

8/3/2016



August 01, 2016

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

Re: CHPRC SAF X16-005  
Work Order: 401249  
SDG: GEL401249

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 12, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

*B Luthman*  
Brielle Luthman for  
Heather Shaffer  
Project Manager

Purchase Order: 300071ES20 - 7H  
Chain of Custody: X16-005-247  
Enclosures



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# Case Narrative

**General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF X16-005  
SDG: GEL401249**

**August 01, 2016**

**Laboratory Identification:**

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

**Summary**

**Sample receipt**

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on July 12, 2016, for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

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

**Sample Identification**

The laboratory received the following sample:

<b>Laboratory Identification</b>	<b>Sample Description</b>
401249001	B365V3

**Case Narrative**

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

**Data Package**

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

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

8/3/2016

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

**GC/MS Volatile  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL401249  
Work Order #: 401249**

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

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

**Calibration Information**

**Continuing Calibration Verification Requirements**

The calibration verification standard requirements were not all met for samples 1203583928 (MB), 1203583929 (LCS), 1203583931 (Non SDG 401282003PSD), 1203587159 (MB) and 1203587160 (LCS). In the daily CCVs analyzed on 7/13/16, Chloroethane recovered at 20.3%D/drift and Acrolein recovered at 22.0%D/drift. In the daily CCV analyzed on 7/14/16, trans-1,4-Dichloro-2-butene recovered at -20.1%D/drift. There were no positive results for any of the analytes that were outside the calibration criteria. The results are reported.

**Quality Control (QC) Information**

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

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

Sample	Analyte	Value
1203583930 (Non SDG 401282003PS)	2-Butanone	66* (70%-130%)
	Acetone	51* (70%-130%)
1203583931 (Non SDG 401282003PSD)	2-Butanone	68* (70%-130%)
	Acetone	55* (70%-130%)

**Technical Information**

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

QC samples 1203583930 (Non SDG 401282003PS) and 1203583931 (Non SDG 401282003PSD) were re-analyzed because the wrong sample was originally spiked.

**Certification Statement**

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

# **Chain of Custody and Supporting Documentation**

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

C.O.C. # **X16-005-247**  
Page 1 of 1

401249

**CH2M Hill Plateau Remediation Company**

Collector: **Frank Hill /CHIPRC**      Contact/Requester: **WATERS-HUSTED, K**      Telephone No. **376-4650**

SAF No. **X16-005**      Sampling Origin: **Hanford Site**      Purchase Order/Charge Code: **300071**

Project Title: **GW Sitewide Surv, FY16**      Logbook No. **HNF-N-506 85/88**      Ice Chest No. **705-526**

Shipped To (Lab): **GEL Laboratories, LLC**      Method of Shipment: **Commercial Carrier**      Bill of Lading/Air Bill No. **776712513802**

Protocol: **SURV**      Priority: **30 Days**      Priority: **PRIORITY**      Offsite Property No. **6812**

**POSSIBLE SAMPLE HAZARDS/REMARKS**      SPECIAL INSTRUCTIONS      Hold Time      Total Activity Exemption: Yes  No

\*Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.      Batch with A, I, S, and W SAFs.

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B365V3	N	W	7/10/16	1031	4x40-mL aGs*	8260_VOA_GCMS: COMMON	14 Days	HCl or H2SO4 to pH <2/Cool <=6C

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix *
Relinquished By	<i>Frank Hill</i>	<i>Frank Hill</i>	JUL 10 2016 1530	Received By	SSU #1		JUL 10 2016 1530	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	SSU #1	<i>Jesly Wall</i>	JUL 11 2016 0730	Received By	<i>Jesly Wall</i>	<i>Jesly Wall</i>	JUL 11 2016 0730	
Relinquished By	<i>Jesly Wall</i>	<i>Jesly Wall</i>	JUL 11 2016 1400	Received By	FEDEX			
Relinquished By	FX	<i>M. Kinslow</i>	7-11-16 0915	Received By	<i>M. Kinslow</i>		7-11-16 0915	

