>LD Wall CHPRC</b>	Print 	Sign	Date/Time <b>JUN 11 2014 1200</b>	Matrix *
Relinquished By <b>LD Wall CHPRC</b>	Print 	Sign	Date/Time <b>JUN 11 2014 1400</b>	Received By <b>FEDEX</b>	Print 	Sign	Date/Time <b>JUN 11 2014 0900</b>	S = Soil      DS = Drum Solids SE = Sediment      DL = Drum Liquids SO = Solid      T = Tissue SL = Sludge      WI = Wipe W = Water      L = Liquid O = Oil      V = Vegetation A = Air      X = Other
Relinquished By	Print 	Sign	Date/Time	Received By <b>LD Wall CHPRC</b>	Print 	Sign	Date/Time	
Relinquished By	Print 	Sign	Date/Time	Received By <b>LD Wall CHPRC</b>	Print 	Sign	Date/Time	
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method (e.g., Return to customer, per lab procedure, used in process)			Disposed By		Date/Time		

**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>WCHN</u>		SDG/AR/COC/Work Order: <u>350505</u>
Received By: <u>JP</u>		Date Received: <u>10-12-14</u>
Suspected Hazard Information	Yes	No
*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"/>	<input type="checkbox"/>
Classified Radioactive II or III by RSO?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
COC/Samples marked containing PCBs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Samples identified as Foreign Soil?	<input checked="" type="checkbox"/>	<input 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 ≤ 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
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>130462961</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 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:
7 Are Encore containers present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9 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:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14 Carrier and tracking number.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: <u>FedEx Air</u> FedEx Ground UPS Field Services Courier Other  7702 7239 4620 " " 4815

Comments (Use Continuation Form if needed):

# **Laboratory Certifications**

**List of current GEL Certifications as of 26 June 2014**

<b>State</b>	<b>Certification</b>
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013-10
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA130005
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122014-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68-00485
Plant Material Permit	PDEP-12-00260
South Carolina Chemistry	10120001
South Carolina GVL	23611001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235-14-9
Utah NELAP	SC000122014-12
Vermont	VT87156
Virginia NELAP	460202
Washington	C780-12
Wisconsin	999887790

# **Volatile Analysis**

# Case Narrative

**ChemStation Case Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0054**

**Method/Analysis Information**

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

Analytical Method: SW846 8260C

Analytical Batch Number: 1395643

**Sample Analysis**

The following client and quality control samples were analyzed to complete this SDG using the methods referenced in the Analysis Information section:

<b>Sample ID</b>	<b>Client ID</b>
350505001	B2WVW1
350505003	B2WVW4
1203108427	Method Blank (MB)
1203108428	350505001(B2WVW1) Post Spike (PS)
1203108429	350505001(B2WVW1) Post Spike Duplicate (PSD)
1203108430	Laboratory Control Sample (LCS)

NOTE: For volatile organic analyses the matrix spike designations may be indicated as "PS" or "PSD". The "PS" designation (post spike) indicates that the matrix was fortified prior to analysis but after applying any prep factors, such as a dilution. The laboratory considers the MS/MSD and PS/PSD designations interchangeable.

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

**Preparation/Analytical Method Verification**

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-038 REV# 21.

Raw data reports are processed and reviewed by the analyst using the Chemstation software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP) section 19.1.2. False positive analytes are designated on the quantitation report with a 'd' qualifier.

**Calibration Information**

A complete list of the initial calibration data files with the correct dates and times of analysis are shown in the Calibration History report located in the Standard Data section of the data package.

The surrogate compounds were calibrated using a minimum five-point calibration curve. The surrogates were added by the auto sampler at a concentration of 50 ug/L or 20 ug/L for low level analyses. GEL Laboratories

LLC will not have surrogate recoveries reported for Dibromofluoromethane. This is due to increased regulations for this analyte and an industry shortage.

**Initial Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG).

**Continuing Calibration Verification Requirements**

All associated calibration verification standard(s) (CCV) met the acceptance criteria.

**Quality Control (QC) Information**

**Blank (MB) Statement**

The blank analyzed with this SDG met the acceptance criteria.

**Surrogate Recoveries**

Surrogate recoveries in all client and quality control samples were within the acceptance limits.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

**QC Sample Designation**

Sample 350505001 (B2WVW1) was designated for spike analysis.

**Matrix Spike (PS) Recovery Statement**

The spike 1203108428 (B2WVW1) recoveries were not all within the acceptance limits. See the Data Exception Report in the miscellaneous section of the data package.

**Matrix Spike Duplicate (PSD) Recovery Statement**

The spike duplicate 1203108429 (B2WVW1) recoveries were not all within the acceptance limits. See the Data Exception Report in the miscellaneous section of the data package.

**Relative Percent Difference (RPD) Statement**

The RPDs between the matrix spike pair met the acceptance limits.

**Internal Standard (ISTD) Acceptance**

The internal standard responses in all client and quality control samples met the required acceptance criteria.

**Technical Information**

**Holding Time Specifications**

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection or 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. All samples in this SDG met the specified holding time.

**Sample Preservation and Integrity**

All samples met the sample preservation and integrity requirements.

**Sample Dilutions/Methanol Dilutions**

The samples in this SDG did not require dilutions.

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

Re-analyses were not required for samples in this SDG.

**Miscellaneous Information**

### Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

### Data Exception (DER) Documentation

The following DER was generated for this SDG: 1306272.

### Manual Integrations

Data files associated with the initial calibration, continuing calibration check, and samples did not require manual integrations.

### TIC Comment

Tentatively identified compounds (TIC) were requested for this sample delivery group/work order. Please note that non-requested target analytes that are reported on the quantitation reports will be present on the Form I. These detected analytes are included in the calibrated method and as a result will be reported on the Sample Data Summary (Form I) or Certificate of Analysis (C of A). TIC data are included on the Sample Data Summary (Form I). 350505001 (B2WVW1) and 350505003 (B2WVW4).

### Additional Comments

Additional comments were not required for this SDG.

### Residual Chlorine

Residual Chlorine was not detected in any of the samples in this SDG.

### System Configuration

The Volatile-GC/MS analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description	P & T Trap
VOA3.I	Agilent 6890/5973 GC/MS w/ OI 4560/Archon Autosampler	HP6890/HP5973	DB-624	J&W, 60m x 0.25mm x 1.4um	Trap 10

### Certification Statement

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

**DATA EXCEPTION REPORT**

<b>Mo.Day Yr.</b> 19-JUN-14	<b>Division:</b> Federal	<b>Quality Criteria:</b> SOP	<b>Type:</b> Process
<b>Instrument Type:</b> VOA GC/MS	<b>Test / Method:</b> 8260C	<b>Matrix Type:</b> Liquid	<b>Client Code:</b> WCHN001
<b>Batch ID:</b> 1395643	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 350505(X0054)</b>			
<b>Application Issues:</b> Failed Recovery for MS/PS Failed Recovery for MSD/PSD			
<b>Specification and Requirements</b> <b>Exception Description:</b>		<b>DER Disposition:</b>	
1. The recovers for Acetone and 2-Butanone were outside of acceptance limits in the MS and in the MSD performed on sample 350505001. The calculated relative percent differences between the MS and MSD were within acceptance limits for all compounds.		1. Narrate and report data.	

**Originator's Name:**  
Crystal Stacey      19-JUN-14

**Data Validator/Group Leader:**  
Erin Haubert      24-JUN-14

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0054 GEL Work Order: 350505 Project: RC-236A Groundwater

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

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

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

DL Indicates that sample is diluted.

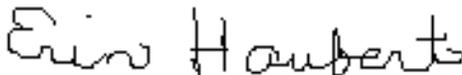
RA Indicates that sample is re-analyzed without re-extraction.

RE Indicates that sample is re-extracted.

#### Review/Validation

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

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

Signature: 

Name: Erin Haubert

Date: 24 JUN 2014

Title: Data Validator

# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 24, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW1	Project: WCHN RC-236A
Sample ID: 350505001	Client ID: WCHN001
Matrix: WATER	
Collect Date: 11-JUN-14 08:26	
Receive Date: 12-JUN-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Volatil Organics</b>											
<b>Volatiles by SW846 8260C "As Received"</b>											
1,1,1-Trichloroethane	U	0.300	0.300	5.00	ug/L	1	CDS1	06/13/14	1016	1395643	1
1,1,2-Trichloroethane	U	0.300	0.300	5.00	ug/L	1					
1,1-Dichloroethane	U	0.300	0.300	10.0	ug/L	1					
1,1-Dichloroethylene	U	0.300	0.300	10.0	ug/L	1					
1,2-Dichloroethane	U	0.300	0.300	5.00	ug/L	1					
2-Butanone	TU	3.00	3.00	10.0	ug/L	1					
4-Methyl-2-pentanone	U	3.00	3.00	10.0	ug/L	1					
Acetone	TU	3.00	3.00	20.0	ug/L	1					
Benzene	U	0.300	0.300	5.00	ug/L	1					
Carbon disulfide	U	1.60	1.60	10.0	ug/L	1					
Carbon tetrachloride	U	0.300	0.300	5.00	ug/L	1					
Chlorobenzene	U	0.300	0.300	5.00	ug/L	1					
Chloroform	U	0.300	0.300	5.00	ug/L	1					
Ethylbenzene	U	0.300	0.300	5.00	ug/L	1					
Methylene chloride	U	1.60	1.60	5.00	ug/L	1					
Tetrachloroethylene	U	0.300	0.300	5.00	ug/L	1					
Toluene	U	0.300	0.300	5.00	ug/L	1					
Trichloroethylene	U	0.300	0.300	5.00	ug/L	1					
Vinyl chloride	U	0.300	0.300	10.0	ug/L	1					
Xylenes (total)	U	0.300	0.300	10.0	ug/L	1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments			
1	SW846 8260C				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	Volatiles by SW846 8260C "As Received"	50.9 ug/L	50.0	102	(78%-124%)
Bromofluorobenzene	Volatiles by SW846 8260C "As Received"	45.1 ug/L	50.0	90.2	(80%-120%)
Toluene-d8	Volatiles by SW846 8260C "As Received"	49.1 ug/L	50.0	98.1	(80%-120%)

**Notes:**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 24, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW4	Project: WCHN RC-236A
Sample ID: 350505003	Client ID: WCHN001
Matrix: WATER	
Collect Date: 11-JUN-14 10:28	
Receive Date: 12-JUN-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Volatil Organics</b>											
<b>Volatiles by SW846 8260C "As Received"</b>											
1,1,1-Trichloroethane	U	0.300	0.300	5.00	ug/L	1	CDS1	06/13/14	0945	1395643	1
1,1,2-Trichloroethane	U	0.300	0.300	5.00	ug/L	1					
1,1-Dichloroethane	U	0.300	0.300	10.0	ug/L	1					
1,1-Dichloroethylene	U	0.300	0.300	10.0	ug/L	1					
1,2-Dichloroethane	U	0.300	0.300	5.00	ug/L	1					
2-Butanone	TU	3.00	3.00	10.0	ug/L	1					
4-Methyl-2-pentanone	U	3.00	3.00	10.0	ug/L	1					
Acetone	TU	3.00	3.00	20.0	ug/L	1					
Benzene	U	0.300	0.300	5.00	ug/L	1					
Carbon disulfide	U	1.60	1.60	10.0	ug/L	1					
Carbon tetrachloride	U	0.300	0.300	5.00	ug/L	1					
Chlorobenzene	U	0.300	0.300	5.00	ug/L	1					
Chloroform	U	0.300	0.300	5.00	ug/L	1					
Ethylbenzene	U	0.300	0.300	5.00	ug/L	1					
Methylene chloride	U	1.60	1.60	5.00	ug/L	1					
Tetrachloroethylene	U	0.300	0.300	5.00	ug/L	1					
Toluene	U	0.300	0.300	5.00	ug/L	1					
Trichloroethylene	U	0.300	0.300	5.00	ug/L	1					
Vinyl chloride	U	0.300	0.300	10.0	ug/L	1					
Xylenes (total)	U	0.300	0.300	10.0	ug/L	1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments			
1	SW846 8260C				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	Volatiles by SW846 8260C "As Received"	48.1 ug/L	50.0	96.3	(78%-124%)
Bromofluorobenzene	Volatiles by SW846 8260C "As Received"	43.4 ug/L	50.0	86.8	(80%-120%)
Toluene-d8	Volatiles by SW846 8260C "As Received"	48.3 ug/L	50.0	96.5	(80%-120%)

