

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:

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CAMO-18-148065

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/16/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1119		MEDIA:	OK	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-50 S1		FIELD PREP:	F	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NA
	WSP-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: None


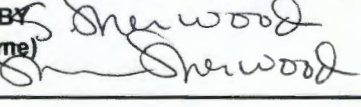
LOCATION COMMENTS: None

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 _____

KT 11/16/17

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CAMO-18-148065**WORK ORDER:****COLLECTED BY (PRINT):** D. Jaramillo & A. Stanfield

RELINQUISHED BY (Printed Name) (Signature)	Katrina Tow 	Date/Time 11/16/17 1525	RECEIVED BY (Printed Name) (Signature)	S Sherwood 	Date/Time 11/16/17 1525
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-18-148066

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11/16/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1419		MEDIA:	OK	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-50 S2		FIELD PREP:	F	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NA
	WSP-CR52/53	1 LITER POLY	1	ICE		
	WSP-GENINORG+PerChlorate	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: None


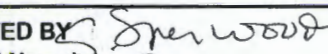
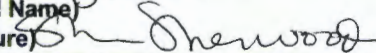
LOCATION COMMENTS: None

FIELD PARAMETERS:

Sample Time	HH:MM	Discharge Rate		KT 11/16/17	Dissolved Oxygen	
Groundwater Elevation		Oxidation-Reduction Potential			Period Purge Volume	
pH		Purge Volume			Specific Conductance	
Temperature		Total Volume Pumped			Turbidity	

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CAMO-18-148066**WORK ORDER:**

COLLECTED BY (PRINT): A. Stanfield

RELINQUISHED BY (Printed Name) (Signature)	Katrina Tow 	Date/Time 11/16/17 1525	RECEIVED BY (Printed Name) (Signature)	 Sherwood 	Date/Time 11/16/17 1525
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-18-148081

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	<u>11/16/2017</u>	<u>OK</u>	FIELD MATRIX:	<u>WG</u>	<u>OK</u>
TIME COLLECTED (HH:MM):	<u>1119</u>	<u> </u>	MEDIA:	<u>OK</u>	<u> </u>
PRS ID:	<u>NA</u>	<u> </u>	SAMPLE TECH CODE:	<u>GSP</u>	<u> </u>
LOCATION ID:	<u>R-50 S1</u>	<u> </u>	FIELD PREP:	<u>UF</u>	<u> </u>
LOCATION TYPE:	<u>NA</u>	<u> </u>	FIELD QC TYPE:	<u>REG</u>	<u> </u>
TOP DEPTH:	<u> </u>	<u> </u>	SAMPLE USAGE:	<u>INV</u>	<u> </u>
BOTTOM DEPTH:	<u> </u>	<u> </u>	EXCAVATED:		YES / NO / <u>(NA)</u>

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

SAMPLE COMMENTS: Sampled 60 ft from running diesel generatorLOCATION COMMENTS: None**FIELD PARAMETERS:**

Sample Time	<u>1119</u>	HH:MM	Discharge Rate	<u>2.54</u>	Dissolved Oxygen	<u>6.40</u>
Groundwater Elevation	<u>5829.86</u>		Oxidation-Reduction Potential	<u>194.4</u>	Period Purge Volume	<u>NA</u>
pH	<u>7.87</u>		Purge Volume	<u>144.78</u>	Specific Conductance	<u>191.4</u>
Temperature	<u>20.1</u>		Total Volume Pumped	<u>213.36</u>	Turbidity	<u>0.16</u>

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CAMO-18-148081**WORK ORDER:****COLLECTED BY (PRINT):** D. Jaramillo & A. Stanfield

RELINQUISHED BY (Printed Name) (Signature) Katrina Tow	Date/Time 11/16/17 1525	RECEIVED BY (Printed Name) (Signature) S. Sherwood	Date/Time 11/16/17 1525
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-18-148082

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	<u>11/16/2017</u>	<u>OK</u>	FIELD MATRIX:	<u>WG</u>	<u>OK</u>
TIME COLLECTED (HH:MM):	<u>1419</u>	<u> </u>	MEDIA:	<u>OK</u>	<u> </u>
PRS ID:	<u>NA</u>	<u> </u>	SAMPLE TECH CODE:	<u>GSP</u>	<u> </u>
LOCATION ID:	<u>R-50 S2</u>	<u> </u>	FIELD PREP:	<u>UF</u>	<u> </u>
LOCATION TYPE:	<u>NA</u>	<u> </u>	FIELD QC TYPE:	<u>REG</u>	<u> </u>
TOP DEPTH:	<u> </u>	<u> </u>	SAMPLE USAGE:	<u>INV</u>	<u> </u>
BOTTOM DEPTH:	<u>↓</u>	<u>↓</u>	EXCAVATED:		YES / NO / <u>(NA)</u>

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

SAMPLE COMMENTS: Sampled 60 ft. from running diesel generatorLOCATION COMMENTS: None

FIELD PARAMETERS:

Sample Time	<u>1419</u>	HH:MM	Discharge Rate	<u>2.34</u>	Dissolved Oxygen	<u>7.93</u>
Groundwater Elevation	<u>5831.18</u>		Oxidation-Reduction Potential	<u>188.0</u>	Period Purge Volume	<u>NA</u>
pH	<u>8.06</u>		Purge Volume	<u>290.16</u>	Specific Conductance	<u>135.6</u>
Temperature	<u>20.2</u>		Total Volume Pumped	<u>371.29</u>	Turbidity	<u>0.45</u>

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CAMO-18-148082**WORK ORDER:****COLLECTED BY (PRINT):**

A. Stanfield

RELINQUISHED BY (Printed Name) (Signature)	<i>Katrina Tow</i> <i>[Signature]</i>	Date/Time 11/16/17 1525	RECEIVED BY (Printed Name) (Signature)	<i>Sherwood</i> <i>[Signature]</i>	Date/Time 11/16/17 1525
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-18-148104

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/16/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1119		MEDIA:	OK	
PRS ID:	NA		SAMPLE TECH CODE:	DC	
LOCATION ID:	R-50 S1		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	FTB	
TOP DEPTH:			SAMPLE USAGE:	QC	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	11/16/17	HCL	Y	NA

SAMPLE COMMENTS: None

LOCATION COMMENTS: None

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	

KT 11/16/17

COLLECTED BY (PRINT): D. Jaramillo & A. Stanfield

RELINQUISHED BY (Printed Name) (Signature)	Katrina Tow <i>[Signature]</i>	Date/Time 11/16/17 1525	RECEIVED BY (Printed Name) (Signature)	S. Sherwood <i>[Signature]</i>	Date/Time 11/16/17 1525
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-18-148105

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/16/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1419		MEDIA:	OK	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-50 S2		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	FTB	
TOP DEPTH:	↓		SAMPLE USAGE:	QC	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	1 MS 11/16/17	HCL	Y	NA

SAMPLE COMMENTS: None

LOCATION COMMENTS: None

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 _____

KT 11/16/17

COLLECTED BY (PRINT): A. Stanfield

RELINQUISHED BY (Printed Name) (Signature)	Katrina Tow <i>[Signature]</i>	Date/Time 11/16/17 1525	RECEIVED BY (Printed Name) (Signature)	S. Overwood <i>[Signature]</i>	Date/Time 11/16/17 1525
RELINQUISHED BY (Printed Name) (Signature)		Date/Time	RECEIVED BY (Printed Name) (Signature)		Date/Time

① Sampling Plan ID/Name:

11552 (R-50 S1+S2)

COC:

2018-945

TEST - Explosives		YES	NO
② Samples collected from a WFO area?			<input checked="" type="checkbox"/>
Field Test for Explosives Results		YES	NO
③ HE SPOT test result positive. If YES - Do not transport.			