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

PRINTED ON 6/27/2016      FSR ID = FSR33722      A-6004-842 (REV 2)

**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>CPRC</u>		SDG/AR/COC/Work Order: <u>401249</u>	
Received By: <u>MR</u>		Date Received: <u>7-12-16</u>	
Suspected Hazard Information	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>qmo</u>
Classified Radioactive II or III by RSO?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____
Samples identified as Foreign Soil?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

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

16 Carrier and tracking number.

Circle Applicable:

FedEx Air	FedEx Ground	UPS	Field Services	Courier	Other
<u>7767</u>	<u>1251</u>	<u>3548</u>	<u>2c</u>	<u>3c</u>	
		<u>3798</u>	<u>2c</u>		
		<u>3802</u>	<u>2c</u>		
		<u>3526</u>	<u>2c</u>		
		<u>3662</u>	<u>15c</u>		<u>NO ice</u>

Comments (Use Continuation Form if needed):

# **Data Review Qualifier Definitions**

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

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

# Laboratory Certifications

## List of current GEL Certifications as of 01 August 2016

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

# **Volatile Analysis**

# Case Narrative

**GC/MS Volatile  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL401249  
Work Order #: 401249**

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

**Analytical Method: SW846 8260C**

**Analytical Procedure: GL-OA-E-038 REV# 22**

**Analytical Batch: 1581352**

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

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
401249001	B365V3
1203583928	Method Blank (MB)
1203583929	Laboratory Control Sample (LCS)
1203583930	401282003(NonSDG) Post Spike (PS)
1203583931	401282003(NonSDG) Post Spike Duplicate (PSD)
1203587159	Method Blank (MB)
1203587160	Laboratory Control Sample (LCS)

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

**Data Summary:**

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

**Quality Control (QC) Information**

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

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

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203583930 (Non SDG 401282003PS)	2-Butanone	66* (70%-130%)
	Acetone	51* (70%-130%)
1203583931 (Non SDG 401282003PSD)	2-Butanone	68* (70%-130%)
	Acetone	55* (70%-130%)

**Technical Information**

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

QC samples 1203583930 (Non SDG 401282003PS) and 1203583931 (Non SDG 401282003PSD) were re-analyzed because the wrong sample was originally spiked.

**Certification Statement**

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

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL401249 GEL Work Order: 401249

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

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

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

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

DL Indicates that sample is diluted.

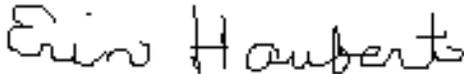
RA Indicates that sample is re-analyzed without re-extraction.

RE Indicates that sample is re-extracted.

**Review/Validation**

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

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

Signature: 

Name: Erin Haubert

Date: 25 JUL 2016

Title: Data Validator

# Sample Data Summary

**Volatile**  
**Certificate of Analysis**  
**Sample Summary**

<b>SDG Number:</b> GEL401249	<b>Date Collected:</b> 07/10/2016 10:31	<b>Matrix:</b> WATER
<b>Lab Sample ID:</b> 401249001	<b>Date Received:</b> 07/12/2016 09:15	
<b>Client ID:</b> B365V3	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0X16005
<b>Batch ID:</b> 1581352	<b>Method:</b> SW846 8260C	<b>SOP Ref:</b> GL-OA-E-038
<b>Run Date:</b> 07/13/2016 11:21	<b>Inst:</b> VOA3.I	<b>Dilution:</b> 1
<b>Prep Date:</b> 07/13/2016 11:21	<b>Analyst:</b> CDS1	<b>Purge Vol:</b> 5 mL
<b>Data File:</b> 071316V3\3R308.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	RDL
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	2.00	5.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	2.00	5.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	2.00	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	2.00	5.00
75-15-0	Carbon disulfide	U	1.60	ug/L	1.60	10.0	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	2.00	5.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	2.00	5.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	2.00	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	2.00	5.00
75-09-2	Methylene chloride	J	4.82	ug/L	1.60	5.00	5.00
127-18-4	Tetrachloroethylene	U	0.300	ug/L	0.300	2.00	5.00
108-88-3	Toluene	U	0.300	ug/L	0.300	2.00	5.00
79-01-6	Trichloroethylene	U	0.300	ug/L	0.300	2.00	5.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	2.00	10.0
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	2.00	10.0
78-93-3	2-Butanone	TU	3.00	ug/L	3.00	10.0	10.0
108-10-1	4-Methyl-2-pentanone	U	3.00	ug/L	3.00	10.0	10.0
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	2.00	10.0
1330-20-7	Xylenes (total)	U	0.300	ug/L	0.300	6.00	10.0
67-64-1	Acetone	TU	3.00	ug/L	3.00	10.0	20.0

