

The order of this data package is as follows:

1. Chain-of-Custody/Lab Request
2. Copies of field COCs
3. Validation Report
4. Laboratory analysis

Comments:

General Engineering

Charleston SC

## Chain of Custody/Analysis Request

COC/Lab Request #:

2017-2777

Page 1 of 1

Client Contact:

Lab Agreement #:

Site Name:

Los Alamos National Laboratory

Project Number:

ADEP

Analysis Turnaround Time:

24 Hour - ☐ Other - ☐7 Days - ☐14 Days - ☐21 Days - ☐28 Days - ☒

Rad Screening Info:

Yes, Below

Background

Log-  
No

Lab Reporting Limit Type:

Sample Quantitation

Limit

MDL

Field Sample ID

Sample  
DateSample  
TimeSample  
Matrix

MSGP-Hg

WSP-8260B-VOA

WSP-8330B-NMED HEXMOD

WSP-All Metals

WSP-CN(T)

WSP-GENINORG+PerChlorate

WSP-NH3+NO3/NO2+PO4

WSP-TKN+TOC

CAWA-17-142884

Sep 13 2017

12:40

W

1

1

1

CAWA-17-142919

Sep 13 2017

12:40

W

1

2

3

1

1

CAWA-17-143032

Sep 13 2017

12:40

W

2

Special Instructions:

Relinquished by:

Sherwood

Print Name:

Sherwood

Date/Time:

9/14/17 3pm

Received by:

Print Name:

Date/Time:

Relinquished by:

Print Name:

Date/Time:

Received by:

Print Name:

Date/Time:

Relinquished by:

Print Name:

Date/Time:

Received by:

Print Name:

Date/Time:

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11390

EVENT NAME: Water/CdV (TA16 260) Q4 MY2017

SAMPLE ID: CAWA-17-142884

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	9/13/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1240		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-47I		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:	↓	↓	SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NA
↓	WSP- GENINORG+PerChlorat e	1 LITER POLY	1	ICE	↓	↓
↓	WSP- NH3+NO3/NO2+PO4	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Sample Time \_\_\_\_\_ HH:MM \_\_\_\_\_ Dissolved Oxygen \_\_\_\_\_ Flow (in gpm) \_\_\_\_\_  
Oxidation-Reduction \_\_\_\_\_ pH \_\_\_\_\_ Specific \_\_\_\_\_  
Potential \_\_\_\_\_ Conductance \_\_\_\_\_  
Temperature \_\_\_\_\_ Turbidity \_\_\_\_\_

COLLECTED BY (PRINT): A. Vigil, T. Vander Vliet

RELINQUISHED BY (Printed Name) Tanya Vander Vliet (Signature) Tanya Vander Vliet	Date/Time 9-13-17 141345 9/13/17	RECEIVED BY: Sherwood (Printed Name) Sherwood (Signature) Sherwood	Date/Time 9/13/17 1345
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 08/24/2017



## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11390

EVENT NAME: Water/CdV (TA16 260) Q4 MY2017

SAMPLE ID: CAWA-17-142919

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	9/13/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1240		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-47i		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:	↓		SAMPLE USAGE:	INV	✓
BOTTOM DEPTH:	↓	✓	EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1000-500 ML POLY 8/31/17	1	HNO3	Y	NA
↓	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL	↓	↓
↓	WSP-8330B-NMED HEXMOD	1 LITER AMBER GLASS	3	ICE	↓	↓
↓	WSP-CN(T)	250 ML POLY	1	NAOH	↓	↓
✓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS: Sampled 40 ft. from running diesel generator

LOCATION COMMENTS: He spot test yields negative results; Breezy while sampling

## FIELD PARAMETERS:

Sample Time	1240	HH:MM	Dissolved Oxygen	6.23	Flow (in gpm)	0.93
Oxidation-Reduction Potential	253.7		pH	7.28	Specific Conductance	121.6
Temperature	16.9		Turbidity	0.91		

COLLECTED BY (PRINT): A. Virgil T. VanderViz

RELINQUISHED BY (Printed Name) Tanya VanderViz (Signature) Tanya VanderViz	Date/Time 9-13-17 1345	RECEIVED BY (Printed Name) J. Sherwood (Signature) J. Sherwood	Date/Time 9/13/17 1345
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11390

EVENT NAME: Water/CdV (TA16 260) Q4 MY2017

SAMPLE ID: CAWA-17-143032

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	9/13/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1240		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	DC	
LOCATION ID:	R-47i		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	FTB	
TOP DEPTH:	↓		SAMPLE USAGE:	QC	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / <u>NA</u>

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	1/8/31/17	HCL	Y	NA

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Sample Time \_\_\_\_\_ HH:MM Dissolved Oxygen \_\_\_\_\_ Flow (in gpm) \_\_\_\_\_  
Oxidation-Reduction Potential \_\_\_\_\_ pH \_\_\_\_\_ Specific Conductance \_\_\_\_\_  
Temperature \_\_\_\_\_ Turbidity \_\_\_\_\_

COLLECTED BY (PRINT): A. Vigil, T. Vander Vliet

RELINQUISHED BY (Printed Name) Tanya Vander Vliet (Signature) Tanya Vander Vliet	Date/Time 9-13-17 1345	RECEIVED BY (Printed Name) S. Sherwood (Signature) S. Sherwood	Date/Time 9/13/17 1345
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 08/24/2017



COC: 2017-2777

TEST - Field Screen		YES	NO	NA
The sample has field screening measurements of alpha activity and beta activity.			X	
Activity (dpm/100cm <sup>2</sup> )	Sampled Location			
Alpha detectable and < 20,000	TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, TA-48, or TA-49			
Alpha > 125 and < 20,000	other locations			
Beta > 1,500 and < 100,000	any location			
Alpha activity ≥ 20,000 dpm/100cm <sup>2</sup> and beta activity ≥ 100,000 dpm/100cm <sup>2</sup> and ≥ 0.5 mR/hr on the external surface of the package.				
The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910, based on field screening measurements of alpha and beta activity.				

TEST - Location		YES	NO	NA
Prior analytical measurements of radioactive isotopes are available.		X		
Activity (pCi/g)	Sampled Location			
<ul style="list-style-type: none"> <li>Am-241 &gt; 27 and &lt; 27,000</li> <li>Cs-137 &gt; 270 and &lt; 270,000</li> <li>Pu-238 &gt; 27 and &lt; 27,000</li> <li>Pu-239/240 &gt; 27 and &lt; 27,000</li> <li>Th-228 &gt; 27 and &lt; 27,000</li> <li>U-238 &gt; 270 and &lt; 270,000</li> <li>H-3 &gt; 27,000,000 and &lt; 27,000,000,000</li> </ul>	The sampling location is within TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, Sediment/Soil from Effluent Canyon, Mortandad Canyon from Effluent Canyon to the Soil Contamination Area near the sediment traps, Bayo Canyon at TA-10, TA-15, TA-35, TA-36, TA-39, TA-48 or TA-49.		X	
<ul style="list-style-type: none"> <li>Am-241, Pu-238, Pu-239/240, or Th-228 ≥ 27,000</li> <li>U-238 ≥ 270,000</li> <li>H-3 ≥ 27,000,000,000</li> </ul>			X	
The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910, based on prior analytical measurements of radioactive isotopes.				

TEST - AK		YES	NO	NA
The shippers documented knowledge of the sample positively identifies appropriate labeling.				X
The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910, and the sample is submitted to ARS or RP for hazard classification analysis.				X

HOLD SAMPLES FOR ANALYSIS
The sampling location within TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, Sediment/Soil from Effluent Canyon, Mortandad Canyon from Effluent Canyon to the Soil Contamination Area near the sediment traps, Bayo Canyon at TA-10, TA-35, TA-15, TA-36, TA-39, TA-48 or TA-49 AND does not have usable field screening measurements of alpha and beta activity available AND the sampling location or related sampling location(s) do not have prior reliable analytical measurements of radioactive isotopes available AND knowledge of the sample is not acceptable to identify appropriate labeling.

These samples do not meet the criteria for classification in any hazard class according to regulation OSHA 29 CFR 1910.1200. The sample(s) contained in this shipment have been assigned a tentative proper DOT shipping name, hazard class, identification number, and packing group, based on the shipper's knowledge of the sample:

Hazard Assessment Completed By:	Date/Time
(Printed Name) Sherri Sherwood	9/14/17
(Signature) <i>Sherri Sherwood</i>	3pm

## DATA VALIDATION REPORT

Chain Of Custody No. 2017-2777

### 1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
432868	EPA:120.1	1				
432868	EPA:150.1	1				
432868	EPA:160.1	1				
432868	EPA:170.0	2		1		
432868	EPA:245.2	2				
432868	EPA:300.0	1				
432868	EPA:310.1	1				
432868	EPA:335.4	1				
432868	EPA:350.1	1				
432868	EPA:351.2	1				
432868	EPA:353.2	1				
432868	EPA:365.4	1				
432868	SM:A2340B	1				
432868	SW-846:6010C	1				
432868	SW-846:6020	1				
432868	SW-846:6850	1				
432868	SW-846:8260B	1		1		
432868	SW-846:8330B	1				
432868	SW-846:9060	1				

						Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates																
432868	EPA:120.1	1705527	1705527	1										1				1			
432868	EPA:150.1	1700639	1700639	1										1				1			
432868	EPA:160.1	1700497	1700497	1				1						1				1			
432868	EPA:170.0	NA	NA	2		1															
432868	EPA:245.2	1702521	1702509	2				1	1					1				1			

## DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
432868	EPA:300.0	1703207	1703207	1					1					1			1				
432868	EPA:310.1	1700638	1700638	1						1				1			1				
432868	EPA:335.4	1700910	1700909	1					1	1				1			1				
432868	EPA:350.1	1700465	1700464	1					1	1				1			1				
432868	EPA:351.2	1701316	1701315	1					1	1				1			1				
432868	EPA:353.2	1701312	1701312	1					1					1			1				
432868	EPA:365.4	1701314	1701313	1					1	1				1			1				
432868	SM:A2340B	1706554	1706554	1																	
432868	SW-846:6010C	1701155	1701154	1					1	1				1			1				
432868	SW-846:6020	1701124	1701123	1					1	1				1			1				
432868	SW-846:6850	1702207	1702204	1					1	1	1			1							
432868	SW-846:8260B	1701572	1701572	1		1			1					2							
432868	SW-846:8330B	1701357	1701355	1					1	1	1			1							
432868	SW-846:9060	1701620	1701620	1					1					1			1				

### 2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CAWA-17-142884	432868001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAWA-17-142887	1203886676	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203886675	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CAWA-17-142884	432868001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAWA-17-143050	1203875001	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203875000	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CAWA-17-142884	432868001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAWA-17-142887	1203874648	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203874647	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203874646	MB	1	0	0	0
EPA:170.0	VOC	CAWA-17-142884	432868001	REG	1	0	0	0
EPA:170.0	VOC	CAWA-17-142919	432868002	REG	1	0	0	0
EPA:170.0	VOC	CAWA-17-143032	432868003	FTB	1	0	0	0
EPA:245.2	INORGANIC	CAWA-17-142866	1203879601	DUP	1	0	0	0



## DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:245.2	INORGANIC	CAWA-17-142866	1203879603	MS	0	0	1	0
EPA:245.2	INORGANIC	CAWA-17-142884	432868001	REG	1	0	0	0
EPA:245.2	INORGANIC	CAWA-17-142919	432868002	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203879600	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203879599	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAWA-17-142884	432868001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAWA-17-143050	1203881302	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203881301	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203881300	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAWA-17-142884	432868001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAWA-17-143050	1203874998	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAWA-17-143050	1203874999	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203874996	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CAWA-17-142918	1203876737	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CAWA-17-142918	1203876738	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CAWA-17-142919	432868002	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203875703	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203875702	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAWA-17-142856	1203874557	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAWA-17-142856	1203874558	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CAWA-17-142884	432868001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203874556	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203874555	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAWA-17-142919	432868002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203876777	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203876776	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	WST05-17-145280	1203876778	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	WST05-17-145280	1203876780	MS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	CAWA-17-142884	1203876760	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAWA-17-142884	432868001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203876757	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203876756	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAWA-17-142865	1203876770	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAWA-17-142865	1203876773	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CAWA-17-142884	432868001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203876769	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203876768	MB	1	0	0	0
SM:A2340B	INORGANIC	CAWA-17-142884	432868001	REG	1	0	0	0
SW-846:6010C	INORGANIC	CAWA-17-142883	1203876402	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CAWA-17-142883	1203876403	MS	0	0	17	0

## DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
SW-846:6010C	INORGANIC	CAWA-17-142884	432868001	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203876401	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203876400	MB	17	0	0	0
SW-846:6020	INORGANIC	CAWA-17-142883	1203876322	DUP	11	0	0	0
SW-846:6020	INORGANIC	CAWA-17-142883	1203876323	MS	0	0	11	0
SW-846:6020	INORGANIC	CAWA-17-142884	432868001	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203876321	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203876320	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAWA-17-142856	1203878945	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAWA-17-142856	1203878946	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAWA-17-142884	432868001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203878944	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203878943	MB	1	0	0	0
SW-846:8260B	VOC	CAWA-17-142919	432868002	REG	80	3	0	0
SW-846:8260B	VOC	CAWA-17-143032	432868003	FTB	80	3	0	0
SW-846:8260B	VOC	LCS	1203878617	LCS	0	3	70	0
SW-846:8260B	VOC	LCS	1203878618	LCS	0	3	10	0
SW-846:8260B	VOC	MB	1203878616	MB	80	3	0	0
SW-846:8330B	LCMS/MS HIGH	CAWA-17-142900	1203876873	MS	0	1	23	0
SW-846:8330B	LCMS/MS HIGH	CAWA-17-142900	1203876874	MSD	0	1	23	0
SW-846:8330B	LCMS/MS HIGH	CAWA-17-142919	432868002	REG	23	1	0	0
SW-846:8330B	LCMS/MS HIGH	LCS	1203876872	LCS	0	1	23	0
SW-846:8330B	LCMS/MS HIGH	MB	1203876871	MB	23	1	0	0
SW-846:9060	GENERAL CHEMISTRY	CAWA-17-142891	1203877659	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAWA-17-142919	432868002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203877658	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203877657	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

## DATA VALIDATION REPORT

Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name	Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
MB	1203876320	METHOD BLANK	SW-846:6020	W	Molybdenum	0.287	J	ug/L	0.500
CAWA-17-143032	432868003	TRIP BLANK	EPA:170.0	W	Temperature	3		Deg C	

Field Sample ID	Blank Lab	Blank Type	Analytical Method	Parameter Name	Blank Lab Result	Blank Lab Units	Lab Result	Lab Qualifier	Lab Detection Limit	Detect Flag	Detect to Nondetect Factor	Detect to Estimated Factor	Use Factors
CAWA-17-142884	1203876320	METHOD BLANK	SW-846:6020	Molybdenum	0.287	ug/L	1.67		0.500	Y	5	100	Y

6. Any surrogate recoveries outside the control limits?

No.

7. Any MS/MSD recoveries or RPDs outside the control limits?

Field Sample ID	MS Lab Sample ID	MSD Lab Sample ID	Analytical Method	Parameter Name	Analysis Lot ID	Analysis Date	Sample Matrix	MS Spike Recovery	MSD Spike Recovery	MS Upper Limit	MS Lower Limit	MS Reject Limit	RPD	RPD Limit
WST05-17-145280	1203876780		EPA:351.2	Total Kjeldahl Nitrogen	1701315	09-21-2017	W	112		110	90	10		

8. Any LCS/LCSD or BS/BSD recoveries or RPDs outside the control limits?

No.



## DATA VALIDATION REPORT

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Parameter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detect Flag	Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent	Analysis Lot ID	Validation Status Code	Use Flag
R-47i	2017-2777	CAWA-17-142884	REG	INIT	INORGANIC	SW-846:6020	Molybdenum		J+	I4a	Y	1.67	ug/L	1.67	ug/L			W	09/13/2017	1701124	VAL	Y	

### Reason Code

### Description

I4a	The affected analytes are considered estimated and biased high because this analyte was identified in the method blank but was >5x
J_LAB	The analytical laboratory qualified the detected result as estimated (J) because the result was less the PQL but greater than the MDL
NQ	The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualify. The analyte is detected in the sample.
U_LAB	The analytical laboratory qualified the analyte as not detected.

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAWA-17-142884	R-47i	REG	EPA:120.1	0	1
CAWA-17-142884	R-47i	REG	EPA:150.1	0	1
CAWA-17-142884	R-47i	REG	EPA:160.1	0	1

## DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAWA-17-142884	R-47i	REG	EPA:170.0	0	1
CAWA-17-142884	R-47i	REG	EPA:245.2	0	1
CAWA-17-142884	R-47i	REG	EPA:300.0	0	4
CAWA-17-142884	R-47i	REG	EPA:310.1	0	2
CAWA-17-142884	R-47i	REG	EPA:350.1	0	1
CAWA-17-142884	R-47i	REG	EPA:353.2	0	1
CAWA-17-142884	R-47i	REG	EPA:365.4	0	1
CAWA-17-142884	R-47i	REG	SM:A2340B	0	1
CAWA-17-142884	R-47i	REG	SW-846:6010C	0	17
CAWA-17-142884	R-47i	REG	SW-846:6020	0	11
CAWA-17-142884	R-47i	REG	SW-846:6850	0	1
CAWA-17-142919	R-47i	REG	EPA:170.0	0	1
CAWA-17-142919	R-47i	REG	EPA:245.2	0	1
CAWA-17-142919	R-47i	REG	EPA:335.4	0	1
CAWA-17-142919	R-47i	REG	EPA:351.2	0	1
CAWA-17-142919	R-47i	REG	SW-846:8260B	0	80
CAWA-17-142919	R-47i	REG	SW-846:8330B	0	23
CAWA-17-142919	R-47i	REG	SW-846:9060	0	1
CAWA-17-143032	R-47i	FTB	EPA:170.0	0	1
CAWA-17-143032	R-47i	FTB	SW-846:8260B	0	80

September 25, 2017

[gel.com](http://gel.com)

Ms. Nita Patel  
Los Alamos National Laboratory  
TA-00, SM1237, Rm104C  
Los Alamos, New Mexico 87545


Re: LANL- WQH Water Samples  
Work Order: 432868  
SDG: 2017-2777

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on September 15, 2017, and analyzed for Explosives by LCMSMS, GC/MS Volatile, General Chemistry, Metals and Perchlorates by LCMSMS. 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. 4485.

Sincerely,

  
Katrina Hiott for  
Valerie Davis  
Project Manager

Chain of Custody: 2017-2777  
Enclosures





**ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)**  
**LANL- WQH Water Samples**  
**Work Order #: 432868**  
**SDG: 2017-2777**

## Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	5
Data Review Qualifier Flag Definition Sheet.....	10
Volatile Analysis.....	13
Case Narrative.....	14
Sample Data Summary.....	19
Quality Control Summary.....	26
Quality Control Data.....	44
Perchlorates by LCMSMS Analysis.....	66
Case Narrative.....	67
Sample Data Summary.....	73
Quality Control Summary.....	75
Quality Control Data.....	78
Explosives by LCMSMS Analysis.....	84
Case Narrative.....	85
Sample Data Summary.....	90
Quality Control Summary.....	93
Quality Control Data.....	97
Metals Analysis.....	112
Case Narrative.....	113

Sample Data Summary.....	118
Quality Control Summary.....	123
General Chem Analysis.....	137
Case Narrative.....	138
Sample Data Summary.....	168
Quality Control Summary.....	172



# Case Narrative

**Case Narrative for  
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)  
LANL- WQH Water Samples  
Workorder #: 432868  
SDG # : 2017-2777**

**September 25, 2017**

**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 September 15, 2017 for analysis. The samples were delivered with proper chain of custody documentation and signatures. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. Containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Shipping container temperatures were checked, documented, and within specifications. Shipping container temperature was within specification (0 - 6C). There are no additional comments concerning sample receipt.

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

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
432868001	CAWA-17-142884
432868002	CAWA-17-142919
432868003	CAWA-17-143032

**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: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Explosives by LCMSMS, GC/MS Volatile, General Chemistry, Metals and Perchlorates by LCMSMS.

I certify that this data report is in compliance with the terms and conditions of the subcontract and task order, both technically and for completeness, for other than the conditions detailed in the attached case narrative.

  
Katrina Hiott for  
Valerie Davis  
Project Manager

**List of current GEL Certifications as of 25 September 2017**

<b>State</b>	<b>Certification</b>
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	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-23
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404



# **Chain of Custody and Supporting Documentation**

## Chain of Custody/Analysis Request

COC/Lab Request #:

2017-2777

Page 1 of 1

[illegible]

**Special Instructions:**

Relinquished by: <u>Shenwood</u>	Print Name: <u>Shenwood</u>	Date/Time: <u>9/14/17 3pm</u>	Received by: <u>3</u>	Print Name: <u>Joe Watson</u>	Date/Time: <u>9/15/17 8:35</u>
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:

COC:

2017-2777

TEST - Field Screen		YES	NO	NA
The sample has field screening measurements of alpha activity and beta activity.			X	
Activity (dpm/100cm <sup>2</sup> )	Sampled Location			
Alpha detectable and < 20,000	TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, TA-48, or TA-49			
Alpha > 125 and < 20,000	other locations			
Beta > 1,500 and < 100,000	any location			
Alpha activity ≥ 20,000 dpm/100cm <sup>2</sup> and beta activity ≥ 100,000 dpm/100cm <sup>2</sup> and ≥ 0.5 mR/hr on the external surface of the package.				
The sample is tentatively identified as DOT hazard Class 7 (Radioactive). The shipment is labeled <i>Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910</i> , based on field screening measurements of alpha and beta activity.				