TEST - Chemical Preservation		YES	NO
④ Samples are chemically preserved?		<input checked="" type="checkbox"/>	
Field Team Member Statement		YES	NO
⑤ Chemical preservation exceeds limits given 40 CFR 136, Table II - Required Containers, Preservation Techniques and Holding Times (footnote 3). If YES - Do not ship.			<input checked="" type="checkbox"/>

TEST - Field Screen			YES	NO
⑥ The sample has field screening measurements of alpha activity and beta activity?				<input checked="" type="checkbox"/>
Sample Activity (dpm/100cm ²)	Shipment Activity (dpm*g/100cm ²)	Sampled Location	YES	NO
⑦ Alpha detectable	AND Alpha ≥ 160,000	AT TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, TA-48, or TA-49		<input checked="" type="checkbox"/>
⑧ Alpha ≥ 125	AND Alpha ≥ 1,250,000	AT other locations		
⑨ Beta ≥ 1,500	AND Beta ≥ 15,000,000	AT any location		
⑩ The sample Alpha ≥ 16,000,000 dpm*g/100cm ² or Beta ≥ 160,000,000 dpm*g/100cm ² . If YES - Do not ship.				
⑪ On the external surface of the sample container, alpha activity ≥ 24 dpm/cm ² , beta activity ≥ 240 dpm/cm ² , or surface activity ≥ 0.5 mR/hr. If YES - Do not ship.				
⑫ 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
⑬ Prior analytical measurements of radioactive isotopes are available?		<input checked="" type="checkbox"/>	
Sample Activity (pCi/g)	Shipment Activity (pCi)	YES	NO
• Am-241 ≥ 27 pCi/g	AND Am-241 ≥ 270,000 pCi Total		<input checked="" type="checkbox"/>
• Cs-137 ≥ 270 pCi/g	AND Cs-137 ≥ 270,000 pCi Total		
• Pu-238 ≥ 27 pCi/g	AND Pu-238 ≥ 270,000 pCi Total		
• Pu-239/240 ≥ 27 pCi/g	AND Pu-239/240 ≥ 270,000 pCi Total		
• Th-228 ≥ 27 pCi/g	AND Th-228 ≥ 270,000 pCi Total		
• U-234 ≥ 270 pCi/g	AND U-234 ≥ 1,600,000,000 pCi Total		
• U-238 ≥ 270 pCi/g	AND U-238 ≥ unlimited		
• H-3 ≥ 27,000,000 pCi/g	AND H-3 ≥ 27,000,000,000 pCi Total		
⑮ 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.			
⑯ The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910, based on prior analytical measurements of radioactive isotopes.			

TEST - AK		YES	NO
⑰ The shippers documented knowledge of the sample positively identifies appropriate labeling.			<input checked="" type="checkbox"/>
Documented Field Team Member Statement		YES	NO
⑱ 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.			<input checked="" type="checkbox"/>

⑲ 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) Allison Starfield	11/16/17
(Signature)	1525

Hazard Assessment Reviewed By:	Date/Time
(Printed Name) S. Sherwood	11/16/17
(Signature)	1525

DATA VALIDATION REPORT

Chain Of Custody No. 2018-945

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
438300	EPA:120.1	2				
438300	EPA:150.1	2				
438300	EPA:160.1	2				
438300	EPA:170.0	4		2		
438300	EPA:245.2	4				
438300	EPA:300.0	2				
438300	EPA:310.1	2				
438300	EPA:335.4	2				
438300	EPA:350.1	2				
438300	EPA:351.2	2				
438300	EPA:353.2	2				
438300	EPA:365.4	2				
438300	EPA:900	2				
438300	EPA:901.1	2				
438300	EPA:905.0	2				
438300	HASL-300:AM-241	2				
438300	HASL-300:ISOPU	2				
438300	HASL-300:ISOU	2				
438300	SM:A2340B	2				
438300	SW-846:6010C	2				
438300	SW-846:6020	2				
438300	SW-846:6850	2				
438300	SW-846:8260B	2		2		
438300	SW-846:8270D	2				
438300	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
438300	EPA:120.1	1721096	1721096	2										1				1			
438300	EPA:150.1	1721541	1721541	2										1				2			
438300	EPA:160.1	1720543	1720543	2					1					1				1			
438300	EPA:170.0	NA	NA	4		2															
438300	EPA:245.2	1724028	1724027	4					1	1				1				1			
438300	EPA:300.0	1723476	1723476	2					1					1				1			
438300	EPA:310.1	1721540	1721540	2						1				1				1			
438300	EPA:335.4	1720228	1720227	2					1	1				1				1			
438300	EPA:350.1	1720253	1720252	2					1	1				1				1			
438300	EPA:351.2	1719954	1719953	2					1	1				1				1			
438300	EPA:353.2	1720508	1720508	2					1					1				1			
438300	EPA:365.4	1720251	1720250	2					1	1				1				1			
438300	EPA:900	1720594	1720594	2					1	1	1			1				1			
438300	EPA:901.1	1720336	1720336	2					1					1				1			
438300	EPA:905.0	1720592	1720592	2					1	1				1				1			
438300	HASL-300:AM-241	1720756	1720756	2					1					1				1			
438300	HASL-300:ISOPU	1720757	1720757	2					1					1				1			
438300	HASL-300:ISOU	1720758	1720758	2					1					1				1			
438300	SM:A2340B	1726356	1726356	2																	
438300	SW-846:6010C	1720445	1720444	2					1	1				1				1			
438300	SW-846:6020	1720455	1720454	2					1	1				1				1			
438300	SW-846:6850	1722557	1722555	2					1	1	1			1							
438300	SW-846:8260B	1721798	1721798	2		2			2					4							
438300	SW-846:8270D	1720610	1720609	2					1	1	1			1							
438300	SW-846:9060	1720555	1720555	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
EPA:120.1	GENERAL CHEMISTRY	CAMO-18-148065	438300001	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
EPA:120.1	GENERAL CHEMISTRY	CAMO-18-148066	438300004	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203925380	LCS	0	0	1	0
EPA:120.1	GENERAL CHEMISTRY	WST05-18-148667	1203925382	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-147990	1203926490	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-148064	1203926491	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-148065	438300001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-148066	438300004	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203926489	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-18-148065	1203923973	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-18-148065	438300001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-18-148066	438300004	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203923972	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203923971	MB	1	0	0	0
EPA:170.0	VOC	CAMO-18-148065	438300001	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-148066	438300004	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-148081	438300002	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-148082	438300005	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-148104	438300003	FTB	1	0	0	0
EPA:170.0	VOC	CAMO-18-148105	438300006	FTB	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148065	1203932781	DUP	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148065	1203932782	MS	0	0	1	0
EPA:245.2	INORGANIC	CAMO-18-148065	438300001	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148066	438300004	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148081	438300002	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148082	438300005	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203932780	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203932779	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-18-148065	438300001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-18-148066	438300004	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CTUA-17-142756	1203931402	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203931401	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203931400	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-147990	1203926485	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-147990	1203926488	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-148065	438300001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-148066	438300004	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203926482	LCS	0	0	1	0
EPA:335.4	INORGANIC	CAMO-18-148081	438300002	REG	1	0	0	0
EPA:335.4	INORGANIC	CAMO-18-148082	438300005	REG	1	0	0	0
EPA:335.4	INORGANIC	LCS	1203923113	LCS	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	MB	1203923112	MB	1	0	0	0
EPA:335.4	INORGANIC	WST05-18-148667	1203923114	DUP	1	0	0	0
EPA:335.4	INORGANIC	WST05-18-148667	1203923116	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-18-148065	438300001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-18-148066	438300004	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203923168	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203923167	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	WST15-17-148261	1203923169	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	WST15-17-148261	1203923170	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-18-148081	438300002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-18-148082	438300005	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203922360	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203922359	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	WST15-18-150000	1203922363	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	WST15-18-150000	1203922364	MS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-18-148065	1203923891	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-18-148065	438300001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-18-148066	438300004	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203923890	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203923889	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-18-148065	438300001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-18-148066	438300004	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203923159	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203923158	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	WST15-18-150000	1203923160	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	WST15-18-150000	1203923161	MS	0	0	1	0
EPA:900	RAD	CAMO-18-148081	1203924115	DUP	2	0	0	0
EPA:900	RAD	CAMO-18-148081	1203924116	MS	0	0	2	0
EPA:900	RAD	CAMO-18-148081	1203924117	MSD	0	0	2	0
EPA:900	RAD	CAMO-18-148081	438300002	REG	2	0	0	0
EPA:900	RAD	CAMO-18-148082	438300005	REG	2	0	0	0
EPA:900	RAD	LCS	1203924118	LCS	0	0	2	0
EPA:900	RAD	MB	1203924114	MB	2	0	0	0
EPA:901.1	RAD	CAMO-18-148081	438300002	REG	5	0	0	0
EPA:901.1	RAD	CAMO-18-148082	438300005	REG	5	0	0	0
EPA:901.1	RAD	LCS	1203923400	LCS	0	0	3	0
EPA:901.1	RAD	MB	1203923398	MB	5	0	0	0
EPA:901.1	RAD	WST15-17-148261	1203923399	DUP	5	0	0	0
EPA:905.0	RAD	CAMO-18-147983	1203924111	DUP	1	0	0	0
EPA:905.0	RAD	CAMO-18-147983	1203924112	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:905.0	RAD	CAMO-18-148081	438300002	REG	1	0	0	0
EPA:905.0	RAD	CAMO-18-148082	438300005	REG	1	0	0	0
EPA:905.0	RAD	LCS	1203924113	LCS	0	0	1	0
EPA:905.0	RAD	MB	1203924110	MB	1	0	0	0
HASL-300:AM-241	RAD	CAMO-18-148081	438300002	REG	1	0	0	0
HASL-300:AM-241	RAD	CAMO-18-148082	438300005	REG	1	0	0	0
HASL-300:AM-241	RAD	LCS	1203924521	LCS	0	0	1	0
HASL-300:AM-241	RAD	MB	1203924519	MB	1	0	0	0
HASL-300:AM-241	RAD	WST15-17-148261	1203924520	DUP	1	0	0	0
HASL-300:ISOPU	RAD	CAMO-18-148081	438300002	REG	2	0	0	0
HASL-300:ISOPU	RAD	CAMO-18-148082	438300005	REG	2	0	0	0
HASL-300:ISOPU	RAD	LCS	1203924524	LCS	0	0	1	0
HASL-300:ISOPU	RAD	MB	1203924522	MB	2	0	0	0
HASL-300:ISOPU	RAD	WST15-17-148261	1203924523	DUP	2	0	0	0
HASL-300:ISOU	RAD	CAMO-18-148081	438300002	REG	3	0	0	0
HASL-300:ISOU	RAD	CAMO-18-148082	438300005	REG	3	0	0	0
HASL-300:ISOU	RAD	LCS	1203924527	LCS	0	0	1	0
HASL-300:ISOU	RAD	MB	1203924525	MB	3	0	0	0
HASL-300:ISOU	RAD	WST15-17-148261	1203924526	DUP	3	0	0	0
SM:A2340B	INORGANIC	CAMO-18-148065	438300001	REG	1	0	0	0
SM:A2340B	INORGANIC	CAMO-18-148066	438300004	REG	1	0	0	0
SW-846:6010C	INORGANIC	CAMO-18-148065	1203923723	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-18-148065	1203923724	MS	0	0	17	0
SW-846:6010C	INORGANIC	CAMO-18-148065	438300001	REG	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-18-148066	438300004	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203923722	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203923721	MB	17	0	0	0
SW-846:6020	INORGANIC	CAMO-18-148065	1203923748	DUP	11	0	0	0
SW-846:6020	INORGANIC	CAMO-18-148065	1203923749	MS	0	0	11	0
SW-846:6020	INORGANIC	CAMO-18-148065	438300001	REG	11	0	0	0
SW-846:6020	INORGANIC	CAMO-18-148066	438300004	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203923747	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203923746	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-147982	1203928960	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-147982	1203928961	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-148065	438300001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-148066	438300004	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203928959	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203928958	MB	1	0	0	0
SW-846:8260B	VOC	CAMO-18-148081	438300002	REG	80	3	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-846:8260B	VOC	CAMO-18-148082	438300005	REG	80	3	0	0
SW-846:8260B	VOC	CAMO-18-148104	438300003	FTB	80	3	0	0
SW-846:8260B	VOC	CAMO-18-148105	438300006	FTB	80	3	0	0
SW-846:8260B	VOC	LCS	1203927241	LCS	0	3	70	0
SW-846:8260B	VOC	LCS	1203927242	LCS	0	3	10	0
SW-846:8260B	VOC	LCS	1203927507	LCS	0	3	70	0
SW-846:8260B	VOC	LCS	1203927508	LCS	0	3	10	0
SW-846:8260B	VOC	MB	1203927239	MB	80	3	0	0
SW-846:8260B	VOC	MB	1203927240	MB	80	3	0	0
SW-846:8270D	SVOC	CAMO-18-148081	1203924160	MS	0	6	76	0
SW-846:8270D	SVOC	CAMO-18-148081	1203924161	MSD	0	6	76	0
SW-846:8270D	SVOC	CAMO-18-148081	438300002	REG	80	6	0	0
SW-846:8270D	SVOC	CAMO-18-148082	438300005	REG	80	6	0	0
SW-846:8270D	SVOC	LCS	1203924159	LCS	0	6	76	0
SW-846:8270D	SVOC	MB	1203924158	MB	80	6	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-18-148081	438300002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-18-148082	438300005	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-18-147963	1203927021	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203927019	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203927018	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