# Quality Control Summary

**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: July 19, 2016

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CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 401249

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>										
Batch	1581352									
QC1203583929	LCS									
1,1,1-Trichloroethane	50.0		57.0	ug/L		114	(70%-130%)	CDS1	07/13/16	08:47
1,1,2-Trichloroethane	50.0		51.7	ug/L		103	(70%-130%)			
1,1-Dichloroethane	50.0		55.6	ug/L		111	(70%-130%)			
1,1-Dichloroethylene	50.0		53.7	ug/L		107	(70%-130%)			
1,2-Dichloroethane	50.0		51.4	ug/L		103	(70%-130%)			
2-Butanone	250		298	ug/L		119	(70%-130%)			
4-Methyl-2-pentanone	250		246	ug/L		98	(70%-130%)			
Acetone	250		293	ug/L		117	(70%-130%)			
Benzene	50.0		54.6	ug/L		109	(70%-130%)			
Carbon disulfide	250		247	ug/L		99	(70%-130%)			
Carbon tetrachloride	50.0		54.2	ug/L		108	(70%-130%)			
Chlorobenzene	50.0		51.6	ug/L		103	(70%-130%)			
Chloroform	50.0		53.3	ug/L		107	(70%-130%)			
Ethylbenzene	50.0		52.0	ug/L		104	(70%-130%)			
Methylene chloride	50.0		55.0	ug/L		110	(70%-130%)			
Tetrachloroethylene	50.0		51.1	ug/L		102	(70%-130%)			
Toluene	50.0		51.4	ug/L		103	(70%-130%)			
Trichloroethylene	50.0		56.0	ug/L		112	(70%-130%)			
Vinyl chloride	50.0		46.6	ug/L		93	(70%-130%)			
Xylenes (total)	150		152	ug/L		101	(70%-130%)			

**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 401249

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1581352										
**1,2-Dichloroethane-d4	50.0			44.1	ug/L		88	(70%-130%)	CDS1	07/13/16	08:47
**Bromofluorobenzene	50.0			50.8	ug/L		102	(70%-130%)			
**Toluene-d8	50.0			45.0	ug/L		90	(70%-130%)			
QC1203587160	LCS										
1,1,1-Trichloroethane	50.0			51.3	ug/L		103	(70%-130%)		07/14/16	15:56
1,1,2-Trichloroethane	50.0			46.2	ug/L		92	(70%-130%)			
1,1-Dichloroethane	50.0			50.7	ug/L		101	(70%-130%)			
1,1-Dichloroethylene	50.0			50.0	ug/L		100	(70%-130%)			
1,2-Dichloroethane	50.0			48.2	ug/L		96	(70%-130%)			
2-Butanone	250			263	ug/L		105	(70%-130%)			
4-Methyl-2-pentanone	250			214	ug/L		86	(70%-130%)			
Acetone	250			254	ug/L		102	(70%-130%)			
Benzene	50.0			51.2	ug/L		102	(70%-130%)			
Carbon disulfide	250			242	ug/L		97	(70%-130%)			
Carbon tetrachloride	50.0			47.9	ug/L		96	(70%-130%)			
Chlorobenzene	50.0			47.2	ug/L		94	(70%-130%)			
Chloroform	50.0			49.5	ug/L		99	(70%-130%)			
Ethylbenzene	50.0			46.5	ug/L		93	(70%-130%)			
Methylene chloride	50.0			52.4	ug/L		105	(70%-130%)			
Tetrachloroethylene	50.0			46.2	ug/L		92	(70%-130%)			
Toluene	50.0			46.7	ug/L		93	(70%-130%)			
Trichloroethylene	50.0			50.7	ug/L		101	(70%-130%)			