TEST - Location		YES	NO	NA
Prior analytical measurements of radioactive isotopes are available.		X		
Activity (pCi/g)	Sampled Location			
<ul style="list-style-type: none"> <li>Am-241 &gt; 27 and &lt; 27,000</li> <li>Cs-137 &gt; 270 and &lt; 270,000</li> <li>Pu-238 &gt; 27 and &lt; 27,000</li> <li>Pu-239/240 &gt; 27 and &lt; 27,000</li> <li>Th-228 &gt; 27 and &lt; 27,000</li> <li>U-238 &gt; 270 and &lt; 270,000</li> <li>H-3 &gt; 27,000,000 and &lt; 27,000,000,000</li> </ul>	The sampling location is within TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, Sediment/Soil from Effluent Canyon, Mortandad Canyon from Effluent Canyon to the Soil Contamination Area near the sediment traps, Bayo Canyon at TA-10, TA-15, TA-35, TA-36, TA-39, TA-48 or TA-49.		X	
<ul style="list-style-type: none"> <li>Am-241, Pu-238, Pu-239/240, or Th-228 ≥ 27,000</li> <li>U-238 ≥ 270,000</li> <li>H-3 ≥ 27,000,000,000</li> </ul>			X	
The sample is tentatively identified as DOT hazard Class 7 (Radioactive). The shipment is labeled <i>Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910</i> , based on prior analytical measurements of radioactive isotopes.			X	

TEST - AK		YES	NO	NA
The shippers documented knowledge of the sample positively identifies appropriate labeling.				X
The sample is tentatively identified as DOT hazard Class 7 (Radioactive). The shipment is labeled <i>Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910</i> , and the sample is submitted to ARS or RP for hazard classification analysis.				X

HOLD SAMPLES FOR ANALYSIS
The sampling location within TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, Sediment/Soil from Effluent Canyon, Mortandad Canyon from Effluent Canyon to the Soil Contamination Area near the sediment traps, Bayo Canyon at TA-10, TA-35, TA-15, TA-36, TA-39, TA-48 or TA-49 AND does not have usable field screening measurements of alpha and beta activity available AND the sampling location or related sampling location(s) do not have prior reliable analytical measurements of radioactive isotopes available AND knowledge of the sample is not acceptable to identify appropriate labeling.

These samples do not meet the criteria for classification in any hazard class according to regulation OSHA 29 CFR 1910.1200. The sample(s) contained in this shipment have been assigned a tentative proper DOT shipping name, hazard class, identification number, and packing group, based on the shipper's knowledge of the sample:

Hazard Assessment Completed By:	Date/Time
(Printed Name) Sherri Sherwood	9/14/17
(Signature) <i>Sherri Sherwood</i>	3pm

ORIGIN ID:SAFA (505) 665-9966  
KEITH GREENE  
LOS ALAMOS NATL LAB.  
TA00 BLDG 1237 DPU 03  
LOS ALAMOS, NM 87545  
UNITED STATES US

SHIP DATE: 14SEP17  
ACTWGT: 54.0 LB MAN  
CAD: 0014176/CAFE2916

BILL SENDER

TO **VALERIE DAVIS**  
**GENERAL ENGINEERING LAB**  
**2040 SAVAGE RD**

**CHARLESTON SC 29407**

(843) 666-8171

REF: 21PD0ASRGW04BAGWEO



FedEx  
Expre



2 of 2  
MPS# 5908 1782 7214  
Mstr# 5908 1782 7203

FRI - 15 SEP 10:30  
PRIORITY OVERNIGHT

**X7 RBWA**

0201

29407  
SC-US CHS



ORIGIN ID:SAFA (505) 665-9966  
KEITH GREENE  
LOS ALAMOS NATL LAB.  
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545  
UNITED STATES US

SHIP DATE: 14SEP17  
ACTWGT: 51.0 LB MAN  
CAD: 0014176/CAFE2916

BILL SENDER

TO **VALERIE DAVIS**  
**GENERAL ENGINEERING LAB**  
**2040 SAVAGE RD**

**CHARLESTON SC 29407**

(843) 666-8171

REF: 21PD0ASRGW04BAGWEO



FedEx  
Expre



1 of 2  
TRK# 5908 1782 7203  
## MASTER ##

FRI - 15 SEP 10:30  
PRIORITY OVERNIGHT

**X7 RBWA**

29407  
SC-US CHS



**SAMPLE RECEIPT & REVIEW FORM**

Client: <u>EST/L</u>		SDG/AR/COC/Work Order: <u>432868</u>
Received By: <u>ZKW</u>		Date Received: <u>9/15/17</u>
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other  <u>5908 1782 7214</u> <u>5908 1782 7263</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.
Shipped as a DOT Hazardous?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____
COC/Samples marked or classified as radioactive?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> (CPM) (mR/hr)
Is package, COC, and/or Samples marked HAZ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. <input checked="" type="checkbox"/> PCB's <input type="checkbox"/> Flammable <input type="checkbox"/> Foreign Soil <input type="checkbox"/> RCRA <input type="checkbox"/> Asbestos <input type="checkbox"/> Beryllium <input type="checkbox"/> Other:

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken    Damaged container    Leaking container    Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice <input checked="" type="checkbox"/> Ice Packs    Dry ice    None    Other: *all temperatures are recorded in Celsius
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR3-16</u> TEMP: <u>32</u> Secondary Temperature Device Serial # (If Applicable): _____
5	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)
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: _____
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If Preservation added, Lot#: _____ If Yes, Are Encores or Soil Kits present? Yes _____ No <input checked="" type="checkbox"/> (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes <input checked="" type="checkbox"/> No _____ N/A _____ (If unknown, select No) VOA vials free of headspace? Yes _____ No <input checked="" type="checkbox"/> N/A _____ Sample ID's and containers affected: <u>-143033 read w/ headspace</u>
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"/>	

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials RHOTT

Date 9/15/17

Page 1 of 1



# **Data Review Qualifier Flag Definition Sheet**

## Data Review Qualifier Definitions

Qualifier      Explanation

\*      A quality control analyte recovery is outside of specified acceptance criteria

\*\*      Analyte is a surrogate compound

<      Result is less than value reported

>      Result is greater than value reported

^      RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL

A      The TIC is a suspected aldol-condensation product

B      Target analyte was detected in the associated blank

B      Metals-Either presence of analyte detected in the associated blank, or  
MDL/IDL < sample value < PQL

BD      Results are either below the MDC or tracer recovery is low

C      Analyte has been confirmed by GC/MS analysis

D      Results are reported from a diluted aliquot of the sample

d      5-day BOD-The 2:1 depletion requirement was not met for this sample

E      Organics-Concentration of the target analyte exceeds the instrument calibration range

E      Metals-%difference of sample and SD is >10%. Sample concentration must meet flagging criteria

H      Analytical holding time was exceeded

h      Preparation or preservation holding time was exceeded

J      Value is estimated

N      Metals-The Matrix spike sample recovery is not within specified control limits

N      Organics-Presumptive evidence based on mass spectral library search to make a tentative  
identification of the analyte (TIC). Quantitation is based on nearest internal standard  
response factor

N/A      Spike recovery limits do not apply. Sample concentration exceeds spike concentration  
by 4X or more

ND      Analyte concentration is not detected above the reporting limit

UI      Gamma Spectroscopy-Uncertain identification

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

Y      QC Samples were not spiked with this compound

Z      Paint Filter Test-Particulates passed through the filter, however no free liquids were observed.

P Organics-The concentrations between the primary and confirmation columns/detectors is >40% difference.  
For HPLC, the difference is >70%.

U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

# **Volatile Analysis**

# Case Narrative



**GC/MS Volatile  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2017-2777  
Work Order #: 432868**

**Method/Analysis Information**

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

Analytical Method: SW-846:8260B

Analytical Batch Number: 1701572

**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>
432868002	CAWA-17-142919
432868003	CAWA-17-143032
1203877503	432587002(CAWA-17-142901) Post Spike (PS)
1203877504	432587002(CAWA-17-142901) Post Spike (PS)
1203877505	432587002(CAWA-17-142901) Post Spike Duplicate (PSD)
1203877506	432587002(CAWA-17-142901) Post Spike Duplicate (PSD)
1203878616	Method Blank (MB)
1203878617	Laboratory Control Sample (LCS)
1203878618	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 data results reported met all SOP and method criteria, unless otherwise discussed below.

**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# 26.

**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 blanks 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 432587002 (CAWA-17-142901) was designated for spike analysis.

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

The matrix spike (MS) and matrix spike duplicate (MSD) recoveries were within the required acceptance limits.

##### **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**

All samples in this SDG 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.

##### **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**

##### **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) may be requested for samples in this delivery group/work order. Please note that non-requested calibrated analytes detected in a client sample may be reported on the Form 1/Certificate of Analysis as TICs. TIC data, if requested, were included on the Sample Data Summary (Form 1) and included with the sample raw data.

**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.

**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 reviewer name 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 Volatile-GC/MS 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>
VOAA.I	Agilent 7890/5975 GC/MS w/ OI Eclipse/Archon Autosampler	HP7890A/HP5975C	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 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

ARSL004 ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)

Client SDG: 2017-2777 GEL Work Order: 432868

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

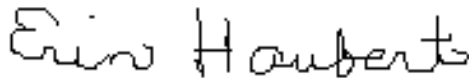
- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- 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: 11 OCT 2017

Title: Data Validator

# **Sample Data Summary**



**Volatile  
Certificate of Analysis  
Sample Summary**

SDG Number: 2017-2777

Lab Sample ID: 432868002

Date Collected: 09/13/2017 12:40

Date Received: 09/15/2017 08:55

Matrix: W

Client ID: CAWA-17-142919

Batch ID: 1701572

Run Date: 09/19/2017 21:04

Prep Date: 09/19/2017 21:04

Data File: 091917\AA219.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOAA.I

Analyst: VXY1

Project: ESHL00114

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Column: DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene	U	0.300	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

SDG Number: 2017-2777

Lab Sample ID: 432868002

Date Collected: 09/13/2017 12:40

Date Received: 09/15/2017 08:55

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1701572

Inst: VOAA.I

Dilution: 1

Run Date: 09/19/2017 21:04

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 09/19/2017 21:04

Data File: 091917\AA219.D

Column: DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	0.300	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	1.50	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	1.00
75-00-3	Chloroethane	U	0.300	ug/L	0.300	1.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	1.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	0.300	ug/L	0.300	1.00
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	1.00
60-29-7	Ethyl ether	U	0.300	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	U	0.300	ug/L	0.300	1.00
74-88-4	Iodomethane	U	1.50	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride	U	1.00	ug/L	1.00	10.0
91-20-3	Naphthalene	U	0.300	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene	U	0.300	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	0.300	ug/L	0.300	1.00
108-88-3	Toluene	U	0.300	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	0.300	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	0.300	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate	U	1.50	ug/L	1.50	5.00
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	0.300	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol	U	15.0	ug/L	15.0	50.0
104-51-8	n-Butylbenzene	U	0.300	ug/L	0.300	1.00
103-65-1	n-Propylbenzene	U	0.300	ug/L	0.300	1.00
95-47-6	o-Xylene	U	0.300	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene	U	0.300	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

SDG Number: 2017-2777

Lab Sample ID: 432868002

Date Collected: 09/13/2017 12:40

Date Received: 09/15/2017 08:55

Matrix: W

Client: ARSL004

Method: SW-846:8260B

Project: ESHL00114

SOP Ref: GL-OA-E-038

Batch ID: 1701572

Inst: VOAA.I

Dilution: 1

Run Date: 09/19/2017 21:04

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 09/19/2017 21:04

Data File: 091917\AA219.D

Column: DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether	U	0.300	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene	U	0.300	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	56.4	50.0	ug/L 113	(71%-134%)
Bromofluorobenzene	51.8	50.0	ug/L 104	(70%-131%)
Toluene-d8	52.9	50.0	ug/L 106	(74%-124%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.413	10.3	ug/L	0	J
	unknown	3.473	18.2	ug/L	0	J

**Volatile  
Certificate of Analysis  
Sample Summary**

SDG Number: 2017-2777

Lab Sample ID: 432868003

Date Collected: 09/13/2017 12:40

Date Received: 09/15/2017 08:55

Matrix: W

Client ID: CAWA-17-143032

Batch ID: 1701572

Run Date: 09/19/2017 21:28

Prep Date: 09/19/2017 21:28

Data File: 091917\AA220.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOAA.I

Analyst: VXY1

Project: ESHL00114

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Column: DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene	U	0.300	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

SDG Number: 2017-2777

Lab Sample ID: 432868003

Date Collected: 09/13/2017 12:40

Date Received: 09/15/2017 08:55

Matrix: W

Client ID: CAWA-17-143032

Batch ID: 1701572

Run Date: 09/19/2017 21:28

Prep Date: 09/19/2017 21:28

Data File: 091917\AA220.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOAA.I

Analyst: VXY1

Column: DB-624

Project: ESHL00114

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	0.300	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	1.50	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	1.00
75-00-3	Chloroethane	U	0.300	ug/L	0.300	1.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	1.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	0.300	ug/L	0.300	1.00
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	1.00
60-29-7	Ethyl ether	U	0.300	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	U	0.300	ug/L	0.300	1.00
74-88-4	Iodomethane	U	1.50	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride	U	1.00	ug/L	1.00	10.0
91-20-3	Naphthalene	U	0.300	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene	U	0.300	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	0.300	ug/L	0.300	1.00
108-88-3	Toluene	U	0.300	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	0.300	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	0.300	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate	U	1.50	ug/L	1.50	5.00
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	0.300	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol	U	15.0	ug/L	15.0	50.0
104-51-8	n-Butylbenzene	U	0.300	ug/L	0.300	1.00
103-65-1	n-Propylbenzene	U	0.300	ug/L	0.300	1.00
95-47-6	o-Xylene	U	0.300	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene	U	0.300	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

**SDG Number:** 2017-2777  
**Lab Sample ID:** 432868003  
  
**Client ID:** CAWA-17-143032  
**Batch ID:** 1701572  
**Run Date:** 09/19/2017 21:28  
**Prep Date:** 09/19/2017 21:28  
**Data File:** 091917\AA220.D

**Date Collected:** 09/13/2017 12:40  
**Date Received:** 09/15/2017 08:55  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOAA.I  
**Analyst:** VXY1  
  
**Column:** DB-624

**Matrix:** W  
  
**Project:** ESHL00114  
**SOP Ref:** GL-OA-E-038  
**Dilution:** 1  
**Purge Vol:** 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether	U	0.300	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene	U	0.300	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	56.3	50.0	ug/L 113	(71%-134%)
Bromofluorobenzene	50.7	50.0	ug/L 101	(70%-131%)
Toluene-d8	52.3	50.0	ug/L 105	(74%-124%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.413	18.4	ug/L	0	J



# **Quality Control Summary**

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**Volatile**  
**Surrogate Recovery Report**

Page 1 of 1

**SDG Number: 2017-2777****Matrix Type: LIQUID**

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Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203878617	LCS for batch 1701572	108	99	96
1203878618	LCS for batch 1701572	105	103	98
1203878616	MB for batch 1701572	110	104	101
1203877503	CAWA-17-142901PS	107	100	97
1203877505	CAWA-17-142901PSD	110	103	98
1203877504	CAWA-17-142901PS	108	105	100
1203877506	CAWA-17-142901PSD	106	101	97
432868002	CAWA-17-142919	113	106	104
432868003	CAWA-17-143032	113	105	101

**Surrogate****Acceptance Limits**

DCED4 = 1,2-Dichloroethane-d4

(71%-134%)

TOL = Toluene-d8

(74%-124%)

BFB = Bromofluorobenzene

(70%-131%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 1 of 8

SDG Number: 2017-2777

Sample Type: Post Spike

Client ID: CAWA-17-142901PS

Matrix: W

Lab Sample ID 1203877503

Instrument: VOAA.I

Analysis Date: 09/19/2017 16:20

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
179601-23-1	PS m,p-Xylenes	100	0.00 U	104	104	59-132
75-05-8	PS Acetonitrile	1250	0.00 U	1300	104	56-131
67-64-1	PS Acetone	250	0.00 U	157	63	25-155
74-88-4	PS Iodomethane	250	0.00 U	263	105	66-133
75-15-0	PS Carbon disulfide	250	0.00 U	277	111	61-141
108-05-4	PS Vinyl acetate	250	0.00 U	275	110	48-133
78-93-3	PS 2-Butanone	250	0.00 U	202	81	25-143
108-10-1	PS 4-Methyl-2-pentanone	250	0.00 U	261	104	61-127
591-78-6	PS 2-Hexanone	250	0.00 U	231	92	33-138
75-71-8	PS Dichlorodifluoromethane	50.0	0.00 U	33.2	66	33-164
74-87-3	PS Chloromethane	50.0	0.00 U	44.8	90	53-139
75-01-4	PS Vinyl chloride	50.0	0.00 U	51.8	104	58-140
74-83-9	PS Bromomethane	50.0	0.00 U	42.9	86	59-146
75-00-3	PS Chloroethane	50.0	0.00 U	50.2	100	65-129
75-69-4	PS Trichlorofluoromethane	50.0	0.00 U	52.2	104	65-141
60-29-7	PS Ethyl ether	50.0	0.00 U	53.5	107	69-127
75-35-4	PS 1,1-Dichloroethylene	50.0	0.00 U	55.3	111	59-130
75-09-2	PS Methylene chloride	50.0	0.00 U	52.9	106	62-123
1634-04-4	PS tert-Butyl methyl ether	50.0	0.00 U	58.5	117	69-132
156-60-5	PS trans-1,2-Dichloroethylene	50.0	0.00 U	57.1	114	65-127
75-34-3	PS 1,1-Dichloroethane	50.0	0.00 U	56.4	113	67-127
156-59-2	PS cis-1,2-Dichloroethylene	50.0	0.00 U	54.6	109	69-127

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 2 of 8

SDG Number: 2017-2777

Sample Type: Post Spike

Client ID: CAWA-17-142901PS

Matrix: W

Lab Sample ID 1203877503

Instrument: VOAA.I

Analysis Date: 09/19/2017 16:20

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
594-20-7	PS 2,2-Dichloropropane	50.0	0.00 U	63.2	126	66-137
74-97-5	PS Bromochloromethane	50.0	0.00 U	53.2	106	71-130
67-66-3	PS Chloroform	50.0	0.00 U	53.9	108	71-129
71-55-6	PS 1,1,1-Trichloroethane	50.0	0.00 U	54.8	110	69-139
563-58-6	PS 1,1-Dichloropropene	50.0	0.00 U	52.6	105	67-130
56-23-5	PS Carbon tetrachloride	50.0	0.00 U	57.4	115	66-143
107-06-2	PS 1,2-Dichloroethane	50.0	0.00 U	55.1	110	69-130
71-43-2	PS Benzene	50.0	0.00 U	52.7	105	66-125
79-01-6	PS Trichloroethylene	50.0	0.00 U	54.3	109	65-131
78-87-5	PS 1,2-Dichloropropane	50.0	0.00 U	54.8	110	67-127
74-95-3	PS Dibromomethane	50.0	0.00 U	53.9	108	72-129
75-27-4	PS Bromodichloromethane	50.0	0.00 U	57.8	116	70-138
10061-01-5	PS cis-1,3-Dichloropropylene	50.0	0.00 U	58.3	117	70-134
108-88-3	PS Toluene	50.0	0.00 U	51.4	103	60-126
10061-02-6	PS trans-1,3-Dichloropropylene	50.0	0.00 U	59.8	120	69-135
79-00-5	PS 1,1,2-Trichloroethane	50.0	0.00 U	52.6	105	66-125
142-28-9	PS 1,3-Dichloropropane	50.0	0.00 U	51.9	104	67-124
127-18-4	PS Tetrachloroethylene	50.0	0.00 U	50.9	102	60-130
124-48-1	PS Dibromochloromethane	50.0	0.00 U	49.7	99	68-143
106-93-4	PS 1,2-Dibromoethane	50.0	0.00 U	54.3	109	71-127
108-90-7	PS Chlorobenzene	50.0	0.00 U	51.1	102	64-124
100-41-4	PS Ethylbenzene	50.0	0.00 U	51.6	103	61-130

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 3 of 8

SDG Number: 2017-2777

Sample Type: Post Spike

Client ID: CAWA-17-142901PS

Matrix: W

Lab Sample ID 1203877503

Instrument: VOAA.I

Analysis Date: 09/19/2017 16:20

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
95-47-6	PS o-Xylene	50.0	0.00 U	51.4	103	62-131
100-42-5	PS Styrene	50.0	0.00 U	52.5	105	59-135
75-25-2	PS Bromoform	50.0	0.00 U	61.2	122	64-138
98-82-8	PS Isopropylbenzene	50.0	0.00 U	51.4	103	55-133
79-34-5	PS 1,1,2,2-Tetrachloroethane	50.0	0.00 U	53.0	106	62-129
96-18-4	PS 1,2,3-Trichloropropane	50.0	0.00 U	52.0	104	70-124
108-86-1	PS Bromobenzene	50.0	0.00 U	51.5	103	62-124
103-65-1	PS n-Propylbenzene	50.0	0.00 U	52.0	104	50-133
108-67-8	PS 1,3,5-Trimethylbenzene	50.0	0.00 U	52.7	105	53-135
95-49-8	PS 2-Chlorotoluene	50.0	0.00 U	51.8	104	56-128
106-43-4	PS 4-Chlorotoluene	50.0	0.00 U	51.5	103	53-130
98-06-6	PS tert-Butylbenzene	50.0	0.00 U	51.3	103	55-135
95-63-6	PS 1,2,4-Trimethylbenzene	50.0	0.00 U	52.7	105	53-132
135-98-8	PS sec-Butylbenzene	50.0	0.00 U	52.7	105	50-138
99-87-6	PS 4-Isopropyltoluene	50.0	0.00 U	53.3	107	49-138
541-73-1	PS 1,3-Dichlorobenzene	50.0	0.00 U	51.4	103	56-126
106-46-7	PS 1,4-Dichlorobenzene	50.0	0.00 U	51.6	103	55-125
104-51-8	PS n-Butylbenzene	50.0	0.00 U	53.8	108	43-142
96-12-8	PS 1,2-Dibromo-3-chloropropane	50.0	0.00 U	57.9	116	62-141
87-68-3	PS Hexachlorobutadiene	50.0	0.00 U	51.7	103	40-147
91-20-3	PS Naphthalene	50.0	0.00 U	50.8	102	62-134
87-61-6	PS 1,2,3-Trichlorobenzene	50.0	0.00 U	51.5	103	52-135

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 4 of 8

SDG Number: 2017-2777

Sample Type: Post Spike

Client ID: CAWA-17-142901PS

Matrix: W

Lab Sample ID 1203877503

Instrument: VOAA.I

Analysis Date: 09/19/2017 16:20

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
120-82-1	PS 1,2,4-Trichlorobenzene	50.0	0.00 U	52.4	105	50-133
630-20-6	PS 1,1,1,2-Tetrachloroethane	50.0	0.00 U	57.6	115	71-133
95-50-1	PS 1,2-Dichlorobenzene	50.0	0.00 U	50.8	102	60-125
71-36-3	PS n-Butyl alcohol	5000	0.00 U	5220	104	60-140

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 5 of 8

SDG Number: 2017-2777

Sample Type: Post Spike Duplicate

Client ID: CAWA-17-142901PSD

Matrix: W

Lab Sample ID 1203877505

Instrument: VOAA.I

Analysis Date: 09/19/2017 16:43

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
179601-23-1	PSD m,p-Xylenes	100	0.00 U	105	105	59-132	1	0-20
75-05-8	PSD Acetonitrile	1250	0.00 U	1350	108	56-131	4	0-20
67-64-1	PSD Acetone	250	0.00 U	163	65	25-155	4	0-20
74-88-4	PSD Iodomethane	250	0.00 U	268	107	66-133	2	0-20
75-15-0	PSD Carbon disulfide	250	0.00 U	285	114	61-141	3	0-20
108-05-4	PSD Vinyl acetate	250	0.00 U	273	109	48-133	1	0-20
78-93-3	PSD 2-Butanone	250	0.00 U	210	84	25-143	4	0-20
108-10-1	PSD 4-Methyl-2-pentanone	250	0.00 U	270	108	61-127	4	0-20
591-78-6	PSD 2-Hexanone	250	0.00 U	238	95	33-138	3	0-20
75-71-8	PSD Dichlorodifluoromethane	50.0	0.00 U	32.9	66	33-164	1	0-20
74-87-3	PSD Chloromethane	50.0	0.00 U	47.0	94	53-139	5	0-20
75-01-4	PSD Vinyl chloride	50.0	0.00 U	51.2	102	58-140	1	0-20
74-83-9	PSD Bromomethane	50.0	0.00 U	42.1	84	59-146	2	0-20
75-00-3	PSD Chloroethane	50.0	0.00 U	50.1	100	65-129	0	0-20
75-69-4	PSD Trichlorofluoromethane	50.0	0.00 U	52.2	104	65-141	0	0-20
60-29-7	PSD Ethyl ether	50.0	0.00 U	52.7	105	69-127	2	0-20
75-35-4	PSD 1,1-Dichloroethylene	50.0	0.00 U	56.4	113	59-130	2	0-20
75-09-2	PSD Methylene chloride	50.0	0.00 U	53.6	107	62-123	1	0-20
1634-04-4	PSD tert-Butyl methyl ether	50.0	0.00 U	59.0	118	69-132	1	0-20
156-60-5	PSD trans-1,2-Dichloroethylene	50.0	0.00 U	58.1	116	65-127	2	0-20
75-34-3	PSD 1,1-Dichloroethane	50.0	0.00 U	57.0	114	67-127	1	0-20
156-59-2	PSD cis-1,2-Dichloroethylene	50.0	0.00 U	54.8	110	69-127	0	0-20

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 6 of 8

SDG Number: 2017-2777

Sample Type: Post Spike Duplicate

Client ID: CAWA-17-142901PSD

Matrix: W

Lab Sample ID 1203877505

Instrument: VOAA.I

Analysis Date: 09/19/2017 16:43

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
594-20-7	PSD 2,2-Dichloropropane	50.0	0.00 U	64.5	129	66-137	2	0-20
74-97-5	PSD Bromochloromethane	50.0	0.00 U	53.3	107	71-130	0	0-20
67-66-3	PSD Chloroform	50.0	0.00 U	54.3	109	71-129	1	0-20
71-55-6	PSD 1,1,1-Trichloroethane	50.0	0.00 U	56.3	113	69-139	3	0-20
563-58-6	PSD 1,1-Dichloropropene	50.0	0.00 U	53.6	107	67-130	2	0-20
56-23-5	PSD Carbon tetrachloride	50.0	0.00 U	59.2	118	66-143	3	0-20
107-06-2	PSD 1,2-Dichloroethane	50.0	0.00 U	55.0	110	69-130	0	0-20
71-43-2	PSD Benzene	50.0	0.00 U	53.3	107	66-125	1	0-20
79-01-6	PSD Trichloroethylene	50.0	0.00 U	55.4	111	65-131	2	0-20
78-87-5	PSD 1,2-Dichloropropane	50.0	0.00 U	54.9	110	67-127	0	0-20
74-95-3	PSD Dibromomethane	50.0	0.00 U	54.4	109	72-129	1	0-20
75-27-4	PSD Bromodichloromethane	50.0	0.00 U	58.0	116	70-138	0	0-20
10061-01-5	PSD cis-1,3-Dichloropropylene	50.0	0.00 U	58.1	116	70-134	0	0-20
108-88-3	PSD Toluene	50.0	0.00 U	52.2	104	60-126	2	0-20
10061-02-6	PSD trans-1,3-Dichloropropylene	50.0	0.00 U	59.7	119	69-135	0	0-20
79-00-5	PSD 1,1,2-Trichloroethane	50.0	0.00 U	52.7	105	66-125	0	0-20
142-28-9	PSD 1,3-Dichloropropane	50.0	0.00 U	51.9	104	67-124	0	0-20
127-18-4	PSD Tetrachloroethylene	50.0	0.00 U	52.1	104	60-130	2	0-20
124-48-1	PSD Dibromochloromethane	50.0	0.00 U	49.8	100	68-143	0	0-20
106-93-4	PSD 1,2-Dibromoethane	50.0	0.00 U	54.9	110	71-127	1	0-20
108-90-7	PSD Chlorobenzene	50.0	0.00 U	51.7	103	64-124	1	0-20
100-41-4	PSD Ethylbenzene	50.0	0.00 U	52.4	105	61-130	2	0-20



Volatile  
Quality Control Summary  
Spike Recovery Report

Page 7 of 8

SDG Number: 2017-2777

Sample Type: Post Spike Duplicate

Client ID: CAWA-17-142901PSD

Matrix: W

Lab Sample ID 1203877505

Instrument: VOAA.I

Analysis Date: 09/19/2017 16:43

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
95-47-6	PSD o-Xylene	50.0	0.00 U	52.1	104	62-131	1	0-20
100-42-5	PSD Styrene	50.0	0.00 U	52.6	105	59-135	0	0-20
75-25-2	PSD Bromoform	50.0	0.00 U	61.5	123	64-138	0	0-20
98-82-8	PSD Isopropylbenzene	50.0	0.00 U	51.9	104	55-133	1	0-20
79-34-5	PSD 1,1,2,2-Tetrachloroethane	50.0	0.00 U	53.8	108	62-129	2	0-20
96-18-4	PSD 1,2,3-Trichloropropane	50.0	0.00 U	52.8	106	70-124	1	0-20
108-86-1	PSD Bromobenzene	50.0	0.00 U	51.0	102	62-124	1	0-20
103-65-1	PSD n-Propylbenzene	50.0	0.00 U	52.3	105	50-133	1	0-20
108-67-8	PSD 1,3,5-Trimethylbenzene	50.0	0.00 U	53.1	106	53-135	1	0-20
95-49-8	PSD 2-Chlorotoluene	50.0	0.00 U	51.8	104	56-128	0	0-20
106-43-4	PSD 4-Chlorotoluene	50.0	0.00 U	51.5	103	53-130	0	0-20
98-06-6	PSD tert-Butylbenzene	50.0	0.00 U	51.8	104	55-135	1	0-20
95-63-6	PSD 1,2,4-Trimethylbenzene	50.0	0.00 U	52.9	106	53-132	0	0-20
135-98-8	PSD sec-Butylbenzene	50.0	0.00 U	53.3	107	50-138	1	0-20
99-87-6	PSD 4-Isopropyltoluene	50.0	0.00 U	53.6	107	49-138	1	0-20
541-73-1	PSD 1,3-Dichlorobenzene	50.0	0.00 U	51.6	103	56-126	0	0-20
106-46-7	PSD 1,4-Dichlorobenzene	50.0	0.00 U	51.8	104	55-125	0	0-20
104-51-8	PSD n-Butylbenzene	50.0	0.00 U	54.3	109	43-142	1	0-20
96-12-8	PSD 1,2-Dibromo-3-chloropropane	50.0	0.00 U	60.2	120	62-141	4	0-20
87-68-3	PSD Hexachlorobutadiene	50.0	0.00 U	52.5	105	40-147	2	0-20
91-20-3	PSD Naphthalene	50.0	0.00 U	52.5	105	62-134	3	0-20
87-61-6	PSD 1,2,3-Trichlorobenzene	50.0	0.00 U	51.9	104	52-135	1	0-20

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 8 of 8

SDG Number: 2017-2777

Sample Type: Post Spike Duplicate

Client ID: CAWA-17-142901PSD

Matrix: W

Lab Sample ID 1203877505

Instrument: VOAA.I

Analysis Date: 09/19/2017 16:43

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
120-82-1	PSD 1,2,4-Trichlorobenzene	50.0	0.00 U	52.9	106	50-133	1	0-20
630-20-6	PSD 1,1,1,2-Tetrachloroethane	50.0	0.00 U	58.4	117	71-133	1	0-20
95-50-1	PSD 1,2-Dichlorobenzene	50.0	0.00 U	50.8	102	60-125	0	0-20
71-36-3	PSD n-Butyl alcohol	5000	0.00 U	5500	110	60-140	5	0-20

## Volatile

Page 1 of 2

Quality Control Summary  
Spike Recovery Report

SDG Number: 2017-2777

Sample Type: Post Spike

Client ID: CAWA-17-142901PS

Matrix: W

Lab Sample ID 1203877504

Instrument: VOAA.I

Analysis Date: 09/19/2017 17:07

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
107-02-8	PS Acrolein	250	0.00 U	296	119	49-141
76-13-1	PS Trichlorotrifluoroethane	250	0.00 U	264	106	57-149
107-05-1	PS Allyl chloride	250	0.00 U	251	100	54-128
107-13-1	PS Acrylonitrile	250	0.00 U	238	95	59-129
107-12-0	PS Propionitrile	250	0.00 U	229	92	58-131
126-98-7	PS Methacrylonitrile	250	0.00 U	238	95	59-134
80-62-6	PS Methyl methacrylate	250	0.00 U	241	97	62-135
97-63-2	PS Ethyl methacrylate	250	0.00 U	244	97	60-136
78-83-1	PS Isobutyl alcohol	2500	0.00 U	2610	105	60-143
126-99-8	PS 2-Chloro-1,3-butadiene	50.0	0.00 U	45.9	92	63-146

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 2 of 2

SDG Number: 2017-2777

Sample Type: Post Spike Duplicate

Client ID: CAWA-17-142901PSD

Matrix: W

Lab Sample ID 1203877506

Instrument: VOAA.I

Analysis Date: 09/19/2017 17:31

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	U	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
107-02-8	PSD Acrolein	250	0.00	U	307	123	49-141	3	0-20
76-13-1	PSD Trichlorotrifluoroethane	250	0.00	U	266	106	57-149	0	0-20
107-05-1	PSD Allyl chloride	250	0.00	U	259	104	54-128	3	0-20
107-13-1	PSD Acrylonitrile	250	0.00	U	258	103	59-129	8	0-20
107-12-0	PSD Propionitrile	250	0.00	U	248	99	58-131	8	0-20
126-98-7	PSD Methacrylonitrile	250	0.00	U	255	102	59-134	7	0-20
80-62-6	PSD Methyl methacrylate	250	0.00	U	260	104	62-135	7	0-20
97-63-2	PSD Ethyl methacrylate	250	0.00	U	256	102	60-136	5	0-20
78-83-1	PSD Isobutyl alcohol	2500	0.00	U	2860	114	60-143	9	0-20
126-99-8	PSD 2-Chloro-1,3-butadiene	50.0	0.00	U	47.0	94	63-146	2	0-20

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 1 of 4

SDG Number: 2017-2777

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1701572

Matrix: WATER

Lab Sample ID 1203878617

Instrument: VOAA.I

Analysis Date: 09/19/2017 14:44

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
179601-23-1	LCS m,p-Xylenes	100	0.0	106	106	71-127
75-05-8	LCS Acetonitrile	1250	0.0	1370	110	61-125
67-64-1	LCS Acetone	250	0.0	355	142	48-157
74-88-4	LCS Iodomethane	250	0.0	273	109	72-128
75-15-0	LCS Carbon disulfide	250	0.0	291	116	69-138
108-05-4	LCS Vinyl acetate	250	0.0	276	111	67-125
78-93-3	LCS 2-Butanone	250	0.0	312	125	55-138
108-10-1	LCS 4-Methyl-2-pentanone	250	0.0	276	110	66-124
591-78-6	LCS 2-Hexanone	250	0.0	333	133	56-140
75-71-8	LCS Dichlorodifluoromethane	50.0	0.0	31.9	64	40-160
74-87-3	LCS Chloromethane	50.0	0.0	48.0	96	58-135
75-01-4	LCS Vinyl chloride	50.0	0.0	51.4	103	65-137
74-83-9	LCS Bromomethane	50.0	0.0	40.7	81	63-137
75-00-3	LCS Chloroethane	50.0	0.0	51.0	102	69-129
75-69-4	LCS Trichlorofluoromethane	50.0	0.0	52.0	104	69-138
60-29-7	LCS Ethyl ether	50.0	0.0	53.1	106	72-125
75-35-4	LCS 1,1-Dichloroethylene	50.0	0.0	58.3	117	66-126
75-09-2	LCS Methylene chloride	50.0	0.0	54.9	110	68-119
1634-04-4	LCS tert-Butyl methyl ether	50.0	0.0	60.6	121	76-128
156-60-5	LCS trans-1,2-Dichloroethylene	50.0	0.0	58.9	118	71-124
75-34-3	LCS 1,1-Dichloroethane	50.0	0.0	57.9	116	73-123
156-59-2	LCS cis-1,2-Dichloroethylene	50.0	0.0	55.4	111	75-123

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 2 of 4

SDG Number: 2017-2777

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1701572

Matrix: WATER

Lab Sample ID 1203878617

Instrument: VOAA.I

Analysis Date: 09/19/2017 14:44

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
594-20-7	LCS 2,2-Dichloropropane	50.0	0.0	65.8	132	72-138
74-97-5	LCS Bromochloromethane	50.0	0.0	53.7	107	76-125
67-66-3	LCS Chloroform	50.0	0.0	55.1	110	76-123
71-55-6	LCS 1,1,1-Trichloroethane	50.0	0.0	57.7	115	74-136
563-58-6	LCS 1,1-Dichloropropene	50.0	0.0	54.5	109	72-129
56-23-5	LCS Carbon tetrachloride	50.0	0.0	60.3	121	72-140
107-06-2	LCS 1,2-Dichloroethane	50.0	0.0	55.4	111	74-122
71-43-2	LCS Benzene	50.0	0.0	54.0	108	72-121
79-01-6	LCS Trichloroethylene	50.0	0.0	56.0	112	74-125
78-87-5	LCS 1,2-Dichloropropane	50.0	0.0	55.6	111	73-121
74-95-3	LCS Dibromomethane	50.0	0.0	54.7	109	78-123
75-27-4	LCS Bromodichloromethane	50.0	0.0	58.7	117	77-131
10061-01-5	LCS cis-1,3-Dichloropropylene	50.0	0.0	58.8	118	78-131
108-88-3	LCS Toluene	50.0	0.0	52.1	104	71-121
10061-02-6	LCS trans-1,3-Dichloropropylene	50.0	0.0	60.3	121	78-131
79-00-5	LCS 1,1,2-Trichloroethane	50.0	0.0	53.1	106	74-118
142-28-9	LCS 1,3-Dichloropropane	50.0	0.0	52.0	104	74-118
127-18-4	LCS Tetrachloroethylene	50.0	0.0	52.0	104	69-129
124-48-1	LCS Dibromochloromethane	50.0	0.0	50.3	101	76-137
106-93-4	LCS 1,2-Dibromoethane	50.0	0.0	54.9	110	78-122
108-90-7	LCS Chlorobenzene	50.0	0.0	51.7	103	74-120
100-41-4	LCS Ethylbenzene	50.0	0.0	52.7	105	73-125

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 3 of 4

SDG Number: 2017-2777

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1701572

Matrix: WATER

Lab Sample ID 1203878617

Instrument: VOAA.I

Analysis Date: 09/19/2017 14:44

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
95-47-6	LCS o-Xylene	50.0	0.0	52.4	105	74-126
100-42-5	LCS Styrene	50.0	0.0	54.3	109	72-130
75-25-2	LCS Bromoform	50.0	0.0	61.1	122	72-136
98-82-8	LCS Isopropylbenzene	50.0	0.0	51.6	103	70-130
79-34-5	LCS 1,1,2,2-Tetrachloroethane	50.0	0.0	53.1	106	70-126
96-18-4	LCS 1,2,3-Trichloropropane	50.0	0.0	52.3	105	74-122
108-86-1	LCS Bromobenzene	50.0	0.0	50.8	102	74-120
103-65-1	LCS n-Propylbenzene	50.0	0.0	52.2	104	67-128
108-67-8	LCS 1,3,5-Trimethylbenzene	50.0	0.0	53.0	106	70-129
95-49-8	LCS 2-Chlorotoluene	50.0	0.0	51.7	103	71-124
106-43-4	LCS 4-Chlorotoluene	50.0	0.0	51.4	103	69-125
98-06-6	LCS tert-Butylbenzene	50.0	0.0	51.3	103	72-130
95-63-6	LCS 1,2,4-Trimethylbenzene	50.0	0.0	52.9	106	70-126
135-98-8	LCS sec-Butylbenzene	50.0	0.0	53.0	106	70-131
99-87-6	LCS 4-Isopropyltoluene	50.0	0.0	53.5	107	71-131
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	51.1	102	72-121
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	51.3	103	71-120
104-51-8	LCS n-Butylbenzene	50.0	0.0	54.0	108	68-134
96-12-8	LCS 1,2-Dibromo-3-chloropropane	50.0	0.0	59.5	119	68-141
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	50.9	102	72-136
91-20-3	LCS Naphthalene	50.0	0.0	51.1	102	72-132
87-61-6	LCS 1,2,3-Trichlorobenzene	50.0	0.0	50.8	102	70-130

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 4 of 4

SDG Number: 2017-2777

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1701572

Matrix: WATER

Lab Sample ID 1203878617

Instrument: VOAA.I

Analysis Date: 09/19/2017 14:44

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
120-82-1	LCS 1,2,4-Trichlorobenzene	50.0	0.0	51.9	104	71-129
630-20-6	LCS 1,1,1,2-Tetrachloroethane	50.0	0.0	58.8	118	79-127
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	50.3	101	74-120
71-36-3	LCS n-Butyl alcohol	5000	0.0	5560	111	63-138



Volatile  
Quality Control Summary  
Spike Recovery Report

Page 1 of 1

SDG Number: 2017-2777

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1701572

Matrix: WATER

Lab Sample ID 1203878618

Instrument: VOAA.I

Analysis Date: 09/19/2017 15:32

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1701572

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
107-02-8	LCS Acrolein	250	0.0	307	123	60-140
76-13-1	LCS Trichlorotrifluoroethane	250	0.0	289	116	61-148
107-05-1	LCS Allyl chloride	250	0.0	270	108	59-125
107-13-1	LCS Acrylonitrile	250	0.0	255	102	65-122
107-12-0	LCS Propionitrile	250	0.0	244	98	64-124
126-98-7	LCS Methacrylonitrile	250	0.0	255	102	64-126
80-62-6	LCS Methyl methacrylate	250	0.0	259	103	69-127
97-63-2	LCS Ethyl methacrylate	250	0.0	261	105	66-130
78-83-1	LCS Isobutyl alcohol	2500	0.0	2790	112	65-135
126-99-8	LCS 2-Chloro-1,3-butadiene	50.0	0.0	49.6	99	66-147

## Method Blank Summary

Page 1 of 1

SDG Number: 2017-2777

Client: ARSL004

Matrix: WATER

Client ID: MB for batch 1701572

Instrument ID: VOAA.I

Data File: 091917\AA206.D

Lab Sample ID: 1203878616

Prep Date: 09/19/2017 15:56

Analyzed: 09/19/17 15:56

Column: DB-624

This method blank applies to the following samples and quality control samples:

Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01 LCS for batch 1701572	1203878617	091917\AA203L.D	09/19/17	1444
02 LCS for batch 1701572	1203878618	091917\AA205.D	09/19/17	1532
03 CAWA-17-142901PS	1203877503	091917\AA207.D	09/19/17	1620
04 CAWA-17-142901PSD	1203877505	091917\AA208.D	09/19/17	1643
05 CAWA-17-142901PS	1203877504	091917\AA209.D	09/19/17	1707
06 CAWA-17-142901PSD	1203877506	091917\AA210.D	09/19/17	1731
07 CAWA-17-142919	432868002	091917\AA219.D	09/19/17	2104
08 CAWA-17-143032	432868003	091917\AA220.D	09/19/17	2128

# Quality Control Data

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b>	<b>2017-2777</b>	<b>Date Collected:</b>	<b>09/08/2017 13:32</b>	<b>Matrix:</b>	<b>W</b>
<b>Lab Sample ID:</b>	<b>1203877503</b>	<b>Date Received:</b>	<b>09/13/2017 09:20</b>		
<b>Client Sample:</b>	<b>QC for batch 1701572</b>	<b>Client:</b>	<b>ARSL004</b>	<b>Project:</b>	<b>QC</b>
<b>Client ID:</b>	<b>CAWA-17-142901PS</b>	<b>Method:</b>	<b>SW-846:8260B</b>	<b>SOP Ref:</b>	<b>GL-OA-E-038</b>
<b>Batch ID:</b>	<b>1701572</b>	<b>Inst:</b>	<b>VOAA.I</b>	<b>Dilution:</b>	<b>1</b>
<b>Run Date:</b>	<b>09/19/2017 16:20</b>	<b>Analyst:</b>	<b>VXY1</b>	<b>Purge Vol:</b>	<b>5 mL</b>
<b>Prep Date:</b>	<b>09/19/2017 16:20</b>				
<b>Data File:</b>	<b>091917\AA207.D</b>	<b>Column:</b>	<b>DB-624</b>		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		57.6	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		54.8	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		53.0	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		52.6	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		56.4	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		55.3	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		52.6	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		51.5	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		52.0	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		52.4	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		52.7	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		57.9	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		54.3	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		50.8	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		55.1	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		54.8	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		52.7	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		51.4	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		51.9	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		51.6	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		63.2	ug/L	0.300	1.00
78-93-3	2-Butanone		202	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene	U	0.300	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene		51.8	ug/L	0.300	1.00
591-78-6	2-Hexanone		231	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		51.5	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		53.3	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		261	ug/L	1.50	5.00
67-64-1	Acetone		157	ug/L	1.50	10.0
75-05-8	Acetonitrile		1300	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene		52.7	ug/L	0.300	1.00
108-86-1	Bromobenzene		51.5	ug/L	0.300	1.00
74-97-5	Bromochloromethane		53.2	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		57.8	ug/L	0.300	1.00
75-25-2	Bromoform		61.2	ug/L	0.300	1.00

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

<b>SDG Number:</b> 2017-2777	<b>Date Collected:</b> 09/08/2017 13:32	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203877503	<b>Date Received:</b> 09/13/2017 09:20	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAWA-17-142901PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 16:20	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 16:20		
<b>Data File:</b> 091917\AA207.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		42.9	ug/L	0.300	1.00
75-15-0	Carbon disulfide		277	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		57.4	ug/L	0.300	1.00
108-90-7	Chlorobenzene		51.1	ug/L	0.300	1.00
75-00-3	Chloroethane		50.2	ug/L	0.300	1.00
67-66-3	Chloroform		53.9	ug/L	0.300	1.00
74-87-3	Chloromethane		44.8	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		49.7	ug/L	0.300	1.00
74-95-3	Dibromomethane		53.9	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		33.2	ug/L	0.300	1.00
60-29-7	Ethyl ether		53.5	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		51.6	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		51.7	ug/L	0.300	1.00
74-88-4	Iodomethane		263	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		51.4	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride		52.9	ug/L	1.00	10.0
91-20-3	Naphthalene		50.8	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		52.5	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		50.9	ug/L	0.300	1.00
108-88-3	Toluene		51.4	ug/L	0.300	1.00
79-01-6	Trichloroethylene		54.3	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		52.2	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		275	ug/L	1.50	5.00
75-01-4	Vinyl chloride		51.8	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		54.6	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		58.3	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		104	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5220	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		53.8	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		52.0	ug/L	0.300	1.00
95-47-6	o-Xylene		51.4	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		52.7	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> 2017-2777	<b>Date Collected:</b> 09/08/2017 13:32	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203877503	<b>Date Received:</b> 09/13/2017 09:20	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAWA-17-142901PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 16:20	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 16:20		
<b>Data File:</b> 091917\AA207.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		58.5	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		51.3	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		57.1	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		59.8	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	53.6	50.0	107	(71%-134%)
Bromofluorobenzene	48.5	50.0	97	(70%-131%)
Toluene-d8	50.2	50.0	100	(74%-124%)

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

<b>SDG Number:</b> 2017-2777	<b>Date Collected:</b> 09/08/2017 13:32	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203877504	<b>Date Received:</b> 09/13/2017 09:20	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAWA-17-142901PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 17:07	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 17:07		
<b>Data File:</b> 091917\AA209.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene		45.9	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein		296	ug/L	1.50	5.00
107-13-1	Acrylonitrile		238	ug/L	1.50	5.00
107-05-1	Allyl chloride		251	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00

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

<b>SDG Number:</b> 2017-2777	<b>Date Collected:</b> 09/08/2017 13:32	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203877504	<b>Date Received:</b> 09/13/2017 09:20	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAWA-17-142901PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 17:07	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 17:07		
<b>Data File:</b> 091917\AA209.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	0.300	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	1.50	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	1.00
75-00-3	Chloroethane	U	0.300	ug/L	0.300	1.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	1.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	0.300	ug/L	0.300	1.00
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	1.00
60-29-7	Ethyl ether	U	0.300	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate		244	ug/L	1.50	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	U	0.300	ug/L	0.300	1.00
74-88-4	Iodomethane	U	1.50	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol		2610	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		238	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		241	ug/L	1.50	5.00
75-09-2	Methylene chloride	U	1.00	ug/L	1.00	10.0
91-20-3	Naphthalene	U	0.300	ug/L	0.300	1.00
107-12-0	Propionitrile		229	ug/L	1.50	5.00
100-42-5	Styrene	U	0.300	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	0.300	ug/L	0.300	1.00
108-88-3	Toluene	U	0.300	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	0.300	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	0.300	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane		264	ug/L	2.00	5.00
108-05-4	Vinyl acetate	U	1.50	ug/L	1.50	5.00
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	0.300	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol	U	15.0	ug/L	15.0	50.0
104-51-8	n-Butylbenzene	U	0.300	ug/L	0.300	1.00
103-65-1	n-Propylbenzene	U	0.300	ug/L	0.300	1.00
95-47-6	o-Xylene	U	0.300	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene	U	0.300	ug/L	0.300	1.00



**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> 2017-2777	<b>Date Collected:</b> 09/08/2017 13:32	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203877504	<b>Date Received:</b> 09/13/2017 09:20	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAWA-17-142901PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 17:07	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 17:07		
<b>Data File:</b> 091917\AA209.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether	U	0.300	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene	U	0.300	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	54.1	50.0	ug/L	108 (71%-134%)
Bromofluorobenzene	50.1	50.0	ug/L	100 (70%-131%)
Toluene-d8	52.5	50.0	ug/L	105 (74%-124%)

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

<b>SDG Number:</b> 2017-2777	<b>Date Collected:</b> 09/08/2017 13:32	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203877505	<b>Date Received:</b> 09/13/2017 09:20	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAWA-17-142901PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 16:43	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 16:43		
<b>Data File:</b> 091917\AA208.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		58.4	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		56.3	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		53.8	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		52.7	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		57.0	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		56.4	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		53.6	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		51.9	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		52.8	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		52.9	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		52.9	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		60.2	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		54.9	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		50.8	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		55.0	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		54.9	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		53.1	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		51.6	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		51.9	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		51.8	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		64.5	ug/L	0.300	1.00
78-93-3	2-Butanone		210	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene	U	0.300	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene		51.8	ug/L	0.300	1.00
591-78-6	2-Hexanone		238	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		51.5	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		53.6	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		270	ug/L	1.50	5.00
67-64-1	Acetone		163	ug/L	1.50	10.0
75-05-8	Acetonitrile		1350	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene		53.3	ug/L	0.300	1.00
108-86-1	Bromobenzene		51.0	ug/L	0.300	1.00
74-97-5	Bromochloromethane		53.3	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		58.0	ug/L	0.300	1.00
75-25-2	Bromoform		61.5	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b>	<b>2017-2777</b>	<b>Date Collected:</b>	<b>09/08/2017 13:32</b>	<b>Matrix:</b>	<b>W</b>
<b>Lab Sample ID:</b>	<b>1203877505</b>	<b>Date Received:</b>	<b>09/13/2017 09:20</b>		
<b>Client Sample:</b>	<b>QC for batch 1701572</b>	<b>Client:</b>	<b>ARSL004</b>	<b>Project:</b>	<b>QC</b>
<b>Client ID:</b>	<b>CAWA-17-142901PSD</b>	<b>Method:</b>	<b>SW-846:8260B</b>	<b>SOP Ref:</b>	<b>GL-OA-E-038</b>
<b>Batch ID:</b>	<b>1701572</b>	<b>Inst:</b>	<b>VOAA.I</b>	<b>Dilution:</b>	<b>1</b>
<b>Run Date:</b>	<b>09/19/2017 16:43</b>	<b>Analyst:</b>	<b>VXY1</b>	<b>Purge Vol:</b>	<b>5 mL</b>
<b>Prep Date:</b>	<b>09/19/2017 16:43</b>				
<b>Data File:</b>	<b>091917\AA208.D</b>	<b>Column:</b>	<b>DB-624</b>		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		42.1	ug/L	0.300	1.00
75-15-0	Carbon disulfide		285	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		59.2	ug/L	0.300	1.00
108-90-7	Chlorobenzene		51.7	ug/L	0.300	1.00
75-00-3	Chloroethane		50.1	ug/L	0.300	1.00
67-66-3	Chloroform		54.3	ug/L	0.300	1.00
74-87-3	Chloromethane		47.0	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		49.8	ug/L	0.300	1.00
74-95-3	Dibromomethane		54.4	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		32.9	ug/L	0.300	1.00
60-29-7	Ethyl ether		52.7	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		52.4	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		52.5	ug/L	0.300	1.00
74-88-4	Iodomethane		268	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		51.9	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride		53.6	ug/L	1.00	10.0
91-20-3	Naphthalene		52.5	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		52.6	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		52.1	ug/L	0.300	1.00
108-88-3	Toluene		52.2	ug/L	0.300	1.00
79-01-6	Trichloroethylene		55.4	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		52.2	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		273	ug/L	1.50	5.00
75-01-4	Vinyl chloride		51.2	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		54.8	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		58.1	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		105	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5500	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		54.3	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		52.3	ug/L	0.300	1.00
95-47-6	o-Xylene		52.1	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		53.3	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> 2017-2777	<b>Date Collected:</b> 09/08/2017 13:32	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203877505	<b>Date Received:</b> 09/13/2017 09:20	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAWA-17-142901PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 16:43	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 16:43		
<b>Data File:</b> 091917\AA208.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		59.0	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		51.8	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		58.1	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		59.7	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	54.8	50.0	110	(71%-134%)
Bromofluorobenzene	49.0	50.0	98	(70%-131%)
Toluene-d8	51.4	50.0	103	(74%-124%)

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

<b>SDG Number:</b> 2017-2777	<b>Date Collected:</b> 09/08/2017 13:32	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203877506	<b>Date Received:</b> 09/13/2017 09:20	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAWA-17-142901PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 17:31	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 17:31		
<b>Data File:</b> 091917\AA210.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene		47.0	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein		307	ug/L	1.50	5.00
107-13-1	Acrylonitrile		258	ug/L	1.50	5.00
107-05-1	Allyl chloride		259	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00

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

<b>SDG Number:</b> 2017-2777	<b>Date Collected:</b> 09/08/2017 13:32	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203877506	<b>Date Received:</b> 09/13/2017 09:20	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAWA-17-142901PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 17:31	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 17:31		
<b>Data File:</b> 091917\AA210.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	0.300	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	1.50	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	1.00
75-00-3	Chloroethane	U	0.300	ug/L	0.300	1.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	1.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	0.300	ug/L	0.300	1.00
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	1.00
60-29-7	Ethyl ether	U	0.300	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate		256	ug/L	1.50	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	U	0.300	ug/L	0.300	1.00
74-88-4	Iodomethane	U	1.50	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol		2860	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		255	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		260	ug/L	1.50	5.00
75-09-2	Methylene chloride	U	1.00	ug/L	1.00	10.0
91-20-3	Naphthalene	U	0.300	ug/L	0.300	1.00
107-12-0	Propionitrile		248	ug/L	1.50	5.00
100-42-5	Styrene	U	0.300	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	0.300	ug/L	0.300	1.00
108-88-3	Toluene	U	0.300	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	0.300	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	0.300	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane		266	ug/L	2.00	5.00
108-05-4	Vinyl acetate	U	1.50	ug/L	1.50	5.00
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	0.300	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol	U	15.0	ug/L	15.0	50.0
104-51-8	n-Butylbenzene	U	0.300	ug/L	0.300	1.00
103-65-1	n-Propylbenzene	U	0.300	ug/L	0.300	1.00
95-47-6	o-Xylene	U	0.300	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene	U	0.300	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> 2017-2777	<b>Date Collected:</b> 09/08/2017 13:32	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203877506	<b>Date Received:</b> 09/13/2017 09:20	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAWA-17-142901PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 17:31	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 17:31		
<b>Data File:</b> 091917\AA210.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether	U	0.300	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene	U	0.300	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	52.9	50.0	106	(71%-134%)
Bromofluorobenzene	48.7	50.0	97	(70%-131%)
Toluene-d8	50.7	50.0	101	(74%-124%)

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

<b>SDG Number:</b> 2017-2777	<b>Matrix:</b> WATER
<b>Lab Sample ID:</b> 1203878616	
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004
<b>Client ID:</b> MB for batch 1701572	<b>Method:</b> SW-846:8260B
<b>Batch ID:</b> 1701572	<b>Project:</b> QC
<b>Run Date:</b> 09/19/2017 15:56	<b>SOP Ref:</b> GL-OA-E-038
<b>Prep Date:</b> 09/19/2017 15:56	<b>Dilution:</b> 1
<b>Data File:</b> 091917\AA206.D	<b>Purge Vol:</b> 5 mL
	<b>Column:</b> DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene	U	0.300	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00



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

<b>SDG Number:</b> 2017-2777		<b>Matrix:</b>	WATER
<b>Lab Sample ID:</b> 1203878616			
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b>	QC
<b>Client ID:</b> MB for batch 1701572	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b>	GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b>	1
<b>Run Date:</b> 09/19/2017 15:56	<b>Analyst:</b> VXY1	<b>Purge Vol:</b>	5 mL
<b>Prep Date:</b> 09/19/2017 15:56			
<b>Data File:</b> 091917\AA206.D	<b>Column:</b> DB-624		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	0.300	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	1.50	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	1.00
75-00-3	Chloroethane	U	0.300	ug/L	0.300	1.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	1.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	0.300	ug/L	0.300	1.00
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	1.00
60-29-7	Ethyl ether	U	0.300	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	U	0.300	ug/L	0.300	1.00
74-88-4	Iodomethane	U	1.50	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride	U	1.00	ug/L	1.00	10.0
91-20-3	Naphthalene	U	0.300	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene	U	0.300	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	0.300	ug/L	0.300	1.00
108-88-3	Toluene	U	0.300	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	0.300	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	0.300	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate	U	1.50	ug/L	1.50	5.00
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	0.300	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol	U	15.0	ug/L	15.0	50.0
104-51-8	n-Butylbenzene	U	0.300	ug/L	0.300	1.00
103-65-1	n-Propylbenzene	U	0.300	ug/L	0.300	1.00
95-47-6	o-Xylene	U	0.300	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene	U	0.300	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> 2017-2777	<b>Matrix:</b> WATER	
<b>Lab Sample ID:</b> 1203878616		
<b>Client Sample:</b> QC for batch 1701572	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> MB for batch 1701572	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1701572	<b>Inst:</b> VOAA.I	<b>Dilution:</b> 1
<b>Run Date:</b> 09/19/2017 15:56	<b>Analyst:</b> VXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 09/19/2017 15:56		
<b>Data File:</b> 091917\AA206.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether	U	0.300	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene	U	0.300	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	54.8	50.0	ug/L 110	(71%-134%)
Bromofluorobenzene	50.3	50.0	ug/L 101	(70%-131%)
Toluene-d8	52.1	50.0	ug/L 104	(74%-124%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.423	5.62	ug/L	0	J
	unknown	3.493	5.77	ug/L	0	J

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

Page 1 of 3

SDG Number: 2017-2777

Lab Sample ID: 1203878617

Client Sample: QC for batch 1701572

Client ID: LCS for batch 1701572

Batch ID: 1701572

Run Date: 09/19/2017 14:44

Prep Date: 09/19/2017 14:44

Data File: 091917\AA203L.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOAA.I

Analyst: VXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		58.8	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		57.7	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		53.1	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		53.1	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		57.9	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		58.3	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		54.5	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		50.8	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		52.3	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		51.9	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		52.9	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		59.5	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		54.9	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		50.3	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		55.4	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		55.6	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		53.0	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		51.1	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		52.0	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		51.3	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		65.8	ug/L	0.300	1.00
78-93-3	2-Butanone		312	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene	U	0.300	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene		51.7	ug/L	0.300	1.00
591-78-6	2-Hexanone		333	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		51.4	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		53.5	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		276	ug/L	1.50	5.00
67-64-1	Acetone		355	ug/L	1.50	10.0
75-05-8	Acetonitrile		1370	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene		54.0	ug/L	0.300	1.00
108-86-1	Bromobenzene		50.8	ug/L	0.300	1.00
74-97-5	Bromochloromethane		53.7	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		58.7	ug/L	0.300	1.00
75-25-2	Bromoform		61.1	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

SDG Number: 2017-2777

Lab Sample ID: 1203878617

Client Sample: QC for batch 1701572

Client ID: LCS for batch 1701572

Batch ID: 1701572

Run Date: 09/19/2017 14:44

Prep Date: 09/19/2017 14:44

Data File: 091917\AA203L.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOAA.I

Analyst: VXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		40.7	ug/L	0.300	1.00
75-15-0	Carbon disulfide		291	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		60.3	ug/L	0.300	1.00
108-90-7	Chlorobenzene		51.7	ug/L	0.300	1.00
75-00-3	Chloroethane		51.0	ug/L	0.300	1.00
67-66-3	Chloroform		55.1	ug/L	0.300	1.00
74-87-3	Chloromethane		48.0	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		50.3	ug/L	0.300	1.00
74-95-3	Dibromomethane		54.7	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		31.9	ug/L	0.300	1.00
60-29-7	Ethyl ether		53.1	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		52.7	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		50.9	ug/L	0.300	1.00
74-88-4	Iodomethane		273	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		51.6	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride		54.9	ug/L	1.00	10.0
91-20-3	Naphthalene		51.1	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		54.3	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		52.0	ug/L	0.300	1.00
108-88-3	Toluene		52.1	ug/L	0.300	1.00
79-01-6	Trichloroethylene		56.0	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		52.0	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		276	ug/L	1.50	5.00
75-01-4	Vinyl chloride		51.4	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		55.4	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		58.8	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		106	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5560	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		54.0	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		52.2	ug/L	0.300	1.00
95-47-6	o-Xylene		52.4	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		53.0	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b>	2017-2777	<b>Matrix:</b>	WATER
<b>Lab Sample ID:</b>	1203878617		
<b>Client Sample:</b>	QC for batch 1701572	<b>Client:</b>	ARSL004
<b>Client ID:</b>	LCS for batch 1701572	<b>Method:</b>	SW-846:8260B
<b>Batch ID:</b>	1701572	<b>Inst:</b>	VOAA.I
<b>Run Date:</b>	09/19/2017 14:44	<b>Analyst:</b>	VXY1
<b>Prep Date:</b>	09/19/2017 14:44		
<b>Data File:</b>	091917\AA203L.D	<b>Column:</b>	DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		60.6	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		51.3	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		58.9	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		60.3	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	53.9	50.0	108	(71%-134%)
Bromofluorobenzene	47.9	50.0	96	(70%-131%)
Toluene-d8	49.7	50.0	99	(74%-124%)

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

SDG Number: 2017-2777

Lab Sample ID: 1203878618

Client Sample: QC for batch 1701572

Client ID: LCS for batch 1701572

Batch ID: 1701572

Run Date: 09/19/2017 15:32

Prep Date: 09/19/2017 15:32

Data File: 091917\AA205.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOAA.I

Analyst: VXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene		49.6	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein		307	ug/L	1.50	5.00
107-13-1	Acrylonitrile		255	ug/L	1.50	5.00
107-05-1	Allyl chloride		270	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b>	<b>2017-2777</b>	<b>Matrix:</b>	<b>WATER</b>
<b>Lab Sample ID:</b>	<b>1203878618</b>		
<b>Client Sample:</b>	<b>QC for batch 1701572</b>	<b>Client:</b>	<b>ARSL004</b>
<b>Client ID:</b>	<b>LCS for batch 1701572</b>	<b>Method:</b>	<b>SW-846:8260B</b>
<b>Batch ID:</b>	<b>1701572</b>	<b>Inst:</b>	<b>VOAA.I</b>
<b>Run Date:</b>	<b>09/19/2017 15:32</b>	<b>Analyst:</b>	<b>VXY1</b>
<b>Prep Date:</b>	<b>09/19/2017 15:32</b>		
<b>Data File:</b>	<b>091917\AA205.D</b>	<b>Column:</b>	<b>DB-624</b>
		<b>Project:</b>	<b>QC</b>
		<b>SOP Ref:</b>	<b>GL-OA-E-038</b>
		<b>Dilution:</b>	<b>1</b>
		<b>Purge Vol:</b>	<b>5 mL</b>

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	0.300	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	1.50	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	1.00
75-00-3	Chloroethane	U	0.300	ug/L	0.300	1.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	1.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	0.300	ug/L	0.300	1.00
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	1.00
60-29-7	Ethyl ether	U	0.300	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate		261	ug/L	1.50	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	U	0.300	ug/L	0.300	1.00
74-88-4	Iodomethane	U	1.50	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol		2790	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		255	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		259	ug/L	1.50	5.00
75-09-2	Methylene chloride	U	1.00	ug/L	1.00	10.0
91-20-3	Naphthalene	U	0.300	ug/L	0.300	1.00
107-12-0	Propionitrile		244	ug/L	1.50	5.00
100-42-5	Styrene	U	0.300	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	0.300	ug/L	0.300	1.00
108-88-3	Toluene	U	0.300	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	0.300	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	0.300	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane		289	ug/L	2.00	5.00
108-05-4	Vinyl acetate	U	1.50	ug/L	1.50	5.00
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	0.300	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol	U	15.0	ug/L	15.0	50.0
104-51-8	n-Butylbenzene	U	0.300	ug/L	0.300	1.00
103-65-1	n-Propylbenzene	U	0.300	ug/L	0.300	1.00
95-47-6	o-Xylene	U	0.300	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene	U	0.300	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b>	2017-2777	<b>Matrix:</b>	WATER
<b>Lab Sample ID:</b>	1203878618		
<b>Client Sample:</b>	QC for batch 1701572	<b>Client:</b>	ARSL004
<b>Client ID:</b>	LCS for batch 1701572	<b>Method:</b>	SW-846:8260B
<b>Batch ID:</b>	1701572	<b>Inst:</b>	VOAA.I
<b>Run Date:</b>	09/19/2017 15:32	<b>Analyst:</b>	VXY1
<b>Prep Date:</b>	09/19/2017 15:32		
<b>Data File:</b>	091917\AA205.D	<b>Column:</b>	DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether	U	0.300	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene	U	0.300	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	52.6	50.0	ug/L	105 (71%-134%)
Bromofluorobenzene	49.2	50.0	ug/L	98 (70%-131%)
Toluene-d8	51.4	50.0	ug/L	103 (74%-124%)



# **Perchlorates by LCMSMS Analysis**

# Case Narrative

**Perchlorates by LCMSMS  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2017-2777  
Work Order #: 432868**

**Method/Analysis Information**

<b>Procedure:</b>	<b>Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)</b>
Analytical Method:	SW-846:6850
Prep Method:	SW-846:6850
Analytical Batch Number:	1702207
Prep Batch Number:	1702204

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
432868001	432868001 (CAWA-17-142884)
1203878947	Interference Check Sample (ICS)
1203878943	Method Blank (MB)
1203878944	Laboratory Control Sample (LCS)
1203878945	432570001(CAWA-17-142856) Matrix Spike (MS)
1203878946	432570001(CAWA-17-142856) 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-067 REV# 14.

**Calibration Information**

**Initial Calibration**

All initial calibration requirements have been met for this SDG. Due to software constraints, all Initial

Calibration Blanks must be designated as IPB001.

#### **ICV Requirements**

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

#### **CCB Requirements**

All continuing calibration blanks (CCB) bracketing the analyses associated with this batch were within acceptance criteria.

#### **CCV Requirements**

All continuing calibration checks (CCV) requirements were met by all bracketing CCV standards.

#### **Low Level Standard (CRI) Requirements**

All low level calibration verification (CRI) requirements were met by all bracketing CRI standards.

#### **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 recoveries met the acceptance limits.

##### **Interference Check Sample (ICS)**

The ICS spike recoveries met the acceptance criteria.

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

Client sample 432570001 (CAWA-17-142856) was chosen for matrix spike and matrix spike duplicate analysis.

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

The MS recoveries were within the established acceptance limits.

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

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

##### **Internal Standard Area Acceptance**

The internal standard areas were within the required acceptance criteria for all samples and QC.

##### **Retention Time**

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard. The presence of Perchlorate was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by DOD QSM 5.0, has been used. In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

#### **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 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.

**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****Manual Integrations**

Manual integrations were not required for any data file associated with this SDG.

**Method Comments**

The samples in this SDG were not originally analyzed using EPA Method 314.0.

**Additional Comments**

The Perchlorate Isotope Ratio on the Form I may differ slightly from the ratio on the corresponding raw data due to rounding rules and/or significant figures or due to software limitations when there are manual integrations, dilutions or other factors. The ratio value of the Form I is the correct value. The retention time marker, Perchlorate-O (18), is added to all samples, instrument blanks, and standards prior to injection. It is used to verify the retention time of Perchlorate and Perchlorate-101 and to insure an accurate injection occurred. Due to various anions affecting the recovery of Perchlorate-O (18) and not Perchlorate and Perchlorate-101, the calibration curves of Perchlorate and Perchlorate-101 are internally corrected for using Perchlorate-O (18).

**Perchlorate Isotope Ratio**

The Perchlorate isotope ratio met acceptance criteria for all samples and QC samples. Please see the isotope ratio criteria in the Miscellaneous Section.

**System Configuration**

The laboratory utilizes a Waters LC 2795 liquid chromatography instrument for Perchlorate analysis. It is coupled with a Micromass Quattro Ultima Mass Spectrometer/Mass Spectrometer. It is designated as LCMSMS #2. It is fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis. The laboratory may also utilize an Agilent 1100 liquid chromatography instrument for Perchlorate analysis. It is coupled with an Applied Biosystems 4000 Mass Spectrometer/Mass Spectrometer, designated as LCMSMS #3 or LCMSMS #4. It is also fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis.

**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.

**Chromatographic Columns**

The LC-MS/MS Perchlorate analysis was performed on a Quattro Ultima LC/MS/MS.

Chromatographic separation of Perchlorate is accomplished through analysis on the following anion column:

Dionex: IonPac AG-16 2 x 50 mm.

**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

ARSL004 ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)

Client SDG: 2017-2777 GEL Work Order: 432868

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

- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- 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: Michael Penny

Date: 25 SEP 2017

Title: Group Leader

# **Sample Data Summary**



## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1702204Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAWA-17-142884Date Received: 15-SEP-17GEL Job No (SDG): 2017-2777GEL Sample ID: 432868001Date Filtered: 20-SEP-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.260	ug/L		1	20-SEP-17 21:01	per0920026a
	Perchlorate Isotope Ratio			2.82			1	20-SEP-17 21:01	per0920026a
14797-73-0	Perchlorate-101	.05	.2	0.261	ug/L		1	20-SEP-17 21:01	per0920026a
	Perchlorate-O(18)			0.498	ug/L		1	20-SEP-17 21:01	per0920026a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

\*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

# **Quality Control Summary**

**Perchlorate Laboratory Control Sample**

**Lab Name:** General Engineering Laboratories

**Lab Code:** GEL

**GEL Job No. (SDG):** 2017-2777

**Extract Batch Code:** 1702204

**Date Filtered:** 20-SEP-17

**Matrix:** WATER

**Sample ID:** 1203878944

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.202	ug/L	101		85 - 115
Perchlorate Isotope Ratio		2.75				-
Perchlorate-101	0.200	.209	ug/L	104		85 - 115
Perchlorate-O(18)		.523	ug/L			-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

### Perchlorate Spike/Spike Duplicate Summary

**Lab Name:** General Engineering Laboratories

**Lab Code:** GEL

**GEL Job No (SDG):** 2017-2777

**Extract Batch Code:** 1702204

**Date Extracted:** 20-SEP-17

**GEL MS/PS ID:** 1203878945

**Client ID:** CAWA-17-142856

**GEL MSD/PSD ID:** 1203878946

**QC Type:** MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	0.0173	ug/L	0.215	99	.222	103	4	30	75 - 125
Perchlorate Isotope Ratio	0	3.26		2.81		3.02		7		-
Perchlorate-101	0.200	0.0151	ug/L	0.217	101	.209	97	4	30	75 - 125
Perchlorate-O(18)	0	0.521	ug/L	0.516		.522		1		-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

# Quality Control Data

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: EPA 6850 ModifiedMatrix: WATERExtraction Batch ID: 1702204Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 20-SEP-17GEL Job No (SDG): 2017-2777GEL Sample ID: 1203878943Date Filtered: 20-SEP-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.050	ug/L	U	1	20-SEP-17 18:39	per0920013a
	Perchlorate Isotope Ratio						1	20-SEP-17 18:39	per0920013a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	20-SEP-17 18:39	per0920013a
	Perchlorate-O(18)			0.553	ug/L		1	20-SEP-17 18:39	per0920013a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

\*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: EPA 6850 ModifiedMatrix: WATERExtraction Batch ID: 1702204Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 20-SEP-17GEL Job No (SDG): 2017-2777GEL Sample ID: 1203878944Date Filtered: 20-SEP-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.202	ug/L		1	20-SEP-17 18:50	per0920014a
	Perchlorate Isotope Ratio			2.75			1	20-SEP-17 18:50	per0920014a
14797-73-0	Perchlorate-101	.05	.2	0.209	ug/L		1	20-SEP-17 18:50	per0920014a
	Perchlorate-O(18)			0.523	ug/L		1	20-SEP-17 18:50	per0920014a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

\*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1702204Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2017-2777GEL Sample ID: 1203878947Date Filtered: 20-SEP-17Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.224	ug/L		1	20-SEP-17 19:01	per0920015a
	Perchlorate Isotope Ratio			2.65			1	20-SEP-17 19:01	per0920015a
14797-73-0	Perchlorate-101	.05	.2	0.240	ug/L		1	20-SEP-17 19:01	per0920015a
	Perchlorate-O(18)			0.522	ug/L		1	20-SEP-17 19:01	per0920015a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

\*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$



## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1702204Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAWA-17-142856MSDate Received: 13-SEP-17GEL Job No (SDG): 2017-2777GEL Sample ID: 1203878945Date Filtered: 20-SEP-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.215	ug/L		1	20-SEP-17 19:22	per0920017a
	Perchlorate Isotope Ratio			2.81			1	20-SEP-17 19:22	per0920017a
14797-73-0	Perchlorate-101	.05	.2	0.217	ug/L		1	20-SEP-17 19:22	per0920017a
	Perchlorate-O(18)			0.516	ug/L		1	20-SEP-17 19:22	per0920017a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

\*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1702204Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAWA-17-142856MSDDate Received: 13-SEP-17GEL Job No (SDG): 2017-2777GEL Sample ID: 1203878946Date Filtered: 20-SEP-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.222	ug/L		1	20-SEP-17 19:33	per0920018a
	Perchlorate Isotope Ratio			3.02			1	20-SEP-17 19:33	per0920018a
14797-73-0	Perchlorate-101	.05	.2	0.209	ug/L		1	20-SEP-17 19:33	per0920018a
	Perchlorate-O(18)			0.522	ug/L		1	20-SEP-17 19:33	per0920018a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

\*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

# **Explosives by LCMSMS Analysis**

# Case Narrative

**Explosives by LCMSMS  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2017-2777  
Work Order #: 432868**

**Method/Analysis Information**

**Procedure:** The Processing, Extraction, and Analysis of Nitroaromatics, Nitroamines, and Nitrate Esters by SW-846 8330B

Analytical Method: SW846 3535A/8330B

Prep Method: SW846 3535A

Analytical Batch Number: 1701357

Prep Batch Number: 1701355

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW846 3535A/8330B:

<b>Sample ID</b>	<b>Client ID</b>
432868002	CAWA-17-142919
1203876871	Method Blank (MB)
1203876872	Laboratory Control Sample (LCS)
1203876873	432723002(CAWA-17-142900) Matrix Spike (MS)
1203876874	432723002(CAWA-17-142900) Matrix Spike Duplicate (MSD)

**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-068 REV# 7.

**Calibration Information**

**Initial Calibration**

All initial calibration requirements for this analysis have been met for this SDG.

**Calibration Verification Standard Requirements**

All associated calibration verification standards (ICV and CCV) for this analysis met the acceptance criteria.

**Calibration Blank Requirements**

All initial and continuing calibration blanks (ICB and CCB) bracketing the analyses associated with this batch for this analysis were within acceptance criteria. Due to software limitations, the CCBs and/or the ICBs may have a concentration for target analytes in the Found column. These values should be zero.

**CRI Requirements**

All low level calibration verification (CRI) requirements for this analysis were met by all bracketing CRI standards.

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

The MB analyzed with this SDG for this analysis met the acceptance criteria.

**Surrogate Recoveries**

All the surrogate recoveries were within the established acceptance criteria in this SDG in this analytical batch for this analysis.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries were within the established acceptance limits.

**QC Sample Designation**

Client sample 432723002 (CAWA-17-142900) was chosen for matrix spike and matrix spike duplicate analysis.

**Matrix Spike (MS) Recovery Statement**

The MS spike recoveries were within the established acceptance limits for this analysis.

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

The RPD values between the MS and MSD (See Below) were not within the acceptance limits. Since all other RPD values met acceptance criteria, the noted exceptions are attributed to vagaries in the extraction process. The data are reported.

Sample	Analyte	Value
1203876873MS and 1203876874MSD (CAWA-17-142900)	Nitrobenzene	31* (0%-30%)

**Internal Standard (ISTD) Acceptance**

The internal standard responses were within the required acceptance criteria for all samples and QC in this SDG.

**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 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**

In accordance with GEL SOP GL-OA-056, all sample and QC extracts are diluted 1:1 v/v with LC reagent grade Water. The samples in this SDG in this analytical batch for this analysis did not require any additional dilutions.

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

Re-extractions or re-analyses were not required in this SDG in this analytical batch for this analysis.

## **Miscellaneous Information**

### **Manual Integrations**

Manual integrations were not required for any data file associated with this SDG.

### **Additional Comments**

Due to software limitations, all initial calibration blanks must be designated as XIB001 in order for the forms to be correct. Due to software limitations, file extensions such as DL, RE, etc. may not appear on the generated forms and/or raw data. Relative Retention Time (RRT) is used by the laboratory to establish peak identity. The RRT of each target analyte is calculated using the retention time of the corresponding internal standard. The RRT of each analyte in a sample must be within 0.1 of the analyte's calculated RRT in the ICV.

### **System Configuration**

The laboratory utilizes an Agilent 1100 liquid chromatography instrument for either Primary or Secondary analyte analysis. It is coupled with an Applied Biosystems 4000 Mass Spectrometer/ Mass Spectrometer, designated as either LC/MS/MS #3 or LC/MS/MS #4. The laboratory also utilizes a Shimadzu Nexera XC liquid chromatography instrument for Primary and/or Secondary analyte analysis. It is coupled with an Applied Biosystems 5500 Mass Spectrometer/ Mass Spectrometer, designated as LC/MS/MS #5. All are fitted with an APCI (Atmospheric Pressure Chemical Ionization) probe that is operated in the negative ionization mode for both the Primary and Secondary analyte analysis.

### **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.

### **Chromatographic Columns**

The LC-MS/MS Explosives analysis was performed on a ABSciex 5500 Qtrap LC/MS/MS.

The detection of the Primary and Secondary Nitroaromatic and Nitramine analytes is accomplished through analysis on the following reversed phase column:

Phenomenex: Ultracarb 5u ODS (20), 250 x 4.60 mm ID.

### **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

ARSL004 ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)

Client SDG: 2017-2777 GEL Work Order: 432868

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

- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- 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: Michael Penny

Date: 26 SEP 2017

Title: Group Leader



# **Sample Data Summary**

1  
High Explosives Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample ID: CAWA-17-142919

Lab Code: GEL

GEL Job No (SDG) 2017-2777

Matrix: WATER

GEL Sample ID: 432868002

Sample Amount 920 mL

Date Received: 15-SEP-17

Moisture: .

Extraction Batch ID: 1701355

Extraction Type Sol Exchange

Date Extracted: 19-SEP-17

Concentrated Extract Volume (mL) 5

Injection Volume (uL):50

GEL data file: EXP0919021.wiff

Date Analyzed: 20-SEP-17 09:54

Dilution Factor: 2

Concentration Units: ug/L

Cas No.	Compound	Concentration*	Q	MDL	PQL
118-96-7	2,4,6-Trinitrotoluene	.087	U	0.087	0.272
<i>118-96-7</i>	<i>2,4,6-Trinitrotoluene</i>				
121-14-2	2,4-Dinitrotoluene	.087	U	0.087	0.272
<i>121-14-2</i>	<i>2,4-Dinitrotoluene</i>				
121-82-4	RDX	.087	U	0.087	0.272
<i>121-82-4</i>	<i>RDX</i>				
13980-04-6	TNX	.087	U	0.087	0.272
<i>13980-04-6</i>	<i>TNX</i>				
19406-51-0	4-Amino-2,6-dinitrotoluene	.087	U	0.087	0.272
<i>19406-51-0</i>	<i>4-Amino-2,6-dinitrotoluene</i>				
2691-41-0	HMX	.087	U	0.087	0.272
<i>2691-41-0</i>	<i>HMX</i>				
35572-78-2	2-Amino-4,6-dinitrotoluene	.087	U	0.087	0.272
<i>35572-78-2</i>	<i>2-Amino-4,6-dinitrotoluene</i>				
479-45-8	Tetryl	.087	U	0.087	0.543
<i>479-45-8</i>	<i>Tetryl</i>				
5755-27-1	MNX	.087	U	0.087	0.272
<i>5755-27-1</i>	<i>MNX</i>				
606-20-2	2,6-Dinitrotoluene	.087	U	0.087	0.272
<i>606-20-2</i>	<i>2,6-Dinitrotoluene</i>				
80251-29-2	DNX	.087	U	0.087	0.272
<i>80251-29-2</i>	<i>DNX</i>				
98-95-3	Nitrobenzene	.087	U	0.087	0.272
<i>98-95-3</i>	<i>Nitrobenzene</i>				
99-08-1	m-Nitrotoluene	.087	U	0.087	0.272
<i>99-08-1</i>	<i>m-Nitrotoluene</i>				

1  
High Explosives Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample ID: CAWA-17-142919

Lab Code: GEL

GEL Job No (SDG) 2017-2777

Matrix: WATER

GEL Sample ID: 432868002

Sample Amount 920 mL

Date Received: 15-SEP-17

Moisture: .

Extraction Batch ID: 1701355

Extraction Type Sol Exchange

Date Extracted: 19-SEP-17

Concentrated Extract Volume (mL) 5

Injection Volume (uL):50

Cas No.	Compound	Concentration*	Q	MDL	PQL
99-35-4	1,3,5-Trinitrobenzene	.087	U	0.087	0.272
99-35-4	1,3,5-Trinitrobenzene				
99-65-0	m-Dinitrobenzene	.087	U	0.087	0.272
99-65-0	m-Dinitrobenzene				
88-72-2	o-Nitrotoluene	.0891	U	0.0891	0.272
88-72-2	o-Nitrotoluene				
78-11-5	PETN	.109	U	0.109	0.543
78-11-5	PETN				
99-99-0	p-Nitrotoluene	.163	U	0.163	0.543
99-99-0	p-Nitrotoluene				
3058-38-6	TATB	.326	U	0.326	1.09
3058-38-6	TATB				
618-87-1	3,5-Dinitroaniline	.326	U	0.326	1.09
618-87-1	3,5-Dinitroaniline				
78-30-8	tris(o-cresyl) phosphate	.326	U	0.326	1.09
78-30-8	tris(o-cresyl) phosphate				
59229-75-3	2,6-Diamino-4-nitrotoluene	.543	U	0.543	2.72
59229-75-3	2,6-Diamino-4-nitrotoluene				
6629-29-4	2,4-Diamino-6-nitrotoluene	.543	U	0.543	2.72
6629-29-4	2,4-Diamino-6-nitrotoluene				

# **Quality Control Summary**

**High Explosives Surrogate Recovery Summary****Lab Name:** GEL Laboratories LLC**GEL Job No (SDG):** 2017-2777**Lab Code:** GEL**HPLC Column:** Ultracarb Phenomenex 5u ODS (20)

<b>Lab Sample ID</b>	<b>Client Sample ID</b>	<b>DNT</b>	<b>QC Limits</b>	<b>Flg</b>
432868002	CAWA-17-142919	99	55 - 115	
1203876871	MB for batch 1701355	97	55 - 115	
1203876872	LCS for batch 1701355	98	55 - 115	
1203876873	CAWA-17-142900MS	96	55 - 115	
1203876874	CAWA-17-142900MSD	96	55 - 115	

DNT = 3,4-Dinitrotoluene

**3B**  
**High Explosives LCS/LCS Duplicate Summary**

**Lab Name:** GEL Laboratories LLC

**Client ID:** LCS

**Lab Code:** GEL

**GEL Job No (SDG)** 2017-2777

**Extract Batch Code:** 1701355

**Date Extracted:** 19-SEP-17

**GEL LCS ID:** 1203876872

**GEL LCSDUP ID:** .

**Analysis Date/Time:** 20-SEP-17 07:32

**DUP Analysis Date/Time:**

**Reporting Units:** ug/L

**QC Type:** LCS/LCSD

Compound	Spike Added	LCS Conc	LCS Rec #	LCSD Conc	LCSD Rec #	RPD #	RPD	Recovery Limits
2,6-Dinitrotoluene	5	4.6	92					72 - 105
2-Amino-4,6-dinitrotoluene	5	4.51	90					70 - 112
3,5-Dinitroaniline	5	4.4	88					70 - 121
4-Amino-2,6-dinitrotoluene	5	4.64	93					74 - 116
DNX	.5	.459	92					65 - 113
HMX	5	4.18	84					58 - 113
PETN	5	4.43	89					57 - 126
RDX	5	4.44	89					64 - 117
TATB	1.25	1.52	122					47 - 135
TNX	.5	.426	85					51 - 110
Tetryl	5	5.02	100					55 - 122
m-Dinitrobenzene	5	4.87	97					74 - 117
m-Nitrotoluene	5	4.09	82					66 - 114
o-Nitrotoluene	5	4.31	86					64 - 115
p-Nitrotoluene	5	4.46	89					66 - 127
tris(o-cresyl) phosphate	5	2.75	55					43 - 104
MNX	.5	.442	88					66 - 114
Nitrobenzene	5	4.51	90					64 - 115
1,3,5-Trinitrobenzene	5	4.75	95					70 - 110
2,4,6-Trinitrotoluene	5	4.78	96					69 - 113
2,4-Diamino-6-nitrotoluene	5	4.19	84					50 - 121
2,4-Dinitrotoluene	5	4.61	92					71 - 110
2,6-Diamino-4-nitrotoluene	5	4.18	84					53 - 127

# Column to be used to flag recovery and RPD values with an asterisk

\* Values outside of QC limits

**3**  
**High Explosives MS/MSD Summary**

**Lab Name:** GEL Laboratories LLC

**Client ID:** CAWA-17-142900

**Lab Code:** GEL

**GEL Job No (SDG)** 2017-2777

**Extract Batch Code:** 1701355

**Date Extracted:** 19-SEP-17

**GEL Spike ID:** 1203876873

**GEL SpikeDup ID:** 1203876874

**Analysis Date/Time:** 20-SEP-17 08:43

**MSD Analysis Date/Time:** 20-SEP-17 09:19

**Reporting Units:** ug/L

**QC Type:** MS/MSD

Compound	Spike Added	Sample Conc	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Rec Limits
2-Amino-4,6-dinitrotoluene	5.61798	0	5	89	4.92	88	2	30	67 - 115
3,5-Dinitroaniline	5.61798	0	4.97	88	5.18	92	4	30	70 - 121
4-Amino-2,6-dinitrotoluene	5.61798	0	5.39	96	5.14	92	5	30	65 - 120
DNX	.5618	0	.557	99	.505	90	10	30	53 - 124
HMX	5.61798	0	5.39	96	4.7	84	14	30	44 - 128
MNX	.5618	0	.561	100	.469	84	18	30	60 - 121
Nitrobenzene	5.61798	0	4.93	88	3.62	64	31 *	30	62 - 116
PETN	5.61798	0	4.98	89	4.65	83	7	30	51 - 131
RDX	5.61798	0	5.21	93	4.79	85	8	30	57 - 125
TATB	1.40449	0	1.84	131	1.64	117	11	30	38 - 149
TNX	.5618	0	.527	94	.503	90	5	30	46 - 120
Tetryl	5.61798	0	5.69	101	5.15	92	10	30	50 - 126
m-Dinitrobenzene	5.61798	0	5.97	106	5.5	98	8	30	74 - 117
m-Nitrotoluene	5.61798	0	4.63	82	4.52	80	2	30	59 - 120
o-Nitrotoluene	5.61798	0	4.77	85	4.59	82	4	30	56 - 119
p-Nitrotoluene	5.61798	0	5.13	91	4.67	83	10	30	61 - 129
tris(o-cresyl) phosphate	5.61798	0	3.72	66	2.85	51	26	30	38 - 105
1,3,5-Trinitrobenzene	5.61798	0	5.57	99	4.85	86	14	30	67 - 111
2,4,6-Trinitrotoluene	5.61798	0	5.57	99	5.33	95	4	30	66 - 112
2,4-Diamino-6-nitrotoluene	5.61798	0	4.02	71	4.09	73	2	30	50 - 121
2,4-Dinitrotoluene	5.61798	0	4.99	89	5.08	90	2	30	69 - 113
2,6-Diamino-4-nitrotoluene	5.61798	0	4.17	74	4.41	79	6	30	53 - 127
2,6-Dinitrotoluene	5.61798	0	5.16	92	5.09	91	1	30	70 - 106

#Column to be used to flag recovery and RPD values with an asterisk

# Quality Control Data



1  
High Explosives Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample ID: MB for batch 1701355

Lab Code: GEL

GEL Job No (SDG) 2017-2777

Matrix: WATER

GEL Sample ID: 1203876871

Sample Amount 1000 mL

Date Received: 15-SEP-17

Moisture: .

Extraction Batch ID: 1701355

Extraction Type Sol Exchange

Date Extracted: 19-SEP-17

Concentrated Extract Volume (mL) 5

Injection Volume (uL):50

GEL data file: EXP0919016.wiff

Date Analyzed: 20-SEP-17 06:57

Dilution Factor: 2

Concentration Units: ug/L

Cas No.	Compound	Concentration*	Q	MDL	PQL
118-96-7	2,4,6-Trinitrotoluene	.08	U	0.080	0.250
<i>118-96-7</i>	<i>2,4,6-Trinitrotoluene</i>				
121-14-2	2,4-Dinitrotoluene	.08	U	0.080	0.250
<i>121-14-2</i>	<i>2,4-Dinitrotoluene</i>				
121-82-4	RDX	.08	U	0.080	0.250
<i>121-82-4</i>	<i>RDX</i>				
13980-04-6	TNX	.08	U	0.080	0.250
<i>13980-04-6</i>	<i>TNX</i>				
19406-51-0	4-Amino-2,6-dinitrotoluene	.08	U	0.080	0.250
<i>19406-51-0</i>	<i>4-Amino-2,6-dinitrotoluene</i>				
2691-41-0	HMX	.08	U	0.080	0.250
<i>2691-41-0</i>	<i>HMX</i>				
35572-78-2	2-Amino-4,6-dinitrotoluene	.08	U	0.080	0.250
<i>35572-78-2</i>	<i>2-Amino-4,6-dinitrotoluene</i>				
479-45-8	Tetryl	.08	U	0.080	0.500
<i>479-45-8</i>	<i>Tetryl</i>				
5755-27-1	MNX	.08	U	0.080	0.250
<i>5755-27-1</i>	<i>MNX</i>				
606-20-2	2,6-Dinitrotoluene	.08	U	0.080	0.250
<i>606-20-2</i>	<i>2,6-Dinitrotoluene</i>				
80251-29-2	DNX	.08	U	0.080	0.250
<i>80251-29-2</i>	<i>DNX</i>				
98-95-3	Nitrobenzene	.08	U	0.080	0.250
<i>98-95-3</i>	<i>Nitrobenzene</i>				
99-08-1	m-Nitrotoluene	.08	U	0.080	0.250
<i>99-08-1</i>	<i>m-Nitrotoluene</i>				

1  
High Explosives Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample ID: MB for batch 1701355

Lab Code: GEL

GEL Job No (SDG) 2017-2777

Matrix: WATER

GEL Sample ID: 1203876871

Sample Amount 1000 mL

Date Received: 15-SEP-17

Moisture: .

Extraction Batch ID: 1701355

Extraction Type Sol Exchange

Date Extracted: 19-SEP-17

Concentrated Extract Volume (mL) 5

Injection Volume (uL):50

Cas No.	Compound	Concentration*	Q	MDL	PQL
99-35-4	1,3,5-Trinitrobenzene	.08	U	0.080	0.250
99-35-4	1,3,5-Trinitrobenzene				
99-65-0	m-Dinitrobenzene	.08	U	0.080	0.250
99-65-0	m-Dinitrobenzene				
88-72-2	o-Nitrotoluene	.082	U	0.082	0.250
88-72-2	o-Nitrotoluene				
78-11-5	PETN	.1	U	0.100	0.500
78-11-5	PETN				
99-99-0	p-Nitrotoluene	.15	U	0.150	0.500
99-99-0	p-Nitrotoluene				
3058-38-6	TATB	.3	U	0.300	1.00
3058-38-6	TATB				
618-87-1	3,5-Dinitroaniline	.3	U	0.300	1.00
618-87-1	3,5-Dinitroaniline				
78-30-8	tris(o-cresyl) phosphate	.3	U	0.300	1.00
78-30-8	tris(o-cresyl) phosphate				
59229-75-3	2,6-Diamino-4-nitrotoluene	.5	U	0.500	2.50
59229-75-3	2,6-Diamino-4-nitrotoluene				
6629-29-4	2,4-Diamino-6-nitrotoluene	.5	U	0.500	2.50
6629-29-4	2,4-Diamino-6-nitrotoluene				

1  
High Explosives Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample ID: LCS for batch 1701355

Lab Code: GEL

GEL Job No (SDG) 2017-2777

Matrix: WATER

GEL Sample ID: 1203876872

Sample Amount 1000 mL

Date Received: 15-SEP-17

Moisture: .

Extraction Batch ID: 1701355

Extraction Type Sol Exchange

Date Extracted: 19-SEP-17

Concentrated Extract Volume (mL) 5

Injection Volume (uL):50

GEL data file: EXP0919017.wiff

Date Analyzed: 20-SEP-17 07:32

Dilution Factor: 2

Concentration Units: ug/L

Cas No.	Compound	Concentration*	Q	MDL	PQL
13980-04-6	TNX	.426		0.080	0.250
<i>13980-04-6</i>	<i>TNX</i>				
5755-27-1	MNX	.442		0.080	0.250
<i>5755-27-1</i>	<i>MNX</i>				
80251-29-2	DNX	.459		0.080	0.250
<i>80251-29-2</i>	<i>DNX</i>				
3058-38-6	TATB	1.52		0.300	1.00
<i>3058-38-6</i>	<i>TATB</i>				
78-30-8	tris(o-cresyl) phosphate	2.75		0.300	1.00
<i>78-30-8</i>	<i>tris(o-cresyl) phosphate</i>				
99-08-1	m-Nitrotoluene	4.09		0.080	0.250
<i>99-08-1</i>	<i>m-Nitrotoluene</i>				
2691-41-0	HMX	4.18		0.080	0.250
<i>2691-41-0</i>	<i>HMX</i>				
59229-75-3	2,6-Diamino-4-nitrotoluene	4.18		0.500	2.50
<i>59229-75-3</i>	<i>2,6-Diamino-4-nitrotoluene</i>				
6629-29-4	2,4-Diamino-6-nitrotoluene	4.19		0.500	2.50
<i>6629-29-4</i>	<i>2,4-Diamino-6-nitrotoluene</i>				
88-72-2	o-Nitrotoluene	4.31		0.082	0.250
<i>88-72-2</i>	<i>o-Nitrotoluene</i>				
618-87-1	3,5-Dinitroaniline	4.4		0.300	1.00
<i>618-87-1</i>	<i>3,5-Dinitroaniline</i>				
78-11-5	PETN	4.43		0.100	0.500
<i>78-11-5</i>	<i>PETN</i>				
121-82-4	RDX	4.44		0.080	0.250
<i>121-82-4</i>	<i>RDX</i>				

1  
High Explosives Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample ID: LCS for batch 1701355

Lab Code: GEL

GEL Job No (SDG) 2017-2777

Matrix: WATER

GEL Sample ID: 1203876872

Sample Amount 1000 mL

Date Received: 15-SEP-17

Moisture: .

Extraction Batch ID: 1701355

Extraction Type Sol Exchange

Date Extracted: 19-SEP-17

Concentrated Extract Volume (mL) 5

Injection Volume (uL):50

Cas No.	Compound	Concentration*	Q	MDL	PQL
99-99-0	p-Nitrotoluene	4.46		0.150	0.500
99-99-0	p-Nitrotoluene				
35572-78-2	2-Amino-4,6-dinitrotoluene	4.51		0.080	0.250
35572-78-2	2-Amino-4,6-dinitrotoluene				
98-95-3	Nitrobenzene	4.51		0.080	0.250
98-95-3	Nitrobenzene				
606-20-2	2,6-Dinitrotoluene	4.6		0.080	0.250
606-20-2	2,6-Dinitrotoluene				
121-14-2	2,4-Dinitrotoluene	4.61		0.080	0.250
121-14-2	2,4-Dinitrotoluene				
19406-51-0	4-Amino-2,6-dinitrotoluene	4.64		0.080	0.250
19406-51-0	4-Amino-2,6-dinitrotoluene				
99-35-4	1,3,5-Trinitrobenzene	4.75		0.080	0.250
99-35-4	1,3,5-Trinitrobenzene				
118-96-7	2,4,6-Trinitrotoluene	4.78		0.080	0.250
118-96-7	2,4,6-Trinitrotoluene				
99-65-0	m-Dinitrobenzene	4.87		0.080	0.250
99-65-0	m-Dinitrobenzene				
479-45-8	Tetryl	5.02		0.080	0.500
479-45-8	Tetryl				

1  
High Explosives Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample ID: CAWA-17-142900(432723002MS)MS

Lab Code: GEL

GEL Job No (SDG) 2017-2777

Matrix: WATER

GEL Sample ID: 1203876873

Sample Amount 890 mL

Date Received: 15-SEP-17

Moisture: .

Extraction Batch ID: 1701355

Extraction Type Sol Exchange

Date Extracted: 19-SEP-17

Concentrated Extract Volume (mL) 5

Injection Volume (uL):50

GEL data file: EXP0919019.wiff

Date Analyzed: 20-SEP-17 08:43

Dilution Factor: 2

Concentration Units: ug/L

Cas No.	Compound	Concentration*	Q	MDL	PQL
13980-04-6	TNX	.527		0.0899	0.281
<i>13980-04-6</i>	<i>TNX</i>				
80251-29-2	DNX	.557		0.0899	0.281
<i>80251-29-2</i>	<i>DNX</i>				
5755-27-1	MNX	.561		0.0899	0.281
<i>5755-27-1</i>	<i>MNX</i>				
3058-38-6	TATB	1.84		0.337	1.12
<i>3058-38-6</i>	<i>TATB</i>				
78-30-8	tris(o-cresyl) phosphate	3.72		0.337	1.12
<i>78-30-8</i>	<i>tris(o-cresyl) phosphate</i>				
6629-29-4	2,4-Diamino-6-nitrotoluene	4.02		0.562	2.81
<i>6629-29-4</i>	<i>2,4-Diamino-6-nitrotoluene</i>				
59229-75-3	2,6-Diamino-4-nitrotoluene	4.17		0.562	2.81
<i>59229-75-3</i>	<i>2,6-Diamino-4-nitrotoluene</i>				
99-08-1	m-Nitrotoluene	4.63		0.0899	0.281
<i>99-08-1</i>	<i>m-Nitrotoluene</i>				
88-72-2	o-Nitrotoluene	4.77		0.0921	0.281
<i>88-72-2</i>	<i>o-Nitrotoluene</i>				
98-95-3	Nitrobenzene	4.93		0.0899	0.281
<i>98-95-3</i>	<i>Nitrobenzene</i>				
618-87-1	3,5-Dinitroaniline	4.97		0.337	1.12
<i>618-87-1</i>	<i>3,5-Dinitroaniline</i>				
78-11-5	PETN	4.98		0.112	0.562
<i>78-11-5</i>	<i>PETN</i>				
121-14-2	2,4-Dinitrotoluene	4.99		0.0899	0.281
<i>121-14-2</i>	<i>2,4-Dinitrotoluene</i>				

1  
High Explosives Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample ID: CAWA-17-142900(432723002MS)MS

Lab Code: GEL

GEL Job No (SDG) 2017-2777

Matrix: WATER

GEL Sample ID: 1203876873

Sample Amount 890 mL

Date Received: 15-SEP-17

Moisture: .

Extraction Batch ID: 1701355

Extraction Type Sol Exchange

Date Extracted: 19-SEP-17

Concentrated Extract Volume (mL) 5

Injection Volume (uL):50

Cas No.	Compound	Concentration*	Q	MDL	PQL
35572-78-2	2-Amino-4,6-dinitrotoluene	5		0.0899	0.281
35572-78-2	2-Amino-4,6-dinitrotoluene				
99-99-0	p-Nitrotoluene	5.13		0.169	0.562
99-99-0	p-Nitrotoluene				
606-20-2	2,6-Dinitrotoluene	5.16		0.0899	0.281
606-20-2	2,6-Dinitrotoluene				
121-82-4	RDX	5.21		0.0899	0.281
121-82-4	RDX				
19406-51-0	4-Amino-2,6-dinitrotoluene	5.39		0.0899	0.281
19406-51-0	4-Amino-2,6-dinitrotoluene				
2691-41-0	HMX	5.39		0.0899	0.281
2691-41-0	HMX				
118-96-7	2,4,6-Trinitrotoluene	5.57		0.0899	0.281
118-96-7	2,4,6-Trinitrotoluene				
99-35-4	1,3,5-Trinitrobenzene	5.57		0.0899	0.281
99-35-4	1,3,5-Trinitrobenzene				
479-45-8	Tetryl	5.69		0.0899	0.562
479-45-8	Tetryl				
99-65-0	m-Dinitrobenzene	5.97		0.0899	0.281
99-65-0	m-Dinitrobenzene				

1  
High Explosives Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample ID: CAWA-17-142900(432723002MSD)MSD

Lab Code: GEL

GEL Job No (SDG) 2017-2777

Matrix: WATER

GEL Sample ID: 1203876874

Sample Amount 890 mL

Date Received: 15-SEP-17

Moisture: .

Extraction Batch ID: 1701355

Extraction Type Sol Exchange

Date Extracted: 19-SEP-17

Concentrated Extract Volume (mL) 5

Injection Volume (uL):50

GEL data file: EXP0919020.wiff

Date Analyzed: 20-SEP-17 09:19

Dilution Factor: 2

Concentration Units: ug/L

Cas No.	Compound	Concentration*	Q	MDL	PQL
5755-27-1	MNX	.469		0.0899	0.281
<i>5755-27-1</i>	<i>MNX</i>				
13980-04-6	TNX	.503		0.0899	0.281
<i>13980-04-6</i>	<i>TNX</i>				
80251-29-2	DNX	.505		0.0899	0.281
<i>80251-29-2</i>	<i>DNX</i>				
3058-38-6	TATB	1.64		0.337	1.12
<i>3058-38-6</i>	<i>TATB</i>				
78-30-8	tris(o-cresyl) phosphate	2.85		0.337	1.12
<i>78-30-8</i>	<i>tris(o-cresyl) phosphate</i>				
98-95-3	Nitrobenzene	3.62		0.0899	0.281
<i>98-95-3</i>	<i>Nitrobenzene</i>				
6629-29-4	2,4-Diamino-6-nitrotoluene	4.09		0.562	2.81
<i>6629-29-4</i>	<i>2,4-Diamino-6-nitrotoluene</i>				
59229-75-3	2,6-Diamino-4-nitrotoluene	4.41		0.562	2.81
<i>59229-75-3</i>	<i>2,6-Diamino-4-nitrotoluene</i>				
99-08-1	m-Nitrotoluene	4.52		0.0899	0.281
<i>99-08-1</i>	<i>m-Nitrotoluene</i>				
88-72-2	o-Nitrotoluene	4.59		0.0921	0.281
<i>88-72-2</i>	<i>o-Nitrotoluene</i>				
78-11-5	PETN	4.65		0.112	0.562
<i>78-11-5</i>	<i>PETN</i>				
99-99-0	p-Nitrotoluene	4.67		0.169	0.562
<i>99-99-0</i>	<i>p-Nitrotoluene</i>				
2691-41-0	HMX	4.7		0.0899	0.281
<i>2691-41-0</i>	<i>HMX</i>				

1  
High Explosives Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample ID: CAWA-17-142900(432723002MSD)MSD

Lab Code: GEL

GEL Job No (SDG) 2017-2777

Matrix: WATER

GEL Sample ID: 1203876874

Sample Amount 890 mL

Date Received: 15-SEP-17

Moisture: .

Extraction Batch ID: 1701355

Extraction Type Sol Exchange

Date Extracted: 19-SEP-17

Concentrated Extract Volume (mL) 5

Injection Volume (uL):50

Cas No.	Compound	Concentration*	Q	MDL	PQL
121-82-4	RDX	4.79		0.0899	0.281
<i>121-82-4</i>	<i>RDX</i>				
99-35-4	1,3,5-Trinitrobenzene	4.85		0.0899	0.281
<i>99-35-4</i>	<i>1,3,5-Trinitrobenzene</i>				
35572-78-2	2-Amino-4,6-dinitrotoluene	4.92		0.0899	0.281
<i>35572-78-2</i>	<i>2-Amino-4,6-dinitrotoluene</i>				
121-14-2	2,4-Dinitrotoluene	5.08		0.0899	0.281
<i>121-14-2</i>	<i>2,4-Dinitrotoluene</i>				
606-20-2	2,6-Dinitrotoluene	5.09		0.0899	0.281
<i>606-20-2</i>	<i>2,6-Dinitrotoluene</i>				
19406-51-0	4-Amino-2,6-dinitrotoluene	5.14		0.0899	0.281
<i>19406-51-0</i>	<i>4-Amino-2,6-dinitrotoluene</i>				
479-45-8	Tetryl	5.15		0.0899	0.562
<i>479-45-8</i>	<i>Tetryl</i>				
618-87-1	3,5-Dinitroaniline	5.18		0.337	1.12
<i>618-87-1</i>	<i>3,5-Dinitroaniline</i>				
118-96-7	2,4,6-Trinitrotoluene	5.33		0.0899	0.281
<i>118-96-7</i>	<i>2,4,6-Trinitrotoluene</i>				
99-65-0	m-Dinitrobenzene	5.5		0.0899	0.281
<i>99-65-0</i>	<i>m-Dinitrobenzene</i>				



## Explosives Initial Calibration Blank

Lab Name: GEL Laboratories LLCGEL Job No(SDG): 2017-2777Lab Code: GELLab Sample ID: XIBLK01Analysis Date: 19-SEP-17 22:05GEL Data File: EXP0919001.wiffInstrument ID: LCMSMS5Column: Ultracarb Phenomenex 5u ODS (20)

Compound	True	Found (ug/L)
3,4-Dinitrotoluene	0	0
tris(o-cresyl) phosphate	0	0
TATB	0	0
3,5-Dinitroaniline	0	0
2,4-Diamino-6-nitrotoluene	0	0
2,6-Diamino-4-nitrotoluene	0	0
DNX	0	0
MNX	0	0
TNX	0	0
1,3,5-Trinitrobenzene	0	0
2,4,6-Trinitrotoluene	0	0
2,4-Dinitrotoluene	0	0
2,6-Dinitrotoluene	0	0
2-Amino-4,6-dinitrotoluene	0	0
4-Amino-2,6-dinitrotoluene	0	0
HMX	0	0
Nitrobenzene	0	0
PETN	0	0
RDX	0	0
Tetryl	0	0
m-Dinitrobenzene	0	0
m-Nitrotoluene	0	0
o-Nitrotoluene	0	0
p-Nitrotoluene	0	0

## Explosives Initial Calibration Blank

Lab Name: GEL Laboratories LLCGEL Job No(SDG): 2017-2777Lab Code: GELLab Sample ID: XIBLK01Analysis Date: 19-SEP-17 22:40GEL Data File: EXP0919002.wiffInstrument ID: LCMSMS5Column: Ultracarb Phenomenex 5u ODS (20)

Compound	True	Found (ug/L)
Tetryl	0	0
m-Dinitrobenzene	0	0
m-Nitrotoluene	0	0
o-Nitrotoluene	0	0
p-Nitrotoluene	0	0
3,4-Dinitrotoluene	0	0
tris(o-cresyl) phosphate	0	0
TATB	0	0
3,5-Dinitroaniline	0	0
2,4-Diamino-6-nitrotoluene	0	0
2,6-Diamino-4-nitrotoluene	0	0
DNX	0	0
MNX	0	0
TNX	0	0
1,3,5-Trinitrobenzene	0	0
2,4,6-Trinitrotoluene	0	0
2,4-Dinitrotoluene	0	0
2,6-Dinitrotoluene	0	0
2-Amino-4,6-dinitrotoluene	0	0
4-Amino-2,6-dinitrotoluene	0	0
HMX	0	0
Nitrobenzene	0	0
PETN	0	0
RDX	0	0

4A  
Explosives Continuing Calibration Blank

Lab Name: GEL Laboratories LLC

GEL Job No(SDG): 2017-2777

Lab Code: GEL

Lab Sample ID: XIBLK02

Analysis Date: 20-SEP-17 03:24

GEL Data File: EXP0919010.wiff

Instrument ID: LCMSMS5

Column: Ultracarb Phenomenex 5u ODS (20)

Compound	True	Found (ug/L)
3,4-Dinitrotoluene	0	0
tris(o-cresyl) phosphate	0	0
TATB	0	0
3,5-Dinitroaniline	0	0
2,4-Diamino-6-nitrotoluene	0	0
2,6-Diamino-4-nitrotoluene	0	0
DNX	0	0
MNX	0	0
TNX	0	0
1,3,5-Trinitrobenzene	0	0
2,4,6-Trinitrotoluene	0	0
2,4-Dinitrotoluene	0	0
2,6-Dinitrotoluene	0	0
2-Amino-4,6-dinitrotoluene	0	0
4-Amino-2,6-dinitrotoluene	0	0
HMX	0	0
Nitrobenzene	0	0
PETN	0	0
RDX	0	0
Tetryl	0	0
m-Dinitrobenzene	0	0
m-Nitrotoluene	0	0
o-Nitrotoluene	0	0
p-Nitrotoluene	0	0

4A  
Explosives Continuing Calibration Blank

Lab Name: GEL Laboratories LLC

GEL Job No(SDG): 2017-2777

Lab Code: GEL

Lab Sample ID: XIBLK03

Analysis Date: 20-SEP-17 05:46

GEL Data File: EXP0919014.wiff

Instrument ID: LCMSMS5

Column: Ultracarb Phenomenex 5u ODS (20)

Compound	True	Found (ug/L)
Nitrobenzene	0	0
PETN	0	0
RDX	0	0
Tetryl	0	0
m-Dinitrobenzene	0	0
m-Nitrotoluene	0	0
o-Nitrotoluene	0	0
p-Nitrotoluene	0	0
3,4-Dinitrotoluene	0	0
tris(o-cresyl) phosphate	0	0
TATB	0	0
3,5-Dinitroaniline	0	0
2,4-Diamino-6-nitrotoluene	0	0
2,6-Diamino-4-nitrotoluene	0	0
DNX	0	0
MNX	0	0
TNX	0	0
1,3,5-Trinitrobenzene	0	0
2,4,6-Trinitrotoluene	0	0
2,4-Dinitrotoluene	0	0
2,6-Dinitrotoluene	0	0
2-Amino-4,6-dinitrotoluene	0	0
4-Amino-2,6-dinitrotoluene	0	0
HMX	0	0

4A  
Explosives Continuing Calibration Blank

Lab Name: GEL Laboratories LLC

GEL Job No(SDG): 2017-2777

Lab Code: GEL

Lab Sample ID: XIBLK04

Analysis Date: 20-SEP-17 11:05

GEL Data File: EXP0919023.wiff

Instrument ID: LCMSMS5

Column: Ultracarb Phenomenex 5u ODS (20)

Compound	True	Found (ug/L)
3,4-Dinitrotoluene	0	0
tris(o-cresyl) phosphate	0	0
TATB	0	0
3,5-Dinitroaniline	0	0
2,4-Diamino-6-nitrotoluene	0	0
2,6-Diamino-4-nitrotoluene	0	0
DNX	0	0
MNX	0	0
TNX	0	0
1,3,5-Trinitrobenzene	0	0
2,4,6-Trinitrotoluene	0	0
2,4-Dinitrotoluene	0	0
2,6-Dinitrotoluene	0	0
2-Amino-4,6-dinitrotoluene	0	0
4-Amino-2,6-dinitrotoluene	0	0
HMX	0	0
Nitrobenzene	0	0
PETN	0	0
RDX	0	0
Tetryl	0	0
m-Dinitrobenzene	0	0
m-Nitrotoluene	0	0
o-Nitrotoluene	0	0
p-Nitrotoluene	0	0

4A  
Explosives Continuing Calibration Blank

Lab Name: GEL Laboratories LLC

GEL Job No(SDG): 2017-2777

Lab Code: GEL

Lab Sample ID: XIBLK05

Analysis Date: 20-SEP-17 12:16

GEL Data File: EXP0919025.wiff

Instrument ID: LCMSMS5

Column: Ultracarb Phenomenex 5u ODS (20)

Compound	True	Found (ug/L)
2-Amino-4,6-dinitrotoluene	0	0
4-Amino-2,6-dinitrotoluene	0	0
HMX	0	0
Nitrobenzene	0	0
PETN	0	0
RDX	0	0
Tetryl	0	0
m-Dinitrobenzene	0	0
m-Nitrotoluene	0	0
o-Nitrotoluene	0	0
p-Nitrotoluene	0	0
3,4-Dinitrotoluene	0	0
tris(o-cresyl) phosphate	0	0
TATB	0	0
3,5-Dinitroaniline	0	0
2,4-Diamino-6-nitrotoluene	0	0
2,6-Diamino-4-nitrotoluene	0	0
DNX	0	0
MNX	0	0
TNX	0	0
1,3,5-Trinitrobenzene	0	0
2,4,6-Trinitrotoluene	0	0
2,4-Dinitrotoluene	0	0
2,6-Dinitrotoluene	0	0

# **Metals Analysis**

# Case Narrative



**Metals**  
**Technical Case Narrative**  
**ARS International, LLC (ARSL)**  
**SDG #: 2017-2777**  
**Work Order #: 432868**

<b>Sample ID</b>	<b>Client ID</b>
432868001	CAWA-17-142884
432868002	CAWA-17-142919
1203876400	Method Blank (MB) <b>ICP</b>
1203876401	Laboratory Control Sample (LCS)
1203876404	432872001(CAWA-17-142883L) Serial Dilution (SD)
1203876402	432872001(CAWA-17-142883D) Sample Duplicate (DUP)
1203876403	432872001(CAWA-17-142883S) Matrix Spike (MS)
1203876320	Method Blank (MB) <b>ICP-MS</b>
1203876321	Laboratory Control Sample (LCS)
1203876324	432872001(CAWA-17-142883L) Serial Dilution (SD)
1203876322	432872001(CAWA-17-142883D) Sample Duplicate (DUP)
1203876323	432872001(CAWA-17-142883S) Matrix Spike (MS)
1203879599	Method Blank (MB) <b>CVAA</b>
1203879600	Laboratory Control Sample (LCS)
1203879605	432587001(CAWA-17-142866L) Serial Dilution (SD)
1203879601	432587001(CAWA-17-142866D) Sample Duplicate (DUP)
1203879603	432587001(CAWA-17-142866S) Matrix Spike (MS)

**Sample Analysis**

Samples 432868001 and 002 in this SDG were analyzed for metals and mercury on an "as received" basis.

**Method/Analysis Information**

<b>Analytical Batch:</b>	1701155, 1701124, 1702521 and 1706554
<b>Prep Batch :</b>	1701154, 1701123 and 1702509
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 29, GL-MA-E-006 REV# 13, GL-MA-E-014 REV# 31, GL-MA-E-010 REV# 35 and GL-GC-E-107 REV# 10
<b>Analytical Method:</b>	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.2 1974 and SM:A2340B
<b>Prep Method :</b>	SW846 3005A and EPA 245.1/245.2 Prep

**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 Hardness as CaCO<sub>3</sub> is calculated from Calcium and Magnesium results.

The Metals analysis-ICP was performed on a PE 7300 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.

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm.

The Metals analysis - ICPMS was performed on a PerkinElmer NexION 350X ICPMS. The instrument is equipped with a ESI PFA-ST nebulizer, quadrupole mass spectrometer, dual mode electron multiplier detector, and Kinetic Energy Discrimination (KED) technology. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum.

### **Calibration Information**

#### **Instrument Calibration**

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

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

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of potassium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 432868001 (CAWA-17-142884)-ICP.

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

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria. For the ICP-MS analysis, the ICSA solution contains analyte concentrations which are verified trace impurities indigenous to the purchased standard.

#### **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 Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

#### **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: 432872001 (CAWA-17-142883)-ICP and ICP-MS and 432587001 (CAWA-17-142866)-CVAA.

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

The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The matrix spike met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes.

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

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. The relative percent differences (RPD) between the sample and its duplicate (DUP) were within acceptable limits for all applicable analytes.

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

All applicable analytes in the serial dilution (SDILT) demonstrated acceptable correlation to its associated sample and met the established acceptance percent difference criteria.

#### **Technical Information**

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

GEL assigns holding times based on the associated methodology. Holding time is measured by comparison of the date and time of sample collection to the date and time of sample preparation and analysis. 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**

The samples in this SDG did not require dilutions.

##### **Preparation Information**

The samples in this SDG were not diluted and were prepared 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.

##### **Additional Comments**

Total Hardness by Calculation is determined using the results of Total Calcium (Ca) and Total Magnesium (Mg) determined by ICP or ICP-MS.

$$\text{Hardness} = 2.497 (\text{Ca}) + 4.118 (\text{Mg})$$

Please refer to the Total Ca and Total Mg data to validate results appearing on the Hardness Summary sheet. Both results are in the Inorganic/metals section of the package. There is no Batch QC for calculated results, and thus no QC Summary for the Hardness by Calculation Batch. The MDLs and PQLs are calculated using the higher of the two calculated values of Ca or Mg.

#### **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**

ARSL004 ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)

Client SDG: 2017-2777 GEL Work Order: 432868

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

- \* A quality control analyte recovery is outside of specified acceptance criteria
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

#### **Review/Validation**

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

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

**Signature:**



**Name: Nik-Cole Elmore**

**Date: 12 OCT 2017**

**Title: Data Validator**

# **Sample Data Summary**

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

**SDG No:** 2017-2777**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 432868001**BASIS:** As Received**DATE COLLECTED** 13-SEP-17**CLIENT ID:** CAWA-17-142884**LEVEL:** Low**DATE RECEIVED** 15-SEP-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.067	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	09/22/17 11:48	092217W1-4	1702521

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

SDG No: 2017-2777

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 432868001

BASIS: As Received

DATE COLLECTED 13-SEP-17

CLIENT ID: CAWA-17-142884

LEVEL: Low

DATE RECEIVED 15-SEP-17

MATRIX: W

%SOLIDS: 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	68	ug/L	U	68	200	200	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	10/06/17 09:53	171005-2	1701124
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	10/06/17 09:53	171005-2	1701124
7440-39-3	Barium	4.35	ug/L	J	1	5	5	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-42-8	Boron	22.4	ug/L	J	15	50	50	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	10/06/17 09:53	171005-2	1701124
7440-70-2	Calcium	9990	ug/L		50	200	200	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-47-3	Chromium	3	ug/L	U	3	10	10	1	MS	BAJ	10/06/17 09:53	171005-2	1701124
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	10/06/17 09:53	171005-2	1701124
7439-95-4	Magnesium	2390	ug/L		110	300	300	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7439-98-7	Molybdenum	1.67	ug/L		0.2	0.5	0.5	1	MS	BAJ	10/06/17 13:51	171006-3	1701124
7440-02-0	Nickel	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	10/06/17 09:53	171005-2	1701124
7440-09-7	Potassium	381	ug/L		50	150	150	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	10/06/17 09:53	171005-2	1701124
7631-86-9	Silica	57000	ug/L		53	213	213	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	10/06/17 09:53	171005-2	1701124
7440-23-5	Sodium	12400	ug/L		100	300	300	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-24-6	Strontium	49.6	ug/L		1	5	5	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	10/06/17 09:53	171005-2	1701124
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-61-1	Uranium	0.284	ug/L		0.067	0.2	0.2	1	MS	BAJ	10/06/17 09:53	171005-2	1701124
7440-62-2	Vanadium	1	ug/L	U	1	5	5	1	P	JWJ	09/19/17 20:18	091917-1	1701155
7440-66-6	Zinc	4.58	ug/L	J	3.3	10	10	1	P	JWJ	09/19/17 20:18	091917-1	1701155

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

**SDG No:** 2017-2777**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 432868001**BASIS:** As Received**DATE COLLECTED** 13-SEP-17**CLIENT ID:** CAWA-17-142884**LEVEL:** Low**DATE RECEIVED** 15-SEP-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
	Hardness as CaCO3	34.8	mg/L		0.453	1.24	1.24	1		TXT1	10/04/17 12:52		1706554

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1701124	1701123	SW846 3005A	50	mL	50	mL	09/19/17	SXW1
1701155	1701154	SW846 3005A	50	mL	50	mL	09/19/17	SXW1
1702521	1702509	EPA 245.1/245.2 Prep	20	mL	20	mL	09/21/17	AXS5

**\*Analytical Methods:**

**P** SW846 3005A/6010C  
**MS** SW846 3005A/6020A  
**AV** EPA 245.2 1974



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

**SDG No:** 2017-2777**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 432868002**BASIS:** As Received**DATE COLLECTED** 13-SEP-17**CLIENT ID:** CAWA-17-142919**LEVEL:** Low**DATE RECEIVED** 15-SEP-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.067	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	09/22/17 11:50	092217W1-4	1702521

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1702521	1702509	EPA 245.1/245.2 Prep	20	mL	20	mL	09/21/17	AXS5

**\*Analytical Methods:**

AV      EPA 245.2 1974

# **Quality Control Summary**

**METALS**  
**-3b-**  
**PREPARATION BLANK SUMMARY**

SDG NO. 2017-2777

Contract: ESHL00114

Matrix: W

<u>Sample ID</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Acceptance Window</u>	<u>Conc Qual</u>	<u>M*</u>	<u>MDL</u>	<u>RDL</u>
1203876320	Antimony	1	ug/L	+/-3	U	MS	1	3
	Arsenic	2	ug/L	+/-5	U	MS	2	5
	Cadmium	0.3	ug/L	+/-1	U	MS	0.3	1
	Chromium	3	ug/L	+/-10	U	MS	3	10
	Lead	0.5	ug/L	+/-2	U	MS	0.5	2
	Molybdenum	0.287	ug/L	+/-0.5	J	MS	0.2	0.5
	Nickel	0.6	ug/L	+/-2	U	MS	0.6	2
	Selenium	2	ug/L	+/-5	U	MS	2	5
	Silver	0.3	ug/L	+/-1	U	MS	0.3	1
	Thallium	0.6	ug/L	+/-2	U	MS	0.6	2
	Uranium	0.067	ug/L	+/-0.2	U	MS	0.067	0.2
1203876400	Aluminum	68	ug/L	+/-200	U	P	68	200
	Barium	1	ug/L	+/-5	U	P	1	5
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Calcium	50	ug/L	+/-200	U	P	50	200
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Copper	3	ug/L	+/-10	U	P	3	10
	Iron	30	ug/L	+/-100	U	P	30	100
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Manganese	2	ug/L	+/-10	U	P	2	10
	Potassium	50	ug/L	+/-150	U	P	50	150
	Silica	53	ug/L	+/-213	U	P	53	213
	Sodium	100	ug/L	+/-300	U	P	100	300
	Strontium	1	ug/L	+/-5	U	P	1	5
	Tin	2.5	ug/L	+/-10	U	P	2.5	10
	Vanadium	1	ug/L	+/-5	U	P	1	5
	Zinc	3.3	ug/L	+/-10	U	P	3.3	10
1203879599	Mercury	0.067	ug/L	+/-0.2	U	AV	0.067	0.2

## \*Analytical Methods:

P SW846 3005A/6010C  
MS SW846 3005A/6020A  
AV EPA 245.1/245.2

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2017-2777 Client ID: CAWA-17-142883S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 432872001 Spike ID: 1203876323

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Antimony	ug/L	75-125	48		1	U	50	95		MS
Arsenic	ug/L	75-125	50.5		2	U	50	99.2		MS
Cadmium	ug/L	75-125	52.5		0.3	U	50	105		MS
Chromium	ug/L	75-125	50		3	U	50	97.7		MS
Lead	ug/L	75-125	51.2		0.5	U	50	102		MS
Molybdenum	ug/L	75-125	52.7		0.65		50	104		MS
Nickel	ug/L	75-125	50.6		0.6	U	50	101		MS
Selenium	ug/L	75-125	51.6		2	U	50	103		MS
Silver	ug/L	75-125	51		0.3	U	50	102		MS
Thallium	ug/L	75-125	49.4		0.6	U	50	98.7		MS
Uranium	ug/L	75-125	50.6		0.382		50	100		MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2017-2777 Client ID: CAWA-17-142883S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 432872001 Spike ID: 1203876403

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Aluminum	ug/L	75-125	5030		68	U	5000	100		P
Barium	ug/L	75-125	501		12.5		500	97.6		P
Beryllium	ug/L	75-125	493		1	U	500	98.7		P
Boron	ug/L	75-125	505		15	U	500	98.7		P
Calcium	ug/L	75-125	14700		9760		5000	99.7		P
Cobalt	ug/L	75-125	497		1	U	500	99.3		P
Copper	ug/L	75-125	501		3	U	500	100		P
Iron	ug/L	75-125	5060		30	U	5000	101		P
Magnesium	ug/L	75-125	8200		2960		5000	105		P
Manganese	ug/L	75-125	489		2	U	500	97.7		P
Potassium	ug/L	75-125	5770		876		5000	97.9		P
Silica	ug/L		64300		54000		10700	96	N/A	P
Sodium	ug/L	75-125	12900		8050		5000	96.3		P
Strontium	ug/L	75-125	523		44.8		500	95.6		P
Tin	ug/L	75-125	475		2.5	U	500	95.1		P
Vanadium	ug/L	75-125	502		2.07	J	500	100		P
Zinc	ug/L	75-125	514		12.2		500	100		P

## \*Analytical Methods:

P SW846 3005A/6010C

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2017-2777 Client ID CAWA-17-142866S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 432587001 Spike ID: 1203879603

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Mercury	ug/L	75-125	2.04		0.067	U	2	102		AV

## \*Analytical Methods:

AV EPA 245.1/245.2

**Metals**  
**-6-**  
**Duplicate Sample Summary**

SDG No.: 2017-2777

Lab Code: GEL

Contract: ESHL00114

Client ID: CAWA-17-142883D

Matrix: WATER

Level: Low

Sample ID: 432872001

Duplicate ID: 1203876322

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Antimony	ug/L		1 U		1 U				MS
Arsenic	ug/L		2 U		2 U				MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L		3 U		3 U				MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	0.65		0.715		9.52		MS
Nickel	ug/L		0.6 U		0.6 U				MS
Selenium	ug/L		2 U		2 U				MS
Silver	ug/L		0.3 U		0.3 U				MS
Thallium	ug/L		0.6 U		0.6 U				MS
Uranium	ug/L	+/- .2	0.382		0.351		8.46		MS

\*Analytical Methods:

MS SW846 3005A/6020A

**Metals**  
**-6-**  
**Duplicate Sample Summary**

SDG No.: 2017-2777

Lab Code: GEL

Contract: ESHL00114

Client ID: CAWA-17-142883D

Matrix: WATER

Level: Low

Sample ID: 432872001

Duplicate ID: 1203876402

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		68 U		68 U				P
Barium	ug/L	+/-5	12.5		12.9		2.88		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L		15 U		15 U				P
Calcium	ug/L	+/-20%	9760		9970		2.07		P
Cobalt	ug/L		1 U		1 U				P
Copper	ug/L		3 U		3 U				P
Iron	ug/L		30 U		30 U				P
Magnesium	ug/L	+/-20%	2960		3020		2.07		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	876		859		1.98		P
Silica	ug/L	+/-20%	54000		55900		3.53		P
Sodium	ug/L	+/-20%	8050		8280		2.87		P
Strontium	ug/L	+/-20%	44.8		46		2.49		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	2.07 J		2.25 J		8.44		P
Zinc	ug/L	+/-10	12.2		10.5		15.3		P

\*Analytical Methods:

P SW846 3005A/6010C



**Metals**  
**-6-**  
**Duplicate Sample Summary**

**SDG No.:** 2017-2777**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CAWA-17-142866D**Matrix:** WATER**Level:** Low**Sample ID:** 432587001**Duplicate ID:** 1203879601**Percent Solids for Dup:** N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Mercury	ug/L		0.067	U	0.067	U			AV

\*Analytical Methods:

AV EPA 245.1/245.2

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2017-2777

Contract: ESHL00114

Aqueous LCS Source:O2Si

Solid LCS Source:

<u>Sample ID</u>	<u>Analyte</u>	<u>Units</u>	<u>True Value</u>	<u>Result</u>	<u>C</u>	<u>% Recovery</u>	<u>Acceptance Limit</u>	<u>M*</u>
1203876321								
	Thallium	ug/L	50	49.6		99.2	80-120	MS
	Uranium	ug/L	50	50.9		102	80-120	MS
	Silver	ug/L	50	51.5		103	80-120	MS
	Antimony	ug/L	50	48		95.9	80-120	MS
	Arsenic	ug/L	50	51.4		103	80-120	MS
	Cadmium	ug/L	50	53.5		107	80-120	MS
	Chromium	ug/L	50	51.5		103	80-120	MS
	Lead	ug/L	50	51.7		103	80-120	MS
	Molybdenum	ug/L	50	51		102	80-120	MS
	Nickel	ug/L	50	53.8		108	80-120	MS
	Selenium	ug/L	50	51.9		104	80-120	MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2017-2777

Contract: ESHL00114

Aqueous LCS Source:OS2I

Solid LCS Source:

<u>Sample ID</u>	<u>Analyte</u>	<u>Units</u>	<u>True Value</u>	<u>Result</u>	<u>C</u>	<u>% Recovery</u>	<u>Acceptance Limit</u>	<u>M*</u>
1203876401								
	Aluminum	ug/L	5000	5290		106	80-120	P
	Barium	ug/L	500	495		99	80-120	P
	Beryllium	ug/L	500	493		98.6	80-120	P
	Boron	ug/L	500	500		100	80-120	P
	Calcium	ug/L	5000	5260		105	80-120	P
	Cobalt	ug/L	500	511		102	80-120	P
	Copper	ug/L	500	499		99.9	80-120	P
	Iron	ug/L	5000	5210		104	80-120	P
	Magnesium	ug/L	5000	5330		107	80-120	P
	Manganese	ug/L	500	498		99.5	80-120	P
	Potassium	ug/L	5000	5140		103	80-120	P
	Silica	ug/L	10700	10000		93.4	80-120	P
	Sodium	ug/L	5000	5140		103	80-120	P
	Strontium	ug/L	500	504		101	80-120	P
	Tin	ug/L	500	486		97.2	80-120	P
	Vanadium	ug/L	500	503		101	80-120	P
	Zinc	ug/L	500	508		102	80-120	P

## \*Analytical Methods:

P SW846 3005A/6010C

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2017-2777

Contract: ESHL00114

Aqueous LCS Source: GEL

Solid LCS Source:

<u>Sample ID</u>	<u>Analyte</u>	<u>Units</u>	<u>True Value</u>	<u>Result</u>	<u>C</u>	<u>% Recovery</u>	<u>Acceptance Limit</u>	<u>M*</u>
1203879600	Mercury	ug/L	2	2.05		103	85-115	AV

## \*Analytical Methods:

AV EPA 245.1/245.2

## METALS

-9-

## Serial Dilution Sample Summary

**SDG NO.** 2017-2777 **Client ID:** CAWA-17-142883L

**Contract:** ESHL00114

**Matrix:** LIQUID **Level:** Low

**Sample ID:** 432872001 **Serial Dilution ID:** 1203876324

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Antimony	1	U	5	U				MS
Arsenic	2	U	10	U				MS
Cadmium	.3	U	1.5	U				MS
Chromium	3	U	15	U				MS
Lead	.5	U	2.5	U				MS
Molybdenum	.65		1.06	J	62.308			MS
Nickel	.6	U	3	U				MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.382		.345	J	9.686			MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 2017-2777 Client ID: CAWA-17-142883L

Contract: ESHL00114

Matrix: LIQUID Level: Low

Sample ID: 432872001 Serial Dilution ID: 1203876404

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Aluminum	68	U	340	U				P
Barium	12.5		13.3	J	6.377			P
Beryllium	1	U	5	U				P
Boron	15	U	75	U				P
Calcium	9760		9800		.404		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	2960		3090		4.597			P
Manganese	2	U	10	U				P
Potassium	876		750		14.384			P
Silica	54000		56600		4.863		10	P
Sodium	8050		8820		9.543		10	P
Strontium	44.8		48		7.047			P
Tin	2.5	U	12.5	U				P
Vanadium	2.07	J	5	U	139.164			P
Zinc	12.2		32.7	J	168.512			P

## \*Analytical Methods:

P SW846 3005A/6010C

## METALS

-9-

## Serial Dilution Sample Summary

**SDG NO.** 2017-2777 **Client ID:** CAWA-17-142866L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 432587001 **Serial Dilution ID:** 1203879605

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Mercury	.067	U	.335	U				AV

## \*Analytical Methods:

AV EPA 245.1/245.2

# **General Chem Analysis**



# Case Narrative

**General Chemistry  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2017-2777  
Work Order #: 432868**

**Method/Analysis Information**

**Product:** Carbon and Total Organic

**Analytical Batch:** 1701620

**Method:** SW 9060 Total Organic Carbon

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW-846:9060:

<b>Sample ID</b>	<b>Client ID</b>
432868002	CAWA-17-142919
1203877657	Method Blank (MB)
1203877658	Laboratory Control Sample (LCS)
1203877659	432570002(CAWA-17-142891) Sample Duplicate (DUP)
1203877662	432570002(CAWA-17-142891) Post Spike (PS)

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-093 REV# 15.

**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 Carbon analysis was performed on a O-I Analytical 1030W Carbon Analyzer.

**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.

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

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

The MB analyzed with this SDG met the acceptance criteria.

#### **Laboratory Control Sample Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

#### **Quality Control (QC) Designation**

Sample 432570002 (CAWA-17-142891) was selected for QC analysis.

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

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

#### **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 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.

### **Miscellaneous Information**

#### **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**

<b>Product:</b>	<b>Cyanide and Total</b>		
<b>Analytical Batch:</b>	1700910	<b>Method:</b>	WSP-CN(T)
<b>Prep Batch :</b>	1700909	<b>Method:</b>	EPA 335.4

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA 335.4 1993:

<b>Sample ID</b>	<b>Client ID</b>
432868002	CAWA-17-142919
1203875702	Method Blank (MB)
1203875703	Laboratory Control Sample (LCS)
1203876737	432872002(CAWA-17-142918) Sample Duplicate (DUP)
1203876738	432872002(CAWA-17-142918) Matrix Spike (MS)

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-095 REV# 20.

### **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 Flow Injection analysis was performed on a Lachat QuickChem FIA+ 8000 Series.

### **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.

### **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 Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Sample 432872002 (CAWA-17-142918) was selected for QC analysis.

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

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

**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 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.

**Miscellaneous Information****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:

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### **Method/Analysis Information**

**Product:** Ion Chromatography

**Analytical Batch:** 1703207

**Method:** WSP-ANIONS

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA:300.0:

<b>Sample ID</b>	<b>Client ID</b>
432868001	CAWA-17-142884
1203881300	Method Blank (MB)
1203881301	Laboratory Control Sample (LCS)
1203881302	432594004(CAWA-17-143050) Sample Duplicate (DUP)
1203881303	432594004(CAWA-17-143050) Post Spike (PS)

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# 25.

### **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 Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

#### **Quality Control (QC) Designation**

Sample 432594004 (CAWA-17-143050) was selected for QC analysis.

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

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

#### **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**

#### **Manual Integrations**

Samples 1203881302 (CAWA-17-143050DUP), 1203881303 (CAWA-17-143050PS) and 432868001 (CAWA-17-142884) were manually integrated to correctly position the baseline as set in the calibration standards.

#### **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**

<b>Product:</b>	<b>Ammonia Nitrogen</b>		
<b>Analytical Batch:</b>	1700465	<b>Method:</b>	NH3
<b>Prep Batch :</b>	1700464	<b>Method:</b>	EPA 350.1 Prep

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA:350.1:

<b>Sample ID</b>	<b>Client ID</b>
432868001	CAWA-17-142884
1203874555	Method Blank (MB)
1203874556	Laboratory Control Sample (LCS)
1203874557	432570001(CAWA-17-142856) Sample Duplicate (DUP)
1203874558	432570001(CAWA-17-142856) Matrix Spike (MS)

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-106 REV# 9.

### **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 Nutrient analysis was performed on a Lachat QuickChem FIA+ 8000 Series.

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Calibration Verification Information**

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

### **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 Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Sample 432570001 (CAWA-17-142856) was selected for QC analysis.

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

The MS/PS recoveries for this sample set were within the required acceptance limits where applicable.

**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 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**

Samples 1203874555 (MB), 1203874556 (LCS), 1203874557 (CAWA-17-142856DUP) and 1203874558 (CAWA-17-142856MS) were re-analyzed due to CCV failure. The reanalysis data with passing instrument QC was reported.

**Miscellaneous Information****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**

<b>Product:</b>	<b>Total Kjeldahl Nitrogen</b>		
<b>Analytical Batch:</b>	1701316	<b>Method:</b>	TKN
<b>Prep Batch :</b>	1701315	<b>Method:</b>	EPA 351.2 Prep

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA:351.2:

<b>Sample ID</b>	<b>Client ID</b>
432868002	CAWA-17-142919
1203876776	Method Blank (MB)
1203876777	Laboratory Control Sample (LCS)
1203876778	433160004(WST05-17-145280) Sample Duplicate (DUP)
1203876780	433160004(WST05-17-145280) Matrix Spike (MS)

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-104 REV# 14.

### **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 Nutrient analysis was performed on a Lachat QuickChem FIA+ 8000 Series.

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Calibration Verification Information**

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

### **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 Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Sample 433160004 (WST05-17-145280) was selected for QC analysis.

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

The percent recoveries (%R) obtained from the spike analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The matrix spike recovered outside of the established acceptance limits due to matrix interference and/or non-homogeneity.

Analyte	Sample	Value
Nitrogen, Total Kjeldahl	1203876780 (WST05-17-145280MS)	112* (90%-110%)

**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 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.

**Miscellaneous Information**

**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:** Nitrate Nitrite by Cadmium Reduction

**Analytical Batch:** 1701312

**Method:** NO3NO2

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA:353.2:

<b>Sample ID</b>	<b>Client ID</b>
432868001	CAWA-17-142884
1203876756	Method Blank (MB)
1203876757	Laboratory Control Sample (LCS)
1203876760	432868001(CAWA-17-142884) Sample Duplicate (DUP)
1203876765	432868001(CAWA-17-142884) Post Spike (PS)

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-128 REV# 9.

### **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 Nutrient analysis was performed on a Lachat QuickChem FIA+ 8500 Series.

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Calibration Verification Information**

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

### **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 Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Sample 432868001 (CAWA-17-142884) was selected for QC analysis.

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

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

**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 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.

**Miscellaneous Information****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**

<b>Product:</b>	<b>Total Phosphorus</b>		
<b>Analytical Batch:</b>	1701314	<b>Method:</b>	PO4
<b>Prep Batch :</b>	1701313	<b>Method:</b>	EPA 365.4 Prep

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA 365.4 1974:

<b>Sample ID</b>	<b>Client ID</b>
432868001	CAWA-17-142884
1203876768	Method Blank (MB)
1203876769	Laboratory Control Sample (LCS)
1203876770	432723001(CAWA-17-142865) Sample Duplicate (DUP)
1203876773	432723001(CAWA-17-142865) Matrix Spike (MS)

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-103 REV# 10.

### **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 Nutrient analysis was performed on a Lachat QuickChem FIA+ 8000 Series.

### **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 Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

##### **Quality Control (QC) Designation**

Sample 432723001 (CAWA-17-142865) was selected for QC analysis.

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

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

##### **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 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.

#### **Miscellaneous Information**

##### **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:** Solids and Total Dissolved

**Analytical Batch:** 1700497

**Method:** TDS

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA:160.1:

<b>Sample ID</b>	<b>Client ID</b>
432868001	CAWA-17-142884
1203874646	Method Blank (MB)
1203874647	Laboratory Control Sample (LCS)
1203874648	432594001(CAWA-17-142887) Sample Duplicate (DUP)

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-001 REV# 15.

### **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 Solids analysis was performed on a Sartorius Balance BAL216. Solids 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 Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

### **Consecutive Weight Checks**

All consecutive weight checks were met.

**Quality Control (QC) Designation**

Sample 432594001 (CAWA-17-142887) was selected for QC analysis.

**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**

**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:

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### **Method/Analysis Information**

**Product:** Specific Conductivity

**Analytical Batch:** 1705527

**Method:** EPA120.1 Specific Conductivity

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA:120.1:

<b>Sample ID</b>	<b>Client ID</b>
432868001	CAWA-17-142884
1203886675	Laboratory Control Sample (LCS)
1203886676	432594001(CAWA-17-142887) Sample Duplicate (DUP)

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-009 REV# 14.

### **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 Orion 160 Conductivity Meter.

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Initial Standardization**

The titrant was properly standardized

### **Calibration Verification Information**

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

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

#### **Laboratory Control Sample Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.



**Quality Control (QC) Designation**

Sample 432594001 (CAWA-17-142887) was selected for QC analysis.

**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****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:** pH

**Analytical Batch:** 1700639 **Method:** PH

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA 150.1 1982:

<b>Sample ID</b>	<b>Client ID</b>
432868001	CAWA-17-142884
1203875000	Laboratory Control Sample (LCS)
1203875001	432594004(CAWA-17-143050) Sample Duplicate (DUP)

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-008 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 Titration and Ion analysis was performed on a Thermo Orion Star A111. Immediates

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Initial Standardization**

The titrant was properly standardized

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

#### **Laboratory Control Sample Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

#### **Quality Control (QC) Designation**

Sample 432594004 (CAWA-17-143050) was selected for QC analysis.

**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**

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

Sample	Analyte	Value
1203875001 (CAWA-17-143050DUP)	pH	Received 13-SEP-17, out of holding 11-SEP-17
432868001 (CAWA-17-142884)	pH	Received 15-SEP-17, out of holding 13-SEP-17

**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****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:

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### **Method/Analysis Information**

**Product:** Alkalinity

**Analytical Batch:** 1700638      **Method:** EPA 310.1 Total Alkalinity

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA:310.1:

<b>Sample ID</b>	<b>Client ID</b>
432868001	CAWA-17-142884
1203874996	Laboratory Control Sample (LCS)
1203874998	432594004(CAWA-17-143050) Sample Duplicate (DUP)
1203874999	432594004(CAWA-17-143050) Matrix Spike (MS)

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# 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 Titration and Ion analysis was performed on a Electronic bottle-top buret.

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Initial Standardization**

The titrant was properly standardized

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

#### **Laboratory Control Sample Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

#### **Quality Control (QC) Designation**

Sample 432594004 (CAWA-17-143050) was selected for QC analysis.

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

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

**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**

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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**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

ARSL004 ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)

Client SDG: 2017-2777 GEL Work Order: 432868

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

- \* A quality control analyte recovery is outside of specified acceptance criteria
- H Analytical holding time was exceeded
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

#### Review/Validation

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

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

Signature:



Name: Kristen Mizzell

Date: 04 OCT 2017

Title: Analyst I

# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: October 4, 2017

Company : Los Alamos National Laboratory  
Address : TA-00, SM1237, Rm104C

Los Alamos, New Mexico 87545  
Contact: Ms. Nita Patel  
Project: LANL- WQH Water Samples

Client SDG: 2017-2777

Client Sample ID: CAWA-17-142884  
Sample ID: 432868001  
Matrix: W  
Collect Date: 13-SEP-17 12:40  
Receive Date: 15-SEP-17  
Collector: Client

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide	U	ND	0.067	0.200	mg/L		1	MXL2	09/23/17	0507	1703207	1
Chloride		2.01	0.067	0.200	mg/L		1					
Fluoride	J	0.0793	0.033	0.100	mg/L		1					
Sulfate		3.83	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	J	0.033	0.017	0.050	mg/L	1.00	1	KLP1	09/18/17	0925	1700465	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		0.417	0.017	0.050	mg/L		1	AXH3	09/19/17	0709	1701312	3
PO4 "As Received"												
Phosphorus, Total as P	J	0.0269	0.020	0.050	mg/L	1.00	1	KLP1	09/21/17	1433	1701314	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		121	3.40	14.3	mg/L			KLP1	09/18/17	1309	1700497	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		57.1	1.45	4.00	mg/L			RXB5	09/15/17	1547	1700638	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		130	1.00	1.00	umhos/cm		1	VH1	10/03/17	1242	1705527	7
PH "As Received"												
pH at Temp 16.0C	H	7.54	0.010	0.100	SU		1	RXB5	09/15/17	1543	1700639	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	09/18/17	0809	1700464
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	09/21/17	1300	1701313



# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: October 4, 2017

Company : Los Alamos National Laboratory  
Address : TA-00, SM1237, Rm104C

Los Alamos, New Mexico 87545  
Contact: Ms. Nita Patel  
Project: LANL- WQH Water Samples

Client SDG: 2017-2777

Client Sample ID: CAWA-17-142884  
Sample ID: 432868001

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
The following Analytical Methods were performed:												
Method	Description					Analyst Comments						
1	EPA:300.0											
2	EPA:350.1											
3	EPA:353.2											
4	EPA 365.4 1974											
5	EPA:160.1											
6	EPA:310.1											
7	EPA:120.1											
8	EPA 150.1 1982											

### Notes:

#### Column headers are defined as follows:

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

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: October 4, 2017

Company : Los Alamos National Laboratory  
Address : TA-00, SM1237, Rm104C

Los Alamos, New Mexico 87545  
Contact: Ms. Nita Patel  
Project: LANL- WQH Water Samples

Client SDG: 2017-2777

Client Sample ID: CAWA-17-142919  
Sample ID: 432868002  
Matrix: W  
Collect Date: 13-SEP-17 12:40  
Receive Date: 15-SEP-17  
Collector: Client

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average		4.96	0.330	1.00	mg/L		1	TSM	09/21/17	2209	1701620	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	09/20/17	1000	1700910	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	09/21/17	1648	1701316	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	09/20/17	0906	1700909
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	09/21/17	1300	1701315

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW-846:9060	
2	EPA 335.4 1993	
3	EPA:351.2	

### Notes:

Column headers are defined as follows:

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

# **Quality Control Summary**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: October 4, 2017

Page 1 of 6

Los Alamos National Laboratory  
TA-00, SM1237, Rm104C  
Los Alamos, New Mexico

Contact: Ms. Nita Patel

Workorder: 432868

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Carbon Analysis</b>											
Batch	1701620										
QC1203877659	432570002	DUP									
Total Organic Carbon Average		2.81		2.83	mg/L	0.673	^	(+/-1.00)	TSM	09/21/17	17:27
QC1203877658	LCS										
Total Organic Carbon Average	10.0			10.0	mg/L			(80%-120%)		09/21/17	16:29
QC1203877657	MB										
Total Organic Carbon Average			U	ND	mg/L					09/21/17	16:17
QC1203877662	432570002	PS									
Total Organic Carbon Average	10.0	2.81		13.4	mg/L			(75%-125%)		09/21/17	18:14
<b>Flow Injection Analysis</b>											
Batch	1700910										
QC1203876737	432872002	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	09/20/17	10:02
QC1203875703	LCS										
Cyanide, Total	50.0			48.8	ug/L			(90%-110%)		09/20/17	09:47
QC1203875702	MB										
Cyanide, Total			U	ND	ug/L					09/20/17	09:46
QC1203876738	432872002	MS									
Cyanide, Total	100	U	ND	103	ug/L			(90%-110%)		09/20/17	10:03
<b>Ion Chromatography</b>											
Batch	1703207										
QC1203881302	432594004	DUP									
Bromide		U	ND	U	ND	mg/L	N/A		MXL2	09/23/17	03:39

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## QC Summary

Workorder: 432868

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1703207										
Chloride		1.08		1.07	mg/L	0.531		(0%-20%)	MXL2	09/23/17	03:39
Fluoride	J	0.0344	U	ND	mg/L	200	^				
Sulfate		2.25		2.22	mg/L	1.25		(0%-20%)			
QC1203881301	LCS										
Bromide	1.25			1.26	mg/L		101	(80%-120%)		09/23/17	02:40
Chloride	5.00			4.73	mg/L		94.5	(80%-120%)			
Fluoride	2.50			2.38	mg/L		95.1	(80%-120%)			
Sulfate	10.0			9.80	mg/L		98	(80%-120%)			
QC1203881300	MB										
Bromide			U	ND	mg/L					09/23/17	02:11
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203881303	432594004	PS									
Bromide	1.25	U	ND	1.26	mg/L		97.1	(75%-125%)		09/23/17	04:08
Chloride	5.00		1.08	5.86	mg/L		95.7	(75%-125%)			
Fluoride	2.50	J	0.0344	2.39	mg/L		94.2	(75%-125%)			
Sulfate	10.0		2.25	12.1	mg/L		98.7	(75%-125%)			

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## QC Summary

Workorder: 432868

Page 3 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1700465										
QC1203874557	432570001	DUP									
Nitrogen, Ammonia	J	0.0221	U	ND	mg/L	200	^		KLP1	09/18/17	09:01
QC1203874556	LCS										
Nitrogen, Ammonia	1.00			1.09	mg/L		109	(90%-110%)		09/18/17	08:59
QC1203874555	MB										
Nitrogen, Ammonia			U	ND	mg/L					09/18/17	08:58
QC1203874558	432570001	MS									
Nitrogen, Ammonia	1.00	J	0.0221	1.04	mg/L		102	(90%-110%)		09/18/17	09:02
Batch											
Batch	1701312										
QC1203876760	432868001	DUP									
Nitrogen, Nitrate/Nitrite		0.417		0.411	mg/L	1.45		(0%-20%)	AXH3	09/19/17	07:11
QC1203876757	LCS										
Nitrogen, Nitrate/Nitrite	1.00			1.04	mg/L		104	(90%-110%)		09/19/17	07:02
QC1203876756	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					09/19/17	07:01
QC1203876765	432868001	PS									
Nitrogen, Nitrate/Nitrite	1.00		0.417	1.44	mg/L		102	(90%-110%)		09/19/17	07:12
Batch											
Batch	1701314										
QC1203876770	432723001	DUP									
Phosphorus, Total as P		0.256		0.254	mg/L	0.784		(0%-27%)	KLP1	09/21/17	14:27
QC1203876769	LCS										
Phosphorus, Total as P	1.00			1.08	mg/L		108	(80%-124%)		09/21/17	14:25
QC1203876768	MB										
Phosphorus, Total as P			U	ND	mg/L					09/21/17	14:24

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 432868

Page 4 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Nutrient Analysis</b>											
Batch	1701314										
QC1203876773	432723001	MS									
Phosphorus, Total as P	1.00	0.256		1.38	mg/L		112	(63%-139%)	KLP1	09/21/17	14:32
Batch	1701316										
QC1203876778	433160004	DUP									
Nitrogen, Total Kjeldahl		0.707		0.790	mg/L	11.1		(0%-20%)	KLP1	09/21/17	17:07
QC1203876777	LCS										
Nitrogen, Total Kjeldahl	1.00			1.08	mg/L		108	(90%-110%)		09/21/17	16:34
QC1203876776	MB										
Nitrogen, Total Kjeldahl			U	ND	mg/L					09/21/17	16:33
QC1203876780	433160004	MS									
Nitrogen, Total Kjeldahl	1.00	0.707		1.83	mg/L		112 *	(90%-110%)		09/21/17	17:08
<b>Solids Analysis</b>											
Batch	1700497										
QC1203874648	432594001	DUP									
Total Dissolved Solids		106		106	mg/L	1.36		(0%-5%)	KLP1	09/18/17	13:09
QC1203874647	LCS										
Total Dissolved Solids	300			289	mg/L		96.2	(95%-105%)		09/18/17	13:09
QC1203874646	MB										
Total Dissolved Solids			U	ND	mg/L					09/18/17	13:09
<b>Titration and Ion Analysis</b>											
Batch	1700638										
QC1203874998	432594004	DUP									
Alkalinity, Total as CaCO3		50.1		49.9	mg/L	0.399		(0%-20%)	RXB5	09/15/17	15:00
Carbonate alkalinity (CaCO3)	U	ND	U	ND	mg/L	N/A					

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## QC Summary

Workorder: 432868

Page 5 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Titration and Ion Analysis</b>											
Batch	1700638										
QC1203874996	LCS										
Alkalinity, Total as CaCO3	100			106	mg/L		106	(90%-110%)	RXB5	09/15/17	14:46
QC1203874999	432594004	MS									
Alkalinity, Total as CaCO3	100	50.1		155	mg/L		105	(80%-120%)		09/15/17	15:01
Batch	1700639										
QC1203875001	432594004	DUP									
pH		H	7.67	H	7.68	SU	0.13	(0%-5%)	RXB5	09/15/17	14:58
QC1203875000	LCS										
pH	7.00			6.99	SU		99.9	(99%-101%)		09/15/17	14:46
Batch	1705527										
QC1203886676	432594001	DUP									
Conductivity		209		210	umhos/cm	0.477		(0%-10%)	VH1	10/03/17	12:40
QC1203886675	LCS										
Conductivity	1410			1410	umhos/cm		99.6	(95%-105%)		10/03/17	12:30

### Notes:

- < Result is less than value reported
- > Result is greater than value reported
- B The target analyte was detected in the associated blank.
- E General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
- H Analytical holding time was exceeded
- J Value is estimated
- N/A RPD or %Recovery limits do not apply.
- N1 See case narrative
- ND Analyte concentration is not detected above the detection limit
- NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Q One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
- R Per section 9.3.4.1 of Method 1664 Revision B, due to matrix spike recovery issues, this result may not be reported or used for regulatory compliance purposes.
- R Sample results are rejected



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## QC Summary

Workorder: 432868

Page 6 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.										
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Z	Paint Filter Test--Particulates passed through the filter, however no free liquids were observed.										
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.										
d	5-day BOD--The 2:1 depletion requirement was not met for this sample										
e	5-day BOD--Test replicates show more than 30% difference between high and low values. The data is qualified per the method and can be used for reporting purposes										
h	Preparation or preservation holding time was exceeded										

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.