

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:

[illegible]

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

EVENT NAME: Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1

SAMPLE ID: CASA-18-147991

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11/8/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1045		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	6SP	
LOCATION ID:	R-11		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / <u>NA</u>

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NA
	WSP-CR52/53	1 LITER POLY	1	ICE		
	WSP- GENINORG+PerChlorat e	1 LITER POLY	1	ICE		
	WSP-N15/O18- NO3	40 mL Glass	2	ICE		
	WSP- NH3+NO3/NO2+PO4	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Sample Time	_____	HH:MM	Discharge Rate	_____	Dissolved Oxygen	_____
Groundwater Elevation	_____		Oxidation-Reduction Potential	_____	Period Purge Volume	_____
pH	_____		Purge Volume	_____	Specific Conductance	_____
Temperature	_____		Total Volume Pumped	_____	Turbidity	_____

11/8/17



**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY****EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1**SAMPLE ID:** CASA-18-147991**WORK ORDER:****COLLECTED BY (PRINT):** D. Hughes, A. Vigil

RELINQUISHED BY (Printed Name) Allizyn Stayfield (Signature) <i>[Signature]</i>	Date/Time 11/8/17 1255	RECEIVED BY <i>[Signature]</i> (Printed Name) S. Sherwood (Signature) <i>[Signature]</i>	Date/Time 11/8/17 1255
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

EVENT NAME: Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1

SAMPLE ID: CASA-18-147998

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/8/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1045		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	6SP	
LOCATION ID:	R-11		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	500 ML POLY	1	HNO3	Y	NA
	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-Gross/AB	1 LITER POLY	1	HNO3		
	WSP-LL-H-3	1 LITER POLY	1	NONE		
	WSP-RAD	1 GAL POLY	1	HNO3		
↓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	↓

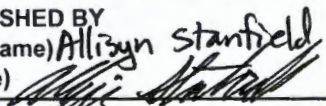
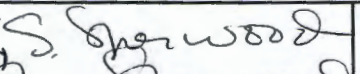
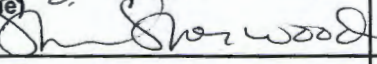
SAMPLE COMMENTS: Sampled 40 ft. from running diesel generator

LOCATION COMMENTS: Breezy while sampling

## FIELD PARAMETERS:

Sample Time	1045	HH:MM	Discharge Rate	3.06	Dissolved Oxygen	6.95
Groundwater Elevation	5832.29		Oxidation-Reduction Potential	211.4	Period Purge Volume	15.3
pH	8.23		Purge Volume	149.94	Specific Conductance	211.4
Temperature	21.3		Total Volume Pumped	201.96	Turbidity	0.34

**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY****EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1**SAMPLE ID:** CASA-18-147998**WORK ORDER:****COLLECTED BY (PRINT):** D. Hughes, A. Vigil

RELINQUISHED BY (Printed Name) Allizyn Stanfield (Signature) 	Date/Time 11/8/17 1255	RECEIVED BY  (Printed Name) S. Sherwood (Signature) 	Date/Time 11/8/17 1255
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time



## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

EVENT NAME: Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1

SAMPLE ID: CASA-18-148016

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/8/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1045	↓	MEDIA:	OK	↓
PRS ID:	OK	↓	SAMPLE TECH CODE:	DC	↓
LOCATION ID:	R-11	↓	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	1/11/8/17	HCL	Y	NA

SAMPLE COMMENTS: Seal broken on FTB; OKed for use by SMO staff

LOCATION COMMENTS:

FIELD PARAMETERS:

Sample Time	HH:MM	Discharge Rate	Dissolved Oxygen
Groundwater Elevation		Oxidation-Reduction Potential	Period Purge Volume
pH		Purge Volume	Specific Conductance
Temperature		Total Volume Pumped	Turbidity

COLLECTED BY (PRINT):

RELINQUISHED BY (Printed Name) Allisyn Stanfield (Signature)	Date/Time 11/8/17 1255	RECEIVED BY (Printed Name) S Sherwood (Signature)	Date/Time 11/8/17 1255
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

EVENT NAME: Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1

SAMPLE ID: CAMO-18-148113

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/8/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1212		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-14 S1		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:	↓		SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / <u>NA</u>

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	Discharge Rate	Dissolved Oxygen
Groundwater Elevation		Oxidation-Reduction Potential	Period Purge Volume
pH		Purge Volume	Specific Conductance
Temperature		Total Volume Pumped	Turbidity

COLLECTED BY (PRINT):

D. Hughes, A. Vigil

RELINQUISHED BY (Printed Name) Allizyn Stanfield (Signature)	Date/Time 11/8/17 1255	RECEIVED BY (Printed Name) S. Sherwood (Signature) S. Sherwood	Date/Time 11/8/17 1255
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time



# SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

EVENT NAME: Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1

SAMPLE ID: CAMO-18-148116

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11/8/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1212		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-14 S1		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:	↓		SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / <u>NA</u>

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	500 ML POLY	1	HNO3	Y	NA
	WSP-8082-PCB	1 LITER AMBER GLASS	3	ICE		
	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C- SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-GrossA/B	1 LITER POLY	1	HNO3		
	WSP-LL-H-3	1 LITER POLY	1	NONE		
	WSP-RAD	1 GAL POLY	1	HNO3		
↓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	↓

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

EVENT NAME: Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1

SAMPLE ID: CAMO-18-148116

WORK ORDER:

SAMPLE COMMENTS: Sampled 40 ft. from running diesel generator

LOCATION COMMENTS: None

## FIELD PARAMETERS:

Sample Time	<u>1212</u>	HH:MM	Discharge Rate	<u>7.14</u>	Dissolved Oxygen	<u>5.77</u>
Groundwater Elevation	<u>5870.52</u>		Oxidation-Reduction Potential	<u>181.4</u>	Period Purge Volume	<u>35.7</u>
pH	<u>8.19</u>		Purge Volume	<u>142.94</u>	Specific Conductance	<u>127.0</u>
Temperature	<u>23.2</u>		Total Volume Pumped	<u>271.32</u>	Turbidity	<u>0.22</u>

COLLECTED BY (PRINT): A. Vigil, D. Hughes

RELINQUISHED BY (Printed Name) (Signature)	Date/Time <u>11/8/17</u> <u>1255</u>	RECEIVED BY (Printed Name) (Signature)	Date/Time <u>11/8/17</u> <u>1255</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time



## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

EVENT NAME: Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1

SAMPLE ID: CAMO-18-148556

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/8/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1212		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	DL	
LOCATION ID:	R-14 S1		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	HCL	Y	NA

SAMPLE COMMENTS: Seal broken on FTB, SMO staff ok'ed for use

LOCATION COMMENTS:

FIELD PARAMETERS:

Sample Time	HH:MM	Discharge Rate	Dissolved Oxygen
Groundwater Elevation		Oxidation-Reduction Potential	Period Purge Volume
pH		Purge Volume	Specific Conductance
Temperature		Total Volume Pumped	Turbidity

COLLECTED BY (PRINT):

D. Hughes, A. Vigil

RELINQUISHED BY (Printed Name) <u>Allison Stanfield</u> (Signature) <u>[Signature]</u>	Date/Time 11/8/17 1255	RECEIVED BY <u>S. Sherwood</u> (Printed Name) <u>[Signature]</u> (Signature)	Date/Time 11/8/17 1255
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time



Samples collected from a WFO area?	YES	NO
COC: 2018-828 Field Test for Explosives Results	YES	NO NA
Spot test shows presence of explosives residues. If YES - Do not ship.		

TEST - Chemical Preservation		YES	NO
Samples are chemically preserved?		X	
Field Team Member Statement		YES	NO NA
Chemical preservation exceeds limits given 40 CFR 136, Table II - Required Containers, Preservation Techniques and Holding Times (footnote 3). If YES - Do not ship.		X	

TEST - Field Screen			YES	NO
The sample has field screening measurements of alpha activity and beta activity?				
Sample Activity (dpm/100cm <sup>2</sup> )	Shipment Activity (dpm*g/100cm <sup>2</sup> )	Sampled Location	YES	NO NA
Alpha detectable	Alpha >160,000	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	Alpha >1,250,000	other locations		
Beta > 1,500	Beta >15,000,000	any location		
The sample Alpha >16,000,000 dpm*g/100cm <sup>2</sup> or Beta > 160,000,000 dpm*g/100cm <sup>2</sup> . If YES - Do not ship.				
On the external surface of the sample container, alpha activity ≥ 24 dpm/cm <sup>2</sup> , beta activity ≥ 240 dpm/cm <sup>2</sup> , or surface activity ≥ 0.5 mR/hr. If YES - Do not ship.				
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
Prior analytical measurements of radioactive isotopes are available?		X	
Sample Activity (pCi/g)	Shipment Activity (pCi)	YES	NO NA
• Am-241 > 27	• Am-241 > 270,000		
• Cs-137 > 270	• Cs-137 > 270,000		
• Pu-238 > 27	• Pu-238 > 270,000		
• Pu-239/240 > 27	• Pu-239/240 > 270,000		
• Th-228 > 27	• Th-228 > 270,000		
• U-234 > 270	• U-234 > 1,600,000,000		
• U-238 > 270	• U-238 > unlimited		X
• H-3 > 27,000,000	• H-3 > 27,000,000,000		
Am-241, Pu-238, Pu-239/240, or Th 228 > 27,000,000 pCi; or Cs-137 > 270,000,000 pCi or U-234 ≥ 160,000,000 pCi; or H-3 ≥ 1 Ci. If YES - Do not ship.			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.			(X)

TEST - AK	YES	NO	NA
The shippers documented knowledge of the sample positively identifies appropriate labeling.			
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.			

HOLD SAMPLES FOR ANALYSIS
The samples are held per ER-SOP-10094, Rev. 1, 5.2.2 [7]

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) MAT ENGLISH	11-9-17
(Signature) [Signature]	1500

Hazard Assessment Reviewed By:	Date/Time
(Printed Name) Ranae Onstott	11/9/17
(Signature) Ranae Onstott	1500

## DATA VALIDATION REPORT

Chain Of Custody No. 2018-828

### 1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
437612	EPA:120.1	2				
437612	EPA:150.1	2				
437612	EPA:160.1	2				
437612	EPA:170.0	4		2		
437612	EPA:245.2	4				
437612	EPA:300.0	2				
437612	EPA:310.1	2				
437612	EPA:335.4	2				
437612	EPA:350.1	2				
437612	EPA:351.2	2				
437612	EPA:353.2	2				
437612	EPA:365.4	2				
437612	EPA:900	2				
437612	EPA:901.1	2				
437612	EPA:905.0	2				
437612	HASL-300:AM-241	2				
437612	HASL-300:ISOPU	2				
437612	HASL-300:ISOU	2				
437612	SM:A2340B	2				
437612	SW-846:6010C	2				
437612	SW-846:6020	2				
437612	SW-846:6850	2				
437612	SW-846:8082	1				
437612	SW-846:8260B	2		2		
437612	SW-846:8270D	2				
437612	SW-846:9060	2				

## 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
437612	EPA:120.1	1719249	1719249	2										1				2			
437612	EPA:150.1	1718738	1718738	2										1				1			
437612	EPA:160.1	1718225	1718225	2					1					1				1			
437612	EPA:170.0	NA	NA	4		2															
437612	EPA:245.2	1721931	1721929	4					1	1				1				1			
437612	EPA:300.0	1718869	1718869	2					1					1				1			
437612	EPA:310.1	1718721	1718721	2						1				1				1			
437612	EPA:335.4	1718271	1718270	2					1	2	1			1				2			
437612	EPA:350.1	1718277	1718276	2					1	1				1				1			
437612	EPA:351.2	1718303	1718302	2					1	1				1				1			
437612	EPA:353.2	1718305	1718305	2					1					1				1			
437612	EPA:365.4	1718301	1718300	2					1	1				1				1			
437612	EPA:900	1720050	1720050	2					1	1	1			1				1			
437612	EPA:901.1	1718234	1718234	2					1					1				1			
437612	EPA:905.0	1720044	1720044	2					1	1				1				1			
437612	HASL-300:AM-241	1718541	1718541	2					1					1				1			
437612	HASL-300:ISOPU	1718543	1718543	2					1					1				1			
437612	HASL-300:ISOU	1718546	1718546	2					1					1				1			
437612	SM:A2340B	1724481	1724481	2																	
437612	SW-846:6010C	1718037	1718036	2					1	1				1				1			
437612	SW-846:6020	1718065	1718064	2					1	1				1				1			
437612	SW-846:6850	1720716	1720708	2					1	1	1			1							
437612	SW-846:8082	1722631	1722630	1					1	1	1			1							
437612	SW-846:8260B	1720463	1720463	2		2			2					4							
437612	SW-846:8270D	1718844	1718842	2					1	1	1			1							
437612	SW-846:9060	1717990	1717990	2					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
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## DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CAMO-18-148113	437612005	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-18-147991	437612001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203920717	LCS	0	0	1	0
EPA:120.1	GENERAL CHEMISTRY	WST05-18-148658	1203920719	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	WST05-18-148663	1203920718	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-148113	437612005	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-148114	1203919487	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-18-147991	437612001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203919485	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-18-148059	1203918114	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-18-148113	437612005	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-18-147991	437612001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203918112	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203918111	MB	1	0	0	0
EPA:170.0	VOC	CAMO-18-148113	437612005	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-148116	437612006	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-148556	437612009	FTB	1	0	0	0
EPA:170.0	VOC	CASA-18-147991	437612001	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-147998	437612002	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148016	437612004	FTB	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148059	1203927662	DUP	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148059	1203927663	MS	0	0	1	0
EPA:245.2	INORGANIC	CAMO-18-148113	437612005	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148116	437612006	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-147991	437612001	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-147998	437612002	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203927529	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203927528	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-18-148057	1203919787	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-18-148113	437612005	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-18-147991	437612001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203919786	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203919785	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-148113	437612005	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-148114	1203919455	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-148114	1203919457	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-18-147991	437612001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203919453	LCS	0	0	1	0
EPA:335.4	INORGANIC	CAMO-18-148073	1203918244	DUP	1	0	0	0
EPA:335.4	INORGANIC	CAMO-18-148073	1203918246	MS	0	0	1	0

## DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:335.4	INORGANIC	CAMO-18-148116	437612006	REG	1	0	0	0
EPA:335.4	INORGANIC	CASA-18-147998	1203918245	DUP	1	0	0	0
EPA:335.4	INORGANIC	CASA-18-147998	1203918247	MS	0	0	1	0
EPA:335.4	INORGANIC	CASA-18-147998	1203918248	MSD	0	0	1	0
EPA:335.4	INORGANIC	CASA-18-147998	437612002	REG	1	0	0	0
EPA:335.4	INORGANIC	LCS	1203918243	LCS	0	0	1	0
EPA:335.4	INORGANIC	MB	1203918242	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-18-148113	437612005	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-18-147991	1203918261	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-18-147991	1203918265	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CASA-18-147991	437612001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203918258	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203918257	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-18-148073	1203918282	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-18-148073	1203918283	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-18-148116	437612006	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-18-147998	437612002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203918281	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203918280	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-18-148057	1203918295	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-18-148113	437612005	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-18-147991	437612001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203918293	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203918292	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-18-148057	1203918278	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-18-148057	1203918279	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-18-148113	437612005	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-18-147991	437612001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203918277	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203918276	MB	1	0	0	0
EPA:900	RAD	CAMO-18-148116	437612006	REG	2	0	0	0
EPA:900	RAD	CAMO-18-148117	1203922640	DUP	2	0	0	0
EPA:900	RAD	CAMO-18-148117	1203922641	MS	0	0	2	0
EPA:900	RAD	CAMO-18-148117	1203922642	MSD	0	0	2	0
EPA:900	RAD	CASA-18-147998	437612002	REG	2	0	0	0
EPA:900	RAD	LCS	1203922643	LCS	0	0	2	0
EPA:900	RAD	MB	1203922639	MB	2	0	0	0
EPA:901.1	RAD	CAMO-18-148116	437612006	REG	5	0	0	0
EPA:901.1	RAD	CASA-18-147998	437612002	REG	5	0	0	0
EPA:901.1	RAD	LCS	1203918140	LCS	0	0	3	0

## DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:901.1	RAD	MB	1203918138	MB	5	0	0	0
EPA:901.1	RAD	WST05-18-148666	1203918139	DUP	5	0	0	0
EPA:905.0	RAD	CAMO-18-148073	1203922620	DUP	1	0	0	0
EPA:905.0	RAD	CAMO-18-148073	1203922621	MS	0	0	1	0
EPA:905.0	RAD	CAMO-18-148116	437612006	REG	1	0	0	0
EPA:905.0	RAD	CASA-18-147998	437612002	REG	1	0	0	0
EPA:905.0	RAD	LCS	1203922622	LCS	0	0	1	0
EPA:905.0	RAD	MB	1203922619	MB	1	0	0	0
HASL-300:AM-241	RAD	CAMO-18-148111	1203918916	DUP	1	0	0	0
HASL-300:AM-241	RAD	CAMO-18-148116	437612006	REG	1	0	0	0
HASL-300:AM-241	RAD	CASA-18-147998	437612002	REG	1	0	0	0
HASL-300:AM-241	RAD	LCS	1203918917	LCS	0	0	1	0
HASL-300:AM-241	RAD	MB	1203918915	MB	1	0	0	0
HASL-300:ISOPU	RAD	CAMO-18-148111	1203918922	DUP	2	0	0	0
HASL-300:ISOPU	RAD	CAMO-18-148116	437612006	REG	2	0	0	0
HASL-300:ISOPU	RAD	CASA-18-147998	437612002	REG	2	0	0	0
HASL-300:ISOPU	RAD	LCS	1203918923	LCS	0	0	1	0
HASL-300:ISOPU	RAD	MB	1203918921	MB	2	0	0	0
HASL-300:ISOU	RAD	CAMO-18-148111	1203918933	DUP	3	0	0	0
HASL-300:ISOU	RAD	CAMO-18-148116	437612006	REG	3	0	0	0
HASL-300:ISOU	RAD	CASA-18-147998	437612002	REG	3	0	0	0
HASL-300:ISOU	RAD	LCS	1203918934	LCS	0	0	1	0
HASL-300:ISOU	RAD	MB	1203918932	MB	3	0	0	0
SM:A2340B	INORGANIC	CAMO-18-148113	437612005	REG	1	0	0	0
SM:A2340B	INORGANIC	CASA-18-147991	437612001	REG	1	0	0	0
SW-846:6010C	INORGANIC	CAMO-18-148057	1203917618	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-18-148057	1203917619	MS	0	0	17	0
SW-846:6010C	INORGANIC	CAMO-18-148113	437612005	REG	17	0	0	0
SW-846:6010C	INORGANIC	CASA-18-147991	437612001	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203917617	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203917616	MB	17	0	0	0
SW-846:6020	INORGANIC	CAMO-18-148113	437612005	REG	11	0	0	0
SW-846:6020	INORGANIC	CASA-18-147991	1203917714	DUP	11	0	0	0
SW-846:6020	INORGANIC	CASA-18-147991	1203917715	MS	0	0	11	0
SW-846:6020	INORGANIC	CASA-18-147991	437612001	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203917713	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203917712	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-148057	1203924392	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-148057	1203924393	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-148113	437612005	REG	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
SW-846:6850	LCMS/MS PERCHLORATE	CASA-18-147991	437612001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203924391	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203924390	MB	1	0	0	0
SW-846:8082	PESTPCB	CAMO-18-148116	437612008	REG	8	2	0	0
SW-846:8082	PESTPCB	CAMO-18-148117	1203929171	MS	0	2	2	0
SW-846:8082	PESTPCB	CAMO-18-148117	1203929172	MSD	0	2	2	0
SW-846:8082	PESTPCB	LCS	1203929170	LCS	0	2	2	0
SW-846:8082	PESTPCB	MB	1203929169	MB	8	2	0	0
SW-846:8260B	VOC	CAMO-18-148116	437612007	REG	80	3	0	0
SW-846:8260B	VOC	CAMO-18-148556	437612009	FTB	80	3	0	0
SW-846:8260B	VOC	CASA-18-147998	437612003	REG	80	3	0	0
SW-846:8260B	VOC	CASA-18-148016	437612004	FTB	80	3	0	0
SW-846:8260B	VOC	LCS	1203923769	LCS	0	3	70	0
SW-846:8260B	VOC	LCS	1203923770	LCS	0	3	10	0
SW-846:8260B	VOC	LCS	1203925356	LCS	0	3	70	0
SW-846:8260B	VOC	LCS	1203925357	LCS	0	3	10	0
SW-846:8260B	VOC	MB	1203923768	MB	80	3	0	0
SW-846:8260B	VOC	MB	1203925355	MB	80	3	0	0
SW-846:8270D	SVOC	CAMO-18-148073	1203919738	MS	0	6	76	0
SW-846:8270D	SVOC	CAMO-18-148073	1203919739	MSD	0	6	76	0
SW-846:8270D	SVOC	CAMO-18-148116	437612007	REG	80	6	0	0
SW-846:8270D	SVOC	CASA-18-147998	437612003	REG	80	6	0	0
SW-846:8270D	SVOC	LCS	1203919737	LCS	0	6	76	0
SW-846:8270D	SVOC	MB	1203919736	MB	80	6	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-18-148071	1203920738	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-18-148116	437612006	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-18-147998	437612002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203920735	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203920734	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

## DATA VALIDATION REPORT

5. Any contaminants in blanks?

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	1203917616	METHOD BLANK	SW-846:6010C	W	Potassium	78	J	ug/L	150
MB	1203917712	METHOD BLANK	SW-846:6020	W	Molybdenum	0.243	J	ug/L	0.500
CASA-18-148016	437612004	TRIP BLANK	EPA:170.0	W	Temperature	2		Deg C	
CAMO-18-148556	437612009	TRIP BLANK	EPA:170.0	W	Temperature	2		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
CASA-18-147991	1203917712	METHOD BLANK	SW-846:6020	Molybdenum	0.243	ug/L	1.52		0.500	Y	5	100	Y
CAMO-18-148113	1203917712	METHOD BLANK	SW-846:6020	Molybdenum	0.243	ug/L	1.14		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
CAMO-18-148073	1203918283		EPA:351.2	Total Kjeldahl Nitrogen	1718302	11-14-2017	W	70.3		110	90	10		

## DATA VALIDATION REPORT

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
CAMO-18-148057	1203917619		SW-846:6010C	Calcium	1718036	12-07-2017	W	126		125	75			

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

LCS Lab Sample	LCSD Lab	Analytical Method	Parameter Name	Lab Lot ID	Analysis	Sample Matrix	LCS Spike Recovery	LCSD Spike Recovery	Upper Limit	Lower Limit	Upper Rejection Limit	Lower Rejection Limit	RPD	RPD Limit
1203918934		HASL-300:ISOU	Uranium-232	1718546	11-26-2017	W	43.6		105	50		10		

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.



## DATA VALIDATION REPORT

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-14 S1	2018-828	CAMO-18-148113	REG	INIT	INORGANIC	SW-846:6020	Molybdenum		U	I4	N	1.14	ug/L	1.14	ug/L			W	11/08/2017		1718065	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.00447	pCi/L	0.00447	pCi/L	0.0398	0.00774	W	11/08/2017		1718541	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	0.671	pCi/L	0.671	pCi/L	4.78	1.22	W	11/08/2017		1718234	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	-1.76	pCi/L	-1.76	pCi/L	4.78	1.41	W	11/08/2017		1718234	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	1.01	pCi/L	1.01	pCi/L	2.92	0.840	W	11/08/2017		1720050	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N	2.36	pCi/L	2.36	pCi/L	2.88	0.926	W	11/08/2017		1720050	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	1.26	pCi/L	1.26	pCi/L	9.44	2.46	W	11/08/2017		1718234	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	0	pCi/L	0	pCi/L	0.0405	0.00778	W	11/08/2017		1718543	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	0.00275	pCi/L	0.00275	pCi/L	0.0579	0.00824	W	11/08/2017		1718543	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	-33.9	pCi/L	-33.9	pCi/L	70.7	21.0	W	11/08/2017		1718234	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	0.698	pCi/L	0.698	pCi/L	6.29	1.55	W	11/08/2017		1718234	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	-0.0426	pCi/L	-0.0426	pCi/L	0.348	0.0845	W	11/08/2017		1720044	VAL	Y
R-14 S1	2018-828	CAMO-18-148116	REG	INIT	RAD	HASL-300:ISOU	Uranium-235/236	U	U	R5	N	0.0391	pCi/L	0.0391	pCi/L	0.0486	0.0125	W	11/08/2017		1718546	VAL	Y
R-11	2018-828	CASA-18-147991	REG	INIT	INORGANIC	SW-846:6020	Molybdenum		J+	I4a	Y	1.52	ug/L	1.52	ug/L			W	11/08/2017		1718065	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.0209	pCi/L	0.0209	pCi/L	0.0414	0.0134	W	11/08/2017		1718541	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	-0.81	pCi/L	-0.81	pCi/L	5.10	1.49	W	11/08/2017		1718234	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	0.13	pCi/L	0.13	pCi/L	5.26	1.34	W	11/08/2017		1718234	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	1.6	pCi/L	1.6	pCi/L	2.29	0.737	W	11/08/2017		1720050	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N	0.668	pCi/L	0.668	pCi/L	2.06	0.607	W	11/08/2017		1720050	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	-0.4	pCi/L	-0.4	pCi/L	9.90	2.73	W	11/08/2017		1718234	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	0	pCi/L	0	pCi/L	0.047	0.00901	W	11/08/2017		1718543	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	-0.00637	pCi/L	-0.00637	pCi/L	0.0671	0.0101	W	11/08/2017		1718543	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	-20.7	pCi/L	-20.7	pCi/L	72.3	19.4	W	11/08/2017		1718234	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	3.09	pCi/L	3.09	pCi/L	5.24	1.37	W	11/08/2017		1718234	VAL	Y
R-11	2018-828	CASA-18-147998	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	0.000543	pCi/L	0.000543	pCi/L	0.442	0.124	W	11/08/2017		1720044	VAL	Y

### Reason Code

### Description

I4

the sample result is =<5x the concentration of related analyte in the method blank.

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

## DATA VALIDATION REPORT

### Reason Code

### Description

NQ	The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualfire. The analyte is detected in the sample.
R5	Analyte is not detected because the amount reported is less than the MDC.
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
CAMO-18-148113	R-14 S1	REG	EPA:120.1	0	1
CAMO-18-148113	R-14 S1	REG	EPA:150.1	0	1
CAMO-18-148113	R-14 S1	REG	EPA:160.1	0	1
CAMO-18-148113	R-14 S1	REG	EPA:170.0	0	1
CAMO-18-148113	R-14 S1	REG	EPA:245.2	0	1
CAMO-18-148113	R-14 S1	REG	EPA:300.0	0	4
CAMO-18-148113	R-14 S1	REG	EPA:310.1	0	2
CAMO-18-148113	R-14 S1	REG	EPA:350.1	0	1
CAMO-18-148113	R-14 S1	REG	EPA:353.2	0	1
CAMO-18-148113	R-14 S1	REG	EPA:365.4	0	1
CAMO-18-148113	R-14 S1	REG	SM:A2340B	0	1
CAMO-18-148113	R-14 S1	REG	SW-846:6010C	0	17
CAMO-18-148113	R-14 S1	REG	SW-846:6020	0	11
CAMO-18-148113	R-14 S1	REG	SW-846:6850	0	1
CAMO-18-148116	R-14 S1	REG	EPA:170.0	0	1
CAMO-18-148116	R-14 S1	REG	EPA:245.2	0	1
CAMO-18-148116	R-14 S1	REG	EPA:335.4	0	1
CAMO-18-148116	R-14 S1	REG	EPA:351.2	0	1
CAMO-18-148116	R-14 S1	REG	EPA:900	0	2
CAMO-18-148116	R-14 S1	REG	EPA:901.1	0	5
CAMO-18-148116	R-14 S1	REG	EPA:905.0	0	1
CAMO-18-148116	R-14 S1	REG	HASL-300:AM-241	0	1
CAMO-18-148116	R-14 S1	REG	HASL-300:ISOPU	0	2
CAMO-18-148116	R-14 S1	REG	HASL-300:ISOU	0	3
CAMO-18-148116	R-14 S1	REG	SW-846:8082	0	8
CAMO-18-148116	R-14 S1	REG	SW-846:8260B	0	80
CAMO-18-148116	R-14 S1	REG	SW-846:8270D	0	80
CAMO-18-148116	R-14 S1	REG	SW-846:9060	0	1

## DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-18-148556	R-14 S1	FTB	EPA:170.0	0	1
CAMO-18-148556	R-14 S1	FTB	SW-846:8260B	0	80
CASA-18-147991	R-11	REG	EPA:120.1	0	1
CASA-18-147991	R-11	REG	EPA:150.1	0	1
CASA-18-147991	R-11	REG	EPA:160.1	0	1
CASA-18-147991	R-11	REG	EPA:170.0	0	1
CASA-18-147991	R-11	REG	EPA:245.2	0	1
CASA-18-147991	R-11	REG	EPA:300.0	0	4
CASA-18-147991	R-11	REG	EPA:310.1	0	2
CASA-18-147991	R-11	REG	EPA:350.1	0	1
CASA-18-147991	R-11	REG	EPA:353.2	0	1
CASA-18-147991	R-11	REG	EPA:365.4	0	1
CASA-18-147991	R-11	REG	SM:A2340B	0	1
CASA-18-147991	R-11	REG	SW-846:6010C	0	17
CASA-18-147991	R-11	REG	SW-846:6020	0	11
CASA-18-147991	R-11	REG	SW-846:6850	0	1
CASA-18-147998	R-11	REG	EPA:170.0	0	1
CASA-18-147998	R-11	REG	EPA:245.2	0	1
CASA-18-147998	R-11	REG	EPA:335.4	0	1
CASA-18-147998	R-11	REG	EPA:351.2	0	1
CASA-18-147998	R-11	REG	EPA:900	0	2
CASA-18-147998	R-11	REG	EPA:901.1	0	5
CASA-18-147998	R-11	REG	EPA:905.0	0	1
CASA-18-147998	R-11	REG	HASL-300:AM-241	0	1
CASA-18-147998	R-11	REG	HASL-300:ISOPU	0	2
CASA-18-147998	R-11	REG	HASL-300:ISOU	0	3
CASA-18-147998	R-11	REG	SW-846:8260B	0	80
CASA-18-147998	R-11	REG	SW-846:8270D	0	80
CASA-18-147998	R-11	REG	SW-846:9060	0	1
CASA-18-148016	R-11	FTB	EPA:170.0	0	1
CASA-18-148016	R-11	FTB	SW-846:8260B	0	80



December 06, 2017

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

Re: LANL- WQH Water Samples  
Work Order: 437612  
SDG: 2018-828

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on November 10, 2017, and analyzed for GC Semivolatile PCB, GC/MS Semivolatile, GC/MS Volatile, General Chemistry, Metals, Perchlorates by LCMSMS and Radiochemistry. 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,



Valerie Davis  
Project Manager

Chain of Custody: 2018-828  
Enclosures



**ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)**  
**LANL- WQH Water Samples**  
**Work Order #: 437612**  
**SDG: 2018-828**

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# Case Narrative

**Case Narrative for  
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)  
LANL- WQH Water Samples  
Workorder #: 437612  
SDG # : 2018-828**

**December 06, 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 November 10, 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>
437612001	CASA-18-147991
437612002	CASA-18-147998
437612003	CASA-18-147998
437612004	CASA-18-148016
437612005	CAMO-18-148113
437612006	CAMO-18-148116
437612007	CAMO-18-148116
437612008	CAMO-18-148116
437612009	CAMO-18-148556

**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: GC Semivolatile PCB, GC/MS Semivolatile, GC/MS Volatile, General Chemistry, Metals, Perchlorates by LCMSMS and Radiochemistry.

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.

A handwritten signature in black ink that reads "Valerie Davis". The script is cursive and fluid.

Valerie Davis  
Project Manager

**List of current GEL Certifications as of 06 December 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	SC000122017-24
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# **Chain of Custody and Supporting Documentation**



[illegible]

Special Instructions:					
Relinquished by: <i>M. Eder</i>	Print Name: <i>MATT ENGERT</i>	Date/Time: <i>11-9-17 1500</i>	Received by: <i>[Signature]</i>	Print Name: <i>Zoe Worsley</i>	Date/Time: <i>11/10/17 8:53</i>
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:



Laboratories LLC

## SAMPLE RECEIPT &amp; REVIEW FORM

Client: <u>ESUL</u>		SDG/AR/COC/Work Order: <u>437612</u>	
Received By: <u>ZKW</u>		Date Received: <u>11/10/17</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>See Attached for tracking #'s and Temps</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> <u>CPM</u> mR/Hr Classified as: Rad 1   Rad 2   Rad 3	
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. PCB's   Flammable   Foreign Soil   RCRA   Asbestos   Beryllium   Other: _____	
Sample Receipt Criteria		Yes	NA
1 Shipping containers received intact and sealed?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
2 Chain of custody documents included with shipment?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		<input checked="" type="checkbox"/>	<input type="checkbox"/>
4 Daily check performed and passed on IR temperature gun?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
5 Sample containers intact and sealed?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
6 Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
7 Do any samples require Volatile Analysis?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
8 Samples received within holding time?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
9 Sample ID's on COC match ID's on bottles?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
10 Date & time on COC match date & time on bottles?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
11 Number of containers received match number indicated on COC?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
12 Are sample containers identifiable as GEL provided?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
13 COC form is properly signed in relinquished/received sections?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments (Use Continuation Form if needed): <u>* We read 2 vials for CAMO-18-148109 collected 11/8 @ 10:07 for WSP-N15/018-NO<sub>3</sub></u>			

PM (or PMA) review: Initials

JBDate 11-10-2017Page 1 of 1

GL-CHL-SR-001 Rev 5

63024 001 0040 000

SHIP DATE: 09NOV17  
ACTWGT: 47.0 LB MAN  
CAD: 0014176/CAFE2916

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

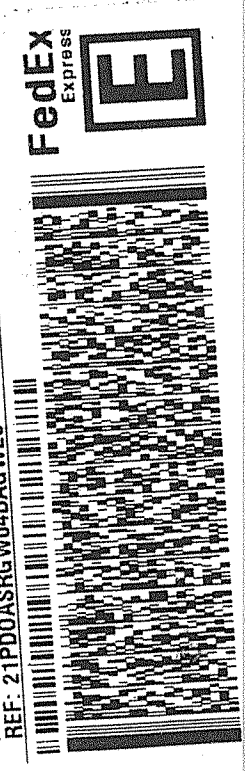
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TO VALERIE DAVIS  
GENERAL ENGINEERING LAB  
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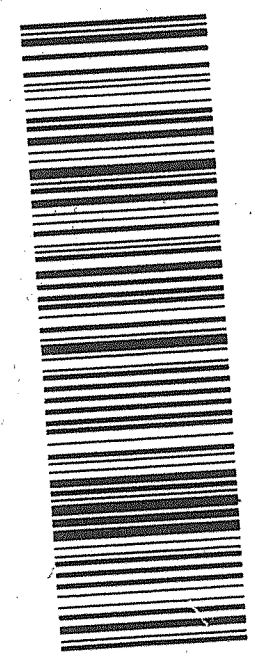
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(843) 556-8171  
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Mstr# 5908 1783 1695  
**X7 RBWA**  
29407  
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Part # 156148V-434 RIT2 08/15

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

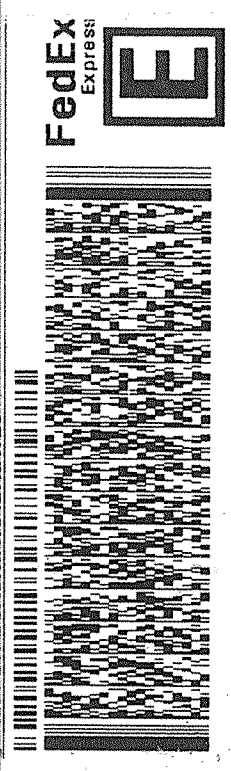
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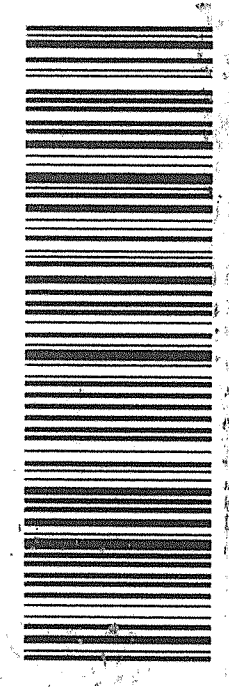
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## MASTER ##  
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SC-US CHS



Part # 156148V-434 RIT2 08/15

Part 4

Page # 156148V-434 P1T2 06/15 08

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BILL SENDER

ORIGIN ID: SAFA (505) 665-9966

KEITH GREENE  
LOS ALAMOS NATL LAB  
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545  
UNITED STATES US

TO VALERIE DAVIS

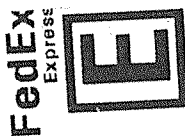
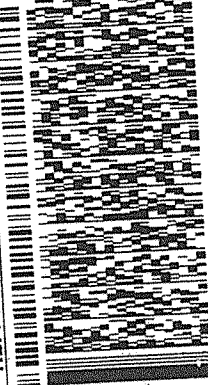
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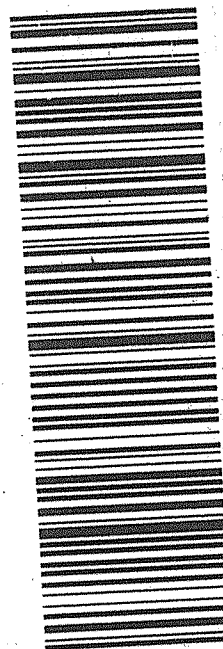
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SC-US CHS

X7 RBWA



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BILL SENDER

ORIGIN ID: SAFA (505) 665-9966

KEITH GREENE  
LOS ALAMOS NATL LAB  
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545  
UNITED STATES US

TO VALERIE DAVIS

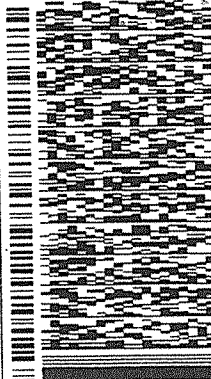
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3 of 3

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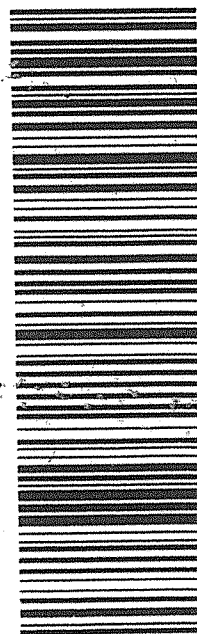
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29407  
SC-US CHS

X7 RBWA



Part # 156148V-434 R1T2 06/15 93



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KEITH GREENE  
LOS ALAMOS NATL LAB.  
TA00 BLDG 1237 DPU 03  
LOS ALAMOS, NM 87545  
UNITED STATES US

SHIP DATE: 09NOV17  
ACTWGT: 49.0 LB MAN  
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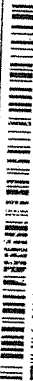
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GENERAL ENGINEERING LAB  
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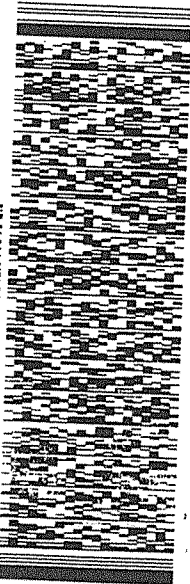
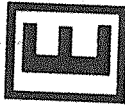
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REF: 21PD0ASRGW04BAGWEO



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2 of 3

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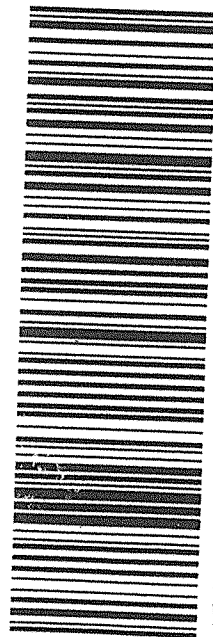
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Part # 156148V-434 R1T2 08/15 88

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LOS ALAMOS NATL LAB.  
TA00 BLDG 1237 DPU 03  
LOS ALAMOS, NM 87545  
UNITED STATES US

SHIP DATE: 09NOV17  
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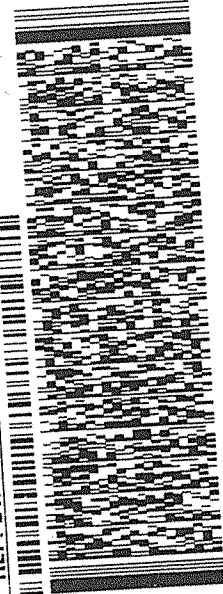
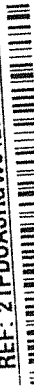
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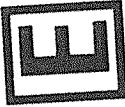
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2 of 3

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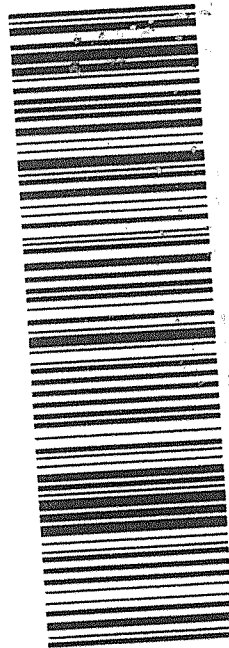
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Part # 156148V-434 R1T2 08/15 88

18c

3c

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: 09NOV17  
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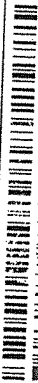
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GENERAL ENGINEERING LAB  
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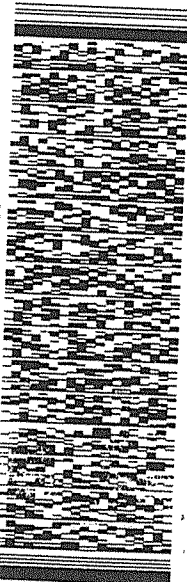
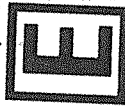
CHARLESTON SC 29407

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REF: 21PD0ASRGW04BAGWE0



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2 of 3

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Mstr# 5908 1783 1732

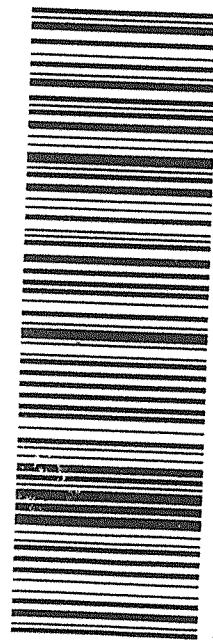
X7 RBWA

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PRIORITY OVERNIGHT



Part # 156148V-434 RIT2 06/15 83

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: 09NOV17  
ACTWGT: 54.0 LB MAN  
CAD: 0014176/CAFE2916

BILL SENDER

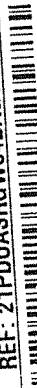
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GENERAL ENGINEERING LAB  
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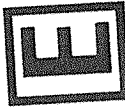
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REF: 21PD0ASRGW04BAGWE0



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2 of 3

MPS# 5908 1783 1700

Mstr# 5908 1783 1695

X7 RBWA

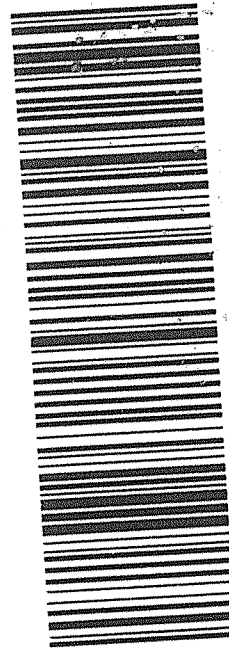
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Part # 156148V-434 RIT2 06/15 83

# **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 #: 2018-828  
Work Order #: 437612**

**Method/Analysis Information**

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

Analytical Method: SW-846:8260B

Analytical Batch Number: 1720463

**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>
437612003	CASA-18-147998
437612004	CASA-18-148016
437612007	CAMO-18-148116
437612009	CAMO-18-148556
1203923768	Method Blank (MB)
1203923769	Laboratory Control Sample (LCS)
1203923770	Laboratory Control Sample (LCS)
1203923771	437515002(CAMO-18-148075) Post Spike (PS)
1203923772	437515002(CAMO-18-148075) Post Spike (PS)
1203923773	437515002(CAMO-18-148075) Post Spike Duplicate (PSD)
1203923774	437515002(CAMO-18-148075) Post Spike Duplicate (PSD)
1203925355	Method Blank (MB)
1203925356	Laboratory Control Sample (LCS)
1203925357	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 437515002 (CAMO-18-148075) 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>
VOA1.I	Hewlett Packard 5973 GC/MS w/ OI 4560/Archon Autosampler	HP6890/HP5973	RTX-624	Restek, 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: 2018-828 GEL Work Order: 437612

#### 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: 06 DEC 2017

Title: Data Validator



# **Sample Data Summary**

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

Page 1 of 3

**SDG Number:** 2018-828  
**Lab Sample ID:** 437612003  
**Client Sample:** VOA,SVOA  
**Client ID:** CASA-18-147998  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 11:37  
**Prep Date:** 11/19/2017 11:37  
**Data File:** 111817V1\11645.D

**Date Collected:** 11/08/2017 10:45  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
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**

Page 2 of 3

**SDG Number:** 2018-828  
**Lab Sample ID:** 437612003  
**Client Sample:** VOA,SVOA  
**Client ID:** CASA-18-147998  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 11:37  
**Prep Date:** 11/19/2017 11:37  
**Data File:** 111817V1\11645.D

**Date Collected:** 11/08/2017 10:45  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
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> 2018-828	<b>Date Collected:</b> 11/08/2017 10:45	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 437612003	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> VOA,SVOA	<b>Client:</b> ARSL004	<b>Project:</b> ESHL00114
<b>Client ID:</b> CASA-18-147998	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/19/2017 11:37	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/19/2017 11:37		
<b>Data File:</b> 111817V1\11645.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	50.5	50.0	ug/L 101	(71%-134%)
Bromofluorobenzene	59.1	50.0	ug/L 118	(70%-131%)
Toluene-d8	46.4	50.0	ug/L 93	(74%-124%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
No Tentatively Identified Compounds Found				ug/L		

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

Page 1 of 3

**SDG Number:** 2018-828  
**Lab Sample ID:** 437612004  
**Client Sample:** VOA  
**Client ID:** CASA-18-148016  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 07:16  
**Prep Date:** 11/19/2017 07:16  
**Data File:** 111817V1\11636.D

**Date Collected:** 11/08/2017 10:45  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
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**

Page 2 of 3

**SDG Number:** 2018-828  
**Lab Sample ID:** 437612004  
**Client Sample:** VOA  
**Client ID:** CASA-18-148016  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 07:16  
**Prep Date:** 11/19/2017 07:16  
**Data File:** 111817V1\11636.D

**Date Collected:** 11/08/2017 10:45  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
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> 2018-828	<b>Date Collected:</b> 11/08/2017 10:45	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 437612004	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> VOA	<b>Client:</b> ARSL004	<b>Project:</b> ESHL00114
<b>Client ID:</b> CASA-18-148016	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/19/2017 07:16	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/19/2017 07:16		
<b>Data File:</b> 111817V1\11636.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	49.0	50.0	ug/L 98	(71%-134%)
Bromofluorobenzene	60.3	50.0	ug/L 121	(70%-131%)
Toluene-d8	45.2	50.0	ug/L 90	(74%-124%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown siloxane	14.549	6.06	ug/L	0	J

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

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**SDG Number:** 2018-828  
**Lab Sample ID:** 437612007  
**Client Sample:** VOA,SVOA  
**Client ID:** CAMO-18-148116  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 12:06  
**Prep Date:** 11/19/2017 12:06  
**Data File:** 111817V1\11646.D

**Date Collected:** 11/08/2017 12:12  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
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**

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**SDG Number:** 2018-828  
**Lab Sample ID:** 437612007  
**Client Sample:** VOA,SVOA  
**Client ID:** CAMO-18-148116  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 12:06  
**Prep Date:** 11/19/2017 12:06  
**Data File:** 111817V1\11646.D

**Date Collected:** 11/08/2017 12:12  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
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>	<b>2018-828</b>	<b>Date Collected:</b>	<b>11/08/2017 12:12</b>	<b>Matrix:</b>	<b>W</b>
<b>Lab Sample ID:</b>	<b>437612007</b>	<b>Date Received:</b>	<b>11/10/2017 08:55</b>		
<b>Client Sample:</b>	<b>VOA,SVOA</b>	<b>Client:</b>	<b>ARSL004</b>	<b>Project:</b>	<b>ESHL00114</b>
<b>Client ID:</b>	<b>CAMO-18-148116</b>	<b>Method:</b>	<b>SW-846:8260B</b>	<b>SOP Ref:</b>	<b>GL-OA-E-038</b>
<b>Batch ID:</b>	<b>1720463</b>	<b>Inst:</b>	<b>VOA1.I</b>	<b>Dilution:</b>	<b>1</b>
<b>Run Date:</b>	<b>11/19/2017 12:06</b>	<b>Analyst:</b>	<b>PXY1</b>	<b>Purge Vol:</b>	<b>5 mL</b>
<b>Prep Date:</b>	<b>11/19/2017 12:06</b>				
<b>Data File:</b>	<b>111817V1\11646.D</b>	<b>Column:</b>	<b>DB-624</b>		

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	49.0	50.0	ug/L 98	(71%-134%)
Bromofluorobenzene	59.9	50.0	ug/L 120	(70%-131%)
Toluene-d8	45.4	50.0	ug/L 91	(74%-124%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
No Tentatively Identified Compounds Found				ug/L		

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

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**SDG Number:** 2018-828  
**Lab Sample ID:** 437612009  
**Client Sample:** VOA  
**Client ID:** CAMO-18-148556  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 07:44  
**Prep Date:** 11/19/2017 07:44  
**Data File:** 111817V1\11637.D

**Date Collected:** 11/08/2017 12:12  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
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**

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**SDG Number:** 2018-828  
**Lab Sample ID:** 437612009  
**Client Sample:** VOA  
**Client ID:** CAMO-18-148556  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 07:44  
**Prep Date:** 11/19/2017 07:44  
**Data File:** 111817V1\11637.D

**Date Collected:** 11/08/2017 12:12  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
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> 2018-828	<b>Date Collected:</b> 11/08/2017 12:12	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 437612009	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> VOA	<b>Client:</b> ARSL004	<b>Project:</b> ESHL00114
<b>Client ID:</b> CAMO-18-148556	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/19/2017 07:44	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/19/2017 07:44		
<b>Data File:</b> 111817V1\11637.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	48.7	50.0	ug/L 97	(71%-134%)
Bromofluorobenzene	60.6	50.0	ug/L 121	(70%-131%)
Toluene-d8	46.1	50.0	ug/L 92	(74%-124%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
No Tentatively Identified Compounds Found				ug/L		

# **Quality Control Summary**

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

Page 1 of 1

**SDG Number: 2018-828****Matrix Type: LIQUID**

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203923769	LCS for batch 1720463	90	93	105
1203923770	LCS for batch 1720463	89	91	109
1203923768	MB for batch 1720463	88	91	112
437612004	CASA-18-148016	98	90	121
437612009	CAMO-18-148556	97	92	121
437612003	CASA-18-147998	101	93	118
437612007	CAMO-18-148116	98	91	120
1203925356	LCS for batch 1720463	93	90	106
1203925357	LCS for batch 1720463	89	90	109
1203925355	MB for batch 1720463	90	92	113
1203923771	CAMO-18-148075PS	93	91	105
1203923773	CAMO-18-148075PSD	89	91	105
1203923772	CAMO-18-148075PS	89	90	108
1203923774	CAMO-18-148075PSD	89	91	109

**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 4

SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720463

Matrix: WATER

Lab Sample ID 1203923769

Instrument: VOA1.I

Analysis Date: 11/19/2017 03:24

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	96.4	96	71-127
75-05-8	LCS Acetonitrile	1250	0.0	1260	100	61-125
67-64-1	LCS Acetone	250	0.0	201	80	48-157
74-88-4	LCS Iodomethane	250	0.0	251	101	72-128
75-15-0	LCS Carbon disulfide	250	0.0	241	96	69-138
108-05-4	LCS Vinyl acetate	250	0.0	252	101	67-125
78-93-3	LCS 2-Butanone	250	0.0	214	86	55-138
108-10-1	LCS 4-Methyl-2-pentanone	250	0.0	234	93	66-124
591-78-6	LCS 2-Hexanone	250	0.0	202	81	56-140
75-71-8	LCS Dichlorodifluoromethane	50.0	0.0	50.3	101	40-160
74-87-3	LCS Chloromethane	50.0	0.0	51.7	103	58-135
75-01-4	LCS Vinyl chloride	50.0	0.0	50.4	101	65-137
74-83-9	LCS Bromomethane	50.0	0.0	52.3	105	63-137
75-00-3	LCS Chloroethane	50.0	0.0	46.8	94	69-129
75-69-4	LCS Trichlorofluoromethane	50.0	0.0	46.4	93	69-138
60-29-7	LCS Ethyl ether	50.0	0.0	53.6	107	72-125
75-35-4	LCS 1,1-Dichloroethylene	50.0	0.0	51.7	103	66-126
75-09-2	LCS Methylene chloride	50.0	0.0	53.6	107	68-119
1634-04-4	LCS tert-Butyl methyl ether	50.0	0.0	58.3	117	76-128
156-60-5	LCS trans-1,2-Dichloroethylene	50.0	0.0	53.0	106	71-124
75-34-3	LCS 1,1-Dichloroethane	50.0	0.0	53.1	106	73-123
156-59-2	LCS cis-1,2-Dichloroethylene	50.0	0.0	54.5	109	75-123

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 2 of 4

SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720463

Matrix: WATER

Lab Sample ID 1203923769

Instrument: VOA1.I

Analysis Date: 11/19/2017 03:24

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	51.1	102	72-138
74-97-5	LCS Bromochloromethane	50.0	0.0	54.1	108	76-125
67-66-3	LCS Chloroform	50.0	0.0	52.7	105	76-123
71-55-6	LCS 1,1,1-Trichloroethane	50.0	0.0	50.5	101	74-136
563-58-6	LCS 1,1-Dichloropropene	50.0	0.0	49.6	99	72-129
56-23-5	LCS Carbon tetrachloride	50.0	0.0	50.6	101	72-140
107-06-2	LCS 1,2-Dichloroethane	50.0	0.0	55.1	110	74-122
71-43-2	LCS Benzene	50.0	0.0	49.8	100	72-121
79-01-6	LCS Trichloroethylene	50.0	0.0	52.5	105	74-125
78-87-5	LCS 1,2-Dichloropropane	50.0	0.0	52.4	105	73-121
74-95-3	LCS Dibromomethane	50.0	0.0	55.4	111	78-123
75-27-4	LCS Bromodichloromethane	50.0	0.0	55.2	110	77-131
10061-01-5	LCS cis-1,3-Dichloropropylene	50.0	0.0	55.9	112	78-131
108-88-3	LCS Toluene	50.0	0.0	47.7	95	71-121
10061-02-6	LCS trans-1,3-Dichloropropylene	50.0	0.0	55.8	112	78-131
79-00-5	LCS 1,1,2-Trichloroethane	50.0	0.0	51.2	102	74-118
142-28-9	LCS 1,3-Dichloropropane	50.0	0.0	51.5	103	74-118
127-18-4	LCS Tetrachloroethylene	50.0	0.0	46.6	93	69-129
124-48-1	LCS Dibromochloromethane	50.0	0.0	54.9	110	76-137
106-93-4	LCS 1,2-Dibromoethane	50.0	0.0	54.1	108	78-122
108-90-7	LCS Chlorobenzene	50.0	0.0	49.0	98	74-120
100-41-4	LCS Ethylbenzene	50.0	0.0	48.2	96	73-125

Volatile  
Quality Control Summary  
Spike Recovery Report

SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720463

Matrix: WATER

Lab Sample ID 1203923769

Instrument: VOA1.I

Analysis Date: 11/19/2017 03:24

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	50.7	101	74-126
100-42-5	LCS Styrene	50.0	0.0	51.7	103	72-130
75-25-2	LCS Bromoform	50.0	0.0	54.7	109	72-136
98-82-8	LCS Isopropylbenzene	50.0	0.0	47.5	95	70-130
79-34-5	LCS 1,1,2,2-Tetrachloroethane	50.0	0.0	49.1	98	70-126
96-18-4	LCS 1,2,3-Trichloropropane	50.0	0.0	51.7	103	74-122
108-86-1	LCS Bromobenzene	50.0	0.0	48.6	97	74-120
103-65-1	LCS n-Propylbenzene	50.0	0.0	45.1	90	67-128
108-67-8	LCS 1,3,5-Trimethylbenzene	50.0	0.0	47.8	96	70-129
95-49-8	LCS 2-Chlorotoluene	50.0	0.0	47.3	95	71-124
106-43-4	LCS 4-Chlorotoluene	50.0	0.0	47.3	95	69-125
98-06-6	LCS tert-Butylbenzene	50.0	0.0	49.1	98	72-130
95-63-6	LCS 1,2,4-Trimethylbenzene	50.0	0.0	48.3	97	70-126
135-98-8	LCS sec-Butylbenzene	50.0	0.0	47.4	95	70-131
99-87-6	LCS 4-Isopropyltoluene	50.0	0.0	48.5	97	71-131
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	45.8	92	72-121
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	46.4	93	71-120
104-51-8	LCS n-Butylbenzene	50.0	0.0	48.3	97	68-134
96-12-8	LCS 1,2-Dibromo-3-chloropropane	50.0	0.0	48.5	97	68-141
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	51.6	103	72-136
91-20-3	LCS Naphthalene	50.0	0.0	52.6	105	72-132
87-61-6	LCS 1,2,3-Trichlorobenzene	50.0	0.0	52.5	105	70-130



Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720463

Matrix: WATER

Lab Sample ID 1203923769

Instrument: VOA1.I

Analysis Date: 11/19/2017 03:24

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	54.6	109	71-129
630-20-6	LCS 1,1,1,2-Tetrachloroethane	50.0	0.0	54.2	108	79-127
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	48.7	97	74-120
71-36-3	LCS n-Butyl alcohol	5000	0.0	5510	110	63-138

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 1 of 1

SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720463

Matrix: WATER

Lab Sample ID 1203923770

Instrument: VOA1.I

Analysis Date: 11/19/2017 04:22

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	214	86	60-140
76-13-1	LCS	Trichlorotrifluoroethane	250	0.0	198	79	61-148
107-05-1	LCS	Allyl chloride	250	0.0	220	88	59-125
107-13-1	LCS	Acrylonitrile	250	0.0	232	93	65-122
107-12-0	LCS	Propionitrile	250	0.0	223	89	64-124
126-98-7	LCS	Methacrylonitrile	250	0.0	229	92	64-126
80-62-6	LCS	Methyl methacrylate	250	0.0	233	93	69-127
97-63-2	LCS	Ethyl methacrylate	250	0.0	213	85	66-130
78-83-1	LCS	Isobutyl alcohol	2500	0.0	2400	96	65-135
126-99-8	LCS	2-Chloro-1,3-butadiene	50.0	0.0	42.4	85	66-147

Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Post Spike

Client ID: CAMO-18-148075PS

Matrix: W

Lab Sample ID 1203923771

Instrument: VOA1.I

Analysis Date: 11/19/2017 19:27

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	101	101	59-132
75-05-8	PS Acetonitrile	1250	0.00 U	1230	99	56-131
67-64-1	PS Acetone	250	0.00 U	118	47	25-155
74-88-4	PS Iodomethane	250	0.00 U	257	103	66-133
75-15-0	PS Carbon disulfide	250	0.00 U	256	103	61-141
108-05-4	PS Vinyl acetate	250	0.00 U	251	100	48-133
78-93-3	PS 2-Butanone	250	0.00 U	161	64	25-143
108-10-1	PS 4-Methyl-2-pentanone	250	0.00 U	241	96	61-127
591-78-6	PS 2-Hexanone	250	0.00 U	190	76	33-138
75-71-8	PS Dichlorodifluoromethane	50.0	0.00 U	58.6	117	33-164
74-87-3	PS Chloromethane	50.0	0.00 U	51.7	103	53-139
75-01-4	PS Vinyl chloride	50.0	0.00 U	53.7	107	58-140
74-83-9	PS Bromomethane	50.0	0.00 U	55.7	111	59-146
75-00-3	PS Chloroethane	50.0	0.00 U	47.3	95	65-129
75-69-4	PS Trichlorofluoromethane	50.0	0.00 U	55.3	111	65-141
60-29-7	PS Ethyl ether	50.0	0.00 U	50.2	100	69-127
75-35-4	PS 1,1-Dichloroethylene	50.0	0.00 U	55.8	112	59-130
75-09-2	PS Methylene chloride	50.0	0.00 U	52.7	105	62-123
1634-04-4	PS tert-Butyl methyl ether	50.0	0.00 U	54.3	109	69-132
156-60-5	PS trans-1,2-Dichloroethylene	50.0	0.00 U	56.5	113	65-127
75-34-3	PS 1,1-Dichloroethane	50.0	0.00 U	53.9	108	67-127
156-59-2	PS cis-1,2-Dichloroethylene	50.0	0.00 U	55.1	110	69-127

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 2 of 8

SDG Number: 2018-828

Sample Type: Post Spike

Client ID: CAMO-18-148075PS

Matrix: W

Lab Sample ID 1203923771

Instrument: VOA1.I

Analysis Date: 11/19/2017 19:27

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	56.9	114	66-137
74-97-5	PS Bromochloromethane	50.0	0.00 U	53.7	107	71-130
67-66-3	PS Chloroform	50.0	0.00 U	55.5	111	71-129
71-55-6	PS 1,1,1-Trichloroethane	50.0	0.00 U	55.9	112	69-139
563-58-6	PS 1,1-Dichloropropene	50.0	0.00 U	55.0	110	67-130
56-23-5	PS Carbon tetrachloride	50.0	0.00 U	60.0	120	66-143
107-06-2	PS 1,2-Dichloroethane	50.0	0.00 U	60.6	121	69-130
71-43-2	PS Benzene	50.0	0.00 U	52.0	104	66-125
79-01-6	PS Trichloroethylene	50.0	0.00 U	57.1	114	65-131
78-87-5	PS 1,2-Dichloropropane	50.0	0.00 U	52.9	106	67-127
74-95-3	PS Dibromomethane	50.0	0.00 U	57.6	115	72-129
75-27-4	PS Bromodichloromethane	50.0	0.00 U	58.8	118	70-138
10061-01-5	PS cis-1,3-Dichloropropylene	50.0	0.00 U	55.9	112	70-134
108-88-3	PS Toluene	50.0	0.00 U	49.1	98	60-126
10061-02-6	PS trans-1,3-Dichloropropylene	50.0	0.00 U	56.2	112	69-135
79-00-5	PS 1,1,2-Trichloroethane	50.0	0.00 U	51.4	103	66-125
142-28-9	PS 1,3-Dichloropropane	50.0	0.00 U	51.1	102	67-124
127-18-4	PS Tetrachloroethylene	50.0	0.00 U	50.5	101	60-130
124-48-1	PS Dibromochloromethane	50.0	0.00 U	56.6	113	68-143
106-93-4	PS 1,2-Dibromoethane	50.0	0.00 U	54.0	108	71-127
108-90-7	PS Chlorobenzene	50.0	0.00 U	49.6	99	64-124
100-41-4	PS Ethylbenzene	50.0	0.00 U	51.5	103	61-130

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 3 of 8

SDG Number: 2018-828

Sample Type: Post Spike

Client ID: CAMO-18-148075PS

Matrix: W

Lab Sample ID 1203923771

Instrument: VOA1.I

Analysis Date: 11/19/2017 19:27

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	52.8	106	62-131
100-42-5	PS Styrene	50.0	0.00 U	52.6	105	59-135
75-25-2	PS Bromoform	50.0	0.00 U	54.2	108	64-138
98-82-8	PS Isopropylbenzene	50.0	0.00 U	48.8	98	55-133
79-34-5	PS 1,1,2,2-Tetrachloroethane	50.0	0.00 U	47.7	95	62-129
96-18-4	PS 1,2,3-Trichloropropane	50.0	0.00 U	50.1	100	70-124
108-86-1	PS Bromobenzene	50.0	0.00 U	47.9	96	62-124
103-65-1	PS n-Propylbenzene	50.0	0.00 U	47.7	95	50-133
108-67-8	PS 1,3,5-Trimethylbenzene	50.0	0.00 U	49.4	99	53-135
95-49-8	PS 2-Chlorotoluene	50.0	0.00 U	47.7	95	56-128
106-43-4	PS 4-Chlorotoluene	50.0	0.00 U	47.6	95	53-130
98-06-6	PS tert-Butylbenzene	50.0	0.00 U	50.9	102	55-135
95-63-6	PS 1,2,4-Trimethylbenzene	50.0	0.00 U	49.6	99	53-132
135-98-8	PS sec-Butylbenzene	50.0	0.00 U	49.7	99	50-138
99-87-6	PS 4-Isopropyltoluene	50.0	0.00 U	50.8	102	49-138
541-73-1	PS 1,3-Dichlorobenzene	50.0	0.00 U	46.0	92	56-126
106-46-7	PS 1,4-Dichlorobenzene	50.0	0.00 U	46.4	93	55-125
104-51-8	PS n-Butylbenzene	50.0	0.00 U	50.9	102	43-142
96-12-8	PS 1,2-Dibromo-3-chloropropane	50.0	0.00 U	46.8	94	62-141
87-68-3	PS Hexachlorobutadiene	50.0	0.00 U	52.0	104	40-147
91-20-3	PS Naphthalene	50.0	0.00 U	50.4	101	62-134
87-61-6	PS 1,2,3-Trichlorobenzene	50.0	0.00 U	50.8	102	52-135

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 4 of 8

SDG Number: 2018-828

Sample Type: Post Spike

Client ID: CAMO-18-148075PS

Matrix: W

Lab Sample ID 1203923771

Instrument: VOA1.I

Analysis Date: 11/19/2017 19:27

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	53.9	108	50-133
630-20-6	PS	1,1,1,2-Tetrachloroethane	50.0	0.00	U	55.8	112	71-133
95-50-1	PS	1,2-Dichlorobenzene	50.0	0.00	U	47.9	96	60-125
71-36-3	PS	n-Butyl alcohol	5000	0.00	U	5450	109	60-140

Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Post Spike Duplicate

Client ID: CAMO-18-148075PSD

Matrix: W

Lab Sample ID 1203923773

Instrument: VOA1.I

Analysis Date: 11/19/2017 19:56

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	102	102	59-132	1	0-20
75-05-8	PSD Acetonitrile	1250	0.00 U	1180	95	56-131	4	0-20
67-64-1	PSD Acetone	250	0.00 U	110	44	25-155	7	0-20
74-88-4	PSD Iodomethane	250	0.00 U	258	103	66-133	1	0-20
75-15-0	PSD Carbon disulfide	250	0.00 U	256	102	61-141	0	0-20
108-05-4	PSD Vinyl acetate	250	0.00 U	241	96	48-133	4	0-20
78-93-3	PSD 2-Butanone	250	0.00 U	149	60	25-143	7	0-20
108-10-1	PSD 4-Methyl-2-pentanone	250	0.00 U	226	90	61-127	6	0-20
591-78-6	PSD 2-Hexanone	250	0.00 U	176	70	33-138	8	0-20
75-71-8	PSD Dichlorodifluoromethane	50.0	0.00 U	60.3	121	33-164	3	0-20
74-87-3	PSD Chloromethane	50.0	0.00 U	54.2	108	53-139	5	0-20
75-01-4	PSD Vinyl chloride	50.0	0.00 U	55.5	111	58-140	3	0-20
74-83-9	PSD Bromomethane	50.0	0.00 U	57.0	114	59-146	2	0-20
75-00-3	PSD Chloroethane	50.0	0.00 U	49.3	99	65-129	4	0-20
75-69-4	PSD Trichlorofluoromethane	50.0	0.00 U	55.9	112	65-141	1	0-20
60-29-7	PSD Ethyl ether	50.0	0.00 U	51.2	102	69-127	2	0-20
75-35-4	PSD 1,1-Dichloroethylene	50.0	0.00 U	55.5	111	59-130	0	0-20
75-09-2	PSD Methylene chloride	50.0	0.00 U	53.4	107	62-123	1	0-20
1634-04-4	PSD tert-Butyl methyl ether	50.0	0.00 U	54.3	109	69-132	0	0-20
156-60-5	PSD trans-1,2-Dichloroethylene	50.0	0.00 U	56.3	113	65-127	0	0-20
75-34-3	PSD 1,1-Dichloroethane	50.0	0.00 U	54.7	109	67-127	1	0-20
156-59-2	PSD cis-1,2-Dichloroethylene	50.0	0.00 U	55.5	111	69-127	1	0-20

Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Post Spike Duplicate

Client ID: CAMO-18-148075PSD

Matrix: W

Lab Sample ID 1203923773

Instrument: VOA1.I

Analysis Date: 11/19/2017 19:56

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	56.5	113	66-137	1	0-20
74-97-5	PSD Bromochloromethane	50.0	0.00 U	53.6	107	71-130	0	0-20
67-66-3	PSD Chloroform	50.0	0.00 U	54.3	109	71-129	2	0-20
71-55-6	PSD 1,1,1-Trichloroethane	50.0	0.00 U	54.9	110	69-139	2	0-20
563-58-6	PSD 1,1-Dichloropropene	50.0	0.00 U	54.2	108	67-130	1	0-20
56-23-5	PSD Carbon tetrachloride	50.0	0.00 U	57.9	116	66-143	3	0-20
107-06-2	PSD 1,2-Dichloroethane	50.0	0.00 U	57.3	115	69-130	6	0-20
71-43-2	PSD Benzene	50.0	0.00 U	51.6	103	66-125	1	0-20
79-01-6	PSD Trichloroethylene	50.0	0.00 U	56.1	112	65-131	2	0-20
78-87-5	PSD 1,2-Dichloropropane	50.0	0.00 U	53.4	107	67-127	1	0-20
74-95-3	PSD Dibromomethane	50.0	0.00 U	55.2	110	72-129	4	0-20
75-27-4	PSD Bromodichloromethane	50.0	0.00 U	56.9	114	70-138	3	0-20
10061-01-5	PSD cis-1,3-Dichloropropylene	50.0	0.00 U	55.0	110	70-134	2	0-20
108-88-3	PSD Toluene	50.0	0.00 U	48.5	97	60-126	1	0-20
10061-02-6	PSD trans-1,3-Dichloropropylene	50.0	0.00 U	55.5	111	69-135	1	0-20
79-00-5	PSD 1,1,2-Trichloroethane	50.0	0.00 U	50.9	102	66-125	1	0-20
142-28-9	PSD 1,3-Dichloropropane	50.0	0.00 U	50.2	100	67-124	2	0-20
127-18-4	PSD Tetrachloroethylene	50.0	0.00 U	50.4	101	60-130	0	0-20
124-48-1	PSD Dibromochloromethane	50.0	0.00 U	55.6	111	68-143	2	0-20
106-93-4	PSD 1,2-Dibromoethane	50.0	0.00 U	52.4	105	71-127	3	0-20
108-90-7	PSD Chlorobenzene	50.0	0.00 U	49.4	99	64-124	1	0-20
100-41-4	PSD Ethylbenzene	50.0	0.00 U	50.7	101	61-130	2	0-20



Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Post Spike Duplicate

Client ID: CAMO-18-148075PSD

Matrix: W

Lab Sample ID 1203923773

Instrument: VOA1.I

Analysis Date: 11/19/2017 19:56

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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 51.7	103	62-131	2	0-20
100-42-5	PSD Styrene	50.0	0.00	U 51.4	103	59-135	2	0-20
75-25-2	PSD Bromoform	50.0	0.00	U 53.1	106	64-138	2	0-20
98-82-8	PSD Isopropylbenzene	50.0	0.00	U 49.4	99	55-133	1	0-20
79-34-5	PSD 1,1,2,2-Tetrachloroethane	50.0	0.00	U 46.3	93	62-129	3	0-20
96-18-4	PSD 1,2,3-Trichloropropane	50.0	0.00	U 49.2	98	70-124	2	0-20
108-86-1	PSD Bromobenzene	50.0	0.00	U 48.5	97	62-124	1	0-20
103-65-1	PSD n-Propylbenzene	50.0	0.00	U 48.8	98	50-133	2	0-20
108-67-8	PSD 1,3,5-Trimethylbenzene	50.0	0.00	U 50.3	101	53-135	2	0-20
95-49-8	PSD 2-Chlorotoluene	50.0	0.00	U 49.0	98	56-128	3	0-20
106-43-4	PSD 4-Chlorotoluene	50.0	0.00	U 48.2	96	53-130	1	0-20
98-06-6	PSD tert-Butylbenzene	50.0	0.00	U 53.1	106	55-135	4	0-20
95-63-6	PSD 1,2,4-Trimethylbenzene	50.0	0.00	U 50.1	100	53-132	1	0-20
135-98-8	PSD sec-Butylbenzene	50.0	0.00	U 50.7	101	50-138	2	0-20
99-87-6	PSD 4-Isopropyltoluene	50.0	0.00	U 52.0	104	49-138	2	0-20
541-73-1	PSD 1,3-Dichlorobenzene	50.0	0.00	U 46.9	94	56-126	2	0-20
106-46-7	PSD 1,4-Dichlorobenzene	50.0	0.00	U 47.1	94	55-125	2	0-20
104-51-8	PSD n-Butylbenzene	50.0	0.00	U 51.8	104	43-142	2	0-20
96-12-8	PSD 1,2-Dibromo-3-chloropropane	50.0	0.00	U 45.9	92	62-141	2	0-20
87-68-3	PSD Hexachlorobutadiene	50.0	0.00	U 54.7	109	40-147	5	0-20
91-20-3	PSD Naphthalene	50.0	0.00	U 51.3	103	62-134	2	0-20
87-61-6	PSD 1,2,3-Trichlorobenzene	50.0	0.00	U 51.6	103	52-135	2	0-20

Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Post Spike Duplicate

Client ID: CAMO-18-148075PSD

Matrix: W

Lab Sample ID 1203923773

Instrument: VOA1.I

Analysis Date: 11/19/2017 19:56

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

			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	54.7	109	50-133	1	0-20
630-20-6	PSD	1,1,1,2-Tetrachloroethane	50.0	0.00	U	54.8	110	71-133	2	0-20
95-50-1	PSD	1,2-Dichlorobenzene	50.0	0.00	U	48.4	97	60-125	1	0-20
71-36-3	PSD	n-Butyl alcohol	5000	0.00	U	5140	103	60-140	6	0-20

Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Post Spike

Client ID: CAMO-18-148075PS

Matrix: W

Lab Sample ID 1203923772

Instrument: VOA1.I

Analysis Date: 11/19/2017 20:25

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	212	85	49-141
76-13-1	PS	Trichlorotrifluoroethane	250	0.00	U	245	98	57-149
107-05-1	PS	Allyl chloride	250	0.00	U	236	95	54-128
107-13-1	PS	Acrylonitrile	250	0.00	U	231	93	59-129
107-12-0	PS	Propionitrile	250	0.00	U	222	89	58-131
126-98-7	PS	Methacrylonitrile	250	0.00	U	232	93	59-134
80-62-6	PS	Methyl methacrylate	250	0.00	U	235	94	62-135
97-63-2	PS	Ethyl methacrylate	250	0.00	U	215	86	60-136
78-83-1	PS	Isobutyl alcohol	2500	0.00	U	2370	95	60-143
126-99-8	PS	2-Chloro-1,3-butadiene	50.0	0.00	U	48.8	98	63-146

## Volatile

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Quality Control Summary  
Spike Recovery Report

SDG Number: 2018-828

Sample Type: Post Spike Duplicate

Client ID: CAMO-18-148075PSD

Matrix: W

Lab Sample ID 1203923774

Instrument: VOA1.I

Analysis Date: 11/19/2017 20:54

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

CAS No		Parmname	Amount Added ug/L	Sample Conc. ug/L		Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
107-02-8	PSD	Acrolein	250	0.00	U	215	86	49-141	1	0-20
76-13-1	PSD	Trichlorotrifluoroethane	250	0.00	U	256	102	57-149	4	0-20
107-05-1	PSD	Allyl chloride	250	0.00	U	243	97	54-128	3	0-20
107-13-1	PSD	Acrylonitrile	250	0.00	U	231	92	59-129	0	0-20
107-12-0	PSD	Propionitrile	250	0.00	U	225	90	58-131	1	0-20
126-98-7	PSD	Methacrylonitrile	250	0.00	U	233	93	59-134	1	0-20
80-62-6	PSD	Methyl methacrylate	250	0.00	U	236	94	62-135	1	0-20
97-63-2	PSD	Ethyl methacrylate	250	0.00	U	215	86	60-136	0	0-20
78-83-1	PSD	Isobutyl alcohol	2500	0.00	U	2420	97	60-143	2	0-20
126-99-8	PSD	2-Chloro-1,3-butadiene	50.0	0.00	U	49.3	99	63-146	1	0-20

Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720463

Matrix: WATER

Lab Sample ID 1203925356

Instrument: VOA1.I

Analysis Date: 11/19/2017 15:07

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	101	101	71-127
75-05-8	LCS Acetonitrile	1250	0.0	1190	95	61-125
67-64-1	LCS Acetone	250	0.0	270	108	48-157
74-88-4	LCS Iodomethane	250	0.0	255	102	72-128
75-15-0	LCS Carbon disulfide	250	0.0	253	101	69-138
108-05-4	LCS Vinyl acetate	250	0.0	261	104	67-125
78-93-3	LCS 2-Butanone	250	0.0	275	110	55-138
108-10-1	LCS 4-Methyl-2-pentanone	250	0.0	238	95	66-124
591-78-6	LCS 2-Hexanone	250	0.0	267	107	56-140
75-71-8	LCS Dichlorodifluoromethane	50.0	0.0	62.9	126	40-160
74-87-3	LCS Chloromethane	50.0	0.0	56.2	112	58-135
75-01-4	LCS Vinyl chloride	50.0	0.0	56.7	113	65-137
74-83-9	LCS Bromomethane	50.0	0.0	56.7	113	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	57.3	115	69-138
60-29-7	LCS Ethyl ether	50.0	0.0	52.6	105	72-125
75-35-4	LCS 1,1-Dichloroethylene	50.0	0.0	56.5	113	66-126
75-09-2	LCS Methylene chloride	50.0	0.0	52.7	105	68-119
1634-04-4	LCS tert-Butyl methyl ether	50.0	0.0	54.1	108	76-128
156-60-5	LCS trans-1,2-Dichloroethylene	50.0	0.0	55.7	111	71-124
75-34-3	LCS 1,1-Dichloroethane	50.0	0.0	54.6	109	73-123
156-59-2	LCS cis-1,2-Dichloroethylene	50.0	0.0	54.3	109	75-123

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 2 of 4

SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720463

Matrix: WATER

Lab Sample ID 1203925356

Instrument: VOA1.I

Analysis Date: 11/19/2017 15:07

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	59.7	119	72-138
74-97-5	LCS Bromochloromethane	50.0	0.0	52.2	104	76-125
67-66-3	LCS Chloroform	50.0	0.0	54.8	110	76-123
71-55-6	LCS 1,1,1-Trichloroethane	50.0	0.0	56.6	113	74-136
563-58-6	LCS 1,1-Dichloropropene	50.0	0.0	55.1	110	72-129
56-23-5	LCS Carbon tetrachloride	50.0	0.0	59.3	119	72-140
107-06-2	LCS 1,2-Dichloroethane	50.0	0.0	57.4	115	74-122
71-43-2	LCS Benzene	50.0	0.0	51.3	103	72-121
79-01-6	LCS Trichloroethylene	50.0	0.0	56.2	112	74-125
78-87-5	LCS 1,2-Dichloropropane	50.0	0.0	52.0	104	73-121
74-95-3	LCS Dibromomethane	50.0	0.0	55.2	110	78-123
75-27-4	LCS Bromodichloromethane	50.0	0.0	57.4	115	77-131
10061-01-5	LCS cis-1,3-Dichloropropylene	50.0	0.0	56.8	114	78-131
108-88-3	LCS Toluene	50.0	0.0	48.5	97	71-121
10061-02-6	LCS trans-1,3-Dichloropropylene	50.0	0.0	55.5	111	78-131
79-00-5	LCS 1,1,2-Trichloroethane	50.0	0.0	49.3	99	74-118
142-28-9	LCS 1,3-Dichloropropane	50.0	0.0	49.2	98	74-118
127-18-4	LCS Tetrachloroethylene	50.0	0.0	50.5	101	69-129
124-48-1	LCS Dibromochloromethane	50.0	0.0	54.4	109	76-137
106-93-4	LCS 1,2-Dibromoethane	50.0	0.0	51.7	103	78-122
108-90-7	LCS Chlorobenzene	50.0	0.0	48.7	97	74-120
100-41-4	LCS Ethylbenzene	50.0	0.0	51.1	102	73-125

Volatile  
Quality Control Summary  
Spike Recovery Report

SDG Number: 2018-828

Client ID: LCS for batch 1720463

Lab Sample ID 1203925356

Instrument: VOA1.I

Analyst: PXY1

Purge Vol: 5 mL

Sample Type: Laboratory Control Sample

Matrix: WATER

Analysis Date: 11/19/2017 15:07

Dilution: 1

Batch ID: 1720463

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	51.7	103	74-126
100-42-5	LCS Styrene	50.0	0.0	51.4	103	72-130
75-25-2	LCS Bromoform	50.0	0.0	54.1	108	72-136
98-82-8	LCS Isopropylbenzene	50.0	0.0	50.8	102	70-130
79-34-5	LCS 1,1,2,2-Tetrachloroethane	50.0	0.0	47.4	95	70-126
96-18-4	LCS 1,2,3-Trichloropropane	50.0	0.0	51.1	102	74-122
108-86-1	LCS Bromobenzene	50.0	0.0	49.1	98	74-120
103-65-1	LCS n-Propylbenzene	50.0	0.0	49.6	99	67-128
108-67-8	LCS 1,3,5-Trimethylbenzene	50.0	0.0	50.9	102	70-129
95-49-8	LCS 2-Chlorotoluene	50.0	0.0	49.4	99	71-124
106-43-4	LCS 4-Chlorotoluene	50.0	0.0	49.1	98	69-125
98-06-6	LCS tert-Butylbenzene	50.0	0.0	52.6	105	72-130
95-63-6	LCS 1,2,4-Trimethylbenzene	50.0	0.0	51.3	103	70-126
135-98-8	LCS sec-Butylbenzene	50.0	0.0	51.2	102	70-131
99-87-6	LCS 4-Isopropyltoluene	50.0	0.0	53.0	106	71-131
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	47.4	95	72-121
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	47.8	96	71-120
104-51-8	LCS n-Butylbenzene	50.0	0.0	53.9	108	68-134
96-12-8	LCS 1,2-Dibromo-3-chloropropane	50.0	0.0	46.8	94	68-141
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	57.6	115	72-136
91-20-3	LCS Naphthalene	50.0	0.0	50.7	101	72-132
87-61-6	LCS 1,2,3-Trichlorobenzene	50.0	0.0	53.1	106	70-130

Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720463

Matrix: WATER

Lab Sample ID 1203925356

Instrument: VOA1.I

Analysis Date: 11/19/2017 15:07

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	58.7	117	71-129
630-20-6	LCS 1,1,1,2-Tetrachloroethane	50.0	0.0	54.6	109	79-127
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	49.1	98	74-120
71-36-3	LCS n-Butyl alcohol	5000	0.0	5210	104	63-138



Volatile  
Quality Control Summary  
Spike Recovery Report

Page 1 of 1

SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720463

Matrix: WATER

Lab Sample ID 1203925357

Instrument: VOA1.I

Analysis Date: 11/19/2017 16:34

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720463

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	213	85	60-140
76-13-1	LCS	Trichlorotrifluoroethane	250	0.0	226	90	61-148
107-05-1	LCS	Allyl chloride	250	0.0	229	92	59-125
107-13-1	LCS	Acrylonitrile	250	0.0	226	91	65-122
107-12-0	LCS	Propionitrile	250	0.0	219	88	64-124
126-98-7	LCS	Methacrylonitrile	250	0.0	229	91	64-126
80-62-6	LCS	Methyl methacrylate	250	0.0	231	92	69-127
97-63-2	LCS	Ethyl methacrylate	250	0.0	210	84	66-130
78-83-1	LCS	Isobutyl alcohol	2500	0.0	2340	94	65-135
126-99-8	LCS	2-Chloro-1,3-butadiene	50.0	0.0	46.1	92	66-147

## Method Blank Summary

Page 1 of 1

SDG Number:	2018-828	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1720463	Instrument ID:	VOA1.I	Data File:	111817V1\11631A.D
Lab Sample ID:	1203923768	Prep Date:	11/19/2017 04:51	Analyzed:	11/19/17 04:51
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 1720463	1203923769	111817V1\11628A.D	11/19/17	0324
02 LCS for batch 1720463	1203923770	111817V1\11630A.D	11/19/17	0422
03 CASA-18-148016	437612004	111817V1\11636.D	11/19/17	0716
04 CAMO-18-148556	437612009	111817V1\11637.D	11/19/17	0744
05 CASA-18-147998	437612003	111817V1\11645.D	11/19/17	1137
06 CAMO-18-148116	437612007	111817V1\11646.D	11/19/17	1206

## Method Blank Summary

Page 1 of 1

SDG Number:	2018-828	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1720463	Instrument ID:	VOA1.I	Data File:	111917V1\11I707A.D
Lab Sample ID:	1203925355	Prep Date:	11/19/2017 17:03	Analyzed:	11/19/17 17:03
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
08 LCS for batch 1720463	1203925356	111917V1\11I703A.D	11/19/17	1507
09 LCS for batch 1720463	1203925357	111917V1\11I706A.D	11/19/17	1634
10 CAMO-18-148075PS	1203923771	111917V1\11I712.D	11/19/17	1927
11 CAMO-18-148075PSD	1203923773	111917V1\11I713.D	11/19/17	1956
12 CAMO-18-148075PS	1203923772	111917V1\11I714.D	11/19/17	2025
13 CAMO-18-148075PSD	1203923774	111917V1\11I715.D	11/19/17	2054

# Quality Control Data

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

Page 1 of 3

SDG Number: 2018-828

Lab Sample ID: 1203923768

Client Sample: QC for batch 1720463

Client ID: MB for batch 1720463

Batch ID: 1720463

Run Date: 11/19/2017 04:51

Prep Date: 11/19/2017 04:51

Data File: 111817V1\11631A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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	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:** 2018-828  
**Lab Sample ID:** 1203923768  
**Client Sample:** QC for batch 1720463  
**Client ID:** MB for batch 1720463  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 04:51  
**Prep Date:** 11/19/2017 04:51  
**Data File:** 111817V1\11631A.D

**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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	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> 2018-828	<b>Matrix:</b> WATER
<b>Lab Sample ID:</b> 1203923768	
<b>Client Sample:</b> QC for batch 1720463	<b>Client:</b> ARSL004
<b>Client ID:</b> MB for batch 1720463	<b>Method:</b> SW-846:8260B
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I
<b>Run Date:</b> 11/19/2017 04:51	<b>Analyst:</b> PXY1
<b>Prep Date:</b> 11/19/2017 04:51	<b>Project:</b> QC
<b>Data File:</b> 111817V1\11631A.D	<b>SOP Ref:</b> GL-OA-E-038
	<b>Dilution:</b> 1
	<b>Purge Vol:</b> 5 mL
	<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	44.1	50.0	ug/L 88	(71%-134%)
Bromofluorobenzene	56.0	50.0	ug/L 112	(70%-131%)
Toluene-d8	45.5	50.0	ug/L 91	(74%-124%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
No Tentatively Identified Compounds Found				ug/L		

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

Page 1 of 3

SDG Number: 2018-828

Lab Sample ID: 1203923769

Client Sample: QC for batch 1720463

Client ID: LCS for batch 1720463

Batch ID: 1720463

Run Date: 11/19/2017 03:24

Prep Date: 11/19/2017 03:24

Data File: 111817V1\11628A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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		54.2	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		50.5	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		49.1	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		51.2	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		53.1	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		51.7	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		49.6	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		52.5	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		51.7	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		54.6	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		48.3	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		48.5	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		54.1	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		48.7	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		52.4	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		47.8	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		45.8	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		51.5	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		46.4	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		51.1	ug/L	0.300	1.00
78-93-3	2-Butanone		214	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		47.3	ug/L	0.300	1.00
591-78-6	2-Hexanone		202	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		47.3	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		48.5	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		234	ug/L	1.50	5.00
67-64-1	Acetone		201	ug/L	1.50	10.0
75-05-8	Acetonitrile		1260	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		49.8	ug/L	0.300	1.00
108-86-1	Bromobenzene		48.6	ug/L	0.300	1.00
74-97-5	Bromochloromethane		54.1	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		55.2	ug/L	0.300	1.00
75-25-2	Bromoform		54.7	ug/L	0.300	1.00



**Volatile  
Certificate of Analysis  
Sample Summary**

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SDG Number: 2018-828

Lab Sample ID: 1203923769

Client Sample: QC for batch 1720463

Client ID: LCS for batch 1720463

Batch ID: 1720463

Run Date: 11/19/2017 03:24

Prep Date: 11/19/2017 03:24

Data File: 111817V1\11628A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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		52.3	ug/L	0.300	1.00
75-15-0	Carbon disulfide		241	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		50.6	ug/L	0.300	1.00
108-90-7	Chlorobenzene		49.0	ug/L	0.300	1.00
75-00-3	Chloroethane		46.8	ug/L	0.300	1.00
67-66-3	Chloroform		52.7	ug/L	0.300	1.00
74-87-3	Chloromethane		51.7	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		54.9	ug/L	0.300	1.00
74-95-3	Dibromomethane		55.4	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		50.3	ug/L	0.300	1.00
60-29-7	Ethyl ether		53.6	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		48.2	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		51.6	ug/L	0.300	1.00
74-88-4	Iodomethane		251	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		47.5	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		52.6	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		51.7	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		46.6	ug/L	0.300	1.00
108-88-3	Toluene		47.7	ug/L	0.300	1.00
79-01-6	Trichloroethylene		52.5	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		46.4	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		252	ug/L	1.50	5.00
75-01-4	Vinyl chloride		50.4	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		54.5	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		55.9	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		96.4	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5510	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		48.3	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		45.1	ug/L	0.300	1.00
95-47-6	o-Xylene		50.7	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		47.4	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

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<b>SDG Number:</b>	2018-828	<b>Matrix:</b>	WATER
<b>Lab Sample ID:</b>	1203923769		
<b>Client Sample:</b>	QC for batch 1720463	<b>Client:</b>	ARSL004
<b>Client ID:</b>	LCS for batch 1720463	<b>Method:</b>	SW-846:8260B
<b>Batch ID:</b>	1720463	<b>Inst:</b>	VOA1.I
<b>Run Date:</b>	11/19/2017 03:24	<b>Analyst:</b>	PXY1
<b>Prep Date:</b>	11/19/2017 03:24		
<b>Data File:</b>	111817V1\11628A.D	<b>Column:</b>	DB-624
		<b>Project:</b>	QC
		<b>SOP Ref:</b>	GL-OA-E-038
		<b>Dilution:</b>	1
		<b>Purge Vol:</b>	5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		58.3	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		49.1	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		53.0	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		55.8	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	45.0	50.0	ug/L	90	(71%-134%)
Bromofluorobenzene	52.4	50.0	ug/L	105	(70%-131%)
Toluene-d8	46.3	50.0	ug/L	93	(74%-124%)

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

Page 1 of 3

SDG Number: 2018-828

Matrix: WATER

Lab Sample ID: 1203923770

Client Sample: QC for batch 1720463

Client: ARSL004

Project: QC

Client ID: LCS for batch 1720463

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1720463

Inst: VOA1.I

Dilution: 1

Run Date: 11/19/2017 04:22

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/19/2017 04:22

Data File: 111817V1\11630A.D

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		42.4	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		214	ug/L	1.50	5.00
107-13-1	Acrylonitrile		232	ug/L	1.50	5.00
107-05-1	Allyl chloride		220	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:** 2018-828  
**Lab Sample ID:** 1203923770  
**Client Sample:** QC for batch 1720463  
**Client ID:** LCS for batch 1720463  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 04:22  
**Prep Date:** 11/19/2017 04:22  
**Data File:** 111817V1\11630A.D

**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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	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		213	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		2400	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		229	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		233	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		223	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		198	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**

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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203923770  
**Client Sample:** QC for batch 1720463  
**Client ID:** LCS for batch 1720463  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 04:22  
**Prep Date:** 11/19/2017 04:22  
**Data File:** 111817V1\11630A.D

**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
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	44.3	50.0	ug/L 89	(71%-134%)
Bromofluorobenzene	54.3	50.0	ug/L 109	(70%-131%)
Toluene-d8	45.3	50.0	ug/L 91	(74%-124%)

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

Page 1 of 3

**SDG Number:** 2018-828  
**Lab Sample ID:** 1203923771  
**Client Sample:** QC for batch 1720463  
**Client ID:** CAMO-18-148075PS  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 19:27  
**Prep Date:** 11/19/2017 19:27  
**Data File:** 111917V1\111712.D

**Date Collected:** 11/07/2017 11:33  
**Date Received:** 11/09/2017 09:00  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**Column:** DB-624

**Matrix:** W  
  
**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		55.8	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		55.9	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		47.7	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		51.4	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		53.9	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		55.8	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		55.0	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		50.1	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		53.9	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		49.6	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		46.8	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		54.0	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		47.9	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		60.6	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		52.9	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		49.4	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		46.0	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		51.1	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		46.4	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		56.9	ug/L	0.300	1.00
78-93-3	2-Butanone		161	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		47.7	ug/L	0.300	1.00
591-78-6	2-Hexanone		190	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		47.6	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		50.8	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		241	ug/L	1.50	5.00
67-64-1	Acetone		118	ug/L	1.50	10.0
75-05-8	Acetonitrile		1230	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		52.0	ug/L	0.300	1.00
108-86-1	Bromobenzene		47.9	ug/L	0.300	1.00
74-97-5	Bromochloromethane		53.7	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		58.8	ug/L	0.300	1.00
75-25-2	Bromoform		54.2	ug/L	0.300	1.00

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

<b>SDG Number:</b> 2018-828	<b>Date Collected:</b> 11/07/2017 11:33	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203923771	<b>Date Received:</b> 11/09/2017 09:00	
<b>Client Sample:</b> QC for batch 1720463	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAMO-18-148075PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/19/2017 19:27	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/19/2017 19:27		
<b>Data File:</b> 111917V1\111712.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		55.7	ug/L	0.300	1.00
75-15-0	Carbon disulfide		256	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		60.0	ug/L	0.300	1.00
108-90-7	Chlorobenzene		49.6	ug/L	0.300	1.00
75-00-3	Chloroethane		47.3	ug/L	0.300	1.00
67-66-3	Chloroform		55.5	ug/L	0.300	1.00
74-87-3	Chloromethane		51.7	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		56.6	ug/L	0.300	1.00
74-95-3	Dibromomethane		57.6	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		58.6	ug/L	0.300	1.00
60-29-7	Ethyl ether		50.2	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		51.5	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		52.0	ug/L	0.300	1.00
74-88-4	Iodomethane		257	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		48.8	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		52.7	ug/L	1.00	10.0
91-20-3	Naphthalene		50.4	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		50.5	ug/L	0.300	1.00
108-88-3	Toluene		49.1	ug/L	0.300	1.00
79-01-6	Trichloroethylene		57.1	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		55.3	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		251	ug/L	1.50	5.00
75-01-4	Vinyl chloride		53.7	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		55.1	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		55.9	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		101	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5450	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		50.9	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		47.7	ug/L	0.300	1.00
95-47-6	o-Xylene		52.8	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		49.7	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b>	<b>2018-828</b>	<b>Date Collected:</b>	<b>11/07/2017 11:33</b>	<b>Matrix:</b>	<b>W</b>
<b>Lab Sample ID:</b>	<b>1203923771</b>	<b>Date Received:</b>	<b>11/09/2017 09:00</b>		
<b>Client Sample:</b>	<b>QC for batch 1720463</b>	<b>Client:</b>	<b>ARSL004</b>	<b>Project:</b>	<b>QC</b>
<b>Client ID:</b>	<b>CAMO-18-148075PS</b>	<b>Method:</b>	<b>SW-846:8260B</b>	<b>SOP Ref:</b>	<b>GL-OA-E-038</b>
<b>Batch ID:</b>	<b>1720463</b>	<b>Inst:</b>	<b>VOA1.I</b>	<b>Dilution:</b>	<b>1</b>
<b>Run Date:</b>	<b>11/19/2017 19:27</b>	<b>Analyst:</b>	<b>PXY1</b>	<b>Purge Vol:</b>	<b>5 mL</b>
<b>Prep Date:</b>	<b>11/19/2017 19:27</b>				
<b>Data File:</b>	<b>111917V1\111712.D</b>	<b>Column:</b>	<b>DB-624</b>		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		54.3	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		50.9	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		56.5	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		56.2	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	46.3	50.0	ug/L	93	(71%-134%)
Bromofluorobenzene	52.5	50.0	ug/L	105	(70%-131%)
Toluene-d8	45.6	50.0	ug/L	91	(74%-124%)



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

<b>SDG Number:</b> 2018-828	<b>Date Collected:</b> 11/07/2017 11:33	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203923772	<b>Date Received:</b> 11/09/2017 09:00	
<b>Client Sample:</b> QC for batch 1720463	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAMO-18-148075PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/19/2017 20:25	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/19/2017 20:25		
<b>Data File:</b> 111917V1\111714.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		48.8	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		212	ug/L	1.50	5.00
107-13-1	Acrylonitrile		231	ug/L	1.50	5.00
107-05-1	Allyl chloride		236	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> 2018-828	<b>Date Collected:</b> 11/07/2017 11:33	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203923772	<b>Date Received:</b> 11/09/2017 09:00	
<b>Client Sample:</b> QC for batch 1720463	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAMO-18-148075PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/19/2017 20:25	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/19/2017 20:25		
<b>Data File:</b> 111917V1\111714.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		215	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		2370	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		232	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		235	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		222	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		245	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>	<b>2018-828</b>	<b>Date Collected:</b>	<b>11/07/2017 11:33</b>	<b>Matrix:</b>	<b>W</b>
<b>Lab Sample ID:</b>	<b>1203923772</b>	<b>Date Received:</b>	<b>11/09/2017 09:00</b>		
<b>Client Sample:</b>	<b>QC for batch 1720463</b>	<b>Client:</b>	<b>ARSL004</b>	<b>Project:</b>	<b>QC</b>
<b>Client ID:</b>	<b>CAMO-18-148075PS</b>	<b>Method:</b>	<b>SW-846:8260B</b>	<b>SOP Ref:</b>	<b>GL-OA-E-038</b>
<b>Batch ID:</b>	<b>1720463</b>	<b>Inst:</b>	<b>VOA1.I</b>	<b>Dilution:</b>	<b>1</b>
<b>Run Date:</b>	<b>11/19/2017 20:25</b>	<b>Analyst:</b>	<b>PXY1</b>	<b>Purge Vol:</b>	<b>5 mL</b>
<b>Prep Date:</b>	<b>11/19/2017 20:25</b>				
<b>Data File:</b>	<b>111917V1\111714.D</b>	<b>Column:</b>	<b>DB-624</b>		

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	44.7	50.0	ug/L 89	(71%-134%)
Bromofluorobenzene	53.8	50.0	ug/L 108	(70%-131%)
Toluene-d8	45.2	50.0	ug/L 90	(74%-124%)

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

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<b>SDG Number:</b> 2018-828	<b>Date Collected:</b> 11/07/2017 11:33	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203923773	<b>Date Received:</b> 11/09/2017 09:00	
<b>Client Sample:</b> QC for batch 1720463	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAMO-18-148075PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/19/2017 19:56	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/19/2017 19:56		
<b>Data File:</b> 111917V1\11713.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		54.8	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		54.9	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		46.3	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		50.9	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		54.7	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		55.5	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		54.2	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		51.6	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		49.2	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		54.7	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		50.1	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		45.9	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		52.4	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		48.4	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		57.3	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		53.4	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		50.3	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		46.9	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		50.2	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		47.1	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		56.5	ug/L	0.300	1.00
78-93-3	2-Butanone		149	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		49.0	ug/L	0.300	1.00
591-78-6	2-Hexanone		176	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		48.2	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		52.0	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		226	ug/L	1.50	5.00
67-64-1	Acetone		110	ug/L	1.50	10.0
75-05-8	Acetonitrile		1180	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		51.6	ug/L	0.300	1.00
108-86-1	Bromobenzene		48.5	ug/L	0.300	1.00
74-97-5	Bromochloromethane		53.6	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		56.9	ug/L	0.300	1.00
75-25-2	Bromoform		53.1	ug/L	0.300	1.00

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

<b>SDG Number:</b> 2018-828	<b>Date Collected:</b> 11/07/2017 11:33	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203923773	<b>Date Received:</b> 11/09/2017 09:00	
<b>Client Sample:</b> QC for batch 1720463	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAMO-18-148075PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/19/2017 19:56	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/19/2017 19:56		
<b>Data File:</b> 111917V1\111713.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		57.0	ug/L	0.300	1.00
75-15-0	Carbon disulfide		256	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		57.9	ug/L	0.300	1.00
108-90-7	Chlorobenzene		49.4	ug/L	0.300	1.00
75-00-3	Chloroethane		49.3	ug/L	0.300	1.00
67-66-3	Chloroform		54.3	ug/L	0.300	1.00
74-87-3	Chloromethane		54.2	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		55.6	ug/L	0.300	1.00
74-95-3	Dibromomethane		55.2	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		60.3	ug/L	0.300	1.00
60-29-7	Ethyl ether		51.2	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		50.7	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		54.7	ug/L	0.300	1.00
74-88-4	Iodomethane		258	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		49.4	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		53.4	ug/L	1.00	10.0
91-20-3	Naphthalene		51.3	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		51.4	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		50.4	ug/L	0.300	1.00
108-88-3	Toluene		48.5	ug/L	0.300	1.00
79-01-6	Trichloroethylene		56.1	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		55.9	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		241	ug/L	1.50	5.00
75-01-4	Vinyl chloride		55.5	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		55.5	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		55.0	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		102	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5140	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		51.8	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		48.8	ug/L	0.300	1.00
95-47-6	o-Xylene		51.7	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		50.7	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b>	<b>2018-828</b>	<b>Date Collected:</b>	<b>11/07/2017 11:33</b>	<b>Matrix:</b>	<b>W</b>
<b>Lab Sample ID:</b>	<b>1203923773</b>	<b>Date Received:</b>	<b>11/09/2017 09:00</b>		
<b>Client Sample:</b>	<b>QC for batch 1720463</b>	<b>Client:</b>	<b>ARSL004</b>	<b>Project:</b>	<b>QC</b>
<b>Client ID:</b>	<b>CAMO-18-148075PSD</b>	<b>Method:</b>	<b>SW-846:8260B</b>	<b>SOP Ref:</b>	<b>GL-OA-E-038</b>
<b>Batch ID:</b>	<b>1720463</b>	<b>Inst:</b>	<b>VOA1.I</b>	<b>Dilution:</b>	<b>1</b>
<b>Run Date:</b>	<b>11/19/2017 19:56</b>	<b>Analyst:</b>	<b>PXY1</b>	<b>Purge Vol:</b>	<b>5 mL</b>
<b>Prep Date:</b>	<b>11/19/2017 19:56</b>				
<b>Data File:</b>	<b>111917V1\111713.D</b>	<b>Column:</b>	<b>DB-624</b>		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		54.3	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		53.1	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		56.3	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		55.5	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	44.6	50.0	ug/L	89	(71%-134%)
Bromofluorobenzene	52.7	50.0	ug/L	105	(70%-131%)
Toluene-d8	45.3	50.0	ug/L	91	(74%-124%)

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

Page 1 of 3

**SDG Number:** 2018-828  
**Lab Sample ID:** 1203923774  
**Client Sample:** QC for batch 1720463  
**Client ID:** CAMO-18-148075PSD  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 20:54  
**Prep Date:** 11/19/2017 20:54  
**Data File:** 111917V1\111715.D

**Date Collected:** 11/07/2017 11:33  
**Date Received:** 11/09/2017 09:00  
**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**Column:** DB-624

**Matrix:** W  
  
**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		49.3	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		215	ug/L	1.50	5.00
107-13-1	Acrylonitrile		231	ug/L	1.50	5.00
107-05-1	Allyl chloride		243	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> 2018-828	<b>Date Collected:</b> 11/07/2017 11:33	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203923774	<b>Date Received:</b> 11/09/2017 09:00	
<b>Client Sample:</b> QC for batch 1720463	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAMO-18-148075PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/19/2017 20:54	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/19/2017 20:54		
<b>Data File:</b> 111917V1\111715.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		215	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		2420	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		233	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		236	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		225	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		256	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>	<b>2018-828</b>	<b>Date Collected:</b>	<b>11/07/2017 11:33</b>	<b>Matrix:</b>	<b>W</b>
<b>Lab Sample ID:</b>	<b>1203923774</b>	<b>Date Received:</b>	<b>11/09/2017 09:00</b>		
<b>Client Sample:</b>	<b>QC for batch 1720463</b>	<b>Client:</b>	<b>ARSL004</b>	<b>Project:</b>	<b>QC</b>
<b>Client ID:</b>	<b>CAMO-18-148075PSD</b>	<b>Method:</b>	<b>SW-846:8260B</b>	<b>SOP Ref:</b>	<b>GL-OA-E-038</b>
<b>Batch ID:</b>	<b>1720463</b>	<b>Inst:</b>	<b>VOA1.I</b>	<b>Dilution:</b>	<b>1</b>
<b>Run Date:</b>	<b>11/19/2017 20:54</b>	<b>Analyst:</b>	<b>PXY1</b>	<b>Purge Vol:</b>	<b>5 mL</b>
<b>Prep Date:</b>	<b>11/19/2017 20:54</b>				
<b>Data File:</b>	<b>111917V1\111715.D</b>	<b>Column:</b>	<b>DB-624</b>		

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	44.6	50.0	ug/L 89	(71%-134%)
Bromofluorobenzene	54.5	50.0	ug/L 109	(70%-131%)
Toluene-d8	45.6	50.0	ug/L 91	(74%-124%)

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

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SDG Number: 2018-828

Lab Sample ID: 1203925355

Client Sample: QC for batch 1720463

Client ID: MB for batch 1720463

Batch ID: 1720463

Run Date: 11/19/2017 17:03

Prep Date: 11/19/2017 17:03

Data File: 111917V1\11707A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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	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**

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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203925355  
**Client Sample:** QC for batch 1720463  
**Client ID:** MB for batch 1720463  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 17:03  
**Prep Date:** 11/19/2017 17:03  
**Data File:** 111917V1\11707A.D

**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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	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> 2018-828	<b>Matrix:</b> WATER	
<b>Lab Sample ID:</b> 1203925355		
<b>Client Sample:</b> QC for batch 1720463	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> MB for batch 1720463	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720463	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/19/2017 17:03	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/19/2017 17:03		
<b>Data File:</b> 111917V1\11I707A.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	44.8	50.0	ug/L 90	(71%-134%)
Bromofluorobenzene	56.6	50.0	ug/L 113	(70%-131%)
Toluene-d8	46.1	50.0	ug/L 92	(74%-124%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
No Tentatively Identified Compounds Found				ug/L		

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

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SDG Number: 2018-828

Lab Sample ID: 1203925356

Client Sample: QC for batch 1720463

Client ID: LCS for batch 1720463

Batch ID: 1720463

Run Date: 11/19/2017 15:07

Prep Date: 11/19/2017 15:07

Data File: 111917V1\11703A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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		54.6	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		56.6	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		47.4	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		49.3	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		54.6	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		56.5	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		55.1	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		53.1	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		51.1	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		58.7	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		51.3	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		46.8	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		51.7	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		49.1	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		57.4	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		52.0	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		50.9	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		47.4	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		49.2	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		47.8	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		59.7	ug/L	0.300	1.00
78-93-3	2-Butanone		275	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		49.4	ug/L	0.300	1.00
591-78-6	2-Hexanone		267	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		49.1	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		53.0	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		238	ug/L	1.50	5.00
67-64-1	Acetone		270	ug/L	1.50	10.0
75-05-8	Acetonitrile		1190	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		51.3	ug/L	0.300	1.00
108-86-1	Bromobenzene		49.1	ug/L	0.300	1.00
74-97-5	Bromochloromethane		52.2	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		57.4	ug/L	0.300	1.00
75-25-2	Bromoform		54.1	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

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SDG Number: 2018-828

Lab Sample ID: 1203925356

Client Sample: QC for batch 1720463

Client ID: LCS for batch 1720463

Batch ID: 1720463

Run Date: 11/19/2017 15:07

Prep Date: 11/19/2017 15:07

Data File: 111917V1\11703A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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		56.7	ug/L	0.300	1.00
75-15-0	Carbon disulfide		253	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		59.3	ug/L	0.300	1.00
108-90-7	Chlorobenzene		48.7	ug/L	0.300	1.00
75-00-3	Chloroethane		51.0	ug/L	0.300	1.00
67-66-3	Chloroform		54.8	ug/L	0.300	1.00
74-87-3	Chloromethane		56.2	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		54.4	ug/L	0.300	1.00
74-95-3	Dibromomethane		55.2	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		62.9	ug/L	0.300	1.00
60-29-7	Ethyl ether		52.6	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		51.1	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		57.6	ug/L	0.300	1.00
74-88-4	Iodomethane		255	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		50.8	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		52.7	ug/L	1.00	10.0
91-20-3	Naphthalene		50.7	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		51.4	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		50.5	ug/L	0.300	1.00
108-88-3	Toluene		48.5	ug/L	0.300	1.00
79-01-6	Trichloroethylene		56.2	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		57.3	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		261	ug/L	1.50	5.00
75-01-4	Vinyl chloride		56.7	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		54.3	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		56.8	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		101	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5210	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		53.9	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		49.6	ug/L	0.300	1.00
95-47-6	o-Xylene		51.7	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		51.2	ug/L	0.300	1.00

**Volatile  
Certificate of Analysis  
Sample Summary**

**SDG Number:** 2018-828  
**Lab Sample ID:** 1203925356  
**Client Sample:** QC for batch 1720463  
**Client ID:** LCS for batch 1720463  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 15:07  
**Prep Date:** 11/19/2017 15:07  
**Data File:** 111917V1\11I703A.D

**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
1634-04-4	tert-Butyl methyl ether		54.1	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		52.6	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		55.7	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		55.5	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	46.4	50.0	ug/L	93	(71%-134%)
Bromofluorobenzene	52.9	50.0	ug/L	106	(70%-131%)
Toluene-d8	44.9	50.0	ug/L	90	(74%-124%)

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

Page 1 of 3

SDG Number: 2018-828

Matrix: WATER

Lab Sample ID: 1203925357

Client Sample: QC for batch 1720463

Client: ARSL004

Project: QC

Client ID: LCS for batch 1720463

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1720463

Inst: VOA1.I

Dilution: 1

Run Date: 11/19/2017 16:34

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/19/2017 16:34

Data File: 111917V1\11706A.D

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		46.1	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		213	ug/L	1.50	5.00
107-13-1	Acrylonitrile		226	ug/L	1.50	5.00
107-05-1	Allyl chloride		229	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**

Page 2 of 3

SDG Number: 2018-828

Matrix: WATER

Lab Sample ID: 1203925357

Client Sample: QC for batch 1720463

Client: ARSL004

Project: QC

Client ID: LCS for batch 1720463

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1720463

Inst: VOA1.I

Dilution: 1

Run Date: 11/19/2017 16:34

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/19/2017 16:34

Data File: 111917V1\11706A.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		210	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		2340	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		229	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		231	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		219	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		226	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:** 2018-828  
**Lab Sample ID:** 1203925357  
**Client Sample:** QC for batch 1720463  
**Client ID:** LCS for batch 1720463  
**Batch ID:** 1720463  
**Run Date:** 11/19/2017 16:34  
**Prep Date:** 11/19/2017 16:34  
**Data File:** 111917V1\11I706A.D

**Client:** ARSL004  
**Method:** SW-846:8260B  
**Inst:** VOA1.I  
**Analyst:** PXY1  
  
**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
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	44.6	50.0	ug/L	89	(71%-134%)
Bromofluorobenzene	54.4	50.0	ug/L	109	(70%-131%)
Toluene-d8	45.1	50.0	ug/L	90	(74%-124%)

# **Semi-Volatile Analysis**

# Case Narrative

**GC/MS Semivolatile  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2018-828  
Work Order #: 437612**

**Method/Analysis Information**

<b>Procedure:</b>	<b>Analysis of Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry</b>
Analytical Method:	SW846 3510C/8270D
Prep Method:	SW846 3510C
Analytical Batch Number:	1718844
Prep Batch Number:	1718842

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW846 3510C/8270D:

<b>Sample ID</b>	<b>Client ID</b>
437612003	CASA-18-147998
437612007	CAMO-18-148116
1203919736	Method Blank (MB)
1203919737	Laboratory Control Sample (LCS)
1203919738	437632003(CAMO-18-148073) Matrix Spike (MS)
1203919739	437632003(CAMO-18-148073) 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-009 REV# 39.

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

**Calibration Information**

A complete list of the initial calibration data files are shown in the Calibration History report located in the Standard Data section of the data package. The various calibration mixes may not be calibrated using all of the calibration levels. In addition, not all of the mixes are calibrated using the same levels.

Diphenylamine has now superseded N-Nitroso-diphenylamine on Quantitation Reports, Initial Calibration Reports, Calibration Check Standard Reports, etc. Previous versions of EPA Methodologies referenced N-Nitroso-diphenylamine. However, as stated in EPA Methodology, "N-Nitroso-diphenylamine decomposes in the gas chromatographic inlet and cannot be separated from Diphenylamine." Studies of these two compounds at GEL, both independent of each other and together, showed that they not only co-elute, but also have similar mass spectra. N-Nitroso-diphenylamine and Diphenylamine will be reported as Diphenylamine on all reports and forms.

**Initial Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG) in this batch. A second source initial calibration verification (ICV) was included in the standard section directly behind the initial calibration.

**CCV Requirements**

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

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

The MB analyzed with this SDG in this batch met the acceptance criteria.

**Surrogate Recoveries**

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

**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.

**QC Sample Designation**

Sample 437632003 (CAMO-18-148073) was selected for analysis as the matrix spike and matrix spike duplicate.

**Spike Recovery Statement**

The MS and MSD recoveries were within the established acceptance limits.

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

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

**Internal Standard (ISTD) Acceptance**

The internal standard responses used to quantitate the requested target analytes were within the required acceptance criteria for the SDG associated samples in this batch.

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

All samples in this SDG in this batch met the specified holding time. GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the ALPHALIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP. All reported compound mass spectra met the detection specifications in the method.

**Sample Dilutions**

The samples in this SDG in this batch did not require dilutions.

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

Re-extractions or re-analyses were not required in this SDG in this analytical batch unless confirmations or dilutions were required.

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

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

Sample	Analyte	Value
1203919737 (LCS)	4-Nitrophenol	Result 13.2ug/L

**TIC Comment**

Tentatively identified compounds (TIC) were requested for samples 437612003 (CASA-18-147998) and 437612007 (CAMO-18-148116) in this SDG in this batch.

**Additional Comments**

Additional comments were not required for the SDG associated samples in this batch.

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description
MSD2.I	Agilent 7890A/5975C GC/MS w/7683 Autosampler	HP7890A/HP5975C	DB-5MS	25m x 0.2mm, 0.33um (5% Phenylmethylpolysiloxane)

**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: 2018-828 GEL Work Order: 437612

#### 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: Barbara Bailey

Date: 04 DEC 2017

Title: Data Validator

# **Sample Data Summary**

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

Page 1 of 3

**SDG Number:** 2018-828  
**Lab Sample ID:** 437612003  
**Client Sample:** VOA,SVOA  
**Client ID:** CASA-18-147998  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 22:56  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1513.D

**Date Collected:** 11/08/2017 10:45  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 920 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** ESHL00114  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene	U	3.26	ug/L	3.26	10.9
120-82-1	1,2,4-Trichlorobenzene	U	3.26	ug/L	3.26	10.9
95-50-1	1,2-Dichlorobenzene	U	3.26	ug/L	3.26	10.9
122-66-7	Azobenzene	U	3.26	ug/L	3.26	10.9
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.26	ug/L	3.26	10.9
106-46-7	1,4-Dichlorobenzene	U	3.26	ug/L	3.26	10.9
123-91-1	1,4-Dioxane	U	3.26	ug/L	3.26	10.9
90-12-0	1-Methylnaphthalene	U	0.326	ug/L	0.326	1.09
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.26	ug/L	3.26	10.9
95-95-4	2,4,5-Trichlorophenol	U	3.26	ug/L	3.26	10.9
88-06-2	2,4,6-Trichlorophenol	U	3.26	ug/L	3.26	10.9
120-83-2	2,4-Dichlorophenol	U	3.26	ug/L	3.26	10.9
105-67-9	2,4-Dimethylphenol	U	3.26	ug/L	3.26	10.9
51-28-5	2,4-Dinitrophenol	U	5.43	ug/L	5.43	21.7
121-14-2	2,4-Dinitrotoluene	U	3.26	ug/L	3.26	10.9
606-20-2	2,6-Dinitrotoluene	U	3.26	ug/L	3.26	10.9
91-58-7	2-Chloronaphthalene	U	0.446	ug/L	0.446	1.09
95-57-8	2-Chlorophenol	U	3.26	ug/L	3.26	10.9
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.26	ug/L	3.26	10.9
91-57-6	2-Methylnaphthalene	U	0.326	ug/L	0.326	1.09
88-75-5	2-Nitrophenol	U	3.26	ug/L	3.26	10.9
91-94-1	3,3'-Dichlorobenzidine	U	3.26	ug/L	3.26	10.9
101-55-3	4-Bromophenylphenylether	U	3.26	ug/L	3.26	10.9
59-50-7	Parachlorometa cresol	U	3.26	ug/L	3.26	10.9
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.59	ug/L	3.59	10.9
7005-72-3	4-Chlorophenylphenylether	U	3.26	ug/L	3.26	10.9
100-02-7	4-Nitrophenol	U	3.26	ug/L	3.26	10.9
83-32-9	Acenaphthene	U	0.326	ug/L	0.326	1.09
208-96-8	Acenaphthylene	U	0.326	ug/L	0.326	1.09
62-53-3	Aniline	U	4.57	ug/L	4.57	10.9
120-12-7	Anthracene	U	0.326	ug/L	0.326	1.09
1912-24-9	Atrazine	U	3.26	ug/L	3.26	10.9
92-87-5	Benzidine	U	4.24	ug/L	4.24	10.9
56-55-3	Benzo(a)anthracene	U	0.326	ug/L	0.326	1.09
50-32-8	Benzo(a)pyrene	U	0.326	ug/L	0.326	1.09
205-99-2	Benzo(b)fluoranthene	U	0.326	ug/L	0.326	1.09
191-24-2	Benzo(ghi)perylene	U	0.326	ug/L	0.326	1.09

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

Page 2 of 3

**SDG Number:** 2018-828  
**Lab Sample ID:** 437612003  
**Client Sample:** VOA,SVOA  
**Client ID:** CASA-18-147998  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 22:56  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1513.D

**Date Collected:** 11/08/2017 10:45  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 920 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** ESHL00114  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene	U	0.326	ug/L	0.326	1.09
65-85-0	Benzoic acid	U	6.52	ug/L	6.52	21.7
100-51-6	Benzyl alcohol	U	3.26	ug/L	3.26	10.9
85-68-7	Butylbenzylphthalate	U	3.26	ug/L	3.26	10.9
218-01-9	Chrysene	U	0.326	ug/L	0.326	1.09
84-74-2	Di-n-butylphthalate	U	3.26	ug/L	3.26	10.9
117-84-0	Di-n-octylphthalate	U	3.26	ug/L	3.26	10.9
53-70-3	Dibenzo(a,h)anthracene	U	0.326	ug/L	0.326	1.09
132-64-9	Dibenzofuran	U	3.26	ug/L	3.26	10.9
84-66-2	Diethylphthalate	U	3.26	ug/L	3.26	10.9
131-11-3	Dimethylphthalate	U	3.26	ug/L	3.26	10.9
88-85-7	Dinoseb	U	3.26	ug/L	3.26	10.9
122-39-4	Diphenylamine	U	3.26	ug/L	3.26	10.9
206-44-0	Fluoranthene	U	0.326	ug/L	0.326	1.09
86-73-7	Fluorene	U	0.326	ug/L	0.326	1.09
118-74-1	Hexachlorobenzene	U	3.26	ug/L	3.26	10.9
87-68-3	Hexachlorobutadiene	U	3.26	ug/L	3.26	10.9
77-47-4	Hexachlorocyclopentadiene	U	3.26	ug/L	3.26	10.9
67-72-1	Hexachloroethane	U	3.26	ug/L	3.26	10.9
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.326	ug/L	0.326	1.09
78-59-1	Isophorone	U	3.80	ug/L	3.80	10.9
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.26	ug/L	3.26	10.9
924-16-3	N-Nitrosodi-n-butylamine	U	3.26	ug/L	3.26	10.9
55-18-5	N-Nitrosodiethylamine	U	3.26	ug/L	3.26	10.9
621-64-7	N-Nitrosodi--n-propylamine	U	3.26	ug/L	3.26	10.9
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.26	ug/L	3.26	10.9
91-20-3	Naphthalene	U	0.326	ug/L	0.326	1.09
98-95-3	Nitrobenzene	U	3.26	ug/L	3.26	10.9
608-93-5	Pentachlorobenzene	U	3.26	ug/L	3.26	10.9
87-86-5	Pentachlorophenol	U	3.26	ug/L	3.26	10.9
85-01-8	Phenanthrene	U	0.326	ug/L	0.326	1.09
108-95-2	Phenol	U	3.26	ug/L	3.26	10.9
129-00-0	Pyrene	U	0.326	ug/L	0.326	1.09
110-86-1	Pyridine	U	3.26	ug/L	3.26	10.9
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.26	ug/L	3.26	10.9
111-91-1	bis(2-Chloroethoxy)methane	U	3.26	ug/L	3.26	10.9
111-44-4	bis(2-Chloroethyl) ether	U	3.26	ug/L	3.26	10.9
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.26	ug/L	3.26	10.9

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

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**SDG Number:** 2018-828  
**Lab Sample ID:** 437612003  
**Client Sample:** VOA,SVOA  
**Client ID:** CASA-18-147998  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 22:56  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1513.D

**Date Collected:** 11/08/2017 10:45  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 920 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** ESHL00114  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols	U	4.02	ug/L	4.02	10.9
99-09-2	3-Nitroaniline	U	3.26	ug/L	3.26	10.9
	<i>m-Nitroaniline</i>					
95-48-7	o-Cresol	U	3.26	ug/L	3.26	10.9
88-74-4	2-Nitroaniline	U	3.26	ug/L	3.26	10.9
	<i>o-Nitroaniline</i>					
100-01-6	4-Nitroaniline	U	3.26	ug/L	3.26	10.9
	<i>p-Nitroaniline</i>					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	69.5	109	ug/L	64	(32%-124%)
2-Fluorobiphenyl	32.1	54.3	ug/L	59	(32%-112%)
2-Fluorophenol	43.5	109	ug/L	40	(15%-88%)
Nitrobenzene-d5	32.2	54.3	ug/L	59	(36%-115%)
Phenol-d5	24.3	109	ug/L	22	(15%-91%)
p-Terphenyl-d14	43.9	54.3	ug/L	81	(36%-121%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
No Tentatively Identified Compounds Found				ug/L		

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

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**SDG Number:** 2018-828  
**Lab Sample ID:** 437612007  
**Client Sample:** VOA,SVOA  
**Client ID:** CAMO-18-148116  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 23:24  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1514.D

**Date Collected:** 11/08/2017 12:12  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 900 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** ESHL00114  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene	U	3.33	ug/L	3.33	11.1
120-82-1	1,2,4-Trichlorobenzene	U	3.33	ug/L	3.33	11.1
95-50-1	1,2-Dichlorobenzene	U	3.33	ug/L	3.33	11.1
122-66-7	Azobenzene	U	3.33	ug/L	3.33	11.1
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.33	ug/L	3.33	11.1
106-46-7	1,4-Dichlorobenzene	U	3.33	ug/L	3.33	11.1
123-91-1	1,4-Dioxane	U	3.33	ug/L	3.33	11.1
90-12-0	1-Methylnaphthalene	U	0.333	ug/L	0.333	1.11
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.33	ug/L	3.33	11.1
95-95-4	2,4,5-Trichlorophenol	U	3.33	ug/L	3.33	11.1
88-06-2	2,4,6-Trichlorophenol	U	3.33	ug/L	3.33	11.1
120-83-2	2,4-Dichlorophenol	U	3.33	ug/L	3.33	11.1
105-67-9	2,4-Dimethylphenol	U	3.33	ug/L	3.33	11.1
51-28-5	2,4-Dinitrophenol	U	5.56	ug/L	5.56	22.2
121-14-2	2,4-Dinitrotoluene	U	3.33	ug/L	3.33	11.1
606-20-2	2,6-Dinitrotoluene	U	3.33	ug/L	3.33	11.1
91-58-7	2-Chloronaphthalene	U	0.456	ug/L	0.456	1.11
95-57-8	2-Chlorophenol	U	3.33	ug/L	3.33	11.1
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.33	ug/L	3.33	11.1
91-57-6	2-Methylnaphthalene	U	0.333	ug/L	0.333	1.11
88-75-5	2-Nitrophenol	U	3.33	ug/L	3.33	11.1
91-94-1	3,3'-Dichlorobenzidine	U	3.33	ug/L	3.33	11.1
101-55-3	4-Bromophenylphenylether	U	3.33	ug/L	3.33	11.1
59-50-7	Parachlorometa cresol	U	3.33	ug/L	3.33	11.1
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.67	ug/L	3.67	11.1
7005-72-3	4-Chlorophenylphenylether	U	3.33	ug/L	3.33	11.1
100-02-7	4-Nitrophenol	U	3.33	ug/L	3.33	11.1
83-32-9	Acenaphthene	U	0.333	ug/L	0.333	1.11
208-96-8	Acenaphthylene	U	0.333	ug/L	0.333	1.11
62-53-3	Aniline	U	4.67	ug/L	4.67	11.1
120-12-7	Anthracene	U	0.333	ug/L	0.333	1.11
1912-24-9	Atrazine	U	3.33	ug/L	3.33	11.1
92-87-5	Benzidine	U	4.33	ug/L	4.33	11.1
56-55-3	Benzo(a)anthracene	U	0.333	ug/L	0.333	1.11
50-32-8	Benzo(a)pyrene	U	0.333	ug/L	0.333	1.11
205-99-2	Benzo(b)fluoranthene	U	0.333	ug/L	0.333	1.11
191-24-2	Benzo(ghi)perylene	U	0.333	ug/L	0.333	1.11

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

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**SDG Number:** 2018-828  
**Lab Sample ID:** 437612007  
**Client Sample:** VOA,SVOA  
**Client ID:** CAMO-18-148116  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 23:24  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1514.D

**Date Collected:** 11/08/2017 12:12  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 900 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** ESHL00114  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene	U	0.333	ug/L	0.333	1.11
65-85-0	Benzoic acid	U	6.67	ug/L	6.67	22.2
100-51-6	Benzyl alcohol	U	3.33	ug/L	3.33	11.1
85-68-7	Butylbenzylphthalate	U	3.33	ug/L	3.33	11.1
218-01-9	Chrysene	U	0.333	ug/L	0.333	1.11
84-74-2	Di-n-butylphthalate	U	3.33	ug/L	3.33	11.1
117-84-0	Di-n-octylphthalate	U	3.33	ug/L	3.33	11.1
53-70-3	Dibenzo(a,h)anthracene	U	0.333	ug/L	0.333	1.11
132-64-9	Dibenzofuran	U	3.33	ug/L	3.33	11.1
84-66-2	Diethylphthalate	U	3.33	ug/L	3.33	11.1
131-11-3	Dimethylphthalate	U	3.33	ug/L	3.33	11.1
88-85-7	Dinoseb	U	3.33	ug/L	3.33	11.1
122-39-4	Diphenylamine	U	3.33	ug/L	3.33	11.1
206-44-0	Fluoranthene	U	0.333	ug/L	0.333	1.11
86-73-7	Fluorene	U	0.333	ug/L	0.333	1.11
118-74-1	Hexachlorobenzene	U	3.33	ug/L	3.33	11.1
87-68-3	Hexachlorobutadiene	U	3.33	ug/L	3.33	11.1
77-47-4	Hexachlorocyclopentadiene	U	3.33	ug/L	3.33	11.1
67-72-1	Hexachloroethane	U	3.33	ug/L	3.33	11.1
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.333	ug/L	0.333	1.11
78-59-1	Isophorone	U	3.89	ug/L	3.89	11.1
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.33	ug/L	3.33	11.1
924-16-3	N-Nitrosodi-n-butylamine	U	3.33	ug/L	3.33	11.1
55-18-5	N-Nitrosodiethylamine	U	3.33	ug/L	3.33	11.1
621-64-7	N-Nitrosodi-n-propylamine	U	3.33	ug/L	3.33	11.1
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.33	ug/L	3.33	11.1
91-20-3	Naphthalene	U	0.333	ug/L	0.333	1.11
98-95-3	Nitrobenzene	U	3.33	ug/L	3.33	11.1
608-93-5	Pentachlorobenzene	U	3.33	ug/L	3.33	11.1
87-86-5	Pentachlorophenol	U	3.33	ug/L	3.33	11.1
85-01-8	Phenanthrene	U	0.333	ug/L	0.333	1.11
108-95-2	Phenol	U	3.33	ug/L	3.33	11.1
129-00-0	Pyrene	U	0.333	ug/L	0.333	1.11
110-86-1	Pyridine	U	3.33	ug/L	3.33	11.1
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.33	ug/L	3.33	11.1
111-91-1	bis(2-Chloroethoxy)methane	U	3.33	ug/L	3.33	11.1
111-44-4	bis(2-Chloroethyl) ether	U	3.33	ug/L	3.33	11.1
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.33	ug/L	3.33	11.1

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

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**SDG Number:** 2018-828  
**Lab Sample ID:** 437612007  
**Client Sample:** VOA,SVOA  
**Client ID:** CAMO-18-148116  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 23:24  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1514.D

**Date Collected:** 11/08/2017 12:12  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 900 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** ESHL00114  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols	U	4.11	ug/L	4.11	11.1
99-09-2	3-Nitroaniline	U	3.33	ug/L	3.33	11.1
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol	U	3.33	ug/L	3.33	11.1
88-74-4	2-Nitroaniline	U	3.33	ug/L	3.33	11.1
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline	U	3.33	ug/L	3.33	11.1
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	82.0	111	ug/L	74	(32%-124%)
2-Fluorobiphenyl	36.5	55.6	ug/L	66	(32%-112%)
2-Fluorophenol	55.2	111	ug/L	50	(15%-88%)
Nitrobenzene-d5	39.0	55.6	ug/L	70	(36%-115%)
Phenol-d5	31.9	111	ug/L	29	(15%-91%)
p-Terphenyl-d14	51.7	55.6	ug/L	93	(36%-121%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	2.25	4.94	ug/L	0	J



# **Quality Control Summary**

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**Semi-Volatile**  
**Surrogate Recovery Report**

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**SDG Number: 2018-828****Matrix Type: LIQUID**

Sample ID	Client ID	2FP %REC	PHL %REC	NBZ %REC	FBP %REC	TBP %REC	TPH %REC
1203919736	MB for batch 1718842	39	21	54	47	63	79
1203919737	LCS for batch 1718842	46	36	64	62	75	81
437612003	CASA-18-147998	40	22	59	59	64	81
437612007	CAMO-18-148116	50	29	70	66	74	93
1203919738	CAMO-18-148073MS	64	47	74	70	88	95
1203919739	CAMO-18-148073MSD	55	40	66	64	82	89

**Surrogate****Acceptance Limits**

2FP	= 2-Fluorophenol	(15%-88%)
PHL	= Phenol-d5	(15%-91%)
NBZ	= Nitrobenzene-d5	(36%-115%)
FBP	= 2-Fluorobiphenyl	(32%-112%)
TBP	= 2,4,6-Tribromophenol	(32%-124%)
TPH	= p-Terphenyl-d14	(36%-121%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718842

Matrix: WATER

Lab Sample ID 1203919737

Instrument: MSD2.I

Analysis Date: 11/15/2017 20:33

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
62-75-9	LCS N-Methyl-N-nitrosomethylamine	50.0	0.0	23.7	47	30-88
110-86-1	LCS Pyridine	50.0	0.0	21.7	43	27-89
62-53-3	LCS Aniline	50.0	0.0	34.3	69	49-112
108-95-2	LCS Phenol	50.0	0.0	18.4	37	16-82
111-44-4	LCS bis(2-Chloroethyl) ether	50.0	0.0	35.9	72	51-111
95-57-8	LCS 2-Chlorophenol	50.0	0.0	34.9	70	49-105
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	30.7	61	37-95
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	30.3	61	38-96
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	31.5	63	39-97
108-60-1	LCS bis(2-Chloro-1-methylethyl)ether	50.0	0.0	32.3	65	44-123
100-51-6	LCS Benzyl alcohol	50.0	0.0	31.5	63	44-102
95-48-7	LCS o-Cresol	50.0	0.0	32.3	65	41-101
65794-96-9	LCS m,p-Cresols	50.0	0.0	34.4	69	43-102
621-64-7	LCS N-Nitrosodi--n-propylamine <i>N-Nitrosodipropylamine</i>	50.0	0.0	37.5	75	54-115
67-72-1	LCS Hexachloroethane	50.0	0.0	29.3	59	36-96
98-95-3	LCS Nitrobenzene	50.0	0.0	35.5	71	53-115
78-59-1	LCS Isophorone	50.0	0.0	45.6	91	56-117
88-75-5	LCS 2-Nitrophenol	50.0	0.0	37.1	74	51-113
105-67-9	LCS 2,4-Dimethylphenol	50.0	0.0	32.3	65	51-104
111-91-1	LCS bis(2-Chloroethoxy)methane	50.0	0.0	35.3	71	55-114
120-83-2	LCS 2,4-Dichlorophenol	50.0	0.0	37.9	76	53-109
65-85-0	LCS Benzoic acid	100	0.0	50.9	51	21-74

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718842

Matrix: WATER

Lab Sample ID 1203919737

Instrument: MSD2.I

Analysis Date: 11/15/2017 20:33

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
106-47-8	LCS 4-Chloroaniline	50.0	0.0	40.0	80	65-136
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	32.4	65	35-98
59-50-7	LCS Parachlorometa cresol 4-Chloro-3-methylphenol	50.0	0.0	37.2	74	55-115
91-57-6	LCS 2-Methylnaphthalene	50.0	0.0	30.9	62	42-103
91-20-3	LCS Naphthalene	50.0	0.0	31.6	63	44-102
90-12-0	LCS 1-Methylnaphthalene	50.0	0.0	32.0	64	45-108
77-47-4	LCS Hexachlorocyclopentadiene	50.0	0.0	24.9	50	34-89
88-06-2	LCS 2,4,6-Trichlorophenol	50.0	0.0	37.1	74	55-120
95-95-4	LCS 2,4,5-Trichlorophenol	50.0	0.0	38.7	77	55-116
91-58-7	LCS 2-Chloronaphthalene	50.0	0.0	32.6	65	44-107
88-74-4	LCS 2-Nitroaniline o-Nitroaniline	50.0	0.0	35.6	71	53-121
99-09-2	LCS 3-Nitroaniline m-Nitroaniline	50.0	0.0	44.3	89	61-139
131-11-3	LCS Dimethylphthalate	50.0	0.0	37.3	75	60-122
606-20-2	LCS 2,6-Dinitrotoluene	50.0	0.0	36.5	73	59-122
121-14-2	LCS 2,4-Dinitrotoluene	50.0	0.0	36.4	73	57-124
208-96-8	LCS Acenaphthylene	50.0	0.0	32.9	66	50-113
83-32-9	LCS Acenaphthene	50.0	0.0	35.6	71	49-112
51-28-5	LCS 2,4-Dinitrophenol	50.0	0.0	28.4	57	34-122
132-64-9	LCS Dibenzofuran	50.0	0.0	35.1	70	50-111
58-90-2	LCS 2,3,4,6-Tetrachlorophenol	50.0	0.0	37.6	75	54-122
84-66-2	LCS Diethylphthalate	50.0	0.0	36.3	73	57-122
100-02-7	LCS 4-Nitrophenol	50.0	0.0	13.2	26	15-137

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718842

Matrix: WATER

Lab Sample ID 1203919737

Instrument: MSD2.I

Analysis Date: 11/15/2017 20:33

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
86-73-7	LCS Fluorene	50.0	0.0	33.8	68	52-114
7005-72-3	LCS 4-Chlorophenylphenylether	50.0	0.0	38.1	76	52-121
100-01-6	LCS 4-Nitroaniline	50.0	0.0	44.5	89	44-137
	<i>p</i> -Nitroaniline					
534-52-1	LCS 2-Methyl-4,6-dinitrophenol	50.0	0.0	35.7	71	45-124
122-39-4	LCS Diphenylamine	50.0	0.0	37.5	75	55-113
122-66-7	LCS Azobenzene	50.0	0.0	36.4	73	53-115
	<i>1,2-Diphenylhydrazine</i>					
101-55-3	LCS 4-Bromophenylphenylether	50.0	0.0	41.0	82	54-116
118-74-1	LCS Hexachlorobenzene	50.0	0.0	39.8	80	54-115
87-86-5	LCS Pentachlorophenol	50.0	0.0	43.5	87	41-116
85-01-8	LCS Phenanthrene	50.0	0.0	36.0	72	55-110
120-12-7	LCS Anthracene	50.0	0.0	35.2	70	56-112
84-74-2	LCS Di-n-butylphthalate	50.0	0.0	36.7	73	57-123
206-44-0	LCS Fluoranthene	50.0	0.0	35.2	70	54-118
129-00-0	LCS Pyrene	50.0	0.0	38.0	76	49-121
85-68-7	LCS Butylbenzylphthalate	50.0	0.0	37.7	75	52-125
117-81-7	LCS bis(2-Ethylhexyl)phthalate	50.0	0.0	37.8	76	52-125
56-55-3	LCS Benzo(a)anthracene	50.0	0.0	36.9	74	57-112
218-01-9	LCS Chrysene	50.0	0.0	37.4	75	58-117
117-84-0	LCS Di-n-octylphthalate	50.0	0.0	35.2	70	50-129
205-99-2	LCS Benzo(b)fluoranthene	50.0	0.0	36.0	72	41-118
207-08-9	LCS Benzo(k)fluoranthene	50.0	0.0	35.6	71	42-121
50-32-8	LCS Benzo(a)pyrene	50.0	0.0	34.9	70	40-118

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718842

Matrix: WATER

Lab Sample ID 1203919737

Instrument: MSD2.I

Analysis Date: 11/15/2017 20:33

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
193-39-5	LCS Indeno(1,2,3-cd)pyrene	50.0	0.0	38.1	76	34-125
53-70-3	LCS Dibenzo(a,h)anthracene	50.0	0.0	39.1	78	38-129
191-24-2	LCS Benzo(ghi)perylene	50.0	0.0	37.5	75	33-131
123-91-1	LCS 1,4-Dioxane	50.0	0.0	20.4	41	38-78
930-55-2	LCS N-Nitrosopyrrolidine	50.0	0.0	37.4	75	54-113
95-94-3	LCS 1,2,4,5-Tetrachlorobenzene	50.0	0.0	34.7	69	44-102
1912-24-9	LCS Atrazine	50.0	0.0	41.4	83	60-131
92-87-5	LCS Benzidine	100	0.0	19.7	20	20-144
91-94-1	LCS 3,3'-Dichlorobenzidine	50.0	0.0	30.8	62	43-127
120-82-1	LCS 1,2,4-Trichlorobenzene	50.0	0.0	33.3	67	39-99

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Matrix Spike

Client ID: CAMO-18-148073MS

Matrix: W

Lab Sample ID 1203919738

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:22

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
62-75-9	MS N-Methyl-N-nitrosomethylamine	109	0.00 U	67.6	62	25-106
110-86-1	MS Pyridine	109	0.00 U	69.1	64	24-93
62-53-3	MS Aniline	109	0.00 U	92.9	85	37-113
108-95-2	MS Phenol	109	0.00 U	51.8	48	23-82
111-44-4	MS bis(2-Chloroethyl) ether	109	0.00 U	88.4	81	39-114
95-57-8	MS 2-Chlorophenol	109	0.00 U	85.2	78	37-108
541-73-1	MS 1,3-Dichlorobenzene	109	0.00 U	67.0	62	27-97
106-46-7	MS 1,4-Dichlorobenzene	109	0.00 U	66.8	61	28-97
95-50-1	MS 1,2-Dichlorobenzene	109	0.00 U	69.3	64	28-99
108-60-1	MS bis(2-Chloro-1-methylethyl)ether	109	0.00 U	79.8	73	32-127
100-51-6	MS Benzyl alcohol	109	0.00 U	81.5	75	37-116
95-48-7	MS o-Cresol	109	0.00 U	82.8	76	34-109
65794-96-9	MS m,p-Cresols	109	0.00 U	89.8	83	36-120
621-64-7	MS N-Nitrosodi--n-propylamine <i>N-Nitrosodipropylamine</i>	109	0.00 U	94.2	87	42-118
67-72-1	MS Hexachloroethane	109	0.00 U	58.9	54	29-94
98-95-3	MS Nitrobenzene	109	0.00 U	82.7	76	38-123
78-59-1	MS Isophorone	109	0.00 U	83.1	76	43-120
88-75-5	MS 2-Nitrophenol	109	0.00 U	83.7	77	39-115
105-67-9	MS 2,4-Dimethylphenol	109	0.00 U	76.7	71	39-107
111-91-1	MS bis(2-Chloroethoxy)methane	109	0.00 U	83.8	77	42-118
120-83-2	MS 2,4-Dichlorophenol	109	0.00 U	88.5	81	40-111
65-85-0	MS Benzoic acid	217	0.00 U	119	55	17-95

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Client ID: CAMO-18-148073MS

Lab Sample ID 1203919738

Instrument: MSD2.I

Analyst: AGS1

Inj. Vol: 1 uL

Sample Type: Matrix Spike

Matrix: W

Analysis Date: 11/16/2017 00:22

Dilution: 1

Prep Batch ID: 1718842

Batch ID: 1718844

CAS No		Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
106-47-8	MS	4-Chloroaniline	109	0.00 U	116	107	44-138
87-68-3	MS	Hexachlorobutadiene	109	0.00 U	60.5	56	26-98
59-50-7	MS	Parachlorometa cresol <i>4-Chloro-3-methylphenol</i>	109	0.00 U	88.1	81	41-122
91-57-6	MS	2-Methylnaphthalene	109	0.00 U	65.9	61	29-109
91-20-3	MS	Naphthalene	109	0.00 U	68.3	63	31-108
90-12-0	MS	1-Methylnaphthalene	109	0.00 U	68.2	63	33-112
77-47-4	MS	Hexachlorocyclopentadiene	109	0.00 U	42.9	39	26-79
88-06-2	MS	2,4,6-Trichlorophenol	109	0.00 U	84.3	78	39-124
95-95-4	MS	2,4,5-Trichlorophenol	109	0.00 U	89.1	82	42-120
91-58-7	MS	2-Chloronaphthalene	109	0.00 U	69.7	64	29-113
88-74-4	MS	2-Nitroaniline <i>o-Nitroaniline</i>	109	0.00 U	82.5	76	41-121
99-09-2	MS	3-Nitroaniline <i>m-Nitroaniline</i>	109	0.00 U	108	99	42-144
131-11-3	MS	Dimethylphthalate	109	0.00 U	86.5	80	45-128
606-20-2	MS	2,6-Dinitrotoluene	109	0.00 U	85.0	78	46-124
121-14-2	MS	2,4-Dinitrotoluene	109	0.00 U	83.3	77	45-125
208-96-8	MS	Acenaphthylene	109	0.00 U	73.9	68	35-120
83-32-9	MS	Acenaphthene	109	0.00 U	80.8	74	35-117
51-28-5	MS	2,4-Dinitrophenol	109	0.00 U	65.4	60	27-122
132-64-9	MS	Dibenzofuran	109	0.00 U	79.4	73	38-113
58-90-2	MS	2,3,4,6-Tetrachlorophenol	109	0.00 U	88.0	81	40-128
84-66-2	MS	Diethylphthalate	109	0.00 U	86.2	79	43-127
100-02-7	MS	4-Nitrophenol	109	0.00 U	28.3	26	17-85



Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Client ID: CAMO-18-148073MS

Lab Sample ID 1203919738

Instrument: MSD2.I

Analyst: AGS1

Inj. Vol: 1 uL

Sample Type: Matrix Spike

Matrix: W

Analysis Date: 11/16/2017 00:22

Dilution: 1

Prep Batch ID: 1718842

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
86-73-7	MS Fluorene	109	0.00 U	78.5	72	39-117
7005-72-3	MS 4-Chlorophenylphenylether	109	0.00 U	86.0	79	39-121
100-01-6	MS 4-Nitroaniline	109	0.00 U	74.9	69	30-133
534-52-1	MS 2-Methyl-4,6-dinitrophenol	109	0.00 U	82.1	76	32-126
122-39-4	MS Diphenylamine	109	0.00 U	86.1	79	37-118
122-66-7	MS Azobenzene	109	0.00 U	82.8	76	38-120
101-55-3	MS 4-Bromophenylphenylether	109	0.00 U	93.4	86	39-121
118-74-1	MS Hexachlorobenzene	109	0.00 U	90.9	84	40-118
87-86-5	MS Pentachlorophenol	109	0.00 U	97.5	90	35-121
85-01-8	MS Phenanthrene	109	0.00 U	80.9	74	40-115
120-12-7	MS Anthracene	109	0.00 U	79.3	73	38-120
84-74-2	MS Di-n-butylphthalate	109	0.00 U	81.5	75	41-128
206-44-0	MS Fluoranthene	109	0.00 U	77.7	71	41-119
129-00-0	MS Pyrene	109	0.00 U	92.2	85	35-128
85-68-7	MS Butylbenzylphthalate	109	0.00 U	87.4	80	40-129
117-81-7	MS bis(2-Ethylhexyl)phthalate	109	0.00 U	84.7	78	38-131
56-55-3	MS Benzo(a)anthracene	109	0.00 U	82.5	76	39-120
218-01-9	MS Chrysene	109	0.00 U	81.9	75	41-124
117-84-0	MS Di-n-octylphthalate	109	0.00 U	74.8	69	37-134
205-99-2	MS Benzo(b)fluoranthene	109	0.00 U	82.8	76	31-122
207-08-9	MS Benzo(k)fluoranthene	109	0.00 U	83.2	77	33-123
50-32-8	MS Benzo(a)pyrene	109	0.00 U	76.9	71	32-118

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Matrix Spike

Client ID: CAMO-18-148073MS

Matrix: W

Lab Sample ID 1203919738

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:22

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
193-39-5	MS Indeno(1,2,3-cd)pyrene	109	0.00 U	75.3	69	27-121
53-70-3	MS Dibenzo(a,h)anthracene	109	0.00 U	74.6	69	30-125
191-24-2	MS Benzo(ghi)perylene	109	0.00 U	71.1	65	24-126
123-91-1	MS 1,4-Dioxane	109	0.00 U	76.4	70	24-110
930-55-2	MS N-Nitrosopyrrolidine	109	0.00 U	94.9	87	47-119
95-94-3	MS 1,2,4,5-Tetrachlorobenzene	109	0.00 U	72.4	67	32-101
1912-24-9	MS Atrazine	109	0.00 U	97.7	90	42-129
92-87-5	MS Benzidine	217	0.00 U	32.9	15	15-130
91-94-1	MS 3,3'-Dichlorobenzidine	109	0.00 U	45.2	42	34-124
120-82-1	MS 1,2,4-Trichlorobenzene	109	0.00 U	65.5	60	26-102

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148073MSD

Matrix: W

Lab Sample ID 1203919739

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:50

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
62-75-9	MSD N-Methyl-N-nitrosomethylamine	109	0.00 U	60.3	56	25-106	11	0-30
110-86-1	MSD Pyridine	109	0.00 U	55.2	51	24-93	22	0-30
62-53-3	MSD Aniline	109	0.00 U	81.0	74	37-113	14	0-30
108-95-2	MSD Phenol	109	0.00 U	45.1	41	23-82	14	0-30
111-44-4	MSD bis(2-Chloroethyl) ether	109	0.00 U	76.9	71	39-114	14	0-30
95-57-8	MSD 2-Chlorophenol	109	0.00 U	73.1	67	37-108	15	0-30
541-73-1	MSD 1,3-Dichlorobenzene	109	0.00 U	56.7	52	27-97	17	0-30
106-46-7	MSD 1,4-Dichlorobenzene	109	0.00 U	57.4	53	28-97	15	0-30
95-50-1	MSD 1,2-Dichlorobenzene	109	0.00 U	59.1	54	28-99	16	0-30
108-60-1	MSD bis(2-Chloro-1-methylethyl)ether	109	0.00 U	68.2	63	32-127	16	0-30
100-51-6	MSD Benzyl alcohol	109	0.00 U	74.0	68	37-116	10	0-30
95-48-7	MSD o-Cresol	109	0.00 U	71.5	66	34-109	15	0-30
65794-96-9	MSD m,p-Cresols	109	0.00 U	80.7	74	36-120	11	0-30
621-64-7	MSD N-Nitrosodi-n-propylamine <i>N-Nitrosodipropylamine</i>	109	0.00 U	81.1	75	42-118	15	0-30
67-72-1	MSD Hexachloroethane	109	0.00 U	50.3	46	29-94	16	0-30
98-95-3	MSD Nitrobenzene	109	0.00 U	74.2	68	38-123	11	0-30
78-59-1	MSD Isophorone	109	0.00 U	73.6	68	43-120	12	0-30
88-75-5	MSD 2-Nitrophenol	109	0.00 U	78.0	72	39-115	7	0-30
105-67-9	MSD 2,4-Dimethylphenol	109	0.00 U	63.8	59	39-107	18	0-30
111-91-1	MSD bis(2-Chloroethoxy)methane	109	0.00 U	74.3	68	42-118	12	0-30
120-83-2	MSD 2,4-Dichlorophenol	109	0.00 U	80.9	74	40-111	9	0-30
65-85-0	MSD Benzoic acid	217	0.00 U	111	51	17-95	7	0-30

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148073MSD

Matrix: W

Lab Sample ID 1203919739

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:50

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
106-47-8	MSD 4-Chloroaniline	109	0.00 U	110	101	44-138	5	0-30
87-68-3	MSD Hexachlorobutadiene	109	0.00 U	52.0	48	26-98	15	0-30
59-50-7	MSD Parachlorometa cresol 4-Chloro-3-methylphenol	109	0.00 U	81.7	75	41-122	8	0-30
91-57-6	MSD 2-Methylnaphthalene	109	0.00 U	58.6	54	29-109	12	0-30
91-20-3	MSD Naphthalene	109	0.00 U	59.3	55	31-108	14	0-30
90-12-0	MSD 1-Methylnaphthalene	109	0.00 U	60.4	56	33-112	12	0-30
77-47-4	MSD Hexachlorocyclopentadiene	109	0.00 U	43.3	40	26-79	1	0-30
88-06-2	MSD 2,4,6-Trichlorophenol	109	0.00 U	78.2	72	39-124	7	0-30
95-95-4	MSD 2,4,5-Trichlorophenol	109	0.00 U	82.2	76	42-120	8	0-30
91-58-7	MSD 2-Chloronaphthalene	109	0.00 U	62.6	58	29-113	11	0-30
88-74-4	MSD 2-Nitroaniline o-Nitroaniline	109	0.00 U	79.5	73	41-121	4	0-30
99-09-2	MSD 3-Nitroaniline m-Nitroaniline	109	0.00 U	112	103	42-144	4	0-30
131-11-3	MSD Dimethylphthalate	109	0.00 U	81.6	75	45-128	6	0-30
606-20-2	MSD 2,6-Dinitrotoluene	109	0.00 U	80.2	74	46-124	6	0-30
121-14-2	MSD 2,4-Dinitrotoluene	109	0.00 U	81.0	75	45-125	3	0-30
208-96-8	MSD Acenaphthylene	109	0.00 U	66.6	61	35-120	10	0-30
83-32-9	MSD Acenaphthene	109	0.00 U	70.3	65	35-117	14	0-30
51-28-5	MSD 2,4-Dinitrophenol	109	0.00 U	71.7	66	27-122	9	0-30
132-64-9	MSD Dibenzofuran	109	0.00 U	72.4	67	38-113	9	0-30
58-90-2	MSD 2,3,4,6-Tetrachlorophenol	109	0.00 U	83.0	76	40-128	6	0-30
84-66-2	MSD Diethylphthalate	109	0.00 U	80.3	74	43-127	7	0-30
100-02-7	MSD 4-Nitrophenol	109	0.00 U	35.0	32	17-85	21	0-30

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148073MSD

Matrix: W

Lab Sample ID 1203919739

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:50

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
86-73-7	MSD Fluorene	109	0.00 U	70.3	65	39-117	11	0-30
7005-72-3	MSD 4-Chlorophenylphenylether	109	0.00 U	77.6	71	39-121	10	0-30
100-01-6	MSD 4-Nitroaniline <i>p</i> -Nitroaniline	109	0.00 U	80.3	74	30-133	7	0-30
534-52-1	MSD 2-Methyl-4,6-dinitrophenol	109	0.00 U	84.5	78	32-126	3	0-30
122-39-4	MSD Diphenylamine	109	0.00 U	79.0	73	37-118	9	0-30
122-66-7	MSD Azobenzene <i>1,2-Diphenylhydrazine</i>	109	0.00 U	74.8	69	38-120	10	0-30
101-55-3	MSD 4-Bromophenylphenylether	109	0.00 U	83.5	77	39-121	11	0-30
118-74-1	MSD Hexachlorobenzene	109	0.00 U	83.0	76	40-118	9	0-30
87-86-5	MSD Pentachlorophenol	109	0.00 U	96.5	89	35-121	1	0-30
85-01-8	MSD Phenanthrene	109	0.00 U	76.6	70	40-115	5	0-30
120-12-7	MSD Anthracene	109	0.00 U	76.7	71	38-120	3	0-30
84-74-2	MSD Di-n-butylphthalate	109	0.00 U	77.8	72	41-128	5	0-30
206-44-0	MSD Fluoranthene	109	0.00 U	76.9	71	41-119	1	0-30
129-00-0	MSD Pyrene	109	0.00 U	83.3	77	35-128	10	0-30
85-68-7	MSD Butylbenzylphthalate	109	0.00 U	81.1	75	40-129	7	0-30
117-81-7	MSD bis(2-Ethylhexyl)phthalate	109	0.00 U	80.6	74	38-131	5	0-30
56-55-3	MSD Benzo(a)anthracene	109	0.00 U	77.9	72	39-120	6	0-30
218-01-9	MSD Chrysene	109	0.00 U	79.0	73	41-124	4	0-30
117-84-0	MSD Di-n-octylphthalate	109	0.00 U	70.3	65	37-134	6	0-30
205-99-2	MSD Benzo(b)fluoranthene	109	0.00 U	78.8	72	31-122	5	0-30
207-08-9	MSD Benzo(k)fluoranthene	109	0.00 U	80.7	74	33-123	3	0-30
50-32-8	MSD Benzo(a)pyrene	109	0.00 U	74.0	68	32-118	4	0-30

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

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SDG Number: 2018-828

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148073MSD

Matrix: W

Lab Sample ID 1203919739

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:50

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
193-39-5	MSD Indeno(1,2,3-cd)pyrene	109	0.00	U	64.7	60	27-121	15 0-30
53-70-3	MSD Dibenzo(a,h)anthracene	109	0.00	U	67.3	62	30-125	10 0-30
191-24-2	MSD Benzo(ghi)perylene	109	0.00	U	61.9	57	24-126	14 0-30
123-91-1	MSD 1,4-Dioxane	109	0.00	U	64.5	59	24-110	17 0-30
930-55-2	MSD N-Nitrosopyrrolidine	109	0.00	U	82.4	76	47-119	14 0-30
95-94-3	MSD 1,2,4,5-Tetrachlorobenzene	109	0.00	U	62.9	58	32-101	14 0-30
1912-24-9	MSD Atrazine	109	0.00	U	93.3	86	42-129	5 0-30
92-87-5	MSD Benzidine	217	0.00	U	42.4	20	15-130	25 0-30
91-94-1	MSD 3,3'-Dichlorobenzidine	109	0.00	U	44.4	41	34-124	2 0-30
120-82-1	MSD 1,2,4-Trichlorobenzene	109	0.00	U	56.9	52	26-102	14 0-30

## Method Blank Summary

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SDG Number:	2018-828	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1718842	Instrument ID:	MSD2.I	Data File:	s111517.B\s2k1507.D
Lab Sample ID:	1203919736	Prep Date:	11/15/2017 09:15	Analyzed:	11/15/17 20:04
Column:	DB-5ms				

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 1718842	1203919737	s111517.B\s2k1508.D	11/15/17	2033
02 CASA-18-147998	437612003	s111517.B\s2k1513.D	11/15/17	2256
03 CAMO-18-148116	437612007	s111517.B\s2k1514.D	11/15/17	2324
04 CAMO-18-148073MS	1203919738	s111517.B\s2k1516.D	11/16/17	0022
05 CAMO-18-148073MSD	1203919739	s111517.B\s2k1517.D	11/16/17	0050

# Quality Control Data



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

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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203919736  
**Client Sample:** QC for batch 1718842  
**Client ID:** MB for batch 1718842  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 20:04  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1507.D

**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 1000 mL  
**Column:** DB-5ms

**Matrix:** WATER  
**Project:** QC  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene	U	3.00	ug/L	3.00	10.0
120-82-1	1,2,4-Trichlorobenzene	U	3.00	ug/L	3.00	10.0
95-50-1	1,2-Dichlorobenzene	U	3.00	ug/L	3.00	10.0
122-66-7	Azobenzene	U	3.00	ug/L	3.00	10.0
541-73-1	<i>1,2-Diphenylhydrazine</i> 1,3-Dichlorobenzene	U	3.00	ug/L	3.00	10.0
106-46-7	1,4-Dichlorobenzene	U	3.00	ug/L	3.00	10.0
123-91-1	1,4-Dioxane	U	3.00	ug/L	3.00	10.0
90-12-0	1-Methylnaphthalene	U	0.300	ug/L	0.300	1.00
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.00	ug/L	3.00	10.0
95-95-4	2,4,5-Trichlorophenol	U	3.00	ug/L	3.00	10.0
88-06-2	2,4,6-Trichlorophenol	U	3.00	ug/L	3.00	10.0
120-83-2	2,4-Dichlorophenol	U	3.00	ug/L	3.00	10.0
105-67-9	2,4-Dimethylphenol	U	3.00	ug/L	3.00	10.0
51-28-5	2,4-Dinitrophenol	U	5.00	ug/L	5.00	20.0
121-14-2	2,4-Dinitrotoluene	U	3.00	ug/L	3.00	10.0
606-20-2	2,6-Dinitrotoluene	U	3.00	ug/L	3.00	10.0
91-58-7	2-Chloronaphthalene	U	0.410	ug/L	0.410	1.00
95-57-8	2-Chlorophenol	U	3.00	ug/L	3.00	10.0
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.00	ug/L	3.00	10.0
91-57-6	2-Methylnaphthalene	U	0.300	ug/L	0.300	1.00
88-75-5	2-Nitrophenol	U	3.00	ug/L	3.00	10.0
91-94-1	3,3'-Dichlorobenzidine	U	3.00	ug/L	3.00	10.0
101-55-3	4-Bromophenylphenylether	U	3.00	ug/L	3.00	10.0
59-50-7	Parachlorometa cresol	U	3.00	ug/L	3.00	10.0
106-47-8	<i>4-Chloro-3-methylphenol</i> 4-Chloroaniline	U	3.30	ug/L	3.30	10.0
7005-72-3	4-Chlorophenylphenylether	U	3.00	ug/L	3.00	10.0
100-02-7	4-Nitrophenol	U	3.00	ug/L	3.00	10.0
83-32-9	Acenaphthene	U	0.300	ug/L	0.300	1.00
208-96-8	Acenaphthylene	U	0.300	ug/L	0.300	1.00
62-53-3	Aniline	U	4.20	ug/L	4.20	10.0
120-12-7	Anthracene	U	0.300	ug/L	0.300	1.00
1912-24-9	Atrazine	U	3.00	ug/L	3.00	10.0
92-87-5	Benzidine	U	3.90	ug/L	3.90	10.0
56-55-3	Benzo(a)anthracene	U	0.300	ug/L	0.300	1.00
50-32-8	Benzo(a)pyrene	U	0.300	ug/L	0.300	1.00
205-99-2	Benzo(b)fluoranthene	U	0.300	ug/L	0.300	1.00
191-24-2	Benzo(ghi)perylene	U	0.300	ug/L	0.300	1.00

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

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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203919736  
**Client Sample:** QC for batch 1718842  
**Client ID:** MB for batch 1718842  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 20:04  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1507.D

**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 1000 mL  
**Column:** DB-5ms

**Matrix:** WATER  
**Project:** QC  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene	U	0.300	ug/L	0.300	1.00
65-85-0	Benzoic acid	U	6.00	ug/L	6.00	20.0
100-51-6	Benzyl alcohol	U	3.00	ug/L	3.00	10.0
85-68-7	Butylbenzylphthalate	U	3.00	ug/L	3.00	10.0
218-01-9	Chrysene	U	0.300	ug/L	0.300	1.00
84-74-2	Di-n-butylphthalate	U	3.00	ug/L	3.00	10.0
117-84-0	Di-n-octylphthalate	U	3.00	ug/L	3.00	10.0
53-70-3	Dibenzo(a,h)anthracene	U	0.300	ug/L	0.300	1.00
132-64-9	Dibenzofuran	U	3.00	ug/L	3.00	10.0
84-66-2	Diethylphthalate	U	3.00	ug/L	3.00	10.0
131-11-3	Dimethylphthalate	U	3.00	ug/L	3.00	10.0
88-85-7	Dinoseb	U	3.00	ug/L	3.00	10.0
122-39-4	Diphenylamine	U	3.00	ug/L	3.00	10.0
206-44-0	Fluoranthene	U	0.300	ug/L	0.300	1.00
86-73-7	Fluorene	U	0.300	ug/L	0.300	1.00
118-74-1	Hexachlorobenzene	U	3.00	ug/L	3.00	10.0
87-68-3	Hexachlorobutadiene	U	3.00	ug/L	3.00	10.0
77-47-4	Hexachlorocyclopentadiene	U	3.00	ug/L	3.00	10.0
67-72-1	Hexachloroethane	U	3.00	ug/L	3.00	10.0
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.300	ug/L	0.300	1.00
78-59-1	Isophorone	U	3.50	ug/L	3.50	10.0
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.00	ug/L	3.00	10.0
924-16-3	N-Nitrosodi-n-butylamine	U	3.00	ug/L	3.00	10.0
55-18-5	N-Nitrosodiethylamine	U	3.00	ug/L	3.00	10.0
621-64-7	N-Nitrosodi-n-propylamine	U	3.00	ug/L	3.00	10.0
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.00	ug/L	3.00	10.0
91-20-3	Naphthalene	U	0.300	ug/L	0.300	1.00
98-95-3	Nitrobenzene	U	3.00	ug/L	3.00	10.0
608-93-5	Pentachlorobenzene	U	3.00	ug/L	3.00	10.0
87-86-5	Pentachlorophenol	U	3.00	ug/L	3.00	10.0
85-01-8	Phenanthrene	U	0.300	ug/L	0.300	1.00
108-95-2	Phenol	U	3.00	ug/L	3.00	10.0
129-00-0	Pyrene	U	0.300	ug/L	0.300	1.00
110-86-1	Pyridine	U	3.00	ug/L	3.00	10.0
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.00	ug/L	3.00	10.0
111-91-1	bis(2-Chloroethoxy)methane	U	3.00	ug/L	3.00	10.0
111-44-4	bis(2-Chloroethyl) ether	U	3.00	ug/L	3.00	10.0
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.00	ug/L	3.00	10.0

**Semi-Volatile  
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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203919736  
**Client Sample:** QC for batch 1718842  
**Client ID:** MB for batch 1718842  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 20:04  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1507.D

**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 1000 mL  
**Column:** DB-5ms

**Matrix:** WATER  
**Project:** QC  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols	U	3.70	ug/L	3.70	10.0
99-09-2	3-Nitroaniline	U	3.00	ug/L	3.00	10.0
95-48-7	<i>m</i> -Nitroaniline o-Cresol	U	3.00	ug/L	3.00	10.0
88-74-4	2-Nitroaniline	U	3.00	ug/L	3.00	10.0
100-01-6	<i>o</i> -Nitroaniline 4-Nitroaniline <i>p</i> -Nitroaniline	U	3.00	ug/L	3.00	10.0

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	62.6	100	ug/L	63	(32%-124%)
2-Fluorobiphenyl	23.6	50.0	ug/L	47	(32%-112%)
2-Fluorophenol	39.3	100	ug/L	39	(15%-88%)
Nitrobenzene-d5	27.0	50.0	ug/L	54	(36%-115%)
Phenol-d5	21.4	100	ug/L	21	(15%-91%)
p-Terphenyl-d14	39.6	50.0	ug/L	79	(36%-121%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
000067-66-3	Trichloromethane	2.009	68.6	ug/L	95	NJ

**Semi-Volatile  
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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203919737  
**Client Sample:** QC for batch 1718842  
**Client ID:** LCS for batch 1718842  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 20:33  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1508.D

**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 1000 mL  
**Column:** DB-5ms

**Matrix:** WATER  
**Project:** QC  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene		34.7	ug/L	3.00	10.0
120-82-1	1,2,4-Trichlorobenzene		33.3	ug/L	3.00	10.0
95-50-1	1,2-Dichlorobenzene		31.5	ug/L	3.00	10.0
122-66-7	Azobenzene		36.4	ug/L	3.00	10.0
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		30.7	ug/L	3.00	10.0
106-46-7	1,4-Dichlorobenzene		30.3	ug/L	3.00	10.0
123-91-1	1,4-Dioxane		20.4	ug/L	3.00	10.0
90-12-0	1-Methylnaphthalene		32.0	ug/L	0.300	1.00
58-90-2	2,3,4,6-Tetrachlorophenol		37.6	ug/L	3.00	10.0
95-95-4	2,4,5-Trichlorophenol		38.7	ug/L	3.00	10.0
88-06-2	2,4,6-Trichlorophenol		37.1	ug/L	3.00	10.0
120-83-2	2,4-Dichlorophenol		37.9	ug/L	3.00	10.0
105-67-9	2,4-Dimethylphenol		32.3	ug/L	3.00	10.0
51-28-5	2,4-Dinitrophenol		28.4	ug/L	5.00	20.0
121-14-2	2,4-Dinitrotoluene		36.4	ug/L	3.00	10.0
606-20-2	2,6-Dinitrotoluene		36.5	ug/L	3.00	10.0
91-58-7	2-Chloronaphthalene		32.6	ug/L	0.410	1.00
95-57-8	2-Chlorophenol		34.9	ug/L	3.00	10.0
534-52-1	2-Methyl-4,6-dinitrophenol		35.7	ug/L	3.00	10.0
91-57-6	2-Methylnaphthalene		30.9	ug/L	0.300	1.00
88-75-5	2-Nitrophenol		37.1	ug/L	3.00	10.0
91-94-1	3,3'-Dichlorobenzidine		30.8	ug/L	3.00	10.0
101-55-3	4-Bromophenylphenylether		41.0	ug/L	3.00	10.0
59-50-7	Parachlorometa cresol		37.2	ug/L	3.00	10.0
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		40.0	ug/L	3.30	10.0
7005-72-3	4-Chlorophenylphenylether		38.1	ug/L	3.00	10.0
100-02-7	4-Nitrophenol		13.2	ug/L	3.00	10.0
83-32-9	Acenaphthene		35.6	ug/L	0.300	1.00
208-96-8	Acenaphthylene		32.9	ug/L	0.300	1.00
62-53-3	Aniline		34.3	ug/L	4.20	10.0
120-12-7	Anthracene		35.2	ug/L	0.300	1.00
1912-24-9	Atrazine		41.4	ug/L	3.00	10.0
92-87-5	Benzidine		19.7	ug/L	3.90	10.0
56-55-3	Benzo(a)anthracene		36.9	ug/L	0.300	1.00
50-32-8	Benzo(a)pyrene		34.9	ug/L	0.300	1.00
205-99-2	Benzo(b)fluoranthene		36.0	ug/L	0.300	1.00
191-24-2	Benzo(ghi)perylene		37.5	ug/L	0.300	1.00

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SDG Number: 2018-828  
Lab Sample ID: 1203919737  
Client Sample: QC for batch 1718842  
Client ID: LCS for batch 1718842  
Batch ID: 1718844  
Run Date: 11/15/2017 20:33  
Prep Date: 11/15/2017 09:15  
Data File: s111517.B\s2k1508.D

Client: ARSL004  
Method: SW846 3510C/8270D  
Inst: MSD2.I  
Analyst: AGS1  
Aliquot: 1000 mL  
Column: DB-5ms

Matrix: WATER  
Project: QC  
SOP Ref: GL-OA-E-009  
Dilution: 1  
Inj. Vol: 1 uL  
Final Volume: 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene		35.6	ug/L	0.300	1.00
65-85-0	Benzoic acid		50.9	ug/L	6.00	20.0
100-51-6	Benzyl alcohol		31.5	ug/L	3.00	10.0
85-68-7	Butylbenzylphthalate		37.7	ug/L	3.00	10.0
218-01-9	Chrysene		37.4	ug/L	0.300	1.00
84-74-2	Di-n-butylphthalate		36.7	ug/L	3.00	10.0
117-84-0	Di-n-octylphthalate		35.2	ug/L	3.00	10.0
53-70-3	Dibenzo(a,h)anthracene		39.1	ug/L	0.300	1.00
132-64-9	Dibenzofuran		35.1	ug/L	3.00	10.0
84-66-2	Diethylphthalate		36.3	ug/L	3.00	10.0
131-11-3	Dimethylphthalate		37.3	ug/L	3.00	10.0
88-85-7	Dinoseb	U	3.00	ug/L	3.00	10.0
122-39-4	Diphenylamine		37.5	ug/L	3.00	10.0
206-44-0	Fluoranthene		35.2	ug/L	0.300	1.00
86-73-7	Fluorene		33.8	ug/L	0.300	1.00
118-74-1	Hexachlorobenzene		39.8	ug/L	3.00	10.0
87-68-3	Hexachlorobutadiene		32.4	ug/L	3.00	10.0
77-47-4	Hexachlorocyclopentadiene		24.9	ug/L	3.00	10.0
67-72-1	Hexachloroethane		29.3	ug/L	3.00	10.0
193-39-5	Indeno(1,2,3-cd)pyrene		38.1	ug/L	0.300	1.00
78-59-1	Isophorone		45.6	ug/L	3.50	10.0
62-75-9	N-Methyl-N-nitrosomethylamine		23.7	ug/L	3.00	10.0
924-16-3	N-Nitrosodi-n-butylamine	U	3.00	ug/L	3.00	10.0
55-18-5	N-Nitrosodiethylamine	U	3.00	ug/L	3.00	10.0
621-64-7	N-Nitrosodi-n-propylamine		37.5	ug/L	3.00	10.0
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		37.4	ug/L	3.00	10.0
91-20-3	Naphthalene		31.6	ug/L	0.300	1.00
98-95-3	Nitrobenzene		35.5	ug/L	3.00	10.0
608-93-5	Pentachlorobenzene	U	3.00	ug/L	3.00	10.0
87-86-5	Pentachlorophenol		43.5	ug/L	3.00	10.0
85-01-8	Phenanthrene		36.0	ug/L	0.300	1.00
108-95-2	Phenol		18.4	ug/L	3.00	10.0
129-00-0	Pyrene		38.0	ug/L	0.300	1.00
110-86-1	Pyridine		21.7	ug/L	3.00	10.0
108-60-1	bis(2-Chloro-1-methylethyl)ether		32.3	ug/L	3.00	10.0
111-91-1	bis(2-Chloroethoxy)methane		35.3	ug/L	3.00	10.0
111-44-4	bis(2-Chloroethyl) ether		35.9	ug/L	3.00	10.0
117-81-7	bis(2-Ethylhexyl)phthalate		37.8	ug/L	3.00	10.0

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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203919737  
**Client Sample:** QC for batch 1718842  
**Client ID:** LCS for batch 1718842  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 20:33  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1508.D

**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 1000 mL  
**Column:** DB-5ms

**Matrix:** WATER  
**Project:** QC  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols		34.4	ug/L	3.70	10.0
99-09-2	3-Nitroaniline		44.3	ug/L	3.00	10.0
	<i>m-Nitroaniline</i>					
95-48-7	o-Cresol		32.3	ug/L	3.00	10.0
88-74-4	2-Nitroaniline		35.6	ug/L	3.00	10.0
	<i>o-Nitroaniline</i>					
100-01-6	4-Nitroaniline		44.5	ug/L	3.00	10.0
	<i>p-Nitroaniline</i>					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	74.9	100	ug/L	75	(32%-124%)
2-Fluorobiphenyl	30.9	50.0	ug/L	62	(32%-112%)
2-Fluorophenol	46.3	100	ug/L	46	(15%-88%)
Nitrobenzene-d5	31.9	50.0	ug/L	64	(36%-115%)
Phenol-d5	36.0	100	ug/L	36	(15%-91%)
p-Terphenyl-d14	40.7	50.0	ug/L	81	(36%-121%)

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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203919738  
**Client Sample:** QC for batch 1718842  
**Client ID:** CAMO-18-148073MS  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 00:22  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1516.D

**Date Collected:** 11/08/2017 12:58  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 460 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** QC  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene		72.4	ug/L	6.52	21.7
120-82-1	1,2,4-Trichlorobenzene		65.5	ug/L	6.52	21.7
95-50-1	1,2-Dichlorobenzene		69.3	ug/L	6.52	21.7
122-66-7	Azobenzene		82.8	ug/L	6.52	21.7
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		67.0	ug/L	6.52	21.7
106-46-7	1,4-Dichlorobenzene		66.8	ug/L	6.52	21.7
123-91-1	1,4-Dioxane		76.4	ug/L	6.52	21.7
90-12-0	1-Methylnaphthalene		68.2	ug/L	0.652	2.17
58-90-2	2,3,4,6-Tetrachlorophenol		88.0	ug/L	6.52	21.7
95-95-4	2,4,5-Trichlorophenol		89.1	ug/L	6.52	21.7
88-06-2	2,4,6-Trichlorophenol		84.3	ug/L	6.52	21.7
120-83-2	2,4-Dichlorophenol		88.5	ug/L	6.52	21.7
105-67-9	2,4-Dimethylphenol		76.7	ug/L	6.52	21.7
51-28-5	2,4-Dinitrophenol		65.4	ug/L	10.9	43.5
121-14-2	2,4-Dinitrotoluene		83.3	ug/L	6.52	21.7
606-20-2	2,6-Dinitrotoluene		85.0	ug/L	6.52	21.7
91-58-7	2-Chloronaphthalene		69.7	ug/L	0.891	2.17
95-57-8	2-Chlorophenol		85.2	ug/L	6.52	21.7
534-52-1	2-Methyl-4,6-dinitrophenol		82.1	ug/L	6.52	21.7
91-57-6	2-Methylnaphthalene		65.9	ug/L	0.652	2.17
88-75-5	2-Nitrophenol		83.7	ug/L	6.52	21.7
91-94-1	3,3'-Dichlorobenzidine		45.2	ug/L	6.52	21.7
101-55-3	4-Bromophenylphenylether		93.4	ug/L	6.52	21.7
59-50-7	Parachlorometa cresol		88.1	ug/L	6.52	21.7
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		116	ug/L	7.17	21.7
7005-72-3	4-Chlorophenylphenylether		86.0	ug/L	6.52	21.7
100-02-7	4-Nitrophenol		28.3	ug/L	6.52	21.7
83-32-9	Acenaphthene		80.8	ug/L	0.652	2.17
208-96-8	Acenaphthylene		73.9	ug/L	0.652	2.17
62-53-3	Aniline		92.9	ug/L	9.13	21.7
120-12-7	Anthracene		79.3	ug/L	0.652	2.17
1912-24-9	Atrazine		97.7	ug/L	6.52	21.7
92-87-5	Benzidine		32.9	ug/L	8.48	21.7
56-55-3	Benzo(a)anthracene		82.5	ug/L	0.652	2.17
50-32-8	Benzo(a)pyrene		76.9	ug/L	0.652	2.17
205-99-2	Benzo(b)fluoranthene		82.8	ug/L	0.652	2.17
191-24-2	Benzo(ghi)perylene		71.1	ug/L	0.652	2.17

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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203919738  
**Client Sample:** QC for batch 1718842  
**Client ID:** CAMO-18-148073MS  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 00:22  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1516.D

**Date Collected:** 11/08/2017 12:58  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 460 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** QC  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene		83.2	ug/L	0.652	2.17
65-85-0	Benzoic acid		119	ug/L	13.0	43.5
100-51-6	Benzyl alcohol		81.5	ug/L	6.52	21.7
85-68-7	Butylbenzylphthalate		87.4	ug/L	6.52	21.7
218-01-9	Chrysene		81.9	ug/L	0.652	2.17
84-74-2	Di-n-butylphthalate		81.5	ug/L	6.52	21.7
117-84-0	Di-n-octylphthalate		74.8	ug/L	6.52	21.7
53-70-3	Dibenzo(a,h)anthracene		74.6	ug/L	0.652	2.17
132-64-9	Dibenzofuran		79.4	ug/L	6.52	21.7
84-66-2	Diethylphthalate		86.2	ug/L	6.52	21.7
131-11-3	Dimethylphthalate		86.5	ug/L	6.52	21.7
88-85-7	Dinoseb	U	6.52	ug/L	6.52	21.7
122-39-4	Diphenylamine		86.1	ug/L	6.52	21.7
206-44-0	Fluoranthene		77.7	ug/L	0.652	2.17
86-73-7	Fluorene		78.5	ug/L	0.652	2.17
118-74-1	Hexachlorobenzene		90.9	ug/L	6.52	21.7
87-68-3	Hexachlorobutadiene		60.5	ug/L	6.52	21.7
77-47-4	Hexachlorocyclopentadiene		42.9	ug/L	6.52	21.7
67-72-1	Hexachloroethane		58.9	ug/L	6.52	21.7
193-39-5	Indeno(1,2,3-cd)pyrene		75.3	ug/L	0.652	2.17
78-59-1	Isophorone		83.1	ug/L	7.61	21.7
62-75-9	N-Methyl-N-nitrosomethylamine		67.6	ug/L	6.52	21.7
924-16-3	N-Nitrosodi-n-butylamine	U	6.52	ug/L	6.52	21.7
55-18-5	N-Nitrosodiethylamine	U	6.52	ug/L	6.52	21.7
621-64-7	N-Nitrosodi-n-propylamine		94.2	ug/L	6.52	21.7
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		94.9	ug/L	6.52	21.7
91-20-3	Naphthalene		68.3	ug/L	0.652	2.17
98-95-3	Nitrobenzene		82.7	ug/L	6.52	21.7
608-93-5	Pentachlorobenzene	U	6.52	ug/L	6.52	21.7
87-86-5	Pentachlorophenol		97.5	ug/L	6.52	21.7
85-01-8	Phenanthrene		80.9	ug/L	0.652	2.17
108-95-2	Phenol		51.8	ug/L	6.52	21.7
129-00-0	Pyrene		92.2	ug/L	0.652	2.17
110-86-1	Pyridine		69.1	ug/L	6.52	21.7
108-60-1	bis(2-Chloro-1-methylethyl)ether		79.8	ug/L	6.52	21.7
111-91-1	bis(2-Chloroethoxy)methane		83.8	ug/L	6.52	21.7
111-44-4	bis(2-Chloroethyl) ether		88.4	ug/L	6.52	21.7
117-81-7	bis(2-Ethylhexyl)phthalate		84.7	ug/L	6.52	21.7



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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203919738  
**Client Sample:** QC for batch 1718842  
**Client ID:** CAMO-18-148073MS  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 00:22  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1516.D

**Date Collected:** 11/08/2017 12:58  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 460 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** QC  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols		89.8	ug/L	8.04	21.7
99-09-2	3-Nitroaniline		108	ug/L	6.52	21.7
	<i>m-Nitroaniline</i>					
95-48-7	o-Cresol		82.8	ug/L	6.52	21.7
88-74-4	2-Nitroaniline		82.5	ug/L	6.52	21.7
	<i>o-Nitroaniline</i>					
100-01-6	4-Nitroaniline		74.9	ug/L	6.52	21.7
	<i>p-Nitroaniline</i>					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	190	217	ug/L	88	(32%-124%)
2-Fluorobiphenyl	76.2	109	ug/L	70	(32%-112%)
2-Fluorophenol	140	217	ug/L	64	(15%-88%)
Nitrobenzene-d5	80.7	109	ug/L	74	(36%-115%)
Phenol-d5	103	217	ug/L	47	(15%-91%)
p-Terphenyl-d14	104	109	ug/L	95	(36%-121%)

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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203919739  
**Client Sample:** QC for batch 1718842  
**Client ID:** CAMO-18-148073MSD  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 00:50  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1517.D

**Date Collected:** 11/08/2017 12:58  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 460 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** QC  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene		62.9	ug/L	6.52	21.7
120-82-1	1,2,4-Trichlorobenzene		56.9	ug/L	6.52	21.7
95-50-1	1,2-Dichlorobenzene		59.1	ug/L	6.52	21.7
122-66-7	Azobenzene		74.8	ug/L	6.52	21.7
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		56.7	ug/L	6.52	21.7
106-46-7	1,4-Dichlorobenzene		57.4	ug/L	6.52	21.7
123-91-1	1,4-Dioxane		64.5	ug/L	6.52	21.7
90-12-0	1-Methylnaphthalene		60.4	ug/L	0.652	2.17
58-90-2	2,3,4,6-Tetrachlorophenol		83.0	ug/L	6.52	21.7
95-95-4	2,4,5-Trichlorophenol		82.2	ug/L	6.52	21.7
88-06-2	2,4,6-Trichlorophenol		78.2	ug/L	6.52	21.7
120-83-2	2,4-Dichlorophenol		80.9	ug/L	6.52	21.7
105-67-9	2,4-Dimethylphenol		63.8	ug/L	6.52	21.7
51-28-5	2,4-Dinitrophenol		71.7	ug/L	10.9	43.5
121-14-2	2,4-Dinitrotoluene		81.0	ug/L	6.52	21.7
606-20-2	2,6-Dinitrotoluene		80.2	ug/L	6.52	21.7
91-58-7	2-Chloronaphthalene		62.6	ug/L	0.891	2.17
95-57-8	2-Chlorophenol		73.1	ug/L	6.52	21.7
534-52-1	2-Methyl-4,6-dinitrophenol		84.5	ug/L	6.52	21.7
91-57-6	2-Methylnaphthalene		58.6	ug/L	0.652	2.17
88-75-5	2-Nitrophenol		78.0	ug/L	6.52	21.7
91-94-1	3,3'-Dichlorobenzidine		44.4	ug/L	6.52	21.7
101-55-3	4-Bromophenylphenylether		83.5	ug/L	6.52	21.7
59-50-7	Parachlorometa cresol		81.7	ug/L	6.52	21.7
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		110	ug/L	7.17	21.7
7005-72-3	4-Chlorophenylphenylether		77.6	ug/L	6.52	21.7
100-02-7	4-Nitrophenol		35.0	ug/L	6.52	21.7
83-32-9	Acenaphthene		70.3	ug/L	0.652	2.17
208-96-8	Acenaphthylene		66.6	ug/L	0.652	2.17
62-53-3	Aniline		81.0	ug/L	9.13	21.7
120-12-7	Anthracene		76.7	ug/L	0.652	2.17
1912-24-9	Atrazine		93.3	ug/L	6.52	21.7
92-87-5	Benzidine		42.4	ug/L	8.48	21.7
56-55-3	Benzo(a)anthracene		77.9	ug/L	0.652	2.17
50-32-8	Benzo(a)pyrene		74.0	ug/L	0.652	2.17
205-99-2	Benzo(b)fluoranthene		78.8	ug/L	0.652	2.17
191-24-2	Benzo(ghi)perylene		61.9	ug/L	0.652	2.17

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**SDG Number:** 2018-828  
**Lab Sample ID:** 1203919739  
**Client Sample:** QC for batch 1718842  
**Client ID:** CAMO-18-148073MSD  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 00:50  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1517.D

**Date Collected:** 11/08/2017 12:58  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 460 mL  
**Column:** DB-5ms

**Matrix:** W  
**Project:** QC  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene		80.7	ug/L	0.652	2.17
65-85-0	Benzoic acid		111	ug/L	13.0	43.5
100-51-6	Benzyl alcohol		74.0	ug/L	6.52	21.7
85-68-7	Butylbenzylphthalate		81.1	ug/L	6.52	21.7
218-01-9	Chrysene		79.0	ug/L	0.652	2.17
84-74-2	Di-n-butylphthalate		77.8	ug/L	6.52	21.7
117-84-0	Di-n-octylphthalate		70.3	ug/L	6.52	21.7
53-70-3	Dibenzo(a,h)anthracene		67.3	ug/L	0.652	2.17
132-64-9	Dibenzofuran		72.4	ug/L	6.52	21.7
84-66-2	Diethylphthalate		80.3	ug/L	6.52	21.7
131-11-3	Dimethylphthalate		81.6	ug/L	6.52	21.7
88-85-7	Dinoseb	U	6.52	ug/L	6.52	21.7
122-39-4	Diphenylamine		79.0	ug/L	6.52	21.7
206-44-0	Fluoranthene		76.9	ug/L	0.652	2.17
86-73-7	Fluorene		70.3	ug/L	0.652	2.17
118-74-1	Hexachlorobenzene		83.0	ug/L	6.52	21.7
87-68-3	Hexachlorobutadiene		52.0	ug/L	6.52	21.7
77-47-4	Hexachlorocyclopentadiene		43.3	ug/L	6.52	21.7
67-72-1	Hexachloroethane		50.3	ug/L	6.52	21.7
193-39-5	Indeno(1,2,3-cd)pyrene		64.7	ug/L	0.652	2.17
78-59-1	Isophorone		73.6	ug/L	7.61	21.7
62-75-9	N-Methyl-N-nitrosomethylamine		60.3	ug/L	6.52	21.7
924-16-3	N-Nitrosodi-n-butylamine	U	6.52	ug/L	6.52	21.7
55-18-5	N-Nitrosodiethylamine	U	6.52	ug/L	6.52	21.7
621-64-7	N-Nitrosodi-n-propylamine		81.1	ug/L	6.52	21.7
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		82.4	ug/L	6.52	21.7
91-20-3	Naphthalene		59.3	ug/L	0.652	2.17
98-95-3	Nitrobenzene		74.2	ug/L	6.52	21.7
608-93-5	Pentachlorobenzene	U	6.52	ug/L	6.52	21.7
87-86-5	Pentachlorophenol		96.5	ug/L	6.52	21.7
85-01-8	Phenanthrene		76.6	ug/L	0.652	2.17
108-95-2	Phenol		45.1	ug/L	6.52	21.7
129-00-0	Pyrene		83.3	ug/L	0.652	2.17
110-86-1	Pyridine		55.2	ug/L	6.52	21.7
108-60-1	bis(2-Chloro-1-methylethyl)ether		68.2	ug/L	6.52	21.7
111-91-1	bis(2-Chloroethoxy)methane		74.3	ug/L	6.52	21.7
111-44-4	bis(2-Chloroethyl) ether		76.9	ug/L	6.52	21.7
117-81-7	bis(2-Ethylhexyl)phthalate		80.6	ug/L	6.52	21.7

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<b>SDG Number:</b> 2018-828	<b>Date Collected:</b> 11/08/2017 12:58	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203919739	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> QC for batch 1718842	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAMO-18-148073MSD	<b>Method:</b> SW846 3510C/8270D	<b>SOP Ref:</b> GL-OA-E-009
<b>Batch ID:</b> 1718844	<b>Inst:</b> MSD2.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/16/2017 00:50	<b>Analyst:</b> AGS1	<b>Inj. Vol:</b> 1 uL
<b>Prep Date:</b> 11/15/2017 09:15	<b>Aliquot:</b> 460 mL	<b>Final Volume:</b> 1 mL
<b>Data File:</b> s111517.B\s2k1517.D	<b>Column:</b> DB-5ms	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols		80.7	ug/L	8.04	21.7
99-09-2	3-Nitroaniline		112	ug/L	6.52	21.7
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol		71.5	ug/L	6.52	21.7
88-74-4	2-Nitroaniline		79.5	ug/L	6.52	21.7
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline		80.3	ug/L	6.52	21.7
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	178	217	ug/L	82	(32%-124%)
2-Fluorobiphenyl	69.7	109	ug/L	64	(32%-112%)
2-Fluorophenol	120	217	ug/L	55	(15%-88%)
Nitrobenzene-d5	71.5	109	ug/L	66	(36%-115%)
Phenol-d5	86.5	217	ug/L	40	(15%-91%)
p-Terphenyl-d14	97.1	109	ug/L	89	(36%-121%)

# **Perchlorates by LCMSMS Analysis**

# Case Narrative

**Perchlorates by LCMSMS  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2018-828  
Work Order #: 437612**

**Method/Analysis Information**

**Procedure:** **Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)**

Analytical Method: SW-846:6850

Prep Method: SW-846:6850

Analytical Batch Number: 1720716

Prep Batch Number: 1720708

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
437612001	437612001 (CASA-18-147991)
437612005	437612005 (CAMO-18-148113)
1203924394	Interference Check Sample (ICS)
1203924390	Method Blank (MB)
1203924391	Laboratory Control Sample (LCS)
1203924392	437632001(CAMO-18-148057) Matrix Spike (MS)
1203924393	437632001(CAMO-18-148057) 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 437632001 (CAMO-18-148057) was chosen for matrix spike and matrix spike duplicate analysis.

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

One or more of the required spiking analytes were not within the acceptance limits in the matrix spike duplicate (MSD). The non-conforming recoveries are due to the background concentration in the parent sample, 437632001 (CAMO-18-148057). The LCS and MS were within the acceptance ranges.

Sample	Analyte	Value
1203924393 (CAMO-18-148057MSD)	Perchlorate	64* (75%-125%)
	Perchlorate-101	62* (75%-125%)

### **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 Quatro 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: 2018-828 GEL Work Order: 437612

#### 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
- J Value is estimated
- 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: 29 NOV 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: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-18-147991Date Received: 10-NOV-17GEL Job No (SDG): 2018-828GEL Sample ID: 437612001Date Filtered: 20-NOV-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	0.707	ug/L		1	28-NOV-17 00:26	per1127026a
	Perchlorate Isotope Ratio			2.92			1	28-NOV-17 00:26	per1127026a
14797-73-0	Perchlorate-101	.05	.2	0.757	ug/L		1	28-NOV-17 00:26	per1127026a
	Perchlorate-O(18)			0.529	ug/L		1	28-NOV-17 00:26	per1127026a

^ 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: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-148113Date Received: 10-NOV-17GEL Job No (SDG): 2018-828GEL Sample ID: 437612005Date Filtered: 20-NOV-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	0.307	ug/L		1	28-NOV-17 00:38	per1127027a
	Perchlorate Isotope Ratio			2.85			1	28-NOV-17 00:38	per1127027a
14797-73-0	Perchlorate-101	.05	.2	0.337	ug/L		1	28-NOV-17 00:38	per1127027a
	Perchlorate-O(18)			0.473	ug/L		1	28-NOV-17 00:38	per1127027a

^ 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):** 2018-828

**Extract Batch Code:** 1720708

**Date Filtered:** 20-NOV-17

**Matrix:** WATER

**Sample ID:** 1203924391

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.184	ug/L	92		85 - 115
Perchlorate Isotope Ratio		2.87				-
Perchlorate-101	0.200	.2	ug/L	100		85 - 115
Perchlorate-O(18)		.498	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):** 2018-828

**Extract Batch Code:** 1720708

**Date Extracted:** 20-NOV-17

**GEL MS/PS ID:** 1203924392

**Client ID:** CAMO-18-148057

**GEL MSD/PSD ID:** 1203924393

**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	0.396	ug/L	0.547	75	.523	64 *	4	30	75 - 125
Perchlorate Isotope Ratio	0	3.00		3.01		3.04		1		-
Perchlorate-101	0.200	0.413	ug/L	0.568	78	.538	62 *	5	30	75 - 125
Perchlorate-O(18)	0	0.496	ug/L	0.483		.514		6		-

^ 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: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 20-NOV-17GEL Job No (SDG): 2018-828GEL Sample ID: 1203924390Date Filtered: 20-NOV-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	27-NOV-17 23:50	per1127023a
	Perchlorate Isotope Ratio						1	27-NOV-17 23:50	per1127023a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	27-NOV-17 23:50	per1127023a
	Perchlorate-O(18)			0.503	ug/L		1	27-NOV-17 23:50	per1127023a

^ 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: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 20-NOV-17GEL Job No (SDG): 2018-828GEL Sample ID: 1203924391Date Filtered: 20-NOV-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	0.184	ug/L	J	1	28-NOV-17 00:02	per1127024a
	Perchlorate Isotope Ratio			2.87			1	28-NOV-17 00:02	per1127024a
14797-73-0	Perchlorate-101	.05	.2	0.200	ug/L		1	28-NOV-17 00:02	per1127024a
	Perchlorate-O(18)			0.498	ug/L		1	28-NOV-17 00:02	per1127024a

^ 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: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2018-828GEL Sample ID: 1203924394Date Filtered: 20-NOV-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	0.200	ug/L		1	28-NOV-17 00:14	per1127025a
	Perchlorate Isotope Ratio			3.06			1	28-NOV-17 00:14	per1127025a
14797-73-0	Perchlorate-101	.05	.2	0.204	ug/L		1	28-NOV-17 00:14	per1127025a
	Perchlorate-O(18)			0.513	ug/L		1	28-NOV-17 00:14	per1127025a

^ 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: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-148057MSDate Received: 10-NOV-17GEL Job No (SDG): 2018-828GEL Sample ID: 1203924392Date Filtered: 20-NOV-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	0.547	ug/L		1	28-NOV-17 01:01	per1127029a
	Perchlorate Isotope Ratio			3.01			1	28-NOV-17 01:01	per1127029a
14797-73-0	Perchlorate-101	.05	.2	0.568	ug/L		1	28-NOV-17 01:01	per1127029a
	Perchlorate-O(18)			0.483	ug/L		1	28-NOV-17 01:01	per1127029a

^ 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: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-148057MSDDate Received: 10-NOV-17GEL Job No (SDG): 2018-828GEL Sample ID: 1203924393Date Filtered: 20-NOV-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	0.523	ug/L		1	28-NOV-17 01:13	per1127030a
	Perchlorate Isotope Ratio			3.04			1	28-NOV-17 01:13	per1127030a
14797-73-0	Perchlorate-101	.05	.2	0.538	ug/L		1	28-NOV-17 01:13	per1127030a
	Perchlorate-O(18)			0.514	ug/L		1	28-NOV-17 01:13	per1127030a

^ 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 =

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

# PCB Analysis



# Case Narrative

**GC Semivolatile PCB  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2018-828  
Work Order #: 437612**

**Method/Analysis Information**

<b>Procedure:</b>	<b>Analysis of The Analysis of Polychlorinated Biphenyls by GC/ECD by ECD</b>
Analytical Method:	SW846 3535A/8082
Prep Method:	SW846 3535A
Analytical Batch Number:	1722631
Prep Batch Number:	1722630

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW846 3535A/8082:

<b>Sample ID</b>	<b>Client ID</b>
437612008	CAMO-18-148116
1203929169	Method Blank (MB)
1203929170	Laboratory Control Sample (LCS)
1203929171	437508003(CAMO-18-148117) Matrix Spike (MS)
1203929172	437508003(CAMO-18-148117) 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-040 REV# 24.

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

**Calibration Information**

A complete list of the initial calibration data files are shown in the Calibration History report located in the Standard Data section of the data package.

**Initial Calibration**

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

**Continuing Calibration Verification (CCV) Requirements**

The calibration verification standards(ICV or CCV) did not meet acceptance criteria with a positive bias. As there were no target analytes detected in the associated environmental samples, the sample results were not adversely affected.

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

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCSD)**

An LCSD was not used in place of matrix QC.

**Laboratory Control Sample (LCS/LCSD) Recovery**

The LCS/LCSD spike recoveries met the acceptance limits.

**QC Sample Designation**

Sample 437508003 (CAMO-18-148117) was selected for the matrix spike and matrix spike duplicate analysis.

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

The MS/MSD recoveries were within the established acceptance limits.

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

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

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

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

**Preparation/Analytical Method Verification**

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

**Sample Dilutions**

The samples in this SDG in this batch did not require dilutions.

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

Re-extractions or re-analyses were not required for the samples in this SDG and reported in this batch.

**Miscellaneous Information****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. 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.

**Manual integrations**

Manual integrations were not required for samples and QC samples associated with this SDG in this batch.

**Additional Comments**

The lower results from either column have been chosen and reported in the data package for the client samples, MB and LCS. The data reported for the MS/MSD are from the same analytical column as the parent sample.

**System Configuration**

The Semi-Volatiles-PCB 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>
ECD9A.I_1	Agilent 7890A Gas Chromatograph/Dual ECD w/ 7693 Autosampler	7890A GC/ECD	Restek Rtx-CLPest 1	30m x 0.25mm, 0.25um
ECD9A.I_2	Agilent 7890A Gas Chromatograph/Dual ECD w/ 7693 Autosampler	7890A GC/ECD	Restek Rtx-CLPest 2	30m x 0.25mm, 0.20um

**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: 2018-828 GEL Work Order: 437612

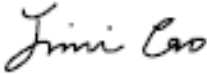
#### The Qualifiers in this report are defined as follows:

- \* 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: Jimin Cao

Date: 05 DEC 2017

Title: Data Validator

# **Sample Data Summary**

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

Page 1 of 1

**SDG Number:** 2018-828  
**Lab Sample ID:** 437612008  
**Client Sample:** PCB  
**Client ID:** CAMO-18-148116  
**Batch ID:** 1722631  
**Run Date:** 12/01/2017 17:56  
**Prep Date:** 12/01/2017 04:50  
**Data File:** 120117.S\E910154.D  
 120117.S\E910154.D

**Date Collected:** 11/08/2017 12:12  
**Date Received:** 11/10/2017 08:55  
**Client:** ARSL004  
**Method:** SW846 3535A/8082  
**Inst:** ECD9A.I  
**Analyst:** YS1  
**Aliquot:** 920 mL  
**Column:** 1 RTX-CLPEST 1  
 2 RTX-CLPEST 2

**Matrix:** W  
**Project:** ESHL00114  
**SOP Ref:** GL-OA-E-040  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
12674-11-2	Aroclor-1016	U	0.0362	ug/L	0.0362	0.109	1
11104-28-2	Aroclor-1221	U	0.0362	ug/L	0.0362	0.109	1
11141-16-5	Aroclor-1232	U	0.0362	ug/L	0.0362	0.109	1
53469-21-9	Aroclor-1242	U	0.0362	ug/L	0.0362	0.109	1
12672-29-6	Aroclor-1248	U	0.0362	ug/L	0.0362	0.109	1
11097-69-1	Aroclor-1254	U	0.0362	ug/L	0.0362	0.109	1
11096-82-5	Aroclor-1260	U	0.0362	ug/L	0.0362	0.109	1
37324-23-5	Aroclor-1262	U	0.0362	ug/L	0.0362	0.109	1

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
4cmx	0.158	0.217	ug/L 73	(33%-122%)
Decachlorobiphenyl	0.208	0.217	ug/L 96	(35%-138%)

# **Quality Control Summary**



---

**PCB**  
**Surrogate Recovery Report**

Page 1 of 1

**SDG Number: 2018-828****Matrix Type: LIQUID**

---

Sample ID	Client ID	4CMX 1 %REC #	4CMX 2 %REC #	DCB 1 %REC #	DCB 2 %REC #
1203929169	MB for batch 1722630	94	89	115	107
1203929170	LCS for batch 1722630	62	61	78	75
1203929171	CAMO-18-148117MS	74	71	82	83
1203929172	CAMO-18-148117MSD	64	62	75	72
437612008	CAMO-18-148116	77	73	101	96

---

**Surrogate****Acceptance Limits**

4CMX = 4cmx (33%-122%)

DCB = Decachlorobiphenyl (35%-138%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

**PCB**  
**Quality Control Summary**  
**Spike Recovery Report**

Page 1 of 1

SDG Number: 2018-828

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1722630

Matrix: WATER

Lab Sample ID 1203929170

Instrument: ECD9A.I

Analysis Date: 12/01/2017 15:50

Dilution: 1

Analyst: YS1

Prep Batch ID: 1722630

Inj. Vol: 1 uL

Batch ID: 1722631

CAS No			Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
12674-11-2	LCS	Aroclor-1016		1.00	0.0	0.639	64	45-101
11096-82-5	LCS	Aroclor-1260		1.00	0.0	0.814	81	52-113

## PCB

Page 1 of 2

Quality Control Summary  
Spike Recovery Report

SDG Number: 2018-828

Sample Type: Matrix Spike

Client ID: CAMO-18-148117MS

Matrix: W

Lab Sample ID 1203929171

Instrument: ECD9A.I

Analysis Date: 12/01/2017 16:19

Dilution: 1

Analyst: YS1

Prep Batch ID: 1722630

Inj. Vol: 1 uL

Batch ID: 1722631

CAS No			Parmname		Amount Added ug/L	Sample Conc. ug/L	U	Spike Conc. ug/L	Recovery %	Acceptance Limits
12674-11-2	MS	Aroclor-1016			1.00	0.00	U	0.792	79	26-110
11096-82-5	MS	Aroclor-1260			1.00	0.00	U	0.759	76	30-127

**PCB**  
**Quality Control Summary**  
**Spike Recovery Report**

Page 2 of 2

SDG Number: 2018-828

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148117MSD

Matrix: W

Lab Sample ID 1203929172

Instrument: ECD9A.I

Analysis Date: 12/01/2017 16:35

Dilution: 1

Analyst: YS1

Prep Batch ID: 1722630

Inj. Vol: 1 uL

Batch ID: 1722631

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L		Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
12674-11-2	MSD Aroclor-1016	1.00	0.00	U	0.707	71	26-110	11	0-27
11096-82-5	MSD Aroclor-1260	1.00	0.00	U	0.677	68	30-127	11	0-29

## Method Blank Summary

Page 1 of 1

SDG Number:	2018-828	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1722630	Instrument ID:	ECD9A.I_1	Data File:	120117.S\E9I0145.D
Lab Sample ID:	1203929169		ECD9A.I_2		120117.S\E9I0145.D
Column:	RTX-CLPEST 1	Prep Date:	12/01/2017 04:50	Analyzed:	12/01/17 15:38
	RTX-CLPEST 2				

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 1722630	1203929170	120117.S\E9I0146.D 120117.S\E9I0146.D	12/01/17	1550
02 CAMO-18-148117MS	1203929171	120117.S\E9I0148.D 120117.S\E9I0148.D	12/01/17	1619
03 CAMO-18-148117MSD	1203929172	120117.S\E9I0149.D 120117.S\E9I0149.D	12/01/17	1635
04 CAMO-18-148116	437612008	120117.S\E9I0154.D 120117.S\E9I0154.D	12/01/17	1756

# Quality Control Data

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

Page 1 of 1

**SDG Number:** 2018-828  
**Lab Sample ID:** 1203929169  
**Client Sample:** QC for batch 1722630  
**Client ID:** MB for batch 1722630  
**Batch ID:** 1722631  
**Run Date:** 12/01/2017 15:38  
**Prep Date:** 12/01/2017 04:50  
**Data File:** 120117.S\E910145.D  
 120117.S\E910145.D

**Client:** ARSL004  
**Method:** SW846 3535A/8082  
**Inst:** ECD9A.I  
**Analyst:** YS1  
**Aliquot:** 1000 mL  
**Column:** 1 RTX-CLPEST 1  
 2 RTX-CLPEST 2

**Matrix:** WATER  
**Project:** QC  
**SOP Ref:** GL-OA-E-040  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
12674-11-2	Aroclor-1016	U	0.0333	ug/L	0.0333	0.100	1
11104-28-2	Aroclor-1221	U	0.0333	ug/L	0.0333	0.100	1
11141-16-5	Aroclor-1232	U	0.0333	ug/L	0.0333	0.100	1
53469-21-9	Aroclor-1242	U	0.0333	ug/L	0.0333	0.100	1
12672-29-6	Aroclor-1248	U	0.0333	ug/L	0.0333	0.100	1
11097-69-1	Aroclor-1254	U	0.0333	ug/L	0.0333	0.100	1
11096-82-5	Aroclor-1260	U	0.0333	ug/L	0.0333	0.100	1
37324-23-5	Aroclor-1262	U	0.0333	ug/L	0.0333	0.100	1

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
4cmx	0.179	0.200	ug/L 89	(33%-122%)
Decachlorobiphenyl	0.215	0.200	ug/L 107	(35%-138%)

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

Page 1 of 1

**SDG Number:** 2018-828  
**Lab Sample ID:** 1203929170  
**Client Sample:** QC for batch 1722630  
**Client ID:** LCS for batch 1722630  
**Batch ID:** 1722631  
**Run Date:** 12/01/2017 15:50  
**Prep Date:** 12/01/2017 04:50  
**Data File:** 120117.S\E910146.D  
 120117.S\E910146.D

**Client:** ARSL004  
**Method:** SW846 3535A/8082  
**Inst:** ECD9A.I  
**Analyst:** YS1  
**Aliquot:** 1000 mL  
**Column:** 1 RTX-CLPEST 1  
 2 RTX-CLPEST 2

**Matrix:** WATER  
**Project:** QC  
**SOP Ref:** GL-OA-E-040  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
12674-11-2	Aroclor-1016		0.639	ug/L	0.0333	0.100	1
11104-28-2	Aroclor-1221	U	0.0333	ug/L	0.0333	0.100	1
11141-16-5	Aroclor-1232	U	0.0333	ug/L	0.0333	0.100	1
53469-21-9	Aroclor-1242	U	0.0333	ug/L	0.0333	0.100	1
12672-29-6	Aroclor-1248	U	0.0333	ug/L	0.0333	0.100	1
11097-69-1	Aroclor-1254	U	0.0333	ug/L	0.0333	0.100	1
11096-82-5	Aroclor-1260		0.814	ug/L	0.0333	0.100	2
37324-23-5	Aroclor-1262	U	0.0333	ug/L	0.0333	0.100	1

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
4cmx	0.121	0.200	ug/L 61	(33%-122%)
Decachlorobiphenyl	0.150	0.200	ug/L 75	(35%-138%)



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

Page 1 of 1

**SDG Number:** 2018-828  
**Lab Sample ID:** 1203929171  
**Client Sample:** QC for batch 1722630  
**Client ID:** CAMO-18-148117MS  
**Batch ID:** 1722631  
**Run Date:** 12/01/2017 16:19  
**Prep Date:** 12/01/2017 04:50  
**Data File:** 120117.S\E910148.D  
 120117.S\E910148.D

**Date Collected:** 11/07/2017 12:21  
**Date Received:** 11/09/2017 09:00  
**Client:** ARSL004  
**Method:** SW846 3535A/8082  
**Inst:** ECD9A.I  
**Analyst:** YS1  
**Aliquot:** 500 mL  
**Column:** 1 RTX-CLPEST 1  
 2 RTX-CLPEST 2

**Matrix:** W  
**Project:** QC  
**SOP Ref:** GL-OA-E-040  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** .5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
12674-11-2	Aroclor-1016		0.792	ug/L	0.0333	0.100	1
11104-28-2	Aroclor-1221	U	0.0333	ug/L	0.0333	0.100	1
11141-16-5	Aroclor-1232	U	0.0333	ug/L	0.0333	0.100	1
53469-21-9	Aroclor-1242	U	0.0333	ug/L	0.0333	0.100	1
12672-29-6	Aroclor-1248	U	0.0333	ug/L	0.0333	0.100	1
11097-69-1	Aroclor-1254	U	0.0333	ug/L	0.0333	0.100	1
11096-82-5	Aroclor-1260		0.759	ug/L	0.0333	0.100	1
37324-23-5	Aroclor-1262	U	0.0333	ug/L	0.0333	0.100	1

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
4cmx	0.141	0.200	ug/L 71	(33%-122%)
Decachlorobiphenyl	0.165	0.200	ug/L 83	(35%-138%)

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

Page 1 of 1

**SDG Number:** 2018-828  
**Lab Sample ID:** 1203929172  
**Client Sample:** QC for batch 1722630  
**Client ID:** CAMO-18-148117MSD  
**Batch ID:** 1722631  
**Run Date:** 12/01/2017 16:35  
**Prep Date:** 12/01/2017 04:50  
**Data File:** 120117.S\E9I0149.D  
 120117.S\E9I0149.D

**Date Collected:** 11/07/2017 12:21  
**Date Received:** 11/09/2017 09:00  
**Client:** ARSL004  
**Method:** SW846 3535A/8082  
**Inst:** ECD9A.I  
**Analyst:** YS1  
**Aliquot:** 500 mL  
**Column:** 1 RTX-CLPEST 1  
 2 RTX-CLPEST 2

**Matrix:** W  
**Project:** QC  
**SOP Ref:** GL-OA-E-040  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** .5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
12674-11-2	Aroclor-1016		0.707	ug/L	0.0333	0.100	1
11104-28-2	Aroclor-1221	U	0.0333	ug/L	0.0333	0.100	1
11141-16-5	Aroclor-1232	U	0.0333	ug/L	0.0333	0.100	1
53469-21-9	Aroclor-1242	U	0.0333	ug/L	0.0333	0.100	1
12672-29-6	Aroclor-1248	U	0.0333	ug/L	0.0333	0.100	1
11097-69-1	Aroclor-1254	U	0.0333	ug/L	0.0333	0.100	1
11096-82-5	Aroclor-1260		0.677	ug/L	0.0333	0.100	1
37324-23-5	Aroclor-1262	U	0.0333	ug/L	0.0333	0.100	1

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
4cmx	0.124	0.200	ug/L 62	(33%-122%)
Decachlorobiphenyl	0.143	0.200	ug/L 72	(35%-138%)

# **Metals Analysis**

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**ARS International, LLC (ARSL)**  
**SDG #: 2018-828**  
**Work Order #: 437612**

<b>Sample ID</b>	<b>Client ID</b>
437612001	CASA-18-147991
437612002	CASA-18-147998
437612005	CAMO-18-148113
437612006	CAMO-18-148116
1203917616	Method Blank (MB) <b>ICP</b>
1203917617	Laboratory Control Sample (LCS)
1203917620	437632001(CAMO-18-148057L) Serial Dilution (SD)
1203917618	437632001(CAMO-18-148057D) Sample Duplicate (DUP)
1203917619	437632001(CAMO-18-148057S) Matrix Spike (MS)
1203917712	Method Blank (MB) <b>ICP-MS</b>
1203917713	Laboratory Control Sample (LCS)
1203917716	437612001(CASA-18-147991L) Serial Dilution (SD)
1203917714	437612001(CASA-18-147991D) Sample Duplicate (DUP)
1203917715	437612001(CASA-18-147991S) Matrix Spike (MS)
1203927528	Method Blank (MB) <b>CVAA</b>
1203927529	Laboratory Control Sample (LCS)
1203927664	437515001(CAMO-18-148059L) Serial Dilution (SD)
1203927662	437515001(CAMO-18-148059D) Sample Duplicate (DUP)
1203927663	437515001(CAMO-18-148059S) Matrix Spike (MS)

**Sample Analysis**

Samples 437612001,002,005 and 006 in this SDG were analyzed for metals and mercury on an "as received" basis.

**Method/Analysis Information**

<b>Analytical Batch:</b>	1718037, 1718065, 1721931 and 1724481
<b>Prep Batch :</b>	1718036, 1718064 and 1721929
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 30, GL-MA-E-006 REV# 14, GL-MA-E-014 REV# 32, GL-MA-E-010 REV# 36 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. 437612001 (CASA-18-147991) and 437612005 (CAMO-18-148113)-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: 437632001 (CAMO-18-148057)-ICP, 437612001 (CASA-18-147991)-ICP-MS and 437515001 (CAMO-18-148059)-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: 2018-828 GEL Work Order: 437612

#### **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: 07 DEC 2017**

**Title: Data Validator**

# **Sample Data Summary**

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

**SDG No:** 2018-828**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437612001**BASIS:** As Received**DATE COLLECTED** 08-NOV-17**CLIENT ID:** CASA-18-147991**LEVEL:** Low**DATE RECEIVED** 10-NOV-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	11/29/17 11:42	112917W1-3	1721931

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

**SDG No:** 2018-828**CONTRACT:** ESHL00114**METHOD TYPE:** SW846**SAMPLE ID:** 437612001**BASIS:** As Received**DATE COLLECTED** 08-NOV-17**CLIENT ID:** CASA-18-147991**LEVEL:** Low**DATE RECEIVED** 10-NOV-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	HSC	12/07/17 06:23	120717-1	1718037
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7440-38-2	Arsenic	2.01	ug/L	J	2	5	5	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7440-39-3	Barium	24	ug/L		1	5	5	1	P	HSC	12/07/17 06:23	120717-1	1718037
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	12/07/17 06:23	120717-1	1718037
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	12/07/17 06:23	120717-1	1718037
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7440-70-2	Calcium	10200	ug/L		50	200	200	1	P	HSC	12/07/17 06:23	120717-1	1718037
7440-47-3	Chromium	10	ug/L		3	10	10	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	12/07/17 06:23	120717-1	1718037
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	12/07/17 06:23	120717-1	1718037
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	12/07/17 06:23	120717-1	1718037
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7439-95-4	Magnesium	3260	ug/L		110	300	300	1	P	HSC	12/07/17 06:23	120717-1	1718037
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	12/07/17 06:23	120717-1	1718037
7439-98-7	Molybdenum	1.52	ug/L		0.2	0.5	0.5	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7440-02-0	Nickel	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7440-09-7	Potassium	2060	ug/L		50	150	150	1	P	HSC	12/07/17 06:23	120717-1	1718037
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7631-86-9	Silica	77700	ug/L		53	213	213	1	P	HSC	12/07/17 06:23	120717-1	1718037
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7440-23-5	Sodium	9870	ug/L		100	300	300	1	P	HSC	12/07/17 06:23	120717-1	1718037
7440-24-6	Strontium	45.3	ug/L		1	5	5	1	P	HSC	12/07/17 06:23	120717-1	1718037
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	HSC	12/07/17 06:23	120717-1	1718037
7440-61-1	Uranium	0.723	ug/L		0.067	0.2	0.2	1	MS	BAJ	11/29/17 12:37	171129-2	1718065
7440-62-2	Vanadium	6.96	ug/L		1	5	5	1	P	HSC	12/07/17 06:23	120717-1	1718037
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	12/07/17 06:23	120717-1	1718037

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

**SDG No:** 2018-828**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 437612001**BASIS:** As Received**DATE COLLECTED** 08-NOV-17**CLIENT ID:** CASA-18-147991**LEVEL:** Low**DATE RECEIVED** 10-NOV-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	38.8	mg/L		0.453	1.24	1.24	1		JJ2	12/07/17 11:21		1724481

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1718037	1718036	SW846 3005A	50	mL	50	mL	11/10/17	JXM8
1718065	1718064	SW846 3005A	50	mL	50	mL	11/10/17	JXM8
1721931	1721929	EPA 245.1/245.2 Prep	20	mL	20	mL	11/28/17	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:** 2018-828**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437612002**BASIS:** As Received**DATE COLLECTED** 08-NOV-17**CLIENT ID:** CASA-18-147998**LEVEL:** Low**DATE RECEIVED** 10-NOV-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	11/29/17 11:44	112917W1-3	1721931

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1721931	1721929	EPA 245.1/245.2 Prep	20	mL	20	mL	11/28/17	AXS5

**\*Analytical Methods:**

AV      EPA 245.2 1974

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

**SDG No:** 2018-828**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437612005**BASIS:** As Received**DATE COLLECTED** 08-NOV-17**CLIENT ID:** CAMO-18-148113**LEVEL:** Low**DATE RECEIVED** 10-NOV-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	11/29/17 11:49	112917W1-3	1721931

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

SDG No: 2018-828

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 437612005

BASIS: As Received

DATE COLLECTED 08-NOV-17

CLIENT ID: CAMO-18-148113

LEVEL: Low

DATE RECEIVED 10-NOV-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	HSC	12/07/17 06:26	120717-1	1718037
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7440-39-3	Barium	26.1	ug/L		1	5	5	1	P	HSC	12/07/17 06:26	120717-1	1718037
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	12/07/17 06:26	120717-1	1718037
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	12/07/17 06:26	120717-1	1718037
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7440-70-2	Calcium	14200	ug/L		50	200	200	1	P	HSC	12/07/17 06:26	120717-1	1718037
7440-47-3	Chromium	6.58	ug/L	J	3	10	10	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	12/07/17 06:26	120717-1	1718037
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	12/07/17 06:26	120717-1	1718037
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	12/07/17 06:26	120717-1	1718037
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7439-95-4	Magnesium	3460	ug/L		110	300	300	1	P	HSC	12/07/17 06:26	120717-1	1718037
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	12/07/17 06:26	120717-1	1718037
7439-98-7	Molybdenum	1.14	ug/L		0.2	0.5	0.5	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7440-02-0	Nickel	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7440-09-7	Potassium	1360	ug/L		50	150	150	1	P	HSC	12/07/17 06:26	120717-1	1718037
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7631-86-9	Silica	69200	ug/L		53	213	213	1	P	HSC	12/07/17 06:26	120717-1	1718037
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7440-23-5	Sodium	9710	ug/L		100	300	300	1	P	HSC	12/07/17 06:26	120717-1	1718037
7440-24-6	Strontium	51.9	ug/L		1	5	5	1	P	HSC	12/07/17 06:26	120717-1	1718037
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	HSC	12/07/17 06:26	120717-1	1718037
7440-61-1	Uranium	0.668	ug/L		0.067	0.2	0.2	1	MS	BAJ	11/29/17 12:48	171129-2	1718065
7440-62-2	Vanadium	4.99	ug/L	J	1	5	5	1	P	HSC	12/07/17 06:26	120717-1	1718037
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	12/07/17 06:26	120717-1	1718037



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

**SDG No:** 2018-828**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 437612005**BASIS:** As Received**DATE COLLECTED** 08-NOV-17**CLIENT ID:** CAMO-18-148113**LEVEL:** Low**DATE RECEIVED** 10-NOV-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	49.8	mg/L		0.453	1.24	1.24	1		JJ2	12/07/17 11:21		1724481

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1718037	1718036	SW846 3005A	50	mL	50	mL	11/10/17	JXM8
1718065	1718064	SW846 3005A	50	mL	50	mL	11/10/17	JXM8
1721931	1721929	EPA 245.1/245.2 Prep	20	mL	20	mL	11/28/17	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:** 2018-828**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437612006**BASIS:** As Received**DATE COLLECTED** 08-NOV-17**CLIENT ID:** CAMO-18-148116**LEVEL:** Low**DATE RECEIVED** 10-NOV-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	11/29/17 11:50	112917W1-3	1721931

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1721931	1721929	EPA 245.1/245.2 Prep	20	mL	20	mL	11/28/17	AXS5

**\*Analytical Methods:**

AV      EPA 245.2 1974

# **Quality Control Summary**

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

**SDG NO.** 2018-828  
**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>
1203917616	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	78	ug/L	+/-150	J	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
1203917712	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	0.243	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
1203927528	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. 2018-828

Client ID: CAMO-18-148057S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 437632001

Spike ID: 1203917619

<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	5050		68	U	5000	101		P
Barium	ug/L	75-125	540		39.3		500	100		P
Beryllium	ug/L	75-125	506		1	U	500	101		P
Boron	ug/L	75-125	533		25.1	J	500	101		P
Calcium	ug/L		28600		22300		5000	126	N/A	P
Cobalt	ug/L	75-125	513		1.26	J	500	102		P
Copper	ug/L	75-125	513		3	U	500	102		P
Iron	ug/L	75-125	5100		30	U	5000	102		P
Magnesium	ug/L	75-125	11300		6010		5000	106		P
Manganese	ug/L	75-125	499		2	U	500	99.8		P
Potassium	ug/L	75-125	6370		1420		5000	99.1		P
Silica	ug/L		81900		70000		10700	111	N/A	P
Sodium	ug/L	75-125	16400		11400		5000	100		P
Strontium	ug/L	75-125	601		89.8		500	102		P
Tin	ug/L	75-125	510		2.5	U	500	102		P
Vanadium	ug/L	75-125	516		6.78		500	102		P
Zinc	ug/L	75-125	479		6.41	J	500	94.5		P

\*Analytical Methods:

P SW846 3005A/6010C

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2018-828

Client ID: CASA-18-147991S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 437612001

Spike ID: 1203917715

<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>
Thallium	ug/L	75-125	44.9		0.6	U	50	89.8		MS
Uranium	ug/L	75-125	48		0.723		50	94.5		MS
Antimony	ug/L	75-125	47.8		1	U	50	95.1		MS
Arsenic	ug/L	75-125	49.3		2.01	J	50	94.6		MS
Cadmium	ug/L	75-125	49.1		0.3	U	50	98.1		MS
Chromium	ug/L	75-125	58.3		10		50	96.5		MS
Lead	ug/L	75-125	47		0.5	U	50	93.9		MS
Molybdenum	ug/L	75-125	50.8		1.52		50	98.6		MS
Nickel	ug/L	75-125	46.4		0.6	U	50	91.6		MS
Selenium	ug/L	75-125	49.4		2	U	50	95.3		MS
Silver	ug/L	75-125	49.3		0.3	U	50	98.5		MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-5a-

## Matrix Spike Summary

**SDG NO.** 2018-828 **Client ID:** CAMO-18-148059S**Contract:** ESHL00114 **Level:** Low**Matrix:** WATER **% Solids:****Sample ID:** 437515001 **Spike ID:** 1203927663

<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	2.01		0.067	U	2	100		AV

## \*Analytical Methods:

AV EPA 245.1/245.2

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

SDG No.: 2018-828

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-18-148057D

Matrix: WATER

Level: Low

Sample ID: 437632001

Duplicate ID: 1203917618

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	+/-20%	39.3		40.4		2.68		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	25.1 J		26.2 J		4.23		P
Calcium	ug/L	+/-20%	22300		23100		3.18		P
Cobalt	ug/L		1.26 J		1 U		200		P
Copper	ug/L		3 U		3 U				P
Iron	ug/L		30 U		30 U				P
Magnesium	ug/L	+/-20%	6010		6170		2.69		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	1420		1490		4.94		P
Silica	ug/L	+/-20%	70000		72000		2.78		P
Sodium	ug/L	+/-20%	11400		11800		3.17		P
Strontium	ug/L	+/-20%	89.8		92.4		2.9		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	6.78		6.9		1.74		P
Zinc	ug/L		6.41 J		3.3 U		200		P

\*Analytical Methods:

P SW846 3005A/6010C



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

SDG No.: 2018-828

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-18-147991D

Matrix: WATER

Level: Low

Sample ID: 437612001

Duplicate ID: 1203917714

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		2.01 J		2 U		200		MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-10	10		9.98 J		.579		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	1.52		1.64		7.52		MS
Nickel	ug/L		0.6 U		0.604 J		200		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	0.723		0.723		0		MS

\*Analytical Methods:

MS SW846 3005A/6020A

**Metals**  
**–6–**  
**Duplicate Sample Summary**

**SDG No.:** 2018–828**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CAMO–18–148059D**Matrix:** WATER**Level:** Low**Sample ID:** 437515001**Duplicate ID:** 1203927662**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. 2018-828

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>
1203917617								
	Aluminum	ug/L	5000	4940		98.7	80-120	P
	Barium	ug/L	500	491		98.2	80-120	P
	Beryllium	ug/L	500	486		97.2	80-120	P
	Boron	ug/L	500	487		97.4	80-120	P
	Calcium	ug/L	5000	5010		100	80-120	P
	Cobalt	ug/L	500	499		99.7	80-120	P
	Copper	ug/L	500	493		98.6	80-120	P
	Iron	ug/L	5000	4980		99.6	80-120	P
	Magnesium	ug/L	5000	5040		101	80-120	P
	Manganese	ug/L	500	494		98.7	80-120	P
	Potassium	ug/L	5000	4930		98.6	80-120	P
	Silica	ug/L	10700	9990		93.3	80-120	P
	Sodium	ug/L	5000	4650		93	80-120	P
	Strontium	ug/L	500	496		99.3	80-120	P
	Tin	ug/L	500	482		96.4	80-120	P
	Vanadium	ug/L	500	484		96.9	80-120	P
	Zinc	ug/L	500	473		94.5	80-120	P

## \*Analytical Methods:

P SW846 3005A/6010C

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2018-828

Contract: ESHL00114

Aqueous LCS Source: Inorganic Ventures

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>
1203917713								
	Antimony	ug/L	50	46.3		92.7	80-120	MS
	Arsenic	ug/L	50	47.6		95.1	80-120	MS
	Cadmium	ug/L	50	47.6		95.2	80-120	MS
	Chromium	ug/L	50	48.3		96.6	80-120	MS
	Lead	ug/L	50	47.8		95.7	80-120	MS
	Molybdenum	ug/L	50	46.6		93.2	80-120	MS
	Nickel	ug/L	50	47.8		95.7	80-120	MS
	Selenium	ug/L	50	49.2		98.5	80-120	MS
	Silver	ug/L	50	47.4		94.9	80-120	MS
	Thallium	ug/L	50	45.6		91.1	80-120	MS
	Uranium	ug/L	50	46.6		93.1	80-120	MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2018-828

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>
1203927529	Mercury	ug/L	2	2.04		102	85-115	AV

## \*Analytical Methods:

AV EPA 245.1/245.2

## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 2018-828

Client ID: CAMO-18-148057L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 437632001

Serial Dilution ID: 1203917620

<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	39.3		40		1.561			P
Beryllium	1	U	5	U				P
Boron	25.1	J	75	U	17.039			P
Calcium	22300		23100		3.143		10	P
Cobalt	1.26	J	5	U	6.297			P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	6010		6180		2.942		10	P
Manganese	2	U	10	U				P
Potassium	1420		1850		30.917			P
Silica	70000		70000		.00143		10	P
Sodium	11400		11400		.386		10	P
Strontium	89.8		87.9		2.119		10	P
Tin	2.5	U	12.5	U				P
Vanadium	6.78		6.9	J	1.756			P
Zinc	6.41	J	32.4	J	405.792			P

## \*Analytical Methods:

P SW846 3005A/6010C

## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 2018-828

Client ID: CASA-18-147991L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 437612001

Serial Dilution ID: 1203917716

<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	2.01	J	10	U	30.911			MS
Cadmium	.3	U	1.5	U				MS
Chromium	10		15	U	.378			MS
Lead	.5	U	2.5	U				MS
Molybdenum	1.52		1.48	J	2.76			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	.723		.735	J	1.66			MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-9-

## Serial Dilution Sample Summary

**SDG NO.** 2018-828 **Client ID:** CAMO-18-148059L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 437515001 **Serial Dilution ID:** 1203927664

<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 #: 2018-828  
Work Order #: 437612**

**Method/Analysis Information**

**Product:** Carbon and Total Organic

**Analytical Batch:** 1717990

**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>
437612002	CASA-18-147998
437612006	CAMO-18-148116
1203920734	Method Blank (MB)
1203920735	Laboratory Control Sample (LCS)
1203920738	437822002(CAMO-18-148071) Sample Duplicate (DUP)
1203920741	437822002(CAMO-18-148071) 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 437822002 (CAMO-18-148071) 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>	1718271	<b>Method:</b>	WSP-CN(T)
<b>Prep Batch :</b>	1718270	<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>
437612002	CASA-18-147998
437612006	CAMO-18-148116
1203918242	Method Blank (MB)
1203918243	Laboratory Control Sample (LCS)
1203918244	437632002(CAMO-18-148073) Sample Duplicate (DUP)
1203918245	437612002(CASA-18-147998) Sample Duplicate (DUP)
1203918246	437632002(CAMO-18-148073) Matrix Spike (MS)
1203918247	437612002(CASA-18-147998) Matrix Spike (MS)
1203918248	437612002(CASA-18-147998) Matrix Spike Duplicate (MSD)

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# 21.

### **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.

### **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**

Samples 437612002 (CASA-18-147998) and 437632002 (CAMO-18-148073) were 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.

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

The RPD between the spike and spike duplicate met the acceptance limits.

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

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample 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:** Ion Chromatography

**Analytical Batch:** 1718869

**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>
437612001	CASA-18-147991
437612005	CAMO-18-148113
1203919785	Method Blank (MB)
1203919786	Laboratory Control Sample (LCS)
1203919787	437632001(CAMO-18-148057) Sample Duplicate (DUP)
1203919788	437632001(CAMO-18-148057) 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 437632001 (CAMO-18-148057) 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 1203919787 (CAMO-18-148057DUP), 1203919788 (CAMO-18-148057PS), 437612001 (CASA-18-147991) and 437612005 (CAMO-18-148113) 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>	1718277	<b>Method:</b>	NH3
<b>Prep Batch :</b>	1718276	<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>
437612001	CASA-18-147991
437612005	CAMO-18-148113
1203918257	Method Blank (MB)
1203918258	Laboratory Control Sample (LCS)
1203918261	437612001(CASA-18-147991) Sample Duplicate (DUP)
1203918265	437612001(CASA-18-147991) 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# 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.

### **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 437612001 (CASA-18-147991) 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 1203918257 (MB) and 1203918258 (LCS) 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>	1718303	<b>Method:</b>	TKN
<b>Prep Batch :</b>	1718302	<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>
437612002	CASA-18-147998
437612006	CAMO-18-148116
1203918280	Method Blank (MB)
1203918281	Laboratory Control Sample (LCS)
1203918282	437632002(CAMO-18-148073) Sample Duplicate (DUP)
1203918283	437632002(CAMO-18-148073) 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# 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 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 437632002 (CAMO-18-148073) 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	1203918283 (CAMO-18-148073MS)	70.3* (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**

Samples 1203918280 (MB) and 437612006 (CAMO-18-148116) were re-analyzed due to instrument failure. The results from the reanalysis are 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**

**Product:** Nitrate Nitrite by Cadmium Reduction

**Analytical Batch:** 1718305

**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>
437612001	CASA-18-147991
437612005	CAMO-18-148113
1203918292	Method Blank (MB)
1203918293	Laboratory Control Sample (LCS)
1203918295	437632001(CAMO-18-148057) Sample Duplicate (DUP)
1203918297	437632001(CAMO-18-148057) 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# 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+ 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 437632001 (CAMO-18-148057) 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 following sample 437612001 (CASA-18-147991) was diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	<b>437612</b>
	<b>001</b>
Nitrogen, Nitrate/Nitrite	5X

**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>	1718301	<b>Method:</b>	PO4
<b>Prep Batch :</b>	1718300	<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>
437612001	CASA-18-147991
437612005	CAMO-18-148113
1203918276	Method Blank (MB)
1203918277	Laboratory Control Sample (LCS)
1203918278	437632001(CAMO-18-148057) Sample Duplicate (DUP)
1203918279	437632001(CAMO-18-148057) 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# 11.

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

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

### **Calibration Information**

The 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 437632001 (CAMO-18-148057) 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:** 1718225

**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>
437612001	CASA-18-147991
437612005	CAMO-18-148113
1203918111	Method Blank (MB)
1203918112	Laboratory Control Sample (LCS)
1203918114	437515001(CAMO-18-148059) 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 437515001 (CAMO-18-148059) was selected for QC analysis.

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

The Relative Percent Difference (RPD) between the sample and duplicate falls outside of the established acceptance limits because of the heterogeneous matrix of the sample:

Analyte	Sample	Value
Total Dissolved Solids	1203918114 (CAMO-18-148059DUP)	27.5* (0%-5%)

**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:** Specific Conductivity

**Analytical Batch:** 1719249

**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>
437612001	CASA-18-147991
437612005	CAMO-18-148113
1203920717	Laboratory Control Sample (LCS)
1203920718	437595001(WST05-18-148663) Sample Duplicate (DUP)
1203920719	437605001(WST05-18-148658) 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# 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 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

### **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**

Samples 437595001 (WST05-18-148663) and 437605001 (WST05-18-148658) were 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:** 1718738 **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>
437612001	CASA-18-147991
437612005	CAMO-18-148113
1203919485	Laboratory Control Sample (LCS)
1203919487	437508001(CAMO-18-148114) 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 437508001 (CAMO-18-148114) 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
1203919487 (CAMO-18-148114DUP)	pH	Received 09-NOV-17, out of holding 07-NOV-17
437612001 (CASA-18-147991)	pH	Received 10-NOV-17, out of holding 08-NOV-17
437612005 (CAMO-18-148113)	pH	Received 10-NOV-17, out of holding 08-NOV-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:

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

### **Method/Analysis Information**

**Product:** Alkalinity

**Analytical Batch:** 1718721      **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>
437612001	CASA-18-147991
437612005	CAMO-18-148113
1203919453	Laboratory Control Sample (LCS)
1203919455	437508001(CAMO-18-148114) Sample Duplicate (DUP)
1203919457	437508001(CAMO-18-148114) 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 437508001 (CAMO-18-148114) 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**

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

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

**Certification Statement**

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

## 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: 2018-828 GEL Work Order: 437612

#### 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: 29 NOV 2017

Title: Team Leader



# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: November 29, 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: 2018-828

Client Sample ID: CASA-18-147991  
Sample ID: 437612001  
Matrix: W  
Collect Date: 08-NOV-17 10:45  
Receive Date: 10-NOV-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	J	0.079	0.067	0.200	mg/L		1	MAR1	11/14/17	2335	1718869	1
Chloride		3.76	0.067	0.200	mg/L		1					
Fluoride		0.335	0.033	0.100	mg/L		1					
Sulfate		9.75	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	J	0.0411	0.017	0.050	mg/L	1.00	1	KLP1	11/14/17	1032	1718277	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		5.35	0.085	0.250	mg/L		5	KLP1	11/14/17	1102	1718305	3
PO4 "As Received"												
Phosphorus, Total as P		0.0698	0.020	0.050	mg/L	1.00	1	KLP1	11/16/17	1621	1718301	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		180	3.40	14.3	mg/L			KLP1	11/14/17	1538	1718225	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		77.2	1.45	4.00	mg/L			RXB5	11/18/17	1612	1718721	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		235	1.00	1.00	umhos/cm		1	VH1	11/21/17	1317	1719249	7
PH "As Received"												
pH at Temp 13.6C	H	8.31	0.010	0.100	SU		1	RXB5	11/18/17	1611	1718738	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	11/14/17	0722	1718276
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	11/14/17	1200	1718300

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: November 29, 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: 2018-828

Client Sample ID: CASA-18-147991  
Sample ID: 437612001

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

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: November 29, 2017

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Client SDG: 2018-828

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-147998

Project: ESHL00114

Sample ID: 437612002

Client ID: ARSL004

Matrix: W

Collect Date: 08-NOV-17 10:45

Receive Date: 10-NOV-17

Collector: Client

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	U	ND	0.330	1.00	mg/L		1	TSM	11/17/17	2010	1717990	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	11/14/17	1103	1718271	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	11/14/17	1416	1718303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/14/17	0738	1718270
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	11/14/17	1200	1718302

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

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: November 29, 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: 2018-828

Client Sample ID: CAMO-18-148113  
Sample ID: 437612005  
Matrix: W  
Collect Date: 08-NOV-17 12:12  
Receive Date: 10-NOV-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	MAR1	11/15/17	0005	1718869	1
Chloride		1.56	0.067	0.200	mg/L		1					
Fluoride		0.101	0.033	0.100	mg/L		1					
Sulfate		1.75	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	J	0.0393	0.017	0.050	mg/L	1.00	1	KLP1	11/14/17	1034	1718277	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		0.379	0.017	0.050	mg/L		1	KLP1	11/14/17	1103	1718305	3
PO4 "As Received"												
Phosphorus, Total as P		0.0815	0.020	0.050	mg/L	1.00	1	KLP1	11/16/17	1621	1718301	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		131	3.40	14.3	mg/L			KLP1	11/14/17	1538	1718225	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		61.9	1.45	4.00	mg/L			RXB5	11/18/17	1614	1718721	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		132	1.00	1.00	umhos/cm		1	VH1	11/21/17	1318	1719249	7
PH "As Received"												
pH at Temp 15.0C	H	8.29	0.010	0.100	SU		1	RXB5	11/18/17	1612	1718738	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	11/14/17	0722	1718276
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	11/14/17	1200	1718300

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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: 2018-828

Client Sample ID: CAMO-18-148113  
Sample ID: 437612005

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

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: November 29, 2017

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Client SDG: 2018-828

Project: LANL- WQH Water Samples

Client Sample ID: CAMO-18-148116

Project: ESHL00114

Sample ID: 437612006

Client ID: ARSL004

Matrix: W

Collect Date: 08-NOV-17 12:12

Receive Date: 10-NOV-17

Collector: Client

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	U	ND	0.330	1.00	mg/L		1	TSM	11/17/17	2120	1717990	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	J	2.50	1.67	5.00	ug/L	1.00	1	AXH3	11/14/17	1112	1718271	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	11/14/17	1434	1718303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/14/17	0738	1718270
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	11/14/17	1200	1718302

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

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

# **Quality Control Summary**



# GEL LABORATORIES LLC

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

## QC Summary

Report Date: November 29, 2017

Page 1 of 6

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

Contact: Ms. Nita Patel

Workorder: 437612

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Carbon Analysis</b>											
Batch	1717990										
QC1203920738	437822002	DUP									
Total Organic Carbon Average		J	0.959	1.02	mg/L	5.77	^	(+/-1.00)	TSM	11/18/17	06:19
QC1203920735	LCS										
Total Organic Carbon Average	10.0			10.5	mg/L			(80%-120%)		11/17/17	14:30
QC1203920734	MB										
Total Organic Carbon Average			U	ND	mg/L					11/17/17	14:18
QC1203920741	437822002	PS									
Total Organic Carbon Average	10.0	J	0.959	11.4	mg/L			(75%-125%)		11/18/17	07:06
<b>Flow Injection Analysis</b>											
Batch	1718271										
QC1203918244	437632002	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	11/14/17	11:14
QC1203918245	437612002	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A			11/14/17	11:04
QC1203918243	LCS										
Cyanide, Total	50.0			52.3	ug/L			(90%-110%)		11/14/17	10:59
QC1203918242	MB										
Cyanide, Total			U	ND	ug/L					11/14/17	10:58
QC1203918246	437632002	MS									
Cyanide, Total	100	U	ND	106	ug/L			(90%-110%)		11/14/17	11:15
QC1203918247	437612002	MS									
Cyanide, Total	100	U	ND	104	ug/L			(90%-110%)		11/14/17	11:05

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## QC Summary

Workorder: 437612

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Flow Injection Analysis</b>											
Batch	1718271										
QC1203918248	437612002	MSD									
Cyanide, Total	100	U	ND	107	ug/L	2.84	107	(0%-20%)	AXH3	11/14/17	11:06
<b>Ion Chromatography</b>											
Batch	1718869										
QC1203919787	437632001	DUP									
Bromide		U	ND	U	ND	mg/L	N/A		MAR1	11/15/17	01:05
Chloride			2.39		2.41	mg/L	0.874	(0%-20%)			
Fluoride			0.228		0.229	mg/L	0.437 ^	(+/-0.100)			
Sulfate			3.19		3.25	mg/L	1.79	(0%-20%)			
QC1203919786	LCS										
Bromide	1.25			1.15	mg/L		92.2	(80%-120%)		11/14/17	21:06
Chloride	5.00			4.69	mg/L		93.8	(80%-120%)			
Fluoride	2.50			2.48	mg/L		99.2	(80%-120%)			
Sulfate	10.0			9.56	mg/L		95.6	(80%-120%)			
QC1203919785	MB										
Bromide			U	ND	mg/L					11/14/17	20:36
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						

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## QC Summary

Workorder: 437612

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1718869										
QC1203919788	437632001	PS									
Bromide	1.25	U	ND	1.21	mg/L		93.4	(75%-125%)	MAR1	11/15/17	02:35
Chloride	5.00		2.39	7.29	mg/L		98	(75%-125%)			
Fluoride	2.50		0.228	2.63	mg/L		96.3	(75%-125%)			
Sulfate	10.0		3.19	12.8	mg/L		95.6	(75%-125%)			
<b>Nutrient Analysis</b>											
Batch	1718277										
QC1203918261	437612001	DUP									
Nitrogen, Ammonia		J	0.0411	J	0.0426	mg/L	3.58	^	(+/-0.050)	KLP1	11/14/17 10:32
QC1203918258	LCS										
Nitrogen, Ammonia	1.00			1.09	mg/L		109	(90%-110%)		11/14/17	10:19
QC1203918257	MB										
Nitrogen, Ammonia			U	ND	mg/L					11/14/17	10:18
QC1203918265	437612001	MS									
Nitrogen, Ammonia	1.00	J	0.0411	1.11	mg/L		107	(90%-110%)		11/14/17	10:33
Batch	1718301										
QC1203918278	437632001	DUP									
Phosphorus, Total as P			0.0751	0.0727	mg/L	3.25	^	(+/-0.050)	KLP1	11/16/17	16:23
QC1203918277	LCS										
Phosphorus, Total as P	1.00			1.05	mg/L		105	(80%-124%)		11/16/17	16:19
QC1203918276	MB										
Phosphorus, Total as P			U	ND	mg/L					11/16/17	16:18

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## QC Summary

Workorder: 437612

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Nutrient Analysis</b>											
Batch	1718301										
QC1203918279	437632001	MS									
Phosphorus, Total as P	1.00	0.0751		1.19	mg/L		111	(63%-139%)	KLP1	11/16/17	16:24
Batch	1718303										
QC1203918282	437632002	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A		KLP1	11/14/17	14:27
QC1203918281	LCS										
Nitrogen, Total Kjeldahl	1.00			1.01	mg/L		101	(90%-110%)		11/14/17	14:16
QC1203918280	MB										
Nitrogen, Total Kjeldahl			J	0.0723	mg/L					11/14/17	14:22
QC1203918283	437632002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND	0.703	mg/L		70.3 *	(90%-110%)		11/14/17	14:28
Batch	1718305										
QC1203918295	437632001	DUP									
Nitrogen, Nitrate/Nitrite		0.736		0.737	mg/L	0.136		(0%-20%)	KLP1	11/14/17	11:05
QC1203918293	LCS										
Nitrogen, Nitrate/Nitrite	1.00			1.03	mg/L		103	(90%-110%)		11/14/17	10:56
QC1203918292	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					11/14/17	10:54
QC1203918297	437632001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.736		1.67	mg/L		93.4	(90%-110%)		11/14/17	11:11
<b>Solids Analysis</b>											
Batch	1718225										
QC1203918114	437515001	DUP									
Total Dissolved Solids		160		126	mg/L	27.5 *		(0%-5%)	KLP1	11/14/17	15:38

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## QC Summary

Workorder: 437612

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Solids Analysis</b>											
Batch	1718225										
QC1203918112	LCS										
Total Dissolved Solids	300			287	mg/L		95.7	(95%-105%)	KLP1	11/14/17	15:38
QC1203918111	MB										
Total Dissolved Solids			U	ND	mg/L					11/14/17	15:38
<b>Titration and Ion Analysis</b>											
Batch	1718721										
QC1203919455	437508001	DUP									
Alkalinity, Total as CaCO3		59.3		57.7	mg/L	2.76		(0%-20%)	RXB5	11/18/17	15:55
Carbonate alkalinity (CaCO3)		U	ND	U	ND	mg/L	N/A				
QC1203919453	LCS										
Alkalinity, Total as CaCO3	100			108	mg/L		108	(90%-110%)		11/18/17	15:11
QC1203919457	437508001	MS									
Alkalinity, Total as CaCO3	100	59.3		165	mg/L		106	(80%-120%)		11/18/17	15:56
Batch	1718738										
QC1203919487	437508001	DUP									
pH		H	7.87	H	7.89	SU	0.254	(0%-5%)	RXB5	11/18/17	15:53
QC1203919485	LCS										
pH	7.00			6.99	SU		99.9	(99%-101%)		11/18/17	15:49
Batch	1719249										
QC1203920718	437595001	DUP									
Conductivity		195		195	umhos/cm	0.103		(0%-10%)	VH1	11/21/17	13:16
QC1203920719	437605001	DUP									
Conductivity		176		177	umhos/cm	0.509		(0%-10%)		11/21/17	13:17

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## QC Summary

Workorder: 437612

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1719249										
QC1203920717	LCS										
Conductivity	1410			1400	umhos/cm		99.3	(95%-105%)	VH1	11/21/17	13:14

### 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
- 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.

# **Radiological Analysis**

# Case Narrative



**Radiochemistry  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2018-828  
Work Order #: 437612**

**Method/Analysis Information**

**Product:** Alphaspec Am241 Liquid

Analytical Method: HASL-300:AM-241

Analytical Batch Number: 1718541

<b>Sample ID</b>	<b>Client ID</b>
437612002	CASA-18-147998
437612006	CAMO-18-148116
1203918915	Method Blank (MB)
1203918917	Laboratory Control Sample (LCS)
1203918916	437632010(CAMO-18-148111) 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-RAD-A-011 REV# 26.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met. Calibrations are performed monthly using mixed alpha standards comprised of the following: Gd-148, Np-237, and Cm-244. The initial Calibration was performed in November 2017.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

Aliquots for samples 1203918915 (MB) and 1203918917 (LCS) were changed to 1.0, and the MDCs (and Lc if requested) for all samples are calculated using a blank population per client request.

**Method Blank Criteria**

The Method Blank (MB) met acceptance criteria.

#### **CSU**

The blank result is less than 1.65 times the CSU.

#### **Blank Decision Level**

The blank result is less than the decision level.

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

All yields met the required acceptance limits.

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

The LCS spike recoveries met the acceptance limits.

#### **Designated QC**

The following sample was used for QC: 437632010 (CAMO-18-148111). The QC was from ARSL work order 437632.

#### **Duplication Criteria between QC Sample and Duplicate Sample**

The QC Sample and Duplicate Sample (DUP) met the duplication acceptance criteria.

#### **RDL Met**

The method RDL has been met.

#### **Technical Information:**

##### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

##### **Negative > 3 sigma TPU**

Samples results are not more negative than three sigma TPU.

##### **Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

##### **Recounts**

Samples 1203918917 (LCS) and 437612002 (CASA-18-147998) were recounted due to a peak shift. The recounts are reported.

#### **Miscellaneous Information:**

##### **Manual Integration**

No manual integrations were performed on data in this batch.

##### **Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

##### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier Information**

Manual qualifiers were not required.

## **Method/Analysis Information**

**Product:** ISOPU  
**Analytical Method:** HASL-300:ISOPU  
**Analytical Batch Number:** 1718543

<b>Sample ID</b>	<b>Client ID</b>
437612002	CASA-18-147998
437612006	CAMO-18-148116
1203918921	Method Blank (MB)
1203918923	Laboratory Control Sample (LCS)
1203918922	437632010(CAMO-18-148111) 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-RAD-A-011 REV# 26.

### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met. Calibrations are performed monthly using mixed alpha standards comprised of the following: Gd-148, Np-237, and Cm-244. The initial Calibration was performed in November 2017.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

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

#### **Blank Information**

Aliquots for samples 1203918921 (MB) and 1203918923 (LCS) were changed to 1.0, and the MDCs (and Lc if requested) for all samples are calculated using a blank population per client request.

#### **Method Blank Criteria**

The Method Blank (MB) met acceptance criteria.

#### **CSU**

The blank result is less than 1.65 times the CSU.

#### **Blank Decision Level**

The blank result is less than the decision level.

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

All yields met the required acceptance limits.

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

The LCS spike recoveries met the acceptance limits.

#### **Designated QC**

The following sample was used for QC: 437632010 (CAMO-18-148111). The QC was from ARSL work order 437632.

#### **Duplication Criteria between QC Sample and Duplicate Sample**

The QC Sample and Duplicate Sample (DUP) met the duplication acceptance criteria.

#### **RDL Met**

Samples (See Below) did not meet the detection limits due to the high standard deviation. When a blank population is performed the MDC is greater than the RDL due to the high standard deviation. The samples were counted the maximum count time of in order to achieve the lowest possible MDAs.

Sample	Analyte	Value
1203918921 (MB)	Plutonium-239/240	Result 0.00818 < MDA 0.0575 > RDL 0.05 pCi/L
1203918922 (CAMO-18-148111DUP)	Plutonium-238	Result -0.00868 < MDA 0.064 > RDL 0.05 pCi/L
	Plutonium-239/240	Result -0.00434 < MDA 0.0914 > RDL 0.05 pCi/L
437612002 (CASA-18-147998)	Plutonium-239/240	Result -0.00637 < MDA 0.0671 > RDL 0.05 pCi/L
437612006 (CAMO-18-148116)	Plutonium-239/240	Result 0.00275 < MDA 0.0579 > RDL 0.05 pCi/L

#### **Technical Information:**

##### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

##### **Negative > 3 sigma TPU**

Samples results are not more negative than three sigma TPU.

##### **Sample Re-prep/Re-analysis**

None of the samples in this sample set required prep or reanalysis.

##### **Recounts**

Samples 1203918922 (CAMO-18-148111DUP) and 437612002 (CASA-18-147998) were recounted due to a peak shift. The recounts are reported.

#### **Miscellaneous Information:**

##### **Manual Integration**

No manual integrations were performed on data in this batch.

##### **Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

##### **Additional Comments**

Sample 437612002 (CASA-18-147998) did not meet the resolution requirement of having a full width half maximum of 100 keV or less for the tracer; however, the tracer yield requirement was met and the tracer peak is within the tracer region of interest. The tracer peak centroid for sample 437612002 (CASA-18-147998) is greater

than 50 keV from the expected library energy value for the tracer; however, the tracer yield requirement was met and the tracer peak is within the tracer region of interest.

#### **Qualifier Information**

Manual qualifiers were not required.

#### **Method/Analysis Information**

**Product:** IsoU  
**Analytical Method:** HASL-300:ISOU  
**Analytical Batch Number:** 1718546

<b>Sample ID</b>	<b>Client ID</b>
437612002	CASA-18-147998
437612006	CAMO-18-148116
1203918932	Method Blank (MB)
1203918934	Laboratory Control Sample (LCS)
1203918933	437632010(CAMO-18-148111) 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-RAD-A-011 REV# 26.

#### **Calibration Information:**

##### **Calibration Information**

All initial and continuing calibration requirements have been met. Calibrations are performed monthly using mixed alpha standards comprised of the following: Gd-148, Np-237, and Cm-244. The initial Calibration was performed in November 2017.

##### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

##### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

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

##### **Blank Information**

Aliquots for samples 1203918932 (MB) and 1203918934 (LCS) were changed to 1.0, and the MDCs (and Lc if requested) for all samples are calculated using a blank population per client request.

##### **Method Blank Criteria**

The Method Blank (MB) met acceptance criteria.

#### **CSU**

The blank (See Below) result is greater than 1.65 times the CSU but less than the MDC.

Sample	Analyte	Value
1203918932 (MB)	Uranium-233/234, Uranium-235/236 and Uranium-238	Blank result > 1.65 CSU

#### **Blank Decision Level**

The blank result is less than the decision level.

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

Sample (See Below) did not meet the client's yield requirement. However, there are 400 tracer counts, GEL's standard tracer yield requirements are met, and the client's detection limits are met.

Sample	Analyte	Value
1203918934 (LCS)	Uranium-232 Tracer	43.6* (50%-105%)

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

The LCS spike recoveries met the acceptance limits.

#### **Designated QC**

The following sample was used for QC: 437632010 (CAMO-18-148111). The QC was from ARSL work order 437632.

#### **Duplication Criteria between QC Sample and Duplicate Sample**

The QC Sample and Duplicate Sample (DUP) met the duplication acceptance criteria.

#### **RDL Met**

The method RDL has been met.

#### **Technical Information:**

##### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

##### **Negative > 3 sigma TPU**

Samples results are not more negative than three sigma TPU.

##### **Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

##### **Recounts**

None of the samples in this sample set were recounted.

#### **Miscellaneous Information:**

##### **Manual Integration**

No manual integrations were performed on data in this batch.

##### **Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:**                      **Gammaspec**

Analytical Method:              EPA:901.1

Analytical Batch Number:      1718234

<b>Sample ID</b>	<b>Client ID</b>
437612002	CASA-18-147998
437612006	CAMO-18-148116
1203918138	Method Blank (MB)
1203918140	Laboratory Control Sample (LCS)
1203918139	437595004(WST05-18-148666) 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-RAD-A-013 REV# 27.

**Calibration Information:****Calibration Information**

All initial and continuing calibration requirements have been met. The initial Calibrations were performed in August 2017, January 2017, July 2017 and September 2017.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:****Blank Information**

The blank volume is representative of the sample volumes in this batch.

**Method Blank Criteria**

The Method Blank (MB) met acceptance criteria.

**CSU**

The blank (See Below) result is greater than 1.65 times the CSU but less than the MDC.

Sample	Analyte	Value
1203918138 (MB)	Cobalt-60	Blank result > 1.65 CSU

**Blank Decision Level**

The blank result is less than the decision level.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

**Designated QC**

The following sample was used for QC: 437595004 (WST05-18-148666). The QC was from ARSL work order 437595.

**Duplication Criteria between QC Sample and Duplicate Sample**

The QC Sample and Duplicate Sample (DUP) met the duplication acceptance criteria.

**RDL Met**

The method RDL has been met.

**Technical Information:****Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Recounts**

Sample 1203918138 (MB) was recounted due to a suspected false positive. The recount is reported.

**Miscellaneous Information:****Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** GFPC, Sr90, liquid

Analytical Method: EPA:905.0



Analytical Batch Number: 1720044

<b>Sample ID</b>	<b>Client ID</b>
437612002	CASA-18-147998
437612006	CAMO-18-148116
1203922619	Method Blank (MB)
1203922622	Laboratory Control Sample (LCS)
1203922620	437632002(CAMO-18-148073) Sample Duplicate (DUP)
1203922621	437632002(CAMO-18-148073) 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-RAD-A-004 REV# 19.

#### **Calibration Information:**

##### **Calibration Information**

All initial and continuing calibration requirements have been met. The initial Calibration was performed in April 2016.

##### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

##### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

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

##### **Blank Information**

Aliquots for samples 1203922619 (MB) and 1203922622 (LCS) were changed to 1.0 per client request.

##### **Method Blank Criteria**

The Method Blank (MB) met acceptance criteria.

##### **CSU**

The blank result is less than 1.65 times the CSU.

##### **Blank Decision Level**

The blank result is less than the decision level.

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

All yields met the required acceptance limits.

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

The LCS spike recoveries met the acceptance limits.

##### **Designated QC**

The following sample was used for QC: 437632002 (CAMO-18-148073). The QC was from ARSL work order

437632.

**Matrix Spike (MS) Recovery**

The MS spike recoveries met acceptance limits.

**Duplication Criteria between QC Sample and Duplicate Sample**

The QC Sample and Duplicate Sample (DUP) met the duplication acceptance criteria.

**RDL Met**

The method RDL has been met.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Negative > 3 sigma TPU**

Samples results are not more negative than three sigma TPU.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Recounts**

Sample 437612006 (CAMO-18-148116) was recounted due to results more negative than the three sigma TPU.  
The second count is reported.

**Miscellaneous Information:**

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

The matrix spike, 1203922621 (CAMO-18-148073MS), aliquot was reduced to conserve sample volume.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

<b>Product:</b>	<b>WSP-GrossA/B</b>
Analytical Method:	EPA 900.0/SW846 9310
Analytical Batch Number:	1720050

<b>Sample ID</b>	<b>Client ID</b>
437612002	CASA-18-147998
437612006	CAMO-18-148116
1203922639	Method Blank (MB)
1203922643	Laboratory Control Sample (LCS)

1203922640	437508002(CAMO-18-148117) Sample Duplicate (DUP)
1203922641	437508002(CAMO-18-148117) Matrix Spike (MS)
1203922642	437508002(CAMO-18-148117) Matrix Spike Duplicate (MSD)

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-RAD-A-001 REV# 19.

#### **Calibration Information:**

##### **Calibration Information**

All initial and continuing calibration requirements have been met. The initial Calibration was performed in December 2016.

##### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

##### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

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

##### **Blank Information**

Aliquots for samples 1203922639 (MB) and 1203922643 (LCS) were changed to 1.0 per client request.

##### **Method Blank Criteria**

The Method Blank (MB) met acceptance criteria.

##### **CSU**

The blank result is less than 1.65 times the CSU.

##### **Blank Decision Level**

The blank result is less than the decision level.

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

The LCS spike recoveries met the acceptance limits.

##### **Designated QC**

The following sample was used for QC: 437508002 (CAMO-18-148117). The QC was from ARSL work order 437508.

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

The MS spike recoveries met acceptance limits.

##### **Duplication Criteria between MS and MSD**

The Matrix Spike (MS) and Matrix Spike Duplicate (MSD) met the duplication acceptance criteria.

##### **Duplication Criteria between QC Sample and Duplicate Sample**

The QC Sample and Duplicate Sample (DUP) met the duplication acceptance criteria.

##### **RDL Met**

The method RDL has been met.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Negative > 3 sigma TPU**

Samples results are not more negative than three sigma TPU.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Gross Alpha/Beta Preparation Information**

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

**Recounts**

Sample 1203922641 (CAMO-18-148117MS) was recounted due to high recovery. The recount is reported.

**Miscellaneous Information:**

**Sample-Specific MDA/MDC**

The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

**Additional Comments**

The matrix spike and matrix spike duplicate, 1203922641 (CAMO-18-148117MS) and 1203922642 (CAMO-18-148117MSD), aliquots were reduced to conserve sample volume.

**Qualifier Information**

Manual qualifiers were not required.

**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: 2018-828 GEL Work Order: 437612

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

- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- UI Gamma Spectroscopy--Uncertain identification

#### Review/Validation

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

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

Signature:



Name: Heather McCarty

Date: 06 DEC 2017

Title: Analyst II

# Sample Data Summary

# GEL LABORATORIES LLC

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## Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Report Date: December 6, 2017

Client Sample ID: CASA-18-147998  
Sample ID: 437612002  
Matrix: W  
Collect Date: 08-NOV-17  
Receive Date: 10-NOV-17  
Collector: Client

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
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### Rad Alpha Spec Analysis

*Alphaspec Am241 Liquid "As Received"*

Americium-241	U	0.0209	+/-0.0134	0.0414	0.0176	+/-0.0134	0.050	pCi/L			BXA4	11/28/17	1814	1718541	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	0.00	+/-0.00901	0.047	0.0192	+/-0.00901	0.050	pCi/L			BXA4	11/28/17	1421	1718543	2
Plutonium-239/240	U	-0.00637	+/-0.0101	0.0671	0.0292	+/-0.0101	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		0.776	+/-0.0415	0.106	0.050	+/-0.0553	1.00	pCi/L			BXA4	11/26/17	1119	1718546	3
Uranium-235/236		0.0709	+/-0.0164	0.0457	0.0193	+/-0.0167	1.00	pCi/L							
Uranium-238		0.297	+/-0.0262	0.0619	0.0281	+/-0.0297	0.500	pCi/L							

### Rad Gamma Spec Analysis

*Gammasespec "As Received"*

Cesium-137	U	-0.81	+/-1.49	5.10	2.25	+/-1.50	8.00	pCi/L			BSW1	11/15/17	1359	1718234	4
Cobalt-60	U	0.130	+/-1.34	5.26	2.18	+/-1.34	8.00	pCi/L							
Neptunium-237	U	-0.40	+/-2.73	9.90	4.59	+/-2.73		pCi/L							
Potassium-40	U	-20.7	+/-19.4	72.3	31.7	+/-20.0		pCi/L							
Sodium-22	U	3.09	+/-1.37	5.24	2.19	+/-1.37		pCi/L							

### Rad Gas Flow Proportional Counting

*GFPC, Sr90, liquid "As Received"*

Strontium-90	U	0.000543	+/-0.124	0.442	0.205	+/-0.124	0.500	pCi/L			LXB3	11/29/17	0742	1720044	5
<i>WSP-GrossA/B "As Received"</i>															
Beta	U	0.668	+/-0.607	2.06	0.945	+/-0.609	3.00	pCi/L			AXH4	11/28/17	1136	1720050	6
Alpha	U	1.60	+/-0.737	2.29	0.947	+/-0.749	3.00	pCi/L			AXH4	11/29/17	1146	1720050	7

### The following Analytical Methods were performed

Method	Description
1	HASL-300:AM-241
2	HASL-300:ISOPU
3	HASL-300:ISOU
4	EPA:901.1
5	EPA:905.0
6	EPA 900.0/SW846 9310
7	EPA 900.0/SW846 9310

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Am241 Liquid "As Received"	1718541	82.8	(50%-105%)
Plutonium-242 Tracer	ISOPU "As Received"	1718543	70.1	(50%-105%)
Uranium-232 Tracer	IsoU "As Received"	1718546	80	(50%-105%)

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## Certificate of Analysis

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 Sample ID: CASA-18-147998

Sample ID: 437612002

Project: ESHL00114

Client ID: ARSL004

Report Date: December 6, 2017

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer	Recovery	Test							Batch ID	Recovery%	Acceptable Limits				
Strontium Carrier		GFPC, Sr90, liquid "As Received"							1720044	90.4	(50%-105%)				

### Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 68% confidence level (1-sigma).

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty



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## Certificate of Analysis

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 Sample ID: CAMO-18-148116

Sample ID: 437612006

Matrix: W

Collect Date: 08-NOV-17

Receive Date: 10-NOV-17

Collector: Client

Report Date: December 6, 2017

Project: ESHL00114

Client ID: ARSL004

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
<b>Rad Alpha Spec Analysis</b>															
<i>Alphaspec Am241 Liquid "As Received"</i>															
Americium-241	U	0.00447	+/-0.00774	0.0398	0.0169	+/-0.00775	0.050	pCi/L			BXA4	11/25/17	1132	1718541	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	0.00	+/-0.00778	0.0405	0.0165	+/-0.00778	0.050	pCi/L			BXA4	11/25/17	1131	1718543	2
Plutonium-239/240	U	0.00275	+/-0.00824	0.0579	0.0252	+/-0.00824	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		0.461	+/-0.0333	0.112	0.0531	+/-0.040	1.00	pCi/L			BXA4	11/26/17	1119	1718546	3
Uranium-235/236	U	0.0391	+/-0.0125	0.0486	0.0205	+/-0.0126	1.00	pCi/L							
Uranium-238		0.212	+/-0.0241	0.0658	0.0298	+/-0.0262	0.500	pCi/L							
<b>Rad Gamma Spec Analysis</b>															
<i>Gammasespec "As Received"</i>															
Cesium-137	U	0.671	+/-1.22	4.78	2.07	+/-1.23	8.00	pCi/L			BSW1	11/15/17	1400	1718234	4
Cobalt-60	U	-1.76	+/-1.41	4.78	1.91	+/-1.47	8.00	pCi/L							
Neptunium-237	U	1.26	+/-2.46	9.44	4.30	+/-2.47		pCi/L							
Potassium-40	U	-33.9	+/-21.0	70.7	30.5	+/-22.4		pCi/L							
Sodium-22	U	0.698	+/-1.55	6.29	2.68	+/-1.56		pCi/L							
<b>Rad Gas Flow Proportional Counting</b>															
<i>GFPC, Sr90, liquid "As Received"</i>															
Strontium-90	U	-0.0426	+/-0.0845	0.348	0.146	+/-0.0845	0.500	pCi/L			LXB3	11/30/17	1307	1720044	5
<i>WSP-GrossA/B "As Received"</i>															
Beta	U	2.36	+/-0.926	2.88	1.28	+/-0.947	3.00	pCi/L			AXH4	11/28/17	1136	1720050	6
Alpha	U	1.01	+/-0.840	2.92	1.19	+/-0.845	3.00	pCi/L			AXH4	11/29/17	1146	1720050	7

### The following Analytical Methods were performed

Method	Description
1	HASL-300:AM-241
2	HASL-300:ISOPU
3	HASL-300:ISOU
4	EPA:901.1
5	EPA:905.0
6	EPA 900.0/SW846 9310
7	EPA 900.0/SW846 9310

Surrogate/Tracer	Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Americium-243 Tracer		Alphaspec Am241 Liquid "As Received"	1718541	102	(50%-105%)
Plutonium-242 Tracer		ISOPU "As Received"	1718543	79.7	(50%-105%)
Uranium-232 Tracer		IsoU "As Received"	1718546	73.9	(50%-105%)
Strontium Carrier		GFPC, Sr90, liquid "As Received"	1720044	89.2	(50%-105%)

# GEL LABORATORIES LLC

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## Certificate of Analysis

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 Sample ID: CAMO-18-148116

Sample ID: 437612006

Report Date: December 6, 2017

Project: ESHL00114

Client ID: ARSL004

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test											Batch ID	Recovery%	Acceptable Limits	

### Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 68% confidence level (1-sigma).

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

# **Quality Control Summary**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: December 6, 2017

Page 1 of 6

Client : Los Alamos National Laboratory  
TA-00, SM1237, Rm104C

Los Alamos, New Mexico

Contact: Ms. Nita Patel

Workorder: 437612

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Alpha Spec</b>											
Batch	1718541										
QC1203918916	437632010	DUP									
Americium-241	U	0.00457	U	0.0127	pCi/L	0.34		(0-1)	BXA4	11/25/17	11:32
	Uncert:	+/-0.00457		+/-0.00732							
	TPU:	+/-0.00457		+/-0.00734							
**Americium-243 Tracer	2.62	2.62		2.69	pCi/L		102	(50%-105%)			
	Uncert:	+/-0.077		+/-0.0744							
	TPU:	+/-0.140		+/-0.137							
QC1203918917	LCS										
Americium-241	1.97			1.85	pCi/L		93.9	(80%-120%)	BXA4	11/28/17	18:14
	Uncert:			+/-0.0513							
	TPU:			+/-0.0937							
**Americium-243 Tracer	2.10			2.17	pCi/L		103	(50%-105%)			
	Uncert:			+/-0.0543							
	TPU:			+/-0.104							
QC1203918915	MB										
Americium-241			U	0.00	pCi/L				BXA4	11/25/17	11:32
	Uncert:			+/-0.00481							
	TPU:			+/-0.00481							
**Americium-243 Tracer	2.10			1.90	pCi/L		90.8	(50%-105%)			
	Uncert:			+/-0.0641							
	TPU:			+/-0.115							
Batch	1718543										
QC1203918922	437632010	DUP									
Plutonium-238	U	0.00552	U	-0.00868	pCi/L	0.385		(0-1)	BXA4	11/28/17	14:21
	Uncert:	+/-0.00781		+/-0.0106							
	TPU:	+/-0.00781		+/-0.0106							
Plutonium-239/240	U	0.00828	U	-0.00434	pCi/L	0.24		(0-1)			
	Uncert:	+/-0.0107		+/-0.0156							
	TPU:	+/-0.0107		+/-0.0156							
**Plutonium-242 Tracer	2.47	1.96		1.29	pCi/L		52.5	(50%-105%)			
	Uncert:	+/-0.0831		+/-0.105							
	TPU:	+/-0.137		+/-0.164							
QC1203918923	LCS										
Plutonium-238			U	0.0151	pCi/L			(80%-120%)	BXA4	11/25/17	11:32
	Uncert:			+/-0.0094							
	TPU:			+/-0.00942							
Plutonium-239/240	1.98			2.07	pCi/L		105	(80%-120%)			
	Uncert:			+/-0.0723							
	TPU:			+/-0.119							
**Plutonium-242 Tracer	1.97			1.35	pCi/L		68.2	(50%-105%)			
	Uncert:			+/-0.0707							
	TPU:			+/-0.114							

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Alpha Spec</b>											
Batch	1718543										
QC1203918921	MB										
Plutonium-238			U	0.00545	pCi/L				BXA4	11/25/17	11:31
				Uncert:							
				TPU:							
Plutonium-239/240			U	0.00818	pCi/L						
				Uncert:							
				TPU:							
**Plutonium-242 Tracer	1.97			1.30	pCi/L		65.7	(50%-105%)			
				Uncert:							
				TPU:							
Batch	1718546										
QC1203918933	437632010	DUP									
Uranium-234				0.275	pCi/L	0.687		(0-1)	BXA4	11/26/17	11:19
				Uncert:							
				TPU:							
Uranium-235/236			U	0.0271	pCi/L	0.891		(0-1)			
				Uncert:							
				TPU:							
Uranium-238				0.114	pCi/L	0.823		(0-1)			
				Uncert:							
				TPU:							
**Uranium-232 Tracer	2.62			2.16	pCi/L		80.8	(50%-105%)			
				Uncert:							
				TPU:							
QC1203918934	LCS										
Uranium-234				2.65	pCi/L				BXA4	11/26/17	11:19
				Uncert:							
				TPU:							
Uranium-235/236				0.218	pCi/L						
				Uncert:							
				TPU:							
Uranium-238	2.70			3.00	pCi/L		111	(80%-120%)			
				Uncert:							
				TPU:							
**Uranium-232 Tracer	2.09			0.912	pCi/L		43.6 *	(50%-105%)			
				Uncert:							
				TPU:							
QC1203918932	MB										
Uranium-234			U	0.0463	pCi/L				BXA4	11/26/17	11:19
				Uncert:							
				TPU:							
Uranium-235/236			U	0.0143	pCi/L						
				Uncert:							
				TPU:							
Uranium-238			U	0.0185	pCi/L						
				Uncert:							
				TPU:							

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	1718546										
*Uranium-232 Tracer	2.09			1.21	pCi/L		57.7	(50%-105%)			
	Uncert:			+/-0.0709							
	TPU:			+/-0.127							
Rad Gamma Spec											
Batch	1718234										
QC1203918139	437595004	DUP									
Cesium-137	U	0.994	U	-1.04	pCi/L	0.392		(0-1)	BSW1	11/16/17	07:17
	Uncert:	+/-1.18		+/-1.37							
	TPU:	+/-1.20		+/-1.39							
Cobalt-60	U	0.0903	U	-0.768	pCi/L	0.199		(0-1)			
	Uncert:	+/-1.06		+/-1.08							
	TPU:	+/-1.06		+/-1.10							
Neptunium-237	U	1.19	U	-1.12	pCi/L	0.255		(0-1)			
	Uncert:	+/-1.96		+/-2.52							
	TPU:	+/-1.98		+/-2.54							
Potassium-40	U	-21	U	-35.1	pCi/L	0.188		(0-1)			
	Uncert:	+/-16.0		+/-19.3							
	TPU:	+/-16.8		+/-21.0							
Sodium-22	U	-1.47	U	1.01	pCi/L	0.543		(0-1)			
	Uncert:	+/-1.12		+/-1.10							
	TPU:	+/-1.17		+/-1.12							
QC1203918140	LCS										
Americium-241	34300			37100	pCi/L		108	(80%-120%)	BSW1	11/16/17	07:18
	Uncert:			+/-539							
	TPU:			+/-1850							
Cesium-137	13000			13600	pCi/L		104	(80%-120%)			
	Uncert:			+/-173							
	TPU:			+/-592							
Cobalt-60	11300			11800	pCi/L		105	(80%-120%)			
	Uncert:			+/-178							
	TPU:			+/-572							
Neptunium-237			U	81.1	pCi/L						
	Uncert:			+/-54.5							
	TPU:			+/-57.7							
Potassium-40			U	-14.2	pCi/L						
	Uncert:			+/-105							
	TPU:			+/-105							
Sodium-22			U	-1.78	pCi/L						
	Uncert:			+/-19.0							
	TPU:			+/-19.0							
QC1203918138	MB										
Cesium-137			U	1.71	pCi/L				BSW1	11/16/17	10:29
	Uncert:			+/-1.15							
	TPU:			+/-1.22							
Cobalt-60			U	2.24	pCi/L						
	Uncert:			+/-1.17							

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Parname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Gamma Spec</b>											
Batch	1718234										
Neptunium-237	TPU:			+/-1.28							
			U	0.784	pCi/L						
	Uncert:			+/-2.26							
Potassium-40	TPU:			+/-2.27							
			U	5.39	pCi/L						
	Uncert:			+/-20.0							
Sodium-22	TPU:			+/-20.1							
			U	1.25	pCi/L						
	Uncert:			+/-1.21							
	TPU:			+/-1.25							
<b>Rad Gas Flow</b>											
Batch	1720044										
QC1203922620	437632002	DUP									
Strontium-90	U	-0.0581	U	0.0685	pCi/L	0.252		(0-1)	LXB3	11/29/17	08:46
	Uncert:	+/-0.123		+/-0.128							
	TPU:	+/-0.123		+/-0.128							
**Strontium Carrier	7.85	7.30		5.70	mg		72.6	(50%-105%)			
QC1203922622	LCS										
Strontium-90	23.7			27.2	pCi/L		115	(80%-120%)	LXB3	11/29/17	08:46
	Uncert:			+/-0.765							
	TPU:			+/-2.39							
**Strontium Carrier	7.85			5.50	mg		70.1	(50%-105%)			
QC1203922619	MB										
Strontium-90			U	-0.172	pCi/L				LXB3	11/29/17	08:45
	Uncert:			+/-0.0647							
	TPU:			+/-0.0647							
**Strontium Carrier	7.85			6.90	mg		87.9	(50%-105%)			
QC1203922621	437632002	MS									
Strontium-90	474	U	-0.0581	451	pCi/L		95.1	(75%-125%)	LXB3	11/29/17	08:45
	Uncert:		+/-0.123	+/-12.4							
	TPU:		+/-0.123	+/-39.3							
**Strontium Carrier	7.85	7.30		6.90	mg		87.9	(50%-105%)			
Batch	1720050										
QC1203922640	437508002	DUP									
Alpha	U	0.372	U	0.551	pCi/L	0.0795		(0-1)	AXH4	11/29/17	11:44
	Uncert:	+/-0.611		+/-0.511							
	TPU:	+/-0.612		+/-0.514							
Beta		1.86	U	2.24	pCi/L	0.124		(0-1)		11/28/17	13:44
	Uncert:	+/-0.620		+/-0.846							
	TPU:	+/-0.640		+/-0.868							
QC1203922643	LCS										
Alpha	12.1			13.7	pCi/L		113	(80%-120%)	AXH4	11/29/17	11:37
	Uncert:			+/-0.705							
	TPU:			+/-1.35							
Beta	47.4			46.9	pCi/L		99	(80%-120%)		11/28/17	13:57

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	1720050										
				Uncert:							
				TPU:							
QC1203922639	MB										
Alpha			U	-0.192	pCi/L				AXH4	11/29/17	11:42
				Uncert:							
				TPU:							
Beta			U	-0.198	pCi/L					11/28/17	13:44
				Uncert:							
				TPU:							
QC1203922641	437508002	MS									
Alpha	483	U	0.372	529	pCi/L		109	(75%-125%)	AXH4	11/29/17	16:48
				Uncert:							
				TPU:							
Beta	1890		1.86	1860	pCi/L		98.3	(75%-125%)		11/28/17	13:44
				Uncert:							
				TPU:							
QC1203922642	437508002	MSD									
Alpha	483	U	0.372	545	pCi/L	0.0692	113	(0-1)	AXH4	11/29/17	11:37
				Uncert:							
				TPU:							
Beta	1890		1.86	1930	pCi/L	0.095	102	(0-1)		11/28/17	13:56
				Uncert:							
				TPU:							

### Notes:

TPU and Counting Uncertainty are calculated at the 68% confidence level (1-sigma).

The Qualifiers in this report are defined as follows:

- \*\* Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M M if above MDC and less than LLD
- M REMF Result > MDC/CL and < RDL
- 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.



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Parmname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
R	Sample results are rejected									
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.									
UI	Gamma Spectroscopy--Uncertain identification									
UJ	Gamma Spectroscopy--Uncertain identification									
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.									
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.									
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.									
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.

\*\* Indicates analyte is a surrogate/tracer compound.

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

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

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