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**QC Summary**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1581352										
Vinyl chloride	50.0			46.2	ug/L		92	(70%-130%)	CDS1	07/14/16	15:56
Xylenes (total)	150			136	ug/L		91	(70%-130%)			
**1,2-Dichloroethane-d4	50.0			43.1	ug/L		86	(70%-130%)			
**Bromofluorobenzene	50.0			49.5	ug/L		99	(70%-130%)			
**Toluene-d8	50.0			45.0	ug/L		90	(70%-130%)			
QC1203583928	MB										
1,1,1-Trichloroethane			U	0.300	ug/L					07/13/16	09:49
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						

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1581352										
Toluene			U	0.300	ug/L				CDS1	07/13/16	09:49
Trichloroethylene			U	0.300	ug/L						
Vinyl chloride			U	0.300	ug/L						
Xylenes (total)			U	0.300	ug/L						
**1,2-Dichloroethane-d4	50.0			46.8	ug/L		94	(70%-130%)			
**Bromofluorobenzene	50.0			50.5	ug/L		101	(70%-130%)			
**Toluene-d8	50.0			47.2	ug/L		94	(70%-130%)			
QC1203587159	MB										
1,1,1-Trichloroethane			U	0.300	ug/L					07/14/16	16:57
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						

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1581352										
Methylene chloride			U	1.60	ug/L				CDS1	07/14/16	16:57
Tetrachloroethylene			U	0.300	ug/L						
Toluene			U	0.300	ug/L						
Trichloroethylene			U	0.300	ug/L						
Vinyl chloride			U	0.300	ug/L						
Xylenes (total)			U	0.300	ug/L						
**1,2-Dichloroethane-d4	50.0			45.2	ug/L		90	(70%-130%)			
**Bromofluorobenzene	50.0			47.8	ug/L		96	(70%-130%)			
**Toluene-d8	50.0			47.5	ug/L		95	(70%-130%)			
QC1203583930 401282003 PS											
1,1,1-Trichloroethane	50.0	U	0.00	54.8	ug/L		110	(70%-130%)		07/14/16	17:28
1,1,2-Trichloroethane	50.0	U	0.00	47.7	ug/L		95	(70%-130%)			
1,1-Dichloroethane	50.0	U	0.00	53.6	ug/L		107	(70%-130%)			
1,1-Dichloroethylene	50.0	U	0.00	52.4	ug/L		105	(70%-130%)			
1,2-Dichloroethane	50.0	U	0.00	48.5	ug/L		97	(70%-130%)			
2-Butanone	250	TU	0.00 T	165	ug/L		66 *	(70%-130%)			
4-Methyl-2-pentanone	250	U	0.00	211	ug/L		84	(70%-130%)			
Acetone	250	TU	0.00 T	128	ug/L		51 *	(70%-130%)			
Benzene	50.0	U	0.00	53.0	ug/L		106	(70%-130%)			
Carbon disulfide	250	U	0.00	253	ug/L		101	(70%-130%)			
Carbon tetrachloride	50.0	J	1.63	53.5	ug/L		104	(70%-130%)			
Chlorobenzene	50.0	U	0.00	50.2	ug/L		100	(70%-130%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1581352										
Chloroform	50.0	U	0.00	52.1	ug/L		104	(70%-130%)	CDS1	07/14/16	17:28
Ethylbenzene	50.0	U	0.00	49.6	ug/L		99	(70%-130%)			
Methylene chloride	50.0	U	0.00	52.5	ug/L		105	(70%-130%)			
Tetrachloroethylene	50.0	U	0.00	48.7	ug/L		97	(70%-130%)			
Toluene	50.0	U	0.00	50.4	ug/L		101	(70%-130%)			
Trichloroethylene	50.0	U	0.00	53.0	ug/L		106	(70%-130%)			
Vinyl chloride	50.0	U	0.00	46.7	ug/L		93	(70%-130%)			
Xylenes (total)	150	U	0.00	145	ug/L		96	(70%-130%)			