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
-------------	------------------	------------	-------------------	--------	----------------	------------------	---------------	-----------------	---------------------------

DATA VALIDATION REPORT

Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name	Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
MB	1203923721	METHOD BLANK	SW-846:6010C	W	Potassium	64	J	ug/L	150
CAMO-18-148104	438300003	TRIP BLANK	EPA:170.0	W	Temperature	2		Deg C	
CAMO-18-148105	438300006	TRIP BLANK	EPA:170.0	W	Temperature	2		Deg C	

No.

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
WST15-18-150000	1203922364		EPA:351.2	Total Kjeldahl Nitrogen	1719953	11-21-2017	W	151		110	90	10		
CAMO-18-148065	1203923749		SW-846:6020	Chromium	1720454	12-05-2017	W	70.8		125	75	10		
CAMO-18-148065	1203923749		SW-846:6020	Chromium	1720454	12-05-2017	W	70.8		125	75	10		
CAMO-18-148081	1203924160	1203924161	SW-846:8270D	Benzoic Acid	1720609	11-28-2017	W	45	30	95	17		41	30

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

No.

9. Any Field Duplicate RPDs outside the desired limits?

DATA VALIDATION REPORT

No.

10. Any Lab Duplicate RPDs outside the desired limits?

Field Sample ID	Lab Sample ID	LD Lab Sample ID	Analytical Method	Parameter Name	Sample Matrix	Lab Result	LD Lab Result	Lab Units	Detect Flag	LD Detect Flag	RPD	RPD Limit
CAMO-18-148065	438300001	1203923973	EPA:160.1	Total Dissolved	W	163	151	mg/L	Y	Y	7.27	5

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Parameter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detect Flag	Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent	Analysis Lot ID	Validation Status Code	Use Flag
R-50 S1	2018-945	CAMO-18-148065	REG	INIT	INORGANIC	SW-846:6020	Chromium	N	U	I6a	Y	125	ug/L	125	ug/L			W	11/16/2017		1720455	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.00792	pCi/L	0.00792	pCi/L	0.0353	0.0056	W	11/16/2017		1720756	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	-1.7	pCi/L	-1.7	pCi/L	5.73	1.59	W	11/16/2017		1720336	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	3.3	pCi/L	3.3	pCi/L	5.65	1.12	W	11/16/2017		1720336	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	0.232	pCi/L	0.232	pCi/L	2.82	0.654	W	11/16/2017		1720594	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N	1.13	pCi/L	1.13	pCi/L	2.76	0.822	W	11/16/2017		1720594	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	-0.354	pCi/L	-0.354	pCi/L	7.74	2.08	W	11/16/2017		1720336	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	0.0159	pCi/L	0.0159	pCi/L	0.039	0.00837	W	11/16/2017		1720757	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	0.00000000353	pCi/L	0.00000000353	pCi/L	0.0558	0.0112	W	11/16/2017		1720757	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	-7.59	pCi/L	-7.59	pCi/L	59.6	15.2	W	11/16/2017		1720336	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	0.533	pCi/L	0.533	pCi/L	4.09	0.934	W	11/16/2017		1720336	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	0.00748	pCi/L	0.00748	pCi/L	0.365	0.0986	W	11/16/2017		1720592	VAL	Y
R-50 S1	2018-945	CAMO-18-148081	REG	INIT	RAD	HASL-300:ISOU	Uranium-235/236	U	U	R5	N	0.0561	pCi/L	0.0561	pCi/L	0.109	0.0231	W	11/16/2017		1720758	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.0219	pCi/L	0.0219	pCi/L	0.0355	0.00772	W	11/16/2017		1720756	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	-2.09	pCi/L	-2.09	pCi/L	4.64	1.46	W	11/16/2017		1720336	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	-1.76	pCi/L	-1.76	pCi/L	5.18	1.50	W	11/16/2017		1720336	VAL	Y

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-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	1.72	pCi/L	1.72	pCi/L	2.96	0.934	W	11/16/2017		1720594	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N	0.166	pCi/L	0.166	pCi/L	2.90	0.800	W	11/16/2017		1720594	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	1.15	pCi/L	1.15	pCi/L	8.03	2.14	W	11/16/2017		1720336	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	0.00885	pCi/L	0.00885	pCi/L	0.0326	0.00626	W	11/16/2017		1720757	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	0.00664	pCi/L	0.00664	pCi/L	0.0467	0.00734	W	11/16/2017		1720757	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	22.2	pCi/L	22.2	pCi/L	76.8	18.4	W	11/16/2017		1720336	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	0.908	pCi/L	0.908	pCi/L	5.22	1.22	W	11/16/2017		1720336	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	-0.268	pCi/L	-0.268	pCi/L	0.440	0.0947	W	11/16/2017		1720592	VAL	Y
R-50 S2	2018-945	CAMO-18-148082	REG	INIT	RAD	HASL-300:ISOU	Uranium-235/236	U	U	R5	N	0.0708	pCi/L	0.0708	pCi/L	0.0843	0.0216	W	11/16/2017		1720758	VAL	Y

Reason Code

Description

I6a

The associated matrix spike recovery was below the lower acceptance limit (LAL) but >10%. Follow the external laboratory limits located within the associated data package.

J_LAB

The analytical laboratory qualified the detected result as estimated (J) because the result was less the PQL but greater than the MDL

NQ

The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualifire. 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-18-148065	R-50 S1	REG	EPA:120.1	0	1
CAMO-18-148065	R-50 S1	REG	EPA:150.1	0	1
CAMO-18-148065	R-50 S1	REG	EPA:160.1	0	1
CAMO-18-148065	R-50 S1	REG	EPA:170.0	0	1
CAMO-18-148065	R-50 S1	REG	EPA:245.2	0	1
CAMO-18-148065	R-50 S1	REG	EPA:300.0	0	4
CAMO-18-148065	R-50 S1	REG	EPA:310.1	0	2
CAMO-18-148065	R-50 S1	REG	EPA:350.1	0	1
CAMO-18-148065	R-50 S1	REG	EPA:353.2	0	1
CAMO-18-148065	R-50 S1	REG	EPA:365.4	0	1

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-18-148065	R-50 S1	REG	SM:A2340B	0	1
CAMO-18-148065	R-50 S1	REG	SW-846:6010C	0	17
CAMO-18-148065	R-50 S1	REG	SW-846:6020	0	11
CAMO-18-148065	R-50 S1	REG	SW-846:6850	0	1
CAMO-18-148066	R-50 S2	REG	EPA:120.1	0	1
CAMO-18-148066	R-50 S2	REG	EPA:150.1	0	1
CAMO-18-148066	R-50 S2	REG	EPA:160.1	0	1
CAMO-18-148066	R-50 S2	REG	EPA:170.0	0	1
CAMO-18-148066	R-50 S2	REG	EPA:245.2	0	1
CAMO-18-148066	R-50 S2	REG	EPA:300.0	0	4
CAMO-18-148066	R-50 S2	REG	EPA:310.1	0	2
CAMO-18-148066	R-50 S2	REG	EPA:350.1	0	1
CAMO-18-148066	R-50 S2	REG	EPA:353.2	0	1
CAMO-18-148066	R-50 S2	REG	EPA:365.4	0	1
CAMO-18-148066	R-50 S2	REG	SM:A2340B	0	1
CAMO-18-148066	R-50 S2	REG	SW-846:6010C	0	17
CAMO-18-148066	R-50 S2	REG	SW-846:6020	0	11
CAMO-18-148066	R-50 S2	REG	SW-846:6850	0	1
CAMO-18-148081	R-50 S1	REG	EPA:170.0	0	1
CAMO-18-148081	R-50 S1	REG	EPA:245.2	0	1
CAMO-18-148081	R-50 S1	REG	EPA:335.4	0	1
CAMO-18-148081	R-50 S1	REG	EPA:351.2	0	1
CAMO-18-148081	R-50 S1	REG	EPA:900	0	2
CAMO-18-148081	R-50 S1	REG	EPA:901.1	0	5
CAMO-18-148081	R-50 S1	REG	EPA:905.0	0	1
CAMO-18-148081	R-50 S1	REG	HASL-300:AM-241	0	1
CAMO-18-148081	R-50 S1	REG	HASL-300:ISOPU	0	2
CAMO-18-148081	R-50 S1	REG	HASL-300:ISOU	0	3
CAMO-18-148081	R-50 S1	REG	SW-846:8260B	0	80
CAMO-18-148081	R-50 S1	REG	SW-846:8270D	0	80
CAMO-18-148081	R-50 S1	REG	SW-846:9060	0	1
CAMO-18-148082	R-50 S2	REG	EPA:170.0	0	1
CAMO-18-148082	R-50 S2	REG	EPA:245.2	0	1
CAMO-18-148082	R-50 S2	REG	EPA:335.4	0	1
CAMO-18-148082	R-50 S2	REG	EPA:351.2	0	1
CAMO-18-148082	R-50 S2	REG	EPA:900	0	2
CAMO-18-148082	R-50 S2	REG	EPA:901.1	0	5

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-18-148082	R-50 S2	REG	EPA:905.0	0	1
CAMO-18-148082	R-50 S2	REG	HASL-300:AM-241	0	1
CAMO-18-148082	R-50 S2	REG	HASL-300:ISOPU	0	2
CAMO-18-148082	R-50 S2	REG	HASL-300:ISOU	0	3
CAMO-18-148082	R-50 S2	REG	SW-846:8260B	0	80
CAMO-18-148082	R-50 S2	REG	SW-846:8270D	0	80
CAMO-18-148082	R-50 S2	REG	SW-846:9060	0	1
CAMO-18-148104	R-50 S1	FTB	EPA:170.0	0	1
CAMO-18-148104	R-50 S1	FTB	SW-846:8260B	0	80
CAMO-18-148105	R-50 S2	FTB	EPA:170.0	0	1
CAMO-18-148105	R-50 S2	FTB	SW-846:8260B	0	80

December 14, 2017

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

Re: LANL- WQH Water Samples
Work Order: 438300
SDG: 2018-945

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on November 18, 2017, and analyzed for 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: 2018-945
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 438300
SDG: 2018-945

Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	5
Data Review Qualifier Flag Definition Sheet.....	10
Volatile Analysis.....	13
Case Narrative.....	14
Sample Data Summary.....	19
Quality Control Summary.....	32
Quality Control Data.....	56
Semi-Volatile Analysis.....	87
Case Narrative.....	88
Sample Data Summary.....	94
Quality Control Summary.....	101
Quality Control Data.....	116
Perchlorates by LCMSMS Analysis.....	129
Case Narrative.....	130
Sample Data Summary.....	136
Quality Control Summary.....	139
Quality Control Data.....	142
Metals Analysis.....	148
Case Narrative.....	149

Sample Data Summary.....	155
Quality Control Summary.....	164
General Chem Analysis.....	179
Case Narrative.....	180
Sample Data Summary.....	211
Quality Control Summary.....	218
Radiological Analysis.....	225
Case Narrative.....	226
Sample Data Summary.....	240
Quality Control Summary.....	245

Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 438300
SDG # : 2018-945**

December 14, 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 18, 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:

<u>Laboratory ID</u>	<u>Client ID</u>
438300001	CAMO-18-148065
438300002	CAMO-18-148081
438300003	CAMO-18-148104
438300004	CAMO-18-148066
438300005	CAMO-18-148082
438300006	CAMO-18-148105

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/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.

Valerie Davis

Valerie Davis
Project Manager

List of current GEL Certifications as of 14 December 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	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

COC/Lab Request #:
2018-945
Page 1 of 1

Special Instructions:				
Relinquished by: <u>James Osoff</u>	Print Name: <u>James Osoff</u>	Date/Time: <u>11/27/15</u>	Received by: <u>[Signature]</u>	Print Name: <u>Jack Walsh</u>
Relinquished by:	Print Name:	Date/Time:	Received by:	Date/Time: <u>11-18-17</u>
Relinquished by:	Print Name:	Date/Time:	Received by:	Date/Time: <u>9:00</u>



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ESHL</u>		SDG/AR/COC/Work Order: <u>438300</u>	
Received By: <u>ZKW</u>		Date Received: <u>11/18/17</u>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="radio"/> FedEx Express <input type="radio"/> FedEx Ground <input type="radio"/> UPS <input type="radio"/> Field Services <input type="radio"/> Courier <input type="radio"/> Other	
		<u>5908 1783 2246-22</u> <u>5908 1783 2240-32</u> <u>5908 1783 2279-22</u> <u>5908 1783 2246-22</u> <u>5908 1783 2246-182 (chem)</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?	<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____	
COC/Samples marked or classified as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> (CPM) dR/Hr Classified as: Rad 1 Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?	<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	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice <input checked="" type="checkbox"/> Ice Packs Dry Ice <input checked="" type="checkbox"/> None Other: _____ *all temperatures are recorded in Celsius TEMP: <u>See above</u>
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR3-16</u> Secondary Temperature Device Serial # (If Applicable): _____
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: <u>NST samples read on ground</u> If Preservation added, Lot#: _____
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Yes, Are Encores or Soil Kits present? Yes ___ No <input checked="" type="checkbox"/> (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes ___ No <input checked="" type="checkbox"/> N/A ___ (If unknown, select No) VOA vials free of headspace? Yes ___ No <input checked="" type="checkbox"/> N/A ___ Sample ID's and containers affected: <u>one vial for -148082 read w/ headspace</u>
8	Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: <u>We only read one container for -147756, and -147759, and -147755, and -148105</u>
12	Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KH/rollDate 11/20/17Page 1 of 1

GL-CHL-SR-001 Rev 5

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

SHIP DATE: 17NOV17
ACTWGT: 32.0 LB MAN
CAD: 0014176/CAFE2916

LOS ALAMOS, NM 87545
UNITED STATES US

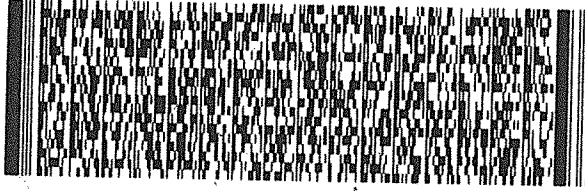
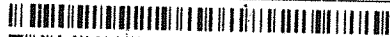
BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

REF: 21D0AWE991158W100



FedEx
Express



2 of 2

MPS# 5908 1783 2280
0263

Mstr# 5908 1783 2279

0201

XO RBWA

29407
SC-US CHS

SATURDAY 12:00
PRIORITY OVERNIGHT

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: 17NOV17
ACTWGT: 52.0 LB MAN
CAD: 0014176/CAFE2916

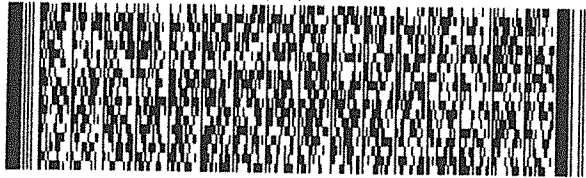
BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

REF: 21D0AWE991158W100



FedEx
Express



1 of 2

TRK# 5908 1783 2279
0201

MASTER

XO RBWA

29407
SC-US CHS

SATURDAY 12:00
PRIORITY OVERNIGHT



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

SHIP DATE: 17NOV17
ACTWGT: 49.0 LB MAN
CAD: 0014176/CAFE2916

LOS ALAMOS, NM 87545
UNITED STATES US

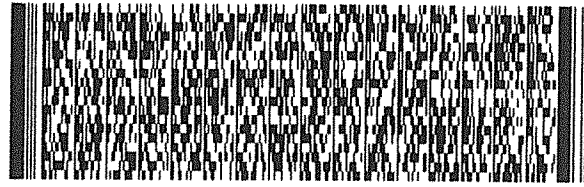
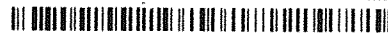
BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

REF: 21PD0ASRGW04BAGWEO



FedEx
Express



3 of 3

MPS# 5908 1783 2268
0263

Mstr# 5908 1783 2246

0201

XO RBWA

29407
SC-US CHS

SATURDAY 12:00
PRIORITY OVERNIGHT

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: 17NOV17
ACTWGT: 41.0 LB MAN
CAD: 0014176/CAFE29

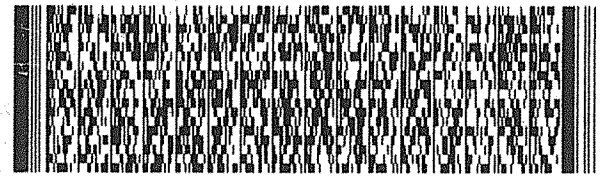
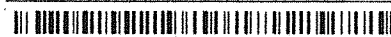
BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

REF: 21PD0ASRGW04BAGWEO



FedEx
Express



1 of 3

TRK# 5908 1783 2246
0201

MASTER

XO RBWA

29407
SC-US CHS

SATURDAY 12:00
PRIORITY OVERNIGHT



ORIGIN ID: SAFA (505) 865-9966
KEITH GREENE
LOS ALAMOS NATL LAB
TRAO BLDG 1237 DPU 03

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 17NOV17
ACTWT: 49.0 LB HHN
CAD: 0014176/CAFE2916

BILL SENDER

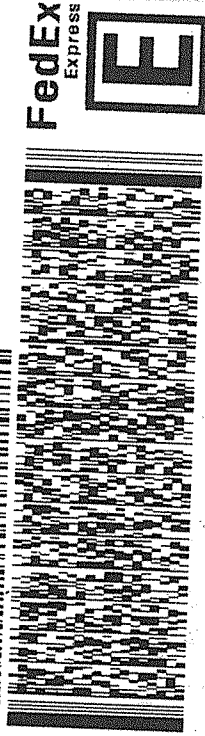
TO **VALERIE DAVIS**
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

REF: 21PD0ASRGW04BAGWEO

22



SATURDAY 12:00
PRIORITY OVERNIGHT

1 of 3
MPS# 5908 1783 2257
0263
Mstr# 5908 1783 2246

X0 RBWA

2940
SC-US CH



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 #: 2018-945
Work Order #: 438300**

Method/Analysis Information

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

Analytical Method: SW-846:8260B

Analytical Batch
Number: 1721798

Sample Analysis

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

Sample ID	Client ID
438300002	CAMO-18-148081
438300003	CAMO-18-148104
438300005	CAMO-18-148082
438300006	CAMO-18-148105
1203927239	Method Blank (MB)
1203927240	Method Blank (MB)
1203927241	Laboratory Control Sample (LCS)
1203927242	Laboratory Control Sample (LCS)
1203927243	438305008(CASA-18-147988) Post Spike (PS)
1203927244	438305008(CASA-18-147988) Post Spike (PS)
1203927245	438305008(CASA-18-147988) Post Spike Duplicate (PSD)
1203927246	438305008(CASA-18-147988) Post Spike Duplicate (PSD)
1203927507	Laboratory Control Sample (LCS)
1203927508	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

Target analytes were detected in the blanks 1203927239 (MB) and 1203927240 (MB) below the reporting limit.

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 438305008 (CASA-18-147988) was designated for spike analysis.

Matrix Spike/Matrix Spike Duplicate Recovery Statement

The spike and/or spike duplicate (See Below) recoveries were not all within the acceptance limits.

Sample	Analyte	Value
1203927245 (CASA-18-147988PSD)	Hexachlorobutadiene	36* (40%-147%)

Relative Percent Difference (RPD) Statement

The RPD between the matrix spike pair (See Below) were not all within the acceptance limits. The unacceptable RPD may be attributed to matrix interference and/or sample non-homogeneity.

Sample	Analyte	Value
1203927243PS and 1203927245PSD (CASA-18-147988)	Several	See applicable report

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:

Instrument ID	Instrument	System Configuration	Column ID	Column Description	P & T Trap
VOA6.I	Agilent 6890N/5975 GC/MS w/ OI 4560/Archon Autosampler	HP6890N/HP5975	DB-624	J&W, 60m x 0.25mm x 1.4um	Trap 10

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2018-945 GEL Work Order: 438300

The Qualifiers in this report are defined as follows:

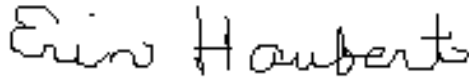
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- B The target analyte was detected in the associated blank.
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- DL Indicates that 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: Erin Haubert

Date: 13 DEC 2017

Title: Data Validator

Sample Data Summary

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945

Lab Sample ID: 438300002

Date Collected: 11/16/2017 11:19

Date Received: 11/18/2017 09:00

Matrix: W

Client ID: CAMO-18-148081

Batch ID: 1721798

Run Date: 11/28/2017 07:41

Prep Date: 11/28/2017 07:41

Data File: 112717V6\6J147.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA6.I

Analyst: JP1

Project: ESHL00114

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Column: DB-624

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

**Volatile
Certificate of Analysis
Sample Summary**

SDG Number: 2018-945
Lab Sample ID: 438300002

Client ID: CAMO-18-148081
Batch ID: 1721798
Run Date: 11/28/2017 07:41
Prep Date: 11/28/2017 07:41
Data File: 112717V6\6J147.D

Date Collected: 11/16/2017 11:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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**

SDG Number: 2018-945
Lab Sample ID: 438300002

Date Collected: 11/16/2017 11:19
Date Received: 11/18/2017 09:00

Matrix: W

Client ID: CAMO-18-148081
Batch ID: 1721798
Run Date: 11/28/2017 07:41
Prep Date: 11/28/2017 07:41
Data File: 112717V6\6J147.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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

Column: DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	54.2	50.0	ug/L 108	(71%-134%)
Bromofluorobenzene	52.1	50.0	ug/L 104	(70%-131%)
Toluene-d8	49.2	50.0	ug/L 98	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.592	5.21	ug/L	0	J
	unknown siloxane	13.744	23.8	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945

Lab Sample ID: 438300003

Date Collected: 11/16/2017 11:19

Date Received: 11/18/2017 09:00

Matrix: W

Client ID: CAMO-18-148104

Batch ID: 1721798

Run Date: 11/28/2017 08:09

Prep Date: 11/28/2017 08:09

Data File: 112717V6\6J148.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA6.I

Analyst: JP1

Column: DB-624

Project: ESHL00114

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
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: 2018-945
Lab Sample ID: 438300003

Client ID: CAMO-18-148104
Batch ID: 1721798
Run Date: 11/28/2017 08:09
Prep Date: 11/28/2017 08:09
Data File: 112717V6\6J148.D

Date Collected: 11/16/2017 11:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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**

SDG Number: 2018-945

Lab Sample ID: 438300003

Date Collected: 11/16/2017 11:19

Date Received: 11/18/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721798

Inst: VOA6.I

Dilution: 1

Run Date: 11/28/2017 08:09

Analyst: JP1

Purge Vol: 5 mL

Prep Date: 11/28/2017 08:09

Data File: 112717V6\6J148.D

Column: DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	51.3	50.0	ug/L 103	(71%-134%)
Bromofluorobenzene	52.1	50.0	ug/L 104	(70%-131%)
Toluene-d8	49.3	50.0	ug/L 99	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown siloxane	11.348	5.34	ug/L	0	J
	unknown siloxane	13.75	41.6	ug/L	0	J
	unknown siloxane	15.67	6.13	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945

Lab Sample ID: 438300005

Date Collected: 11/16/2017 14:19

Date Received: 11/18/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721798

Inst: VOA6.I

Dilution: 1

Run Date: 11/28/2017 08:37

Analyst: JP1

Purge Vol: 5 mL

Prep Date: 11/28/2017 08:37

Data File: 112717V6\6J149.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	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: 2018-945
Lab Sample ID: 438300005

Client ID: CAMO-18-148082
Batch ID: 1721798
Run Date: 11/28/2017 08:37
Prep Date: 11/28/2017 08:37
Data File: 112717V6\6J149.D

Date Collected: 11/16/2017 14:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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**

SDG Number: 2018-945

Lab Sample ID: 438300005

Date Collected: 11/16/2017 14:19

Date Received: 11/18/2017 09:00

Matrix: W

Client: ARSL004

Method: SW-846:8260B

Project: ESHL00114

Inst: VOA6.I

Analyst: JP1

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Prep Date: 11/28/2017 08:37

Data File: 112717V6\6J149.D

Column: DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	52.2	50.0	ug/L 104	(71%-134%)
Bromofluorobenzene	52.1	50.0	ug/L 104	(70%-131%)
Toluene-d8	49.0	50.0	ug/L 98	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.592	5.66	ug/L	0	J
	unknown siloxane	13.75	24.8	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945

Lab Sample ID: 438300006

Date Collected: 11/16/2017 14:19

Date Received: 11/18/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721798

Inst: VOA6.I

Dilution: 1

Run Date: 11/28/2017 09:05

Analyst: JP1

Purge Vol: 5 mL

Prep Date: 11/28/2017 09:05

Data File: 112717V6\6J150.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	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: 2018-945

Lab Sample ID: 438300006

Date Collected: 11/16/2017 14:19

Date Received: 11/18/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721798

Inst: VOA6.I

Dilution: 1

Run Date: 11/28/2017 09:05

Analyst: JP1

Purge Vol: 5 mL

Prep Date: 11/28/2017 09:05

Data File: 112717V6\6J150.D

Column: DB-624

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

**Volatile
Certificate of Analysis
Sample Summary**

SDG Number: 2018-945
Lab Sample ID: 438300006

Date Collected: 11/16/2017 14:19
Date Received: 11/18/2017 09:00

Matrix: W

Client ID: CAMO-18-148105

Client: ARSL004

Project: ESHL00114

Batch ID: 1721798

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Run Date: 11/28/2017 09:05

Inst: VOA6.I

Dilution: 1

Prep Date: 11/28/2017 09:05

Analyst: JP1

Purge Vol: 5 mL

Data File: 112717V6\6J150.D

Column: DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	52.6	50.0	ug/L 105	(71%-134%)
Bromofluorobenzene	52.7	50.0	ug/L 105	(70%-131%)
Toluene-d8	49.7	50.0	ug/L 99	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown siloxane	13.75	21.8	ug/L	0	J

Quality Control Summary

Volatile
Surrogate Recovery Report

Page 1 of 1

SDG Number: 2018-945**Matrix Type: LIQUID**

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203927241	LCS for batch 1721798	100	99	102
1203927242	LCS for batch 1721798	101	98	104
1203927239	MB for batch 1721798	102	99	103
438300002	CAMO-18-148081	108	98	104
438300003	CAMO-18-148104	103	99	104
438300005	CAMO-18-148082	104	98	104
438300006	CAMO-18-148105	105	99	105
1203927507	LCS for batch 1721798	102	100	101
1203927508	LCS for batch 1721798	103	99	103
1203927240	MB for batch 1721798	102	98	101
1203927243	CASA-18-147988PS	102	101	102
1203927245	CASA-18-147988PSD	103	101	101
1203927244	CASA-18-147988PS	105	99	103
1203927246	CASA-18-147988PSD	102	99	103

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: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721798

Matrix: WATER

Lab Sample ID 1203927241

Instrument: VOA6.I

Analysis Date: 11/27/2017 23:12

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	92.3	92	71-127
75-05-8	LCS Acetonitrile	1250	0.0	1360	109	61-125
67-64-1	LCS Acetone	250	0.0	256	102	48-157
74-88-4	LCS Iodomethane	250	0.0	255	102	72-128
75-15-0	LCS Carbon disulfide	250	0.0	256	103	69-138
108-05-4	LCS Vinyl acetate	250	0.0	240	96	67-125
78-93-3	LCS 2-Butanone	250	0.0	264	106	55-138
108-10-1	LCS 4-Methyl-2-pentanone	250	0.0	248	99	66-124
591-78-6	LCS 2-Hexanone	250	0.0	219	88	56-140
75-71-8	LCS Dichlorodifluoromethane	50.0	0.0	50.0	100	40-160
74-87-3	LCS Chloromethane	50.0	0.0	48.1	96	58-135
75-01-4	LCS Vinyl chloride	50.0	0.0	45.8	92	65-137
74-83-9	LCS Bromomethane	50.0	0.0	47.5	95	63-137
75-00-3	LCS Chloroethane	50.0	0.0	46.6	93	69-129
75-69-4	LCS Trichlorofluoromethane	50.0	0.0	45.3	91	69-138
60-29-7	LCS Ethyl ether	50.0	0.0	48.2	96	72-125
75-35-4	LCS 1,1-Dichloroethylene	50.0	0.0	53.0	106	66-126
75-09-2	LCS Methylene chloride	50.0	0.0	50.5	101	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	54.2	108	71-124
75-34-3	LCS 1,1-Dichloroethane	50.0	0.0	54.4	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: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721798

Matrix: WATER

Lab Sample ID 1203927241

Instrument: VOA6.I

Analysis Date: 11/27/2017 23:12

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	49.9	100	72-138
74-97-5	LCS Bromochloromethane	50.0	0.0	53.2	106	76-125
67-66-3	LCS Chloroform	50.0	0.0	52.8	106	76-123
71-55-6	LCS 1,1,1-Trichloroethane	50.0	0.0	50.4	101	74-136
563-58-6	LCS 1,1-Dichloropropene	50.0	0.0	48.2	96	72-129
56-23-5	LCS Carbon tetrachloride	50.0	0.0	50.5	101	72-140
107-06-2	LCS 1,2-Dichloroethane	50.0	0.0	54.9	110	74-122
71-43-2	LCS Benzene	50.0	0.0	51.4	103	72-121
79-01-6	LCS Trichloroethylene	50.0	0.0	51.7	103	74-125
78-87-5	LCS 1,2-Dichloropropane	50.0	0.0	53.3	107	73-121
74-95-3	LCS Dibromomethane	50.0	0.0	52.9	106	78-123
75-27-4	LCS Bromodichloromethane	50.0	0.0	53.6	107	77-131
10061-01-5	LCS cis-1,3-Dichloropropylene	50.0	0.0	52.5	105	78-131
108-88-3	LCS Toluene	50.0	0.0	48.7	97	71-121
10061-02-6	LCS trans-1,3-Dichloropropylene	50.0	0.0	51.9	104	78-131
79-00-5	LCS 1,1,2-Trichloroethane	50.0	0.0	52.8	106	74-118
142-28-9	LCS 1,3-Dichloropropane	50.0	0.0	51.7	103	74-118
127-18-4	LCS Tetrachloroethylene	50.0	0.0	45.7	91	69-129
124-48-1	LCS Dibromochloromethane	50.0	0.0	53.4	107	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	48.1	96	74-120
100-41-4	LCS Ethylbenzene	50.0	0.0	47.0	94	73-125

Volatile
Quality Control Summary
Spike Recovery Report

Page 3 of 4

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721798

Matrix: WATER

Lab Sample ID 1203927241

Instrument: VOA6.I

Analysis Date: 11/27/2017 23:12

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	47.2	94	74-126
100-42-5	LCS Styrene	50.0	0.0	48.3	97	72-130
75-25-2	LCS Bromoform	50.0	0.0	52.4	105	72-136
98-82-8	LCS Isopropylbenzene	50.0	0.0	45.3	91	70-130
79-34-5	LCS 1,1,2,2-Tetrachloroethane	50.0	0.0	51.8	104	70-126
96-18-4	LCS 1,2,3-Trichloropropane	50.0	0.0	53.4	107	74-122
108-86-1	LCS Bromobenzene	50.0	0.0	47.1	94	74-120
103-65-1	LCS n-Propylbenzene	50.0	0.0	43.6	87	67-128
108-67-8	LCS 1,3,5-Trimethylbenzene	50.0	0.0	45.5	91	70-129
95-49-8	LCS 2-Chlorotoluene	50.0	0.0	45.2	90	71-124
106-43-4	LCS 4-Chlorotoluene	50.0	0.0	45.2	90	69-125
98-06-6	LCS tert-Butylbenzene	50.0	0.0	43.9	88	72-130
95-63-6	LCS 1,2,4-Trimethylbenzene	50.0	0.0	45.2	90	70-126
135-98-8	LCS sec-Butylbenzene	50.0	0.0	43.6	87	70-131
99-87-6	LCS 4-Isopropyltoluene	50.0	0.0	44.5	89	71-131
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	44.8	90	72-121
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	44.2	88	71-120
104-51-8	LCS n-Butylbenzene	50.0	0.0	40.0	80	68-134
96-12-8	LCS 1,2-Dibromo-3-chloropropane	50.0	0.0	48.9	98	68-141
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	38.3	77	72-136
91-20-3	LCS Naphthalene	50.0	0.0	51.5	103	72-132
87-61-6	LCS 1,2,3-Trichlorobenzene	50.0	0.0	46.2	92	70-130

Volatile
Quality Control Summary
Spike Recovery Report

Page 4 of 4

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721798

Matrix: WATER

Lab Sample ID 1203927241

Instrument: VOA6.I

Analysis Date: 11/27/2017 23:12

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	43.4	87	71-129
630-20-6	LCS 1,1,1,2-Tetrachloroethane	50.0	0.0	51.6	103	79-127
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	46.4	93	74-120
71-36-3	LCS n-Butyl alcohol	5000	0.0	5450	109	63-138

Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 1

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721798

Matrix: WATER

Lab Sample ID 1203927242

Instrument: VOA6.I

Analysis Date: 11/28/2017 00:08

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	211	85	60-140
76-13-1	LCS	Trichlorotrifluoroethane	250	0.0	242	97	61-148
107-05-1	LCS	Allyl chloride	250	0.0	248	99	59-125
107-13-1	LCS	Acrylonitrile	250	0.0	265	106	65-122
107-12-0	LCS	Propionitrile	250	0.0	260	104	64-124
126-98-7	LCS	Methacrylonitrile	250	0.0	262	105	64-126
80-62-6	LCS	Methyl methacrylate	250	0.0	253	101	69-127
97-63-2	LCS	Ethyl methacrylate	250	0.0	242	97	66-130
78-83-1	LCS	Isobutyl alcohol	2500	0.0	2550	102	65-135
126-99-8	LCS	2-Chloro-1,3-butadiene	50.0	0.0	44.8	90	66-147

Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 8

SDG Number: 2018-945

Sample Type: Post Spike

Client ID: CASA-18-147988PS

Matrix: W

Lab Sample ID 1203927243

Instrument: VOA6.I

Analysis Date: 11/29/2017 02:07

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	87.4	87	59-132
75-05-8	PS Acetonitrile	1250	0.00 U	1330	106	56-131
67-64-1	PS Acetone	250	0.00 U	155	62	25-155
74-88-4	PS Iodomethane	250	0.00 U	249	100	66-133
75-15-0	PS Carbon disulfide	250	0.00 U	250	100	61-141
108-05-4	PS Vinyl acetate	250	0.00 U	217	87	48-133
78-93-3	PS 2-Butanone	250	0.00 U	185	74	25-143
108-10-1	PS 4-Methyl-2-pentanone	250	0.00 U	235	94	61-127
591-78-6	PS 2-Hexanone	250	0.00 U	173	69	33-138
75-71-8	PS Dichlorodifluoromethane	50.0	0.00 U	51.6	103	33-164
74-87-3	PS Chloromethane	50.0	0.00 U	48.5	97	53-139
75-01-4	PS Vinyl chloride	50.0	0.00 U	46.6	93	58-140
74-83-9	PS Bromomethane	50.0	0.00 U	51.5	103	59-146
75-00-3	PS Chloroethane	50.0	0.00 U	47.8	96	65-129
75-69-4	PS Trichlorofluoromethane	50.0	0.00 U	46.9	94	65-141
60-29-7	PS Ethyl ether	50.0	0.00 U	48.2	96	69-127
75-35-4	PS 1,1-Dichloroethylene	50.0	0.00 U	51.8	104	59-130
75-09-2	PS Methylene chloride	50.0	0.00 U	49.8	100	62-123
1634-04-4	PS tert-Butyl methyl ether	50.0	0.00 U	52.1	104	69-132
156-60-5	PS trans-1,2-Dichloroethylene	50.0	0.00 U	52.9	106	65-127
75-34-3	PS 1,1-Dichloroethane	50.0	0.00 U	53.3	107	67-127
156-59-2	PS cis-1,2-Dichloroethylene	50.0	0.00 U	52.4	105	69-127

Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 8

SDG Number: 2018-945

Sample Type: Post Spike

Client ID: CASA-18-147988PS

Matrix: W

Lab Sample ID 1203927243

Instrument: VOA6.I

Analysis Date: 11/29/2017 02:07

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	47.0	94	66-137
74-97-5	PS Bromochloromethane	50.0	0.00 U	52.0	104	71-130
67-66-3	PS Chloroform	50.0	0.00 U	51.5	103	71-129
71-55-6	PS 1,1,1-Trichloroethane	50.0	0.00 U	49.6	99	69-139
563-58-6	PS 1,1-Dichloropropene	50.0	0.00 U	46.8	94	67-130
56-23-5	PS Carbon tetrachloride	50.0	0.00 U	49.3	99	66-143
107-06-2	PS 1,2-Dichloroethane	50.0	0.00 U	53.6	107	69-130
71-43-2	PS Benzene	50.0	0.00 U	49.4	99	66-125
79-01-6	PS Trichloroethylene	50.0	0.00 U	49.0	98	65-131
78-87-5	PS 1,2-Dichloropropane	50.0	0.00 U	51.5	103	67-127
74-95-3	PS Dibromomethane	50.0	0.00 U	51.2	102	72-129
75-27-4	PS Bromodichloromethane	50.0	0.00 U	51.6	103	70-138
10061-01-5	PS cis-1,3-Dichloropropylene	50.0	0.00 U	48.1	96	70-134
108-88-3	PS Toluene	50.0	0.00 U	46.6	93	60-126
10061-02-6	PS trans-1,3-Dichloropropylene	50.0	0.00 U	49.0	98	69-135
79-00-5	PS 1,1,2-Trichloroethane	50.0	0.00 U	50.4	101	66-125
142-28-9	PS 1,3-Dichloropropane	50.0	0.00 U	50.3	101	67-124
127-18-4	PS Tetrachloroethylene	50.0	0.00 U	43.5	87	60-130
124-48-1	PS Dibromochloromethane	50.0	0.00 U	51.2	102	68-143
106-93-4	PS 1,2-Dibromoethane	50.0	0.00 U	51.0	102	71-127
108-90-7	PS Chlorobenzene	50.0	0.00 U	45.5	91	64-124
100-41-4	PS Ethylbenzene	50.0	0.00 U	44.5	89	61-130

Volatile
Quality Control Summary
Spike Recovery Report

Page 3 of 8

SDG Number: 2018-945

Sample Type: Post Spike

Client ID: CASA-18-147988PS

Matrix: W

Lab Sample ID 1203927243

Instrument: VOA6.I

Analysis Date: 11/29/2017 02:07

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	44.4	89	62-131
100-42-5	PS Styrene	50.0	0.00 U	44.8	90	59-135
75-25-2	PS Bromoform	50.0	0.00 U	48.0	96	64-138
98-82-8	PS Isopropylbenzene	50.0	0.00 U	42.4	85	55-133
79-34-5	PS 1,1,2,2-Tetrachloroethane	50.0	0.00 U	48.9	98	62-129
96-18-4	PS 1,2,3-Trichloropropane	50.0	0.00 U	50.4	101	70-124
108-86-1	PS Bromobenzene	50.0	0.00 U	44.1	88	62-124
103-65-1	PS n-Propylbenzene	50.0	0.00 U	40.2	80	50-133
108-67-8	PS 1,3,5-Trimethylbenzene	50.0	0.00 U	42.3	85	53-135
95-49-8	PS 2-Chlorotoluene	50.0	0.00 U	42.3	85	56-128
106-43-4	PS 4-Chlorotoluene	50.0	0.00 U	41.4	83	53-130
98-06-6	PS tert-Butylbenzene	50.0	0.00 U	42.1	84	55-135
95-63-6	PS 1,2,4-Trimethylbenzene	50.0	0.00 U	42.0	84	53-132
135-98-8	PS sec-Butylbenzene	50.0	0.00 U	40.7	81	50-138
99-87-6	PS 4-Isopropyltoluene	50.0	0.00 U	42.2	84	49-138
541-73-1	PS 1,3-Dichlorobenzene	50.0	0.00 U	41.2	82	56-126
106-46-7	PS 1,4-Dichlorobenzene	50.0	0.00 U	40.6	81	55-125
104-51-8	PS n-Butylbenzene	50.0	0.00 U	35.7	71	43-142
96-12-8	PS 1,2-Dibromo-3-chloropropane	50.0	0.00 U	45.7	91	62-141
87-68-3	PS Hexachlorobutadiene	50.0	0.00 U	31.3	63	40-147
91-20-3	PS Naphthalene	50.0	0.00 U	46.4	93	62-134
87-61-6	PS 1,2,3-Trichlorobenzene	50.0	0.00 U	40.5	81	52-135

Volatile

Page 4 of 8

Quality Control Summary
Spike Recovery Report

SDG Number: 2018-945

Sample Type: Post Spike

Client ID: CASA-18-147988PS

Matrix: W

Lab Sample ID 1203927243

Instrument: VOA6.I

Analysis Date: 11/29/2017 02:07

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	37.8	76	50-133
630-20-6	PS	1,1,1,2-Tetrachloroethane	50.0	0.00	U	49.9	100	71-133
95-50-1	PS	1,2-Dichlorobenzene	50.0	0.00	U	43.1	86	60-125
71-36-3	PS	n-Butyl alcohol	5000	0.00	U	5170	103	60-140

Volatile
Quality Control Summary
Spike Recovery Report

Page 5 of 8

SDG Number: 2018-945

Sample Type: Post Spike Duplicate

Client ID: CASA-18-147988PSD

Matrix: W

Lab Sample ID 1203927245

Instrument: VOA6.I

Analysis Date: 11/29/2017 02:35

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	69.4	69	59-132	23 *	0-20
75-05-8	PSD Acetonitrile	1250	0.00 U	1370	110	56-131	3	0-20
67-64-1	PSD Acetone	250	0.00 U	159	64	25-155	3	0-20
74-88-4	PSD Iodomethane	250	0.00 U	240	96	66-133	4	0-20
75-15-0	PSD Carbon disulfide	250	0.00 U	236	94	61-141	6	0-20
108-05-4	PSD Vinyl acetate	250	0.00 U	223	89	48-133	2	0-20
78-93-3	PSD 2-Butanone	250	0.00 U	193	77	25-143	4	0-20
108-10-1	PSD 4-Methyl-2-pentanone	250	0.00 U	244	98	61-127	4	0-20
591-78-6	PSD 2-Hexanone	250	0.00 U	182	73	33-138	5	0-20
75-71-8	PSD Dichlorodifluoromethane	50.0	0.00 U	50.3	101	33-164	3	0-20
74-87-3	PSD Chloromethane	50.0	0.00 U	47.4	95	53-139	2	0-20
75-01-4	PSD Vinyl chloride	50.0	0.00 U	45.4	91	58-140	3	0-20
74-83-9	PSD Bromomethane	50.0	0.00 U	50.1	100	59-146	3	0-20
75-00-3	PSD Chloroethane	50.0	0.00 U	46.7	93	65-129	2	0-20
75-69-4	PSD Trichlorofluoromethane	50.0	0.00 U	46.5	93	65-141	1	0-20
60-29-7	PSD Ethyl ether	50