**Notes:**

# **Quality Control Summary**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: June 24, 2014

Page 1 of 6

WC-Hanford, Inc.  
2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington  
Contact: Joan Kessner

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1395643										
QC1203108430	LCS										
1,1,1-Trichloroethane	50.0			42.1	ug/L		84.2	(70%-130%)	CDS1	06/13/14	07:44
1,1,2-Trichloroethane	50.0			46.2	ug/L		92.3	(70%-130%)			
1,1-Dichloroethane	50.0			41.6	ug/L		83.1	(70%-130%)			
1,1-Dichloroethylene	50.0			40.7	ug/L		81.3	(70%-130%)			
1,2-Dichloroethane	50.0			38.4	ug/L		76.9	(70%-130%)			
2-Butanone	250			237	ug/L		94.8	(70%-130%)			
4-Methyl-2-pentanone	250			203	ug/L		81.3	(70%-130%)			
Acetone	250			235	ug/L		94.1	(70%-130%)			
Benzene	50.0			43.3	ug/L		86.6	(70%-130%)			
Carbon disulfide	250			225	ug/L		90.1	(70%-130%)			
Carbon tetrachloride	50.0			41.5	ug/L		83	(70%-130%)			
Chlorobenzene	50.0			45.3	ug/L		90.6	(70%-130%)			
Chloroform	50.0			42.4	ug/L		84.8	(70%-130%)			
Ethylbenzene	50.0			41.3	ug/L		82.5	(70%-130%)			
Methylene chloride	50.0			41.9	ug/L		83.8	(70%-130%)			
Tetrachloroethylene	50.0			42.5	ug/L		85	(70%-130%)			
Toluene	50.0			43.3	ug/L		86.6	(70%-130%)			
Trichloroethylene	50.0			43.3	ug/L		86.6	(70%-130%)			
Vinyl chloride	50.0			38.9	ug/L		77.7	(70%-130%)			
Xylenes (total)	150			125	ug/L		83.1	(70%-130%)			

# GEL LABORATORIES LLC

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

## QC Summary

**Workorder:** 350505

**Client SDG:** X0054

**Project Description:** RC-236A Groundwater

**Page 2 of 6**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1395643										
**1,2-Dichloroethane-d4	50.0			44.3	ug/L		88.5	(78%-124%)	CDS1	06/13/14	07:44
**Bromofluorobenzene	50.0			45.3	ug/L		90.6	(80%-120%)			
**Toluene-d8	50.0			44.1	ug/L		88.3	(80%-120%)			
QC1203108427	MB										
1,1,1-Trichloroethane			U	0.300	ug/L					06/13/14	09:15
1,1,2-Trichloroethane			U	0.300	ug/L						
1,1-Dichloroethane			U	0.300	ug/L						
1,1-Dichloroethylene			U	0.300	ug/L						
1,2-Dichloroethane			U	0.300	ug/L						
2-Butanone			U	3.00	ug/L						
4-Methyl-2-pentanone			U	3.00	ug/L						
Acetone			U	3.00	ug/L						
Benzene			U	0.300	ug/L						
Carbon disulfide			U	1.60	ug/L						
Carbon tetrachloride			U	0.300	ug/L						
Chlorobenzene			U	0.300	ug/L						
Chloroform			U	0.300	ug/L						
Ethylbenzene			U	0.300	ug/L						
Methylene chloride			U	1.60	ug/L						
Tetrachloroethylene			U	0.300	ug/L						
Toluene			U	0.300	ug/L						
Trichloroethylene			U	0.300	ug/L						

# GEL LABORATORIES LLC

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

## QC Summary

**Workorder:** 350505

**Client SDG:** X0054

**Project Description:** RC-236A Groundwater

**Page 3 of 6**

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1395643										
Vinyl chloride			U	0.300	ug/L				CDS1	06/13/14	09:15
Xylenes (total)			U	0.300	ug/L						
**1,2-Dichloroethane-d4	50.0			49.5	ug/L		99	(78%-124%)			
**Bromofluorobenzene	50.0			45.0	ug/L		90	(80%-120%)			
**Toluene-d8	50.0			50.8	ug/L		102	(80%-120%)			
QC1203108428 350505001 PS											
1,1,1-Trichloroethane	50.0	U	0.00	51.7	ug/L		103	(70%-130%)		06/13/14	11:16
1,1,2-Trichloroethane	50.0	U	0.00	50.8	ug/L		102	(70%-130%)			
1,1-Dichloroethane	50.0	U	0.00	52.4	ug/L		105	(70%-130%)			
1,1-Dichloroethylene	50.0	U	0.00	50.1	ug/L		100	(70%-130%)			
1,2-Dichloroethane	50.0	U	0.00	45.4	ug/L		90.7	(70%-130%)			
2-Butanone	250	TU	0.00 T	143	ug/L		57.1 *	(70%-130%)			
4-Methyl-2-pentanone	250	U	0.00	216	ug/L		86.4	(70%-130%)			
Acetone	250	TU	0.00 T	99.1	ug/L		39.6 *	(70%-130%)			
Benzene	50.0	U	0.00	51.6	ug/L		103	(70%-130%)			
Carbon disulfide	250	U	0.00	275	ug/L		110	(70%-130%)			
Carbon tetrachloride	50.0	U	0.00	51.0	ug/L		102	(70%-130%)			
Chlorobenzene	50.0	U	0.00	51.6	ug/L		103	(70%-130%)			
Chloroform	50.0	U	0.00	50.9	ug/L		102	(70%-130%)			
Ethylbenzene	50.0	U	0.00	49.6	ug/L		99.2	(70%-130%)			
Methylene chloride	50.0	U	1.24	47.9	ug/L		93.4	(70%-130%)			
Tetrachloroethylene	50.0	U	0.00	51.0	ug/L		102	(70%-130%)			

# GEL LABORATORIES LLC

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

## QC Summary

**Workorder:** 350505

**Client SDG:** X0054

**Project Description:** RC-236A Groundwater

**Page 4 of 6**

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1395643										
Toluene	50.0	U	0.00	50.2	ug/L		100	(70%-130%)	CDS1	06/13/14	11:16
Trichloroethylene	50.0	U	0.00	51.9	ug/L		104	(70%-130%)			
Vinyl chloride	50.0	U	0.00	54.8	ug/L		110	(70%-130%)			
Xylenes (total)	150	U	0.00	150	ug/L		100	(70%-130%)			
**1,2-Dichloroethane-d4	50.0		50.9	46.4	ug/L		92.8	(78%-124%)			
**Bromofluorobenzene	50.0		45.1	47.6	ug/L		95.3	(80%-120%)			
**Toluene-d8	50.0		49.1	49.4	ug/L		98.9	(80%-120%)			
QC1203108429 350505001 PSD											
1,1,1-Trichloroethane	50.0	U	0.00	47.6	ug/L	8.40	95.1	(0%-20%)		06/13/14	11:46
1,1,2-Trichloroethane	50.0	U	0.00	45.8	ug/L	10.3	91.6	(0%-20%)			
1,1-Dichloroethane	50.0	U	0.00	46.4	ug/L	12.2	92.7	(0%-20%)			
1,1-Dichloroethylene	50.0	U	0.00	44.1	ug/L	12.9	88.2	(0%-20%)			
1,2-Dichloroethane	50.0	U	0.00	40.0	ug/L	12.6	80	(0%-20%)			
2-Butanone	250	TU	0.00 T	128	ug/L	11.0	51.1 *	(0%-20%)			
4-Methyl-2-pentanone	250	U	0.00	196	ug/L	9.60	78.5	(0%-20%)			
Acetone	250	TU	0.00 T	85.7	ug/L	14.6	34.3 *	(0%-20%)			
Benzene	50.0	U	0.00	46.5	ug/L	10.3	93	(0%-20%)			
Carbon disulfide	250	U	0.00	240	ug/L	13.6	96.1	(0%-20%)			
Carbon tetrachloride	50.0	U	0.00	46.5	ug/L	9.19	93	(0%-20%)			
Chlorobenzene	50.0	U	0.00	48.4	ug/L	6.42	96.8	(0%-20%)			
Chloroform	50.0	U	0.00	44.4	ug/L	13.8	88.7	(0%-20%)			
Ethylbenzene	50.0	U	0.00	47.7	ug/L	3.97	95.3	(0%-20%)			

# GEL LABORATORIES LLC

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

## QC Summary

**Workorder:** 350505

**Client SDG:** X0054

**Project Description:** RC-236A Groundwater

**Page 5 of 6**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1395643										
Methylene chloride	50.0	U	1.24	41.7	ug/L	13.8	81	(0%-20%)	CDS1	06/13/14	11:46
Tetrachloroethylene	50.0	U	0.00	47.5	ug/L	7.12	95	(0%-20%)			
Toluene	50.0	U	0.00	49.4	ug/L	1.59	98.8	(0%-20%)			
Trichloroethylene	50.0	U	0.00	48.2	ug/L	7.47	96.4	(0%-20%)			
Vinyl chloride	50.0	U	0.00	45.4	ug/L	18.7	90.9	(0%-20%)			
Xylenes (total)	150	U	0.00	139	ug/L	7.79	92.6	(0%-20%)			
**1,2-Dichloroethane-d4	50.0		50.9	44.2	ug/L		88.5	(78%-124%)			
**Bromofluorobenzene	50.0		45.1	45.5	ug/L		91	(80%-120%)			
**Toluene-d8	50.0		49.1	47.9	ug/L		95.7	(80%-120%)			

**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
- 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

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

## QC Summary

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Page 6 of 6

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

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.

# **HPLC Polynuclear Aromatic Hydrocarbon Analysis**

**HPLC-PAH  
WC-HANFORD, INC. (WCHN)  
SDG X0054**

**Method/Analysis Information**

**Procedure:** Polynuclear Aromatic Hydrocarbons  
Analytical Method: SW846 8310  
Prep Method: SW846 3510C  
Analytical Batch Number: 1396226  
Prep Batch Number: 1396225

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW846 8310:

<b>Sample ID</b>	<b>Client ID</b>
350505001	B2WVW1
350505003	B2WVW4
1203109931	Method Blank (MB)
1203109932	Laboratory Control Sample (LCS)
1203109935	350505003(B2WVW4) Matrix Spike (MS)
1203109936	350505003(B2WVW4) Matrix Spike Duplicate (MSD)

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

**Preparation/Analytical Method Verification**

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-030 REV# 15.

Raw data reports are processed and reviewed by the analyst using the Target software package. False positives have been removed from the Target quantitation reports per standard operating procedures (SOP) section 18.0.

**Calibration Information**

Due to software limitations, the files displayed at the beginning of the Form 6 are only the last files uploaded for each individual level. A complete listing of all files used in the current ICAL are shown on the Calibration History that is included with each Level 4 or higher package. The last file by date in each level is the one currently uploaded for that level.

The linear equation used in Target and indicated on the initial calibration summary form is not a conventional linear equation (slope intercept formula) and does not match the equation found in SW-846 method 8000B. The x and y axes are inverted in Target, so that the instrument response is treated as the independent variable (x) and the concentration ratio is treated as the dependent variable (y). The equation used in Target to calculate sample

results is adjusted to account for the linear equation inversion and reciprocal slope. The adjusted calculation has been independently verified to produce valid results.

#### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

#### **CCV Requirements**

All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria.

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

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

The MB analyzed with this SDG met the acceptance criteria.

##### **Surrogate Recoveries**

All the surrogate recoveries were within the established acceptance criteria for this SDG.

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

The LCS spike recoveries met the acceptance limits.

##### **QC Sample Designation**

Sample 350505003 (B2WVW4) container was split into equal aliquots for matrix spike and matrix spike duplicate extraction. The spike and surrogate amounts were adjusted accordingly.

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

The MS recoveries were within the established acceptance limits.

##### **Matrix Spike Duplicate (MSD) Recovery Statement**

The MSD recoveries were within the established acceptance limits.

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

The RPD(s) between the MS and MSD met the acceptance limits.

#### **Technical Information:**

##### **Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection or 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.

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

All procedures were performed as stated in the SOP.

##### **Sample Dilutions**

The samples in this SDG did not require dilutions.

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

Re-extractions or re-analyses were not required in this SDG.

#### **Miscellaneous Information:**

##### **Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A DER was not required for this SDG.

**Manual Integrations**

Some initial calibration standards, continuing calibration standards, and/or samples may have required manual integrations due to software limitations. Please see the raw data in the Miscellaneous Section.

**Additional Comments**

The Form 8 is used only as a sequence of the analysis.

**Electronic Package Comment**

The following package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the analyst, reviewer, and report specialist names associated with the generation of the data and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**System Configuration**

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for Polynuclear Aromatic Hydrocarbons analyses. The chromatographic hardware system consists of a HP Model 1100 HPLC with programmable gradient pumping and a 100uL loop injector. The HPLC 1100 is coupled to a HP Model G1315A Diode Array UV detector which monitors absorbance at the following five wavelengths: 1) 224 nm; 2) 250 nm; 3) 270 nm; 4) 234 nm; 5) 300 nm. The HPLC 1100 is also coupled to a HP Model G1321A Fluorescence Detector in series which monitors the following varying excitations and emissions 1) EX 230 nm EM 330 nm; 2) EX 210 nm EM 314 nm; 3) EX 250 nm EM 368 nm; 4) EX 237 nm EM 440 nm; 5) EX 277 nm EM 376 nm; 6) EX 255 nm EM 420 nm; 7) EX 230 nm EM 453 nm. The Diode Array UV detector is used as the primary detector and the Fluorescence Detector is used as the confirmation detector. All results are reported from the primary Diode Array UV detector. The HPLC system is identified with a designation of HPLC C, or HPLC E in the raw data printouts.

**Chromatographic Columns**

Chromatographic separation of Polynuclear Aromatic Hydrocarbons is accomplished through analysis on the following reversed phase columns:

Phenomenex: Luna C18 (2), 100 A, 250 mm x 4.6 mm containing 5 um size particle.

**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

WCHN001 WC-HANFORD, INC.

Client SDG: X0054 GEL Work Order: 350505 Project: RC-236A Groundwater

#### 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.

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: Patricia Steele

Date: 23 JUN 2014

Title: Data Validator

## Roadmap for WCHN X0054 HPLC\_PAH

This roadmap was analyzed by cww on 06-22-2014, 14:24.

This roadmap was reviewed by ps on 06-23-2014, 09:17.

Sample

exclude	manual	datafile	smpid	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p061814.b/ph5f1827.d	350505001	19-JUN-2014	01:58	X0054.sub	B2WVW1	1	1396226	<input type="text"/>
<input type="checkbox"/>	N	/chem/hplce.i/p061814.b/ph5f1828.d	350505003	19-JUN-2014	02:40	X0054.sub	B2WVW4	1	1396226	<input type="text"/>

QC Sample

exclude	manual	datafile	smpid	sampletype	injdate	injtime	sublist	clientid	dilution	batchid	comment
<input type="checkbox"/>	N	/chem/hplce.i/p061814.b/ph5f1825.d	1203109931	mb	19-JUN-2014	00:33	X0054.sub	PAHBLK01	1	1396226	<input type="text"/>
<input type="checkbox"/>	N	/chem/hplce.i/p061814.b/ph5f1826.d	1203109932	lcs	19-JUN-2014	01:16	X0054.sub	PAHBLK01LCS	1	1396226	Pass
<input type="checkbox"/>	N	/chem/hplce.i/p061814.b/ph5f1829.d	1203109935	ms	19-JUN-2014	03:22	X0054.sub	B2WVW4MS	1	1396226	Pass, split sample
<input type="checkbox"/>	N	/chem/hplce.i/p061814.b/ph5f1830.d	1203109936	msd	19-JUN-2014	04:05	X0054.sub	B2WVW4MSD	1	1396226	Pass, split sample

# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 22, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2VWV1	Project: WCHN RC-236A
Sample ID: 350505001	Client ID: WCHN001
Matrix: WATER	
Collect Date: 11-JUN-14 08:26	
Receive Date: 12-JUN-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3510 PAH Extend list Liquid "As Received"</b>											
Acenaphthene	U	0.143	0.143	0.476	ug/L	1	CWW	06/19/14	0158	1396226	1
Acenaphthylene	U	0.143	0.143	0.476	ug/L	1					
Anthracene	U	0.143	0.143	0.476	ug/L	1					
Benzo(a)anthracene	U	0.0152	0.0152	0.0476	ug/L	1					
Benzo(a)pyrene	U	0.0152	0.0152	0.0476	ug/L	1					
Benzo(b)fluoranthene	U	0.0152	0.0152	0.0476	ug/L	1					
Benzo(ghi)perylene	U	0.0152	0.0152	0.0476	ug/L	1					
Benzo(k)fluoranthene	U	0.00762	0.00762	0.0238	ug/L	1					
Chrysene	U	0.0152	0.0152	0.0476	ug/L	1					
Dibenzo(a,h)anthracene	U	0.0152	0.0152	0.0476	ug/L	1					
Fluoranthene	U	0.0152	0.0152	0.0476	ug/L	1					
Fluorene	U	0.143	0.143	0.476	ug/L	1					
Indeno(1,2,3-cd)pyrene	U	0.0152	0.0152	0.0476	ug/L	1					
Naphthalene	U	0.143	0.143	0.476	ug/L	1					
Phenanthrene	U	0.173	0.173	0.476	ug/L	1					
Pyrene	U	0.0152	0.0152	0.0476	ug/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3510C	3510 PAH BY HPLC Prep in liquid	RXC1	06/17/14	0905	1396225

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8310	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3510 PAH Extend list Liquid "As Received"	129 ug/L	238	54.3	(21%-96%)

**Notes:**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 22, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW4	Project: WCHN RC-236A
Sample ID: 350505003	Client ID: WCHN001
Matrix: WATER	
Collect Date: 11-JUN-14 10:28	
Receive Date: 12-JUN-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3510 PAH Extend list Liquid "As Received"</b>											
Acenaphthene	U	0.142	0.142	0.472	ug/L	1	CWW	06/19/14	0240	1396226	1
Acenaphthylene	U	0.142	0.142	0.472	ug/L	1					
Anthracene	U	0.142	0.142	0.472	ug/L	1					
Benzo(a)anthracene	U	0.0151	0.0151	0.0472	ug/L	1					
Benzo(a)pyrene	U	0.0151	0.0151	0.0472	ug/L	1					
Benzo(b)fluoranthene	U	0.0151	0.0151	0.0472	ug/L	1					
Benzo(ghi)perylene	U	0.0151	0.0151	0.0472	ug/L	1					
Benzo(k)fluoranthene	U	0.00755	0.00755	0.0236	ug/L	1					
Chrysene	U	0.0151	0.0151	0.0472	ug/L	1					
Dibenzo(a,h)anthracene	U	0.0151	0.0151	0.0472	ug/L	1					
Fluoranthene	U	0.0151	0.0151	0.0472	ug/L	1					
Fluorene	U	0.142	0.142	0.472	ug/L	1					
Indeno(1,2,3-cd)pyrene	U	0.0151	0.0151	0.0472	ug/L	1					
Naphthalene	U	0.142	0.142	0.472	ug/L	1					
Phenanthrene	U	0.172	0.172	0.472	ug/L	1					
Pyrene	U	0.0151	0.0151	0.0472	ug/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3510C	3510 PAH BY HPLC Prep in liquid	RXC1	06/17/14	0905	1396225

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8310	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3510 PAH Extend list Liquid "As Received"	142 ug/L	236	60.1	(21%-96%)

**Notes:**

# QC Summary

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: June 22, 2014

Page 1 of 4

WC-Hanford, Inc.  
2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington  
Contact: Joan Kessner

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1396226										
QC1203109932	LCS										
Acenaphthene	50.0			46.2	ug/L		92.3	(53%-107%)	CWW	06/19/14	01:16
Acenaphthylene	50.0			42.9	ug/L		85.8	(52%-100%)			
Anthracene	50.0			46.5	ug/L		93.1	(70%-130%)			
Benzo(a)anthracene	5.00			4.51	ug/L		90.1	(70%-130%)			
Benzo(a)pyrene	5.00			4.47	ug/L		89.4	(70%-130%)			
Benzo(b)fluoranthene	5.00			4.37	ug/L		87.3	(70%-130%)			
Benzo(ghi)perylene	5.00			3.86	ug/L		77.1	(42%-115%)			
Benzo(k)fluoranthene	2.50			2.40	ug/L		95.8	(70%-130%)			
Chrysene	5.00			4.66	ug/L		93.1	(70%-130%)			
Dibenzo(a,h)anthracene	5.00			4.37	ug/L		87.4	(30%-118%)			
Fluoranthene	5.00			4.30	ug/L		86	(70%-130%)			
Fluorene	50.0			44.9	ug/L		89.7	(62%-130%)			
Indeno(1,2,3-cd)pyrene	5.00			4.58	ug/L		91.6	(57%-114%)			
Naphthalene	50.0			40.1	ug/L		80.1	(54%-108%)			
Phenanthrene	50.0			44.7	ug/L		89.3	(69%-130%)			
Pyrene	5.00			4.50	ug/L		90	(70%-130%)			
**Decafluorobiphenyl	250			180	ug/L		72	(21%-96%)			
QC1203109931	MB										
Acenaphthene			U	0.150	ug/L					06/19/14	00:33
Acenaphthylene			U	0.150	ug/L						

# GEL LABORATORIES LLC

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

## QC Summary

**Workorder:** 350505

**Client SDG:** X0054

**Project Description:** RC-236A Groundwater

**Page 2 of 4**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1396226										
Anthracene			U	0.150	ug/L						
Benzo(a)anthracene			U	0.016	ug/L				CWW	06/19/14	00:33
Benzo(a)pyrene			U	0.016	ug/L						
Benzo(b)fluoranthene			U	0.016	ug/L						
Benzo(ghi)perylene			U	0.016	ug/L						
Benzo(k)fluoranthene			U	0.008	ug/L						
Chrysene			U	0.016	ug/L						
Dibenzo(a,h)anthracene			U	0.016	ug/L						
Fluoranthene			U	0.016	ug/L						
Fluorene			U	0.150	ug/L						
Indeno(1,2,3-cd)pyrene			U	0.016	ug/L						
Naphthalene			U	0.150	ug/L						
Phenanthrene			U	0.182	ug/L						
Pyrene			U	0.016	ug/L						
**Decafluorobiphenyl	250			177	ug/L		70.8	(21%-96%)			
QC1203109935 350505003 MS											
Acenaphthene	50.0	U	0.142	41.5	ug/L		83	(27%-118%)		06/19/14	03:22
Acenaphthylene	50.0	U	0.142	38.8	ug/L		77.6	(26%-121%)			
Anthracene	50.0	U	0.142	41.9	ug/L		83.7	(36%-122%)			
Benzo(a)anthracene	5.00	U	0.0151	3.96	ug/L		79.2	(35%-129%)			
Benzo(a)pyrene	5.00	U	0.0151	3.91	ug/L		78.2	(25%-135%)			
Benzo(b)fluoranthene	5.00	U	0.0151	3.78	ug/L		75.5	(29%-133%)			
Benzo(ghi)perylene	5.00	U	0.0151	3.48	ug/L		69.6	(27%-140%)			

# GEL LABORATORIES LLC

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

## QC Summary

**Workorder:** 350505

**Client SDG:** X0054

**Project Description:** RC-236A Groundwater

**Page 3 of 4**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1396226										
Benzo(k)fluoranthene	2.50	U	0.00755	2.07	ug/L		82.6	(28%-134%)	CWW	06/19/14	03:22
Chrysene	5.00	U	0.0151	4.09	ug/L		81.7	(25%-141%)			
Dibenzo(a,h)anthracene	5.00	U	0.0151	3.87	ug/L		77.5	(25%-133%)			
Fluoranthene	5.00	U	0.0151	3.82	ug/L		76.4	(32%-134%)			
Fluorene	50.0	U	0.142	40.3	ug/L		80.6	(29%-123%)			
Indeno(1,2,3-cd)pyrene	5.00	U	0.0151	3.92	ug/L		78.3	(25%-135%)			
Naphthalene	50.0	U	0.142	35.1	ug/L		70.2	(32%-104%)			
Phenanthrene	50.0	U	0.172	40.5	ug/L		81	(35%-126%)			
Pyrene	5.00	U	0.0151	4.03	ug/L		80.6	(32%-134%)			
**Decafluorobiphenyl	250		142	144	ug/L		57.7	(21%-96%)			
QC1203109936 350505003 MSD											
Acenaphthene	50.0	U	0.142	39.3	ug/L	5.51	78.6	(0%-20%)		06/19/14	04:05
Acenaphthylene	50.0	U	0.142	36.4	ug/L	6.51	72.7	(0%-20%)			
Anthracene	50.0	U	0.142	42.6	ug/L	1.67	85.1	(0%-20%)			
Benzo(a)anthracene	5.00	U	0.0151	3.87	ug/L	2.43	77.3	(0%-20%)			
Benzo(a)pyrene	5.00	U	0.0151	3.81	ug/L	2.62	76.2	(0%-20%)			
Benzo(b)fluoranthene	5.00	U	0.0151	3.69	ug/L	2.28	73.8	(0%-20%)			
Benzo(ghi)perylene	5.00	U	0.0151	3.42	ug/L	1.79	68.4	(0%-20%)			
Benzo(k)fluoranthene	2.50	U	0.00755	2.02	ug/L	2.23	80.8	(0%-20%)			
Chrysene	5.00	U	0.0151	4.12	ug/L	0.855	82.4	(0%-20%)			
Dibenzo(a,h)anthracene	5.00	U	0.0151	3.87	ug/L	0.107	77.4	(0%-20%)			
Fluoranthene	5.00	U	0.0151	3.75	ug/L	1.87	75	(0%-20%)			

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Page 4 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1396226										
Fluorene	50.0	U	0.142	39.5	ug/L	1.93	79.1	(0%-20%)	CWW	06/19/14	04:05
Indeno(1,2,3-cd)pyrene	5.00	U	0.0151	3.83	ug/L	2.15	76.7	(0%-20%)			
Naphthalene	50.0	U	0.142	30.8	ug/L	13.2	61.5	(0%-20%)			
Phenanthrene	50.0	U	0.172	39.8	ug/L	1.66	79.7	(0%-20%)			
Pyrene	5.00	U	0.0151	3.96	ug/L	1.64	79.3	(0%-20%)			
*Decafluorobiphenyl	250		142	126	ug/L		50.5	(21%-96%)			

**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
- 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.

# Miscellaneous Data

# Prep Logbook

## Extraction of Semivolatile and Nonvolatile Organic Compounds from Groundwater, Wastewater, and Other Aqueous Samples

Batch ID: 1396225      Verified by: \_\_\_\_\_  
 Analyst: Rodricous Corbett  
 Method: SW846 3510C

Lab SOP: GL-OA-E-013 REV# 27  
 Instrument: Semi-Volatiles Manual

Sample ID	Run Date	Initial Volume (mL)	Initial pH	Final Volume (mL)	Prepped Factor (mL/mL)
1203109931 MB	17-JUN-2014 09:05:00	1000	7	1	0.001
1203109932 LCS	17-JUN-2014 09:05:00	1000	7	1	0.001
350505001	17-JUN-2014 09:05:00	1050	8	1	0.00095
350505003	17-JUN-2014 09:05:00	1060	8	1	0.00094
1203109935 MS (350505003)	17-JUN-2014 09:05:00	500	8	0.5	0.001
1203109936 MSD (350505003)	17-JUN-2014 09:05:00	500	8	0.5	0.001
350510004	17-JUN-2014 09:05:00	1000	8	1	0.001
1203109933 MS (350510004)	17-JUN-2014 09:05:00	400	8	0.5	0.00125
1203109934 MSD (350510004)	17-JUN-2014 09:05:00	400	8	0.5	0.00125

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203109932	8310 PAH SPIKE	UE140319-10	1	mL	Verified By: SSS
MS	1203109933	8310 PAH SPIKE	UE140319-10	.5	mL	Final Solvent: ACN
MS	1203109935	8310 PAH SPIKE	UE140319-10	.5	mL	
MSD	1203109934	8310 PAH SPIKE	UE140319-10	.5	mL	
MSD	1203109936	8310 PAH SPIKE	UE140319-10	.5	mL	
SURR	All	Decafluorobiphenyl 250 mg/L	UE140604-30	.5	mL	
SURR	All	Decafluorobiphenyl 250 mg/L	UE140604-30	1	mL	
REGNT	All	HPLC Grade Acetonitrile	2103849	5	mL	
REGNT	All	Methylene Chloride	2117042-D	180	mL	
SOURC	All	SODIUM SULFATE	2101676	30	g	

# **FID Diesel Range Organics Analysis**

# Case Narrative

**FID Diesel Range Organics  
WC-HANFORD, INC. (WCHN)  
SDG X0054**

**Method/Analysis Information**

**Procedure:** Analysis of Diesel Range Organics by Flame Ionization Detector  
Analytical Method: NWTPH-Dx  
Prep Method: SW846 3535A  
Analytical Batch Number: 1396224  
Prep Batch Number: 1396222

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in NWTPH-Dx:

<b>Sample ID</b>	<b>Client ID</b>
350505001	B2WVW1
350505003	B2WVW4
1203109927	Method Blank (MB)
1203109928	Laboratory Control Sample (LCS)
1203109929	350505001(B2WVW1) Matrix Spike (MS)
1203109930	350505001(B2WVW1) Matrix Spike Duplicate (MSD)

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

**Preparation/Analytical Method Verification**

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-003 REV# 24.

Raw data reports are processed and reviewed by the analyst using the Chemstation software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP).

**Calibration Information**

**Initial Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG).

**Continuing Calibration Verification (CCV) Requirements**

All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria. Analyte peaks eluted within the established retention time windows for this method.

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

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

The MB analyzed with this SDG met the acceptance criteria.

### **Surrogate Recoveries**

All surrogate recoveries were within the established acceptance criteria for this SDG.

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

The LCS spike recoveries met the acceptance limits.

### **QC Sample Designation**

Sample 350505001 (B2WVW1) was selected for the matrix spike and matrix spike duplicate analysis.

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

The MS recovery was within the established acceptance limits.

### **Matrix Spike Duplicate (MSD) Recovery Statement**

The MSD recovery was within the established acceptance limits.

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

The RPD between the MS and MSD met the acceptance limits.

## **Technical Information**

### **Holding Time Specifications**

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. All samples in this SDG met the specified holding time.

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

All procedures were performed as stated in the SOP. Analyte peaks eluted within the established retention time windows for this method.

### **Sample Dilutions**

The samples in this SDG did not require dilutions.

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

Re-extractions or re-analyses were not required in this SDG.

## **Miscellaneous Information**

### **Electronic Package Comment**

This package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative.

### **Data Exception (DER) Documentation**

Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Manual Integrations**

Certain standards and samples may have required manual integration to correctly position the baseline as set in the calibration standard injections. If manual integration was performed, copies of all manual integration peak profiles are included in the raw data section of this fraction.

**Additional Comments**

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The additional comments were not required.

**System Configuration**

The Diesel Range Organics analysis was performed on the following instrument configuration:

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>
FID7.I	Agilent Gas Chromatograph	Agilent 6890N GC/FID	DB-5MS	30m x 0.25mm, 0.25um(J&W)

**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

WCHN001 WC-HANFORD, INC.

Client SDG: X0054 GEL Work Order: 350505 Project: RC-236A Groundwater

#### 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.

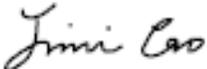
RA Indicates that sample is re-analyzed without re-extraction.

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: 20 JUN 2014

Title: Data Validator

# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 19, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW1	Project: WCHN RC-236A
Sample ID: 350505001	Client ID: WCHN001
Matrix: WATER	
Collect Date: 11-JUN-14 08:26	
Receive Date: 12-JUN-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Diesel Range Organics											
SW846 3535A/NWTPH-Dx DRO "As Received"											
Diesel Range Organics (C10-C20)	U	48.1	48.1	500	ug/L	1	BYT1	06/18/14	1229	1396224	1
Motor Oil (C20-C36)	U	48.1	48.1	500	ug/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3535A	3535A DRO IN LIQ PREP	RXC1	06/17/14	0630	1396222

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	NWTPH-Dx	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
o-Terphenyl	SW846 3535A/NWTPH-Dx DRO "As Received"	13.2 ug/L	19.2	68.8	(50%-150%)

**Notes:**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 19, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW4	Project: WCHN RC-236A
Sample ID: 350505003	Client ID: WCHN001
Matrix: WATER	
Collect Date: 11-JUN-14 10:28	
Receive Date: 12-JUN-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Diesel Range Organics											
SW846 3535A/NWTPH-Dx DRO "As Received"											
Diesel Range Organics (C10-C20)	U	50.0	50.0	500	ug/L	1	BYT1	06/18/14	1425	1396224	1
Motor Oil (C20-C36)	J	343	50.0	500	ug/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3535A	3535A DRO IN LIQ PREP	RXC1	06/17/14	0630	1396222

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	NWTPH-Dx	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
o-Terphenyl	SW846 3535A/NWTPH-Dx DRO "As Received"	15.8 ug/L	20.0	79.0	(50%-150%)

**Notes:**

# **Quality Control Summary**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: June 19, 2014

Page 1 of 2

**WC-Hanford, Inc.**  
**2620 Fermi Avenue**  
**MSIN H4-21**  
**Richland, Washington**  
**Contact: Joan Kessner**

**Workorder: 350505**

**Client SDG: X0054**

**Project Description: RC-236A Groundwater**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Diesel Range Organics</b>											
Batch	1396224										
QC1203109928	LCS										
Diesel Range Organics (C10-C20)	2000			1430	ug/L		71.4	(70%-130%)	BYT1	06/18/14	11:50
Motor Oil (C20-C36)	2000			1600	ug/L		80	(70%-130%)			
**o-Terphenyl	20.0			16.0	ug/L		80.1	(50%-150%)			
QC1203109927	MB										
Diesel Range Organics (C10-C20)			U	50.0	ug/L					06/18/14	11:11
Motor Oil (C20-C36)			U	50.0	ug/L						
**o-Terphenyl	20.0			13.7	ug/L		68.7	(50%-150%)			
QC1203109929	350505001 MS										
Diesel Range Organics (C10-C20)	2000	U	48.1	1510	ug/L		75.6	(70%-130%)		06/18/14	13:08
Motor Oil (C20-C36)	2000	U	48.1	1840	ug/L		92	(70%-130%)			
**o-Terphenyl	20.0		13.2	16.9	ug/L		84.6	(50%-150%)			
QC1203109930	350505001 MSD										
Diesel Range Organics (C10-C20)	2000	U	48.1	1450	ug/L	4.27	72.5	(0%-20%)		06/18/14	13:46
Motor Oil (C20-C36)	2000	U	48.1	1760	ug/L	4.52	87.9	(0%-20%)			
**o-Terphenyl	20.0		13.2	14.9	ug/L		74.6	(50%-150%)			

**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

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
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.

# Miscellaneous

# Prep Logbook

## Extraction of Semivolatile and Nonvolatile Organic Compounds from Groundwater, Wastewater, and Other Aqueous Samples

**Batch ID:** 1396222      **Verified by:** \_\_\_\_\_  
**Analyst:** Rodricous Corbett  
**Method:** SW846 3535A

**Lab SOP:** GL-OA-E-013 REV# 27  
**Instrument:** Semi-Volatiles Manual

Sample ID	Run Date	Initial Volume (mL)	Ph 1	Ph 2	Final Volume (mL)	Prepped Factor (mL/mL)
1203109927 MB	17-JUN-2014 06:30:00	1000	7	1	1	0.001
1203109928 LCS	17-JUN-2014 06:30:00	1000	7	1	1	0.001
350505001	17-JUN-2014 06:30:00	1040	3	1	1	0.00096
1203109929 MS (350505001)	17-JUN-2014 06:30:00	500	3	1	0.5	0.001
1203109930 MSD (350505001)	17-JUN-2014 06:30:00	500	3	1	0.5	0.001
350505003	17-JUN-2014 06:30:00	1000	3	1	1	0.001

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
LCS	1203109928	AZDRO SPIKE LCS STD,4000ug/ml	WFI140611-62	1	mL	Final Solvent: CH2Cl2 Verified by: DPF
MS	1203109929	AZDRO SPIKE LCS STD,4000ug/ml	WFI140611-62	.5	mL	
MSD	1203109930	AZDRO SPIKE LCS STD,4000ug/ml	WFI140611-62	.5	mL	
SURR	All	20 ppm surrogate	WE140520-04	.5	mL	
SURR	All	20 ppm surrogate	WE140520-04	1	mL	
REGNT	All	Methylene Chloride	2117042-D	180	mL	
REGNT	All	1:1 sulfuric acid	2118599	15	mL	
SOURC	All	SODIUM SULFATE	2101676	30	g	

# **GC Volatiles (GRO) Analysis**

# Case Narrative

**GC Volatile Organics  
WC-HANFORD, INC. (WCHN)  
SDG X0054**

**Method/Analysis Information**

**Procedure:** Volatile Total Petroleum Hydrocarbons by Flame Ionization Detector  
Analytical Method: NWTPH-Gx  
Analytical Batch Number: 1398348

**Sample Analysis**

The following client and quality control samples were analyzed to complete this sample delivery group/work order using the methods referenced in the Analysis Information section:

<b>Sample ID</b>	<b>Client ID</b>
350505001	B2WVW1
350505003	B2WVW4
1203115157	Method Blank (MB)
1203115158	350505001(B2WVW1) Post Spike (PS)
1203115159	350505001(B2WVW1) Post Spike Duplicate (PSD)
1203115160	Laboratory Control Sample (LCS)

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

NOTE: For volatile organic analyses the matrix spike designations may be indicated as "PS" or "PSD". The "PS" designation (post spike) indicates that the matrix was fortified prior to analysis but after applying any prep factors, such as a dilution. The laboratory considers the MS/MSD and PS/PSD designations interchangeable.

Gasoline Range Organics will be designated as GRO throughout this case narrative.

Raw data reports are processed and reviewed by the analyst using the Chemstation software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP) section 19.1.2. False positive analytes are designated on the quantitation report with a 'd' qualifier.

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-004 REV# 25.

**Calibration Information**

**Initial Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG). See the calibration history report for a list of data files that were used to generate the initial calibration curve in the Standard Data Section of this data package.

**CCV Requirements**

All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria. Analyte peaks eluted within the established retention time windows for this method.

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

The MB(s) analyzed with this SDG met the acceptance criteria.

**Surrogate Recoveries**

Surrogate recoveries, in all samples and quality control samples, were within the acceptance limits.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

**QC Sample Designation**

Sample 350505001 (B2WVW1) was selected for analysis as the matrix spike.

**Matrix Spike (PS) Recovery Statement**

The GRO recovery was within the acceptance limits.

**Matrix Spike Duplicate (PSD) Recovery Statement**

The GRO recovery was within the acceptance limits.

**Relative Percent Difference (RPD) Statement**

The RPD between the matrix spike pair met the acceptance limits.

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

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. All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

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

Re-extractions or re-analyses were not required in this SDG.

**Miscellaneous Information****Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Manual Integrations**

Data files associated with the initial calibration, continuing calibration check(s), and samples may have been manually integrated to correct misidentification of peaks by the integration software.

#### **Additional Comments**

Additional comments were not required for this SDG.

#### **System Configuration**

The GRO Organics analysis was performed on the following instrument configuration:

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>	<b>P &amp; T Trap</b>
VOC4A.I	Agilent 6890N GC/FID w/ OI 4560/Archon Autosampler	HP6890N GC/FID	DB-624	0.53mm x 3.0u x 15m	OI #10

# GEL LABORATORIES LLC

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

## Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0054 GEL Work Order: 350505 Project: RC-236A Groundwater

### 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: Erin Haubert

Date: 25 JUN 2014

Title: Data Validator

# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 25, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-236A Groundwater

Client SDG: X0054

---

Client Sample ID: B2WVW1	Project: WCHN RC-236A
Sample ID: 350505001	Client ID: WCHN001
Matrix: WATER	
Collect Date: 11-JUN-14 08:26	
Receive Date: 12-JUN-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Volatiles GRO Organics											
NWTPH-Gx GRO Liquid "As Received"											
Gasoline Range Organics (C6 - C10)	U	16.7	16.7	500	ug/L	1	ACJ	06/24/14	1131	1398348	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	NWTPH-Gx	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Bromofluorobenzene	NWTPH-Gx GRO Liquid "As Received"	49.7 ug/L	50.0	99.4	(50%-150%)

**Notes:**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 25, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW4	Project: WCHN RC-236A
Sample ID: 350505003	Client ID: WCHN001
Matrix: WATER	
Collect Date: 11-JUN-14 10:28	
Receive Date: 12-JUN-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Volatiles GRO Organics											
NWTPH-Gx GRO Liquid "As Received"											
Gasoline Range Organics (C6 - C10)	U	16.7	16.7	500	ug/L	1	ACJ	06/24/14	1159	1398348	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	NWTPH-Gx	

Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Bromofluorobenzene		NWTPH-Gx GRO Liquid "As Received"	48.1 ug/L	50.0	96.2	(50%-150%)

**Notes:**

# **Quality Control Summary**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: June 25, 2014

Page 1 of 2

**WC-Hanford, Inc.**  
**2620 Fermi Avenue**  
**MSIN H4-21**  
**Richland, Washington**  
**Contact: Joan Kessner**

**Workorder: 350505**

**Client SDG: X0054**

**Project Description: RC-236A Groundwater**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatiles GRO Organics</b>											
Batch	1398348										
QC1203115160	LCS										
Gasoline Range Organics (C6 - C10)	500		J	495	ug/L		99	(70%-130%)	ACJ	06/24/14	10:02
**Bromofluorobenzene	50.0			55.6	ug/L		111	(50%-150%)			
QC1203115157	MB										
Gasoline Range Organics (C6 - C10)			U	16.7	ug/L					06/24/14	10:31
**Bromofluorobenzene	50.0			49.3	ug/L		98.5	(50%-150%)			
QC1203115158	350505001	PS									
Gasoline Range Organics (C6 - C10)	500	U	0.00	J	484	ug/L		96.7	(70%-130%)	06/24/14	13:24
**Bromofluorobenzene	50.0		49.7		49.0	ug/L		97.9	(50%-150%)		
QC1203115159	350505001	PSD									
Gasoline Range Organics (C6 - C10)	500	U	0.00	J	485	ug/L	0.205	96.9	(0%-20%)	06/24/14	13:52
**Bromofluorobenzene	50.0		49.7		48.8	ug/L		97.5	(50%-150%)		

**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
- 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

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

## QC Summary

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Page 2 of 2

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

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 Fractional Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0054**

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
350505001	B2WVW1
350505003	B2WVW4
1203107992	Method Blank (MB) <b>ICP</b>
1203107993	Laboratory Control Sample (LCS)
1203107996	350505001(B2WVW1L) Serial Dilution (SD)
1203107994	350505001(B2WVW1S) Matrix Spike (MS)
1203107995	350505001(B2WVW1SD) Matrix Spike Duplicate (MSD)
1203107928	Method Blank (MB) <b>ICP-MS</b>
1203107929	Laboratory Control Sample (LCS)
1203107932	350505001(B2WVW1L) Serial Dilution (SD)
1203107930	350505001(B2WVW1S) Matrix Spike (MS)
1203107931	350505001(B2WVW1SD) Matrix Spike Duplicate (MSD)

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

**Method/Analysis Information**

<b>Analytical Batch:</b>	1395474 and 1395449
<b>Prep Batch :</b>	1395473 and 1395448
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 22, GL-MA-E-006 REV# 10 and GL-MA-E-014 REV# 25
<b>Analytical Method:</b>	SW846 3005A/6010C and SW846 3005A/6020A
<b>Prep Method :</b>	SW846 3005A

**Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories,

LLC and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

### **System Configuration**

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 0.4L/min, argon gas flows of 13 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 9000 inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum. Operating conditions are set at 1400W power and combined argon pressures of 360+/-7 kPa for the plasma and auxiliary gases, and 0.85 L/min carrier gas flow, and an initial lens voltage of 5.2.

### **Calibration Information**

#### **Instrument Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG).

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

All PQL standards for 6010C met the control limits with the exception of lead and tin listed below. The sample concentrations were less than the MDL or greater than 2x the PQL, so the data is not adversely affected. 350505001 (B2WVW1) and 350505003 (B2WVW4)-ICP.

#### **ICSA/ICSAB Statement**

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

#### **Continuing Calibration Blanks (CCB) Requirements**

All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria.

#### **Continuing Calibration Verification (CCV) Requirements**

All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

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

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

The MBs analyzed with this SDG met the acceptance criteria.

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

The LCS spike recoveries met the acceptance limits.

#### **Quality Control (QC) Sample Statement**

The following samples were selected as the quality control (QC) samples for this SDG: 350505001 (B2WVW1)-ICP and ICP-MS.

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

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. All applicable analytes met the acceptance criteria.

#### **Matrix Spike Duplicate (MSD) Recovery Statement**

The percent recovery (%R) obtained from the MSD analyses are evaluated when the sample concentration is less than

four times (4X) the spike concentration added. All applicable analytes met the acceptance criteria.

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

The relative percent difference (RPD) obtained from the designated matrix spike duplicate (MSD) is evaluated based on acceptance criteria of 20%. The RPD values between qualifying analyte results in the MS and MSD were within the acceptance limits.

**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. All applicable analytes met the established acceptance percent difference criteria.

**Technical Information**

**Holding Time Specifications**

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. All samples in this SDG met the specified holding time.

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**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. Samples required dilutions for tin in order to minimize suppression due to matrix interferences. 350505001 (B2WVW1) and 350505003 (B2WVW4)-ICP.

**Preparation Information**

The samples in this SDG were prepared exactly according to the cited SOP.

**Miscellaneous Information**

**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. Data exception reports were included behind the Case Narrative or in the Miscellaneous Data section of this data package. A data exception report was not required for this SDG.

**Additional Comments**

Additional comments were not required for this SDG.

**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.

**Review Validation:**

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

**The following data validator verified the information presented in this case narrative:**

Reviewer: Nikhil A. Elmore Date: 6.26.14

# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Qualifier Definition Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0054 GEL Work Order: 350505 Project: RC-236A Groundwater

**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.

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

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 Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Orlette Johnson.

Reviewed by

Nick Cole A. Elmore 6-26-14

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 26, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW1	Project: WCHN RC-236A
Sample ID: 350505001	Client ID: WCHN001
Matrix: WATER	
Collect Date: 11-JUN-14 08:26	
Receive Date: 12-JUN-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Metals Analysis-ICP</b>											
6010_METALS_ICP(Supertrace):COMMON (Add-on) "As Received"											
Aluminum	U	68.0	68.0	200	ug/L	1	HSC	06/16/14	2021	1395474	1
Arsenic	B	5.31	5.00	30.0	ug/L	1					
Barium		11.3	1.00	5.00	ug/L	1					
Beryllium	U	1.00	1.00	5.00	ug/L	1					
Boron	U	15.0	15.0	50.0	ug/L	1					
Cadmium	U	1.00	1.00	5.00	ug/L	1					
Calcium		15700	50.0	200	ug/L	1					
Chromium	B	3.28	1.00	5.00	ug/L	1					
Cobalt	U	1.00	1.00	5.00	ug/L	1					
Copper	U	3.00	3.00	10.0	ug/L	1					
Iron	B	86.9	30.0	100	ug/L	1					
Magnesium		3040	110	300	ug/L	1					
Manganese	B	3.25	2.00	10.0	ug/L	1					
Molybdenum	U	2.00	2.00	10.0	ug/L	1					
Nickel	U	1.50	1.50	5.00	ug/L	1					
Phosphorous	U	60.0	60.0	150	ug/L	1					
Potassium		1850	50.0	150	ug/L	1					
Selenium	B	10.2	6.00	30.0	ug/L	1					
Silicon		6390	25.0	100	ug/L	1					
Silver	U	1.00	1.00	5.00	ug/L	1					
Strontium		67.7	1.00	5.00	ug/L	1					
Thallium	U	5.00	5.00	20.0	ug/L	1					
Vanadium	B	3.20	1.00	5.00	ug/L	1					
Zinc	U	3.30	3.30	10.0	ug/L	1					
Antimony	U	3.50	3.50	10.0	ug/L	1	HSC	06/17/14	1404	1395474	2
Lead	U	3.30	3.30	10.0	ug/L	1					
Sodium		9570	100	300	ug/L	1					
Uranium	B	21.1	10.0	50.0	ug/L	1					
Tin	DU	25.0	25.0	100	ug/L	10	HSC	06/17/14	1431	1395474	3
<b>Metals Analysis-ICP-MS</b>											
SW846 3005A/6020A Liquid - lithium & bismuth "As Received"											
Bismuth	U	0.500	0.500	100	ug/L	1	BAJ	06/26/14	1355	1395449	4
Lithium	U	2.00	2.00	25.0	ug/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
--------	-------------	---------	------	------	------------

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 26, 2014

Company : WC-Hanford, Inc.  
Address : 2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington 99354  
Contact: Joan Kessner  
Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW1  
Sample ID: 350505001

Project: WCHN RC-236A  
Client ID: WCHN001

---

SW846 3005A	ICP-MS 3005A PREP	JX01	06/13/14	0830	1395448
SW846 3005A	SW846 3005A for 6010C	JX01	06/13/14	0830	1395473

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3005A/6010C	
2	SW846 3005A/6010C	
3	SW846 3005A/6010C	
4	SW846 3005A/6020A	

**Notes:**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 26, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW4	Project: WCHN RC-236A
Sample ID: 350505003	Client ID: WCHN001
Matrix: WATER	
Collect Date: 11-JUN-14 10:28	
Receive Date: 12-JUN-14	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Metals Analysis-ICP</b>											
6010_METALS_ICP(Supertrace):COMMON (Add-on) "As Received"											
Aluminum	U	68.0	68.0	200	ug/L	1	HSC	06/16/14	2017	1395474	1
Arsenic	B	6.59	5.00	30.0	ug/L	1					
Barium		17.0	1.00	5.00	ug/L	1					
Beryllium	U	1.00	1.00	5.00	ug/L	1					
Boron	U	15.0	15.0	50.0	ug/L	1					
Cadmium	U	1.00	1.00	5.00	ug/L	1					
Calcium		14600	50.0	200	ug/L	1					
Chromium	U	1.00	1.00	5.00	ug/L	1					
Cobalt	U	1.00	1.00	5.00	ug/L	1					
Copper	U	3.00	3.00	10.0	ug/L	1					
Iron		142	30.0	100	ug/L	1					
Magnesium		4510	110	300	ug/L	1					
Manganese		32.0	2.00	10.0	ug/L	1					
Molybdenum	U	2.00	2.00	10.0	ug/L	1					
Nickel	U	1.50	1.50	5.00	ug/L	1					
Phosphorous	U	60.0	60.0	150	ug/L	1					
Potassium		942	50.0	150	ug/L	1					
Selenium	B	6.55	6.00	30.0	ug/L	1					
Silicon		4700	25.0	100	ug/L	1					
Silver	U	1.00	1.00	5.00	ug/L	1					
Strontium		60.0	1.00	5.00	ug/L	1					
Thallium	U	5.00	5.00	20.0	ug/L	1					
Vanadium	U	1.00	1.00	5.00	ug/L	1					
Zinc	U	3.30	3.30	10.0	ug/L	1					
Antimony	B	4.29	3.50	10.0	ug/L	1	HSC	06/17/14	1400	1395474	2
Lead	U	3.30	3.30	10.0	ug/L	1					
Sodium		2550	100	300	ug/L	1					
Uranium	B	25.3	10.0	50.0	ug/L	1					
Tin	DU	25.0	25.0	100	ug/L	10	HSC	06/17/14	1427	1395474	3
<b>Metals Analysis-ICP-MS</b>											
SW846 3005A/6020A Liquid - lithium & bismuth "As Received"											
Bismuth	U	0.500	0.500	100	ug/L	1	BAJ	06/26/14	1411	1395449	4
Lithium	U	2.00	2.00	25.0	ug/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
--------	-------------	---------	------	------	------------

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 26, 2014

Company : WC-Hanford, Inc.  
Address : 2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington 99354  
Contact: Joan Kessner  
Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW4  
Sample ID: 350505003

Project: WCHN RC-236A  
Client ID: WCHN001

---

SW846 3005A	ICP-MS 3005A PREP	JX01	06/13/14	0830	1395448
SW846 3005A	SW846 3005A for 6010C	JX01	06/13/14	0830	1395473

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3005A/6010C	
2	SW846 3005A/6010C	
3	SW846 3005A/6010C	
4	SW846 3005A/6020A	

**Notes:**

# **Quality Control Summary**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: June 26, 2014

Page 1 of 9

**WC-Hanford, Inc.**  
**2620 Fermi Avenue**  
**MSIN H4-21**  
**Richland, Washington**  
**Contact: Joan Kessner**

**Workorder: 350505**

**Client SDG: X0054**

**Project Description: RC-236A Groundwater**

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch 1395449											
QC1203107929		LCS									
Bismuth	50.0		B	54.4	ug/L		109	(80%-120%)	BAJ	06/26/14	13:52
Lithium	50.0			52.0	ug/L		104	(80%-120%)			
QC1203107928		MB									
Bismuth			U	0.500	ug/L					06/26/14	13:49
Lithium			U	2.00	ug/L						
QC1203107930		350505001 MS									
Bismuth	50.0	U	0.500 B	52.8	ug/L		105	(75%-125%)		06/26/14	13:58
Lithium	50.0	U	2.00	51.9	ug/L		101	(75%-125%)			
QC1203107931		350505001 MSD									
Bismuth	50.0	U	0.500 B	54.6	ug/L	3.48	109	(0%-20%)		06/26/14	14:02
Lithium	50.0	U	2.00	55.4	ug/L	6.45	108	(0%-20%)			
QC1203107932		350505001 SDILT									
Bismuth		U	0.165 DU	2.50	ug/L	N/A				06/26/14	14:08
Lithium		U	1.27 DU	10.0	ug/L	N/A		(0%-10%)			
<b>Metals Analysis-ICP</b>											
Batch 1395474											
QC1203107993		LCS									
Aluminum	5000			4680	ug/L		93.7	(80%-120%)	HSC	06/16/14	20:14
Antimony	500			512	ug/L		102	(80%-120%)		06/17/14	13:57
Arsenic	500			471	ug/L		94.2	(80%-120%)		06/16/14	20:14
Barium	500			476	ug/L		95.2	(80%-120%)			
Beryllium	500			473	ug/L		94.6	(80%-120%)			
Boron	500			459	ug/L		91.9	(80%-120%)			
Cadmium	500			468	ug/L		93.6	(80%-120%)			

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Page 2 of 9

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1395474										
Calcium	5000			4640	ug/L		92.7	(80%-120%)	HSC	06/16/14	20:14
Chromium	500			463	ug/L		92.6	(80%-120%)			
Cobalt	500			471	ug/L		94.2	(80%-120%)			
Copper	500			461	ug/L		92.2	(80%-120%)			
Iron	5000			4760	ug/L		95.3	(80%-120%)			
Lead	500			528	ug/L		106	(80%-120%)		06/17/14	13:57
Magnesium	5000			4820	ug/L		96.4	(80%-120%)		06/16/14	20:14
Manganese	500			467	ug/L		93.4	(80%-120%)			
Molybdenum	500			459	ug/L		91.8	(80%-120%)			
Nickel	500			457	ug/L		91.4	(80%-120%)			
Phosphorous	500			438	ug/L		87.7	(80%-120%)			
Potassium	5000			4820	ug/L		96.4	(80%-120%)			
Selenium	500			460	ug/L		92.1	(80%-120%)			
Silicon	5000			4450	ug/L		89.1	(80%-120%)			
Silver	500			480	ug/L		96	(80%-120%)			
Sodium	5000			5240	ug/L		105	(80%-120%)		06/17/14	13:57
Strontium	500			478	ug/L		95.6	(80%-120%)		06/16/14	20:14
Thallium	500			466	ug/L		93.3	(80%-120%)			
Tin	500			526	ug/L		105	(80%-120%)		06/17/14	13:57
Uranium	500			481	ug/L		96.2	(80%-120%)			
Vanadium	500			482	ug/L		96.4	(80%-120%)		06/16/14	20:14

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Page 3 of 9

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1395474										
Zinc	500			464	ug/L		92.7	(80%-120%)			
QC1203107992	MB										
Aluminum			U	68.0	ug/L				HSC	06/16/14	20:10
Antimony			U	3.50	ug/L					06/17/14	13:53
Arsenic			U	5.00	ug/L					06/16/14	20:10
Barium			U	1.00	ug/L						
Beryllium			U	1.00	ug/L						
Boron			U	15.0	ug/L						
Cadmium			U	1.00	ug/L						
Calcium			U	50.0	ug/L						
Chromium			U	1.00	ug/L						
Cobalt			U	1.00	ug/L						
Copper			U	3.00	ug/L						
Iron			U	30.0	ug/L						
Lead			U	3.30	ug/L					06/17/14	13:53
Magnesium			U	110	ug/L					06/16/14	20:10
Manganese			U	2.00	ug/L						
Molybdenum			U	2.00	ug/L						
Nickel			U	1.50	ug/L						
Phosphorous			U	60.0	ug/L						
Potassium			U	50.0	ug/L						
Selenium			U	6.00	ug/L						
Silicon			U	25.0	ug/L						

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Page 4 of 9

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1395474										
Silver			U	1.00	ug/L				HSC	06/16/14	20:10
Sodium			U	100	ug/L					06/17/14	13:53
Strontium			U	1.00	ug/L					06/16/14	20:10
Thallium			U	5.00	ug/L						
Tin			B	3.18	ug/L					06/17/14	13:53
Uranium			B	18.2	ug/L						
Vanadium			U	1.00	ug/L					06/16/14	20:10
Zinc			U	3.30	ug/L						
QC1203107994 350505001 MS											
Aluminum	5000		U	68.0	ug/L		94.7	(75%-125%)		06/16/14	20:25
Antimony	500		U	3.50	ug/L		103	(75%-125%)		06/17/14	14:09
Arsenic	500		B	5.31	ug/L		93.8	(75%-125%)		06/16/14	20:25
Barium	500			11.3	ug/L		94.5	(75%-125%)			
Beryllium	500		U	1.00	ug/L		94.7	(75%-125%)			
Boron	500		U	15.0	ug/L		93.1	(75%-125%)			
Cadmium	500		U	1.00	ug/L		92.2	(75%-125%)			
Calcium	5000			15700	ug/L		103	(75%-125%)			
Chromium	500		B	3.28	ug/L		91.1	(75%-125%)			
Cobalt	500		U	1.00	ug/L		92.4	(75%-125%)			
Copper	500		U	3.00	ug/L		92.1	(75%-125%)			
Iron	5000		B	86.9	ug/L		96.2	(75%-125%)			
Lead	500		U	3.30	ug/L		105	(75%-125%)		06/17/14	14:09

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: **350505**

Client SDG: X0054

Project Description: RC-236A Groundwater

Page 5 of 9

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>												
Batch	1395474											
Magnesium	5000		3040		7960	ug/L		98.5	(75%-125%)	HSC	06/16/14	20:25
Manganese	500	B	3.25		462	ug/L		91.7	(75%-125%)			
Molybdenum	500	U	2.00		459	ug/L		91.6	(75%-125%)			
Nickel	500	U	1.50		441	ug/L		88.3	(75%-125%)			
Phosphorous	500	U	60.0		484	ug/L		90.3	(75%-125%)			
Potassium	5000		1850		6720	ug/L		97.5	(75%-125%)			
Selenium	500	B	10.2		457	ug/L		89.4	(75%-125%)			
Silicon	5000		6390		10800	ug/L		88.4	(75%-125%)			
Silver	500	U	1.00		480	ug/L		95.8	(75%-125%)			
Sodium	5000		9570		15300	ug/L		114	(75%-125%)		06/17/14	14:09
Strontium	500		67.7		554	ug/L		97.2	(75%-125%)		06/16/14	20:25
Thallium	500	U	5.00		464	ug/L		92.9	(75%-125%)			
Tin	500	DU	25.0	D	506	ug/L		101	(75%-125%)		06/17/14	14:35
Uranium	500	B	21.1		502	ug/L		96.1	(75%-125%)		06/17/14	14:09
Vanadium	500	B	3.20		482	ug/L		95.8	(75%-125%)		06/16/14	20:25
Zinc	500	U	3.30		454	ug/L		90.6	(75%-125%)			
QC1203107995 350505001 MSD												
Aluminum	5000	U	68.0		4740	ug/L	1.20	93.6	(0%-20%)		06/16/14	20:28
Antimony	500	U	3.50		505	ug/L	2.12	101	(0%-20%)		06/17/14	14:12
Arsenic	500	B	5.31		463	ug/L	2.34	91.6	(0%-20%)		06/16/14	20:28
Barium	500		11.3		477	ug/L	1.41	93.2	(0%-20%)			
Beryllium	500	U	1.00		466	ug/L	1.68	93.1	(0%-20%)			

# GEL LABORATORIES LLC

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

## QC Summary

**Workorder:** 350505

**Client SDG:** X0054

**Project Description:** RC-236A Groundwater

**Page 6 of 9**

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1395474										
Boron	500	U	15.0	470	ug/L	1.08	92.1	(0%-20%)	HSC	06/16/14	20:28
Cadmium	500	U	1.00	456	ug/L	1.25	91.1	(0%-20%)			
Calcium	5000		15700	20600	ug/L	1.10	98.3	(0%-20%)			
Chromium	500	B	3.28	454	ug/L	1.05	90.2	(0%-20%)			
Cobalt	500	U	1.00	456	ug/L	1.34	91.2	(0%-20%)			
Copper	500	U	3.00	456	ug/L	1.07	91.1	(0%-20%)			
Iron	5000	B	86.9	4820	ug/L	1.60	94.6	(0%-20%)			
Lead	500	U	3.30	509	ug/L	2.81	102	(0%-20%)		06/17/14	14:12
Magnesium	5000		3040	7850	ug/L	1.40	96.3	(0%-20%)		06/16/14	20:28
Manganese	500	B	3.25	456	ug/L	1.33	90.5	(0%-20%)			
Molybdenum	500	U	2.00	452	ug/L	1.46	90.2	(0%-20%)			
Nickel	500	U	1.50	435	ug/L	1.38	87	(0%-20%)			
Phosphorous	500	U	60.0	483	ug/L	0.167	90.2	(0%-20%)			
Potassium	5000		1850	6630	ug/L	1.46	95.5	(0%-20%)			
Selenium	500	B	10.2	434	ug/L	5.11	84.8	(0%-20%)			
Silicon	5000		6390	10700	ug/L	0.762	86.7	(0%-20%)			
Silver	500	U	1.00	473	ug/L	1.48	94.4	(0%-20%)			
Sodium	5000		9570	14800	ug/L	2.69	106	(0%-20%)		06/17/14	14:12
Strontium	500		67.7	545	ug/L	1.65	95.4	(0%-20%)		06/16/14	20:28
Thallium	500	U	5.00	456	ug/L	1.92	91.1	(0%-20%)			
Tin	500	DU	25.0	D 487	ug/L	3.86	97.4	(0%-20%)		06/17/14	14:39

# GEL LABORATORIES LLC

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

## QC Summary

**Workorder:** 350505

**Client SDG:** X0054

**Project Description:** RC-236A Groundwater

**Page 7 of 9**

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1395474										
Uranium	500	B	21.1		492	ug/L	2.03	94.1	(0%-20%)	06/17/14	14:12
Vanadium	500	B	3.20		477	ug/L	1.12	94.7	(0%-20%)	HSC	06/16/14 20:28
Zinc	500	U	3.30		449	ug/L	0.919	89.8	(0%-20%)		
QC1203107996 350505001 SDILT											
Aluminum		U	61.5	DU	340	ug/L	N/A		(0%-10%)	06/16/14	20:32
Antimony		U	1.80	DU	17.5	ug/L	N/A		(0%-10%)	06/17/14	14:15
Arsenic		B	5.31	DU	25.0	ug/L	N/A		(0%-10%)	06/16/14	20:32
Barium			11.3	D	2.29	ug/L	1.03		(0%-10%)		
Beryllium		U	0.271	DU	5.00	ug/L	N/A		(0%-10%)		
Boron		U	10.1	DU	75.0	ug/L	N/A		(0%-10%)		
Cadmium		U	0.340	DU	5.00	ug/L	N/A		(0%-10%)		
Calcium			15700	D	3140	ug/L	.102		(0%-10%)		
Chromium		B	3.28	DU	5.00	ug/L	N/A		(0%-10%)		
Cobalt		U	0.539	DU	5.00	ug/L	N/A		(0%-10%)		
Copper		U	0.0586	DU	15.0	ug/L	N/A		(0%-10%)		
Iron		B	86.9	DU	150	ug/L	N/A		(0%-10%)		
Lead		U	-1.83	DU	16.5	ug/L	N/A		(0%-10%)	06/17/14	14:15
Magnesium			3040	D	571	ug/L	6.07		(0%-10%)	06/16/14	20:32
Manganese		B	3.25	DU	10.0	ug/L	N/A		(0%-10%)		
Molybdenum		U	1.31	DU	10.0	ug/L	N/A		(0%-10%)		
Nickel		U	-0.803	DU	7.50	ug/L	N/A		(0%-10%)		
Phosphorous		U	32.6	DU	300	ug/L	N/A		(0%-10%)		
Potassium			1850	D	357	ug/L	3.43		(0%-10%)		

# GEL LABORATORIES LLC

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

## QC Summary

**Workorder:** 350505

**Client SDG:** X0054

**Project Description:** RC-236A Groundwater

**Page 8 of 9**

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1395474										
Selenium	B	10.2	DU	30.0	ug/L	N/A		(0%-10%)	HSC	06/16/14	20:32
Silicon		6390	D	1300	ug/L	1.9		(0%-10%)			
Silver	U	0.579	DU	5.00	ug/L	N/A		(0%-10%)			
Sodium		9570	D	1810	ug/L	5.37		(0%-10%)		06/17/14	14:15
Strontium		67.7	D	13.7	ug/L	1.27		(0%-10%)		06/16/14	20:32
Thallium	U	-2.19	DU	25.0	ug/L	N/A		(0%-10%)			
Tin	DU	-7.54	DU	125	ug/L	N/A		(0%-10%)		06/17/14	14:43
Uranium	B	21.1	D	12.1	ug/L	188		(0%-10%)		06/17/14	14:15
Vanadium	B	3.20	D	1.03	ug/L	60.4		(0%-10%)		06/16/14	20:32
Zinc	U	0.378	DU	16.5	ug/L	N/A		(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, and the sample concentration was <= 5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Page 9 of 9

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

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.

# Miscellaneous

## Prep Logbook

### Acid Digestion of Total Recoverable or Dissolved Metals in Surface and Groundwater Samples for Analysis by ICP or ICP-MS

Batch ID:	1395473	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	John Orgel	LCS	1203107993	Metals Spike Mix I	UI2087802-01	.25	mL
Method:	SW846 3005A	LCS	1203107993	Metals Spike Mix II	UI2087804-06	.25	mL
Lab SOP:	GL-MA-E-006 REV# 10	MS	1203107994	Metals Spike Mix I	UI2087802-01	.25	mL
Instrument:	Metals Manual Instrument	MS	1203107994	Metals Spike Mix II	UI2087804-06	.25	mL
		MSD	1203107995	Metals Spike Mix I	UI2087802-01	.25	mL
		MSD	1203107995	Metals Spike Mix II	UI2087804-06	.25	mL

Sample ID	Run Date	Matrix	Initial Volume (mL)	Final Volume (mL)	Prep Factor (mL/mL)	pH Check
1203107992 MB	13-JUN-2014 08:30:19	Water	50	50	1	<2
1203107993 LCS	13-JUN-2014 08:30:19	Water	50	50	1	<2
350505001	13-JUN-2014 08:30:19	Water	50	50	1	<2
1203107994 MS (350505001)	13-JUN-2014 08:30:19	Water	50	50	1	<2
1203107995 MSD (350505001)	13-JUN-2014 08:30:19	Water	50	50	1	<2
1203107996 SDILT (350505001)	13-JUN-2014 08:30:19	Water	50	50	1	<2
350505003	13-JUN-2014 08:30:19	Water	50	50	1	<2

Reagent/Solvent Lot ID	Description	Amount	Comments:
2098278	Concentrated Nitric Acid	1 mL	Block Temperature: 92 C
2108818	HYDROCHLORIC ACID	2.5 mL	Thermometer ID: 119585 Hot Block ID: 010

## Prep Logbook

### Acid Digestion of Total Recoverable or Dissolved Metals in Surface and Groundwater Samples for Analysis by ICP or ICP-MS

Batch ID:	1395448	Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
Analyst:	John Orgel	LCS	1203107929	ICP-MS spiking solution A	UI2087809-A	.125	mL
Method:	SW846 3005A	LCS	1203107929	ICP-MS spiking solution B	UI2091844-B	.125	mL
Lab SOP:	GL-MA-E-006 REV# 10	MS	1203107930	ICP-MS spiking solution A	UI2087809-A	.125	mL
Instrument:	Metals Manual Instrument	MS	1203107930	ICP-MS spiking solution B	UI2091844-B	.125	mL
		MSD	1203107931	ICP-MS spiking solution A	UI2087809-A	.125	mL
		MSD	1203107931	ICP-MS spiking solution B	UI2091844-B	.125	mL

Sample ID	Run Date	Matrix	Initial Volume (mL)	Final Volume (mL)	Prep Factor (mL/mL)	pH Check
1203107928 MB	13-JUN-2014 08:30:19	Water	25	25	1	<2
1203107929 LCS	13-JUN-2014 08:30:19	Water	25	25	1	<2
350505001	13-JUN-2014 08:30:19	Water	25	25	1	<2
1203107930 MS (350505001)	13-JUN-2014 08:30:19	Water	25	25	1	<2
1203107931 MSD (350505001)	13-JUN-2014 08:30:19	Water	25	25	1	<2
1203107932 SDILT (350505001)	13-JUN-2014 08:30:19	Water	25	25	1	<2
350505003	13-JUN-2014 08:30:19	Water	25	25	1	<2

Reagent/Solvent Lot ID	Description	Amount	Comments:
2108818	HYDROCHLORIC ACID	1.25 mL	Block Temperature: 92 C
2108826	Concentrated Nitric Acid	.5 mL	Thermometer ID: 119585 Hot Block ID: 010

# **General Chem Analysis**

# Case Narrative

**General Chemistry Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0054**

**Method/Analysis Information**

<b>Product:</b>	<b>Ion Chromatography</b>		
<b>Analytical Batch:</b>	1395369	<b>Method:</b>	9056_ANIONS_IC: COMMON and COMMON (Add-on)

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW846 9056A:

<b>Sample ID</b>	<b>Client ID</b>
350505002	B2WVW2
350505004	B2WVW5
1203107722	Method Blank (MB)
1203107723	350505004(B2WVW5) Sample Duplicate (DUP)
1203107724	350505004(B2WVW5) Post Spike (PS)
1203107725	Laboratory Control Sample (LCS)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-086 REV# 22.

**Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

**Calibration Information**

The Ion Chromatography analysis was performed on a Dionex ICS-3000 Ion Chromatograph.

**Initial Calibration**

All initial calibration requirements have been met for this SDG.

**Continuing Calibration Blanks**

All continuing calibration blanks (CCBs) associated with reported data from this batch were within acceptance limits.

**Calibration Verification Information (CCV)**

All continuing calibration verification standards (CCVs) associated with reported data from this batch were within acceptance limits.

**Y Intercept Rule**

The absolute value of the intercept is less than 3 times the MDL.

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

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following sample was selected for QC analysis: 350505004 (B2WVW5).

**Matrix Spike (MS)/Post Spike (PS) Recovery Statement**

The MS/PS recovery for this sample set was within the required acceptance limits.

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

The RPD between the sample and its duplicate met the acceptance limits.

**Technical Information**

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

The samples in this SDG did not require re-analysis.

**Miscellaneous Information****Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Manual Integrations**

The following samples from this sample group had to be manually integrated due to errors in the instrument software peak integration: 1203107724 (B2WVW5), 350505002 (B2WVW2) and 350505004 (B2WVW5).

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**Method/Analysis Information**

**Product:** n-Hexane Extractable Material  
**Analytical Batch:** 1395602  
**Method:** EPA 1664A n-Hexane Extractable Material (Oil and Grease)

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA 1664A/1664B:

<b>Sample ID</b>	<b>Client ID</b>
350505001	B2WVW1
350505003	B2WVW4
1203108308	Method Blank (MB)
1203108309	350505001(B2WVW1) Matrix Spike (MS)
1203108310	Laboratory Control Sample (LCS)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-094 REV# 13.

**Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

**Calibration Information**

The Oil & Grease analysis was performed on a Sartorius Balance BAL745. Oil and Grease lab

**Initial Calibration**

All initial calibration requirements have been met for this SDG.

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following sample was selected for QC analysis: 350505001 (B2WVW1).

**Matrix Spike (MS)/Post Spike (PS) Recovery Statement**

The MS/PS recovery for this sample set was within the required acceptance limits.

**Technical Information**

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Preservation/Integrity**

All the samples from this sample group met the preservation and integrity requirements of the method.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

The samples in this SDG did not require re-analysis.

**Sample Aliquot**

Per EPA methodology, the entire sample was used for the analysis.

**Miscellaneous Information**

**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

**Additional Comments**

The client provided volume less than 1 L for the oil and grease analysis. All of the volume must be used in the extraction process; since the provided volume is less than 1 L, the resulting reporting and detection limits are elevated. 1203108309 (B2WVW1), 350505001 (B2WVW1) and 350505003 (B2WVW4).

**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

### **Method/Analysis Information**

**Product:** Alkalinity  
**Analytical Batch:** 1397312      **Method:** SM 2320B Total Alkalinity

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SM 2320B:

<b>Sample ID</b>	<b>Client ID</b>
350505001	B2WVW1
350505003	B2WVW4
1203112590	Method Blank (MB)
1203112592	350505003(B2WVW4) Sample Duplicate (DUP)
1203112596	350505003(B2WVW4) Matrix Spike (MS)
1203112600	Laboratory Control Sample (LCS)

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

### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-033 REV# 11.

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

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

### **Calibration Information**

The Titration and Ion analysis was performed on a manually operated buret.

### **Initial Standardization**

The titrant was properly standardized

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

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

The MB analyzed with this SDG met the acceptance criteria.

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

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following sample was selected for QC analysis: 350505003 (B2WVW4).

**Matrix Spike (MS)/Post Spike (PS) Recovery Statement**

The MS/PS recovery for this sample set was within the required acceptance limits.

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

The RPD between the sample and its duplicate met the acceptance limits.

**Technical Information**

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

The samples in this SDG did not require re-analysis.

**Miscellaneous Information****Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents.

**Additional Comments**

50mL of sample was used due to a insufficient sample volume. 1203112592 (B2WVW4), 1203112596 (B2WVW4) and 350505003 (B2WVW4).

**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**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.

**Review Validation:**

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

**The following data validator verified the information presented in this case narrative:**

Reviewer:  Date: 26Jun14

# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Certificate of Analysis Report for

WCHN001 WC-HANFORD, INC.

Client SDG: X0054 GEL Work Order: 350505 Project: RC-236A Groundwater

**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.

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 Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Orlette Johnson.

Reviewed by



---

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 26, 2014

Company : WC-Hanford, Inc.  
Address : 2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington 99354  
Contact: Joan Kessner  
Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW1  
Sample ID: 350505001  
Matrix: WATER  
Collect Date: 11-JUN-14 08:26  
Receive Date: 12-JUN-14  
Collector: Client

Project: WCHN RC-236A  
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Oil & Grease Analysis											
EPA 1664A n-Hexane Extractable Material (Oil and Grease) "As Received"											
Oil and Grease	B	2.04	1.43	5.10	mg/L		JXT1	06/13/14	0917	1395602	1
Titration and Ion Analysis											
SM 2320B Total Alkalinity "As Received"											
Alkalinity, Total as CaCO <sub>3</sub>		65.2	0.725	1.00	mg/L		PX01	06/21/14	1616	1397312	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 1664A/1664B	
2	SM 2320B	

**Notes:**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 26, 2014

Company : WC-Hanford, Inc.  
Address : 2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington 99354  
Contact: Joan Kessner  
Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW2  
Sample ID: 350505002  
Matrix: WATER  
Collect Date: 11-JUN-14 08:26  
Receive Date: 12-JUN-14  
Collector: Client

Project: WCHN RC-236A  
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
9056_ANIONS_IC: COMMON, COMMON (Add-on) "As Received"											
Bromide	U	0.067	0.067	0.250	mg/L	1	DM	06/12/14	1257	1395369	1
Chloride		1.17	0.067	0.200	mg/L	1					
Fluoride	B	0.148	0.033	0.500	mg/L	1					
Nitrate-N		0.237	0.033	0.100	mg/L	1					
Nitrite-N	U	0.038	0.038	0.100	mg/L	1					
O-Phosphate as P	U	0.067	0.067	0.500	mg/L	1					
Sulfate		8.42	0.133	0.500	mg/L	1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	

Notes:

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 26, 2014

Company : WC-Hanford, Inc.  
Address : 2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington 99354  
Contact: Joan Kessner  
Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2WVW4  
Sample ID: 350505003  
Matrix: WATER  
Collect Date: 11-JUN-14 10:28  
Receive Date: 12-JUN-14  
Collector: Client

Project: WCHN RC-236A  
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Oil & Grease Analysis											
EPA 1664A n-Hexane Extractable Material (Oil and Grease) "As Received"											
Oil and Grease	B	1.98	1.54	5.49	mg/L		JXT1	06/13/14	0917	1395602	1
Titration and Ion Analysis											
SM 2320B Total Alkalinity "As Received"											
Alkalinity, Total as CaCO <sub>3</sub>		51.4	1.45	2.00	mg/L		PX01	06/21/14	1619	1397312	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 1664A/1664B	
2	SM 2320B	

Notes:

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: June 26, 2014

Company : WC-Hanford, Inc.  
Address : 2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington 99354  
Contact: Joan Kessner  
Project: RC-236A Groundwater

Client SDG: X0054

Client Sample ID: B2VWV5  
Sample ID: 350505004  
Matrix: WATER  
Collect Date: 11-JUN-14 10:28  
Receive Date: 12-JUN-14  
Collector: Client

Project: WCHN RC-236A  
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
9056_ANIONS_IC: COMMON, COMMON (Add-on) "As Received"											
Bromide	U	0.067	0.067	0.250	mg/L	1	DM	06/12/14	1328	1395369	1
Chloride		1.07	0.067	0.200	mg/L	1					
Fluoride	B	0.124	0.033	0.500	mg/L	1					
Nitrate-N		0.233	0.033	0.100	mg/L	1					
Nitrite-N	U	0.038	0.038	0.100	mg/L	1					
O-Phosphate as P	U	0.067	0.067	0.500	mg/L	1					
Sulfate		8.20	0.133	0.500	mg/L	1					

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	

Notes:

# **Quality Control Summary**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: June 26, 2014

Page 1 of 3

WC-Hanford, Inc.  
2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington  
Contact: Joan Kessner

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1395369										
QC1203107723 350505004 DUP											
Bromide		U	0.067	U	0.067	mg/L	N/A		DM	06/12/14	14:23
Chloride			1.07		1.05	mg/L	1.70	(0%-20%)			
Fluoride		B	0.124	B	0.114	mg/L	7.90 ^	(+/-0.500)			
Nitrate-N			0.233		0.235	mg/L	0.727 ^	(+/-0.075)			
Nitrite-N		U	0.038	U	0.038	mg/L	N/A				
O-Phosphate as P		U	0.067	U	0.067	mg/L	N/A				
Sulfate			8.20		8.29	mg/L	1.19	(0%-20%)			
QC1203107725 LCS											
Bromide	1.25				1.30	mg/L	104	(90%-110%)		06/13/14	18:17
Chloride	5.00				4.97	mg/L	99.3	(90%-110%)			
Fluoride	2.50				2.53	mg/L	101	(90%-110%)			
Nitrate-N	2.50				2.52	mg/L	101	(90%-110%)			
Nitrite-N	2.50				2.59	mg/L	104	(90%-110%)			
O-Phosphate as P	1.25				1.19	mg/L	95.4	(90%-110%)			
Sulfate	10.0				10.2	mg/L	102	(90%-110%)			
QC1203107722 MB											
Bromide				U	0.067	mg/L				06/13/14	17:47
Chloride				U	0.067	mg/L					
Fluoride				U	0.033	mg/L					
Nitrate-N				U	0.033	mg/L					
Nitrite-N				U	0.038	mg/L					

# GEL LABORATORIES LLC

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

## QC Summary

**Workorder:** 350505

**Client SDG:** X0054

**Project Description:** RC-236A Groundwater

**Page 2 of 3**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1395369										
O-Phosphate as P			U	0.067	mg/L				DM	06/13/14	17:47
Sulfate			U	0.133	mg/L						
QC1203107724 350505004 PS											
Bromide	1.25	U	0.00	1.23	mg/L		98.5	(90%-110%)		06/12/14	14:54
Chloride	5.00		1.07	5.90	mg/L		96.5	(90%-110%)			
Fluoride	2.50	B	0.124	2.62	mg/L		99.9	(90%-110%)			
Nitrate-N	2.50		0.233	2.63	mg/L		95.9	(90%-110%)			
Nitrite-N	2.50	U	0.00	2.43	mg/L		97.1	(90%-110%)			
O-Phosphate as P	1.25	U	0.00	1.20	mg/L		95.7	(90%-110%)			
Sulfate	10.0		8.20	18.5	mg/L		103	(90%-110%)			
<b>Oil &amp; Grease Analysis</b>											
Batch	1395602										
QC1203108310 LCS											
Oil and Grease	40.0			38.1	mg/L		95.3	(73%-112%)	JXT1	06/13/14	09:17
QC1203108308 MB											
Oil and Grease			U	1.40	mg/L					06/13/14	09:17
QC1203108309 350505001 MS											
Oil and Grease	41.5	B	2.04	40.9	mg/L		93.8	(51%-105%)		06/13/14	09:17
<b>Titration and Ion Analysis</b>											
Batch	1397312										
QC1203112592 350505003 DUP											
Alkalinity, Total as CaCO3			51.4	53.4	mg/L	3.92		(0%-20%)	PXO1	06/21/14	16:25
QC1203112600 LCS											
Alkalinity, Total as CaCO3	50.0			51.9	mg/L		104	(90%-110%)		06/21/14	14:05
QC1203112590 MB											
Alkalinity, Total as CaCO3			U	0.725	mg/L					06/21/14	14:05
QC1203112596 350505003 MS											
Alkalinity, Total as CaCO3	100		51.4	154	mg/L		103	(80%-120%)		06/21/14	16:33

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 350505

Client SDG: X0054

Project Description: RC-236A Groundwater

Page 3 of 3

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

### 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, and the sample concentration was  $\leq$  5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- 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.