**1,2-Dichloroethane-d4	50.0		48.4	41.4	ug/L		83	(70%-130%)			
**Bromofluorobenzene	50.0		48.7	49.0	ug/L		98	(70%-130%)			
**Toluene-d8	50.0		48.3	46.0	ug/L		92	(70%-130%)			
QC1203583931 401282003 PSD											
1,1,1-Trichloroethane	50.0	U	0.00	57.6	ug/L	5	115	(0%-20%)		07/14/16	17:58
1,1,2-Trichloroethane	50.0	U	0.00	47.5	ug/L	0	95	(0%-20%)			
1,1-Dichloroethane	50.0	U	0.00	55.7	ug/L	4	111	(0%-20%)			
1,1-Dichloroethylene	50.0	U	0.00	52.6	ug/L	0	105	(0%-20%)			
1,2-Dichloroethane	50.0	U	0.00	49.0	ug/L	1	98	(0%-20%)			
2-Butanone	250	TU	0.00	T 169	ug/L	3	68*	(0%-20%)			
4-Methyl-2-pentanone	250	U	0.00	211	ug/L	0	84	(0%-20%)			
Acetone	250	TU	0.00	T 138	ug/L	8	55*	(0%-20%)			
Benzene	50.0	U	0.00	53.3	ug/L	1	107	(0%-20%)			
Carbon disulfide	250	U	0.00	256	ug/L	1	102	(0%-20%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatile-GC/MS</b>											
Batch	1581352										
Carbon tetrachloride	50.0	J	1.63	54.7	ug/L	2	106	(0%-20%)	CDS1	07/14/16	17:58
Chlorobenzene	50.0	U	0.00	50.4	ug/L	0	101	(0%-20%)			
Chloroform	50.0	U	0.00	52.6	ug/L	1	105	(0%-20%)			
Ethylbenzene	50.0	U	0.00	49.4	ug/L	0	99	(0%-20%)			
Methylene chloride	50.0	U	0.00	53.5	ug/L	2	107	(0%-20%)			
Tetrachloroethylene	50.0	U	0.00	49.7	ug/L	2	99	(0%-20%)			
Toluene	50.0	U	0.00	49.0	ug/L	3	98	(0%-20%)			
Trichloroethylene	50.0	U	0.00	54.3	ug/L	2	109	(0%-20%)			
Vinyl chloride	50.0	U	0.00	47.6	ug/L	2	95	(0%-20%)			
Xylenes (total)	150	U	0.00	144	ug/L	0	96	(0%-20%)			
**1,2-Dichloroethane-d4	50.0		48.4	43.6	ug/L		87	(70%-130%)			
**Bromofluorobenzene	50.0		48.7	48.9	ug/L		98	(70%-130%)			
**Toluene-d8	50.0		48.3	45.4	ug/L		91	(70%-130%)			

**Notes:**

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- N Spike Sample recovery is outside control limits.
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
U	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.										
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Y	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Z	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
o	Analyte failed to recover within LCS limits (Organics only)										

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

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

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

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

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

## Surrogate Recovery Report

SDG Number: GEL401249

Matrix Type: LIQUID

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203583929	LCS for batch 1581352	88	90	102
1203583928	MB for batch 1581352	94	94	101
401249001	B365V3	90	93	95
1203587160	LCS for batch 1581352	86	90	99
1203587159	MB for batch 1581352	90	95	96
1203583930	B35TX1PS	83	92	98
1203583931	B35TX1PSD	87	91	98

**Surrogate****Acceptance Limits**

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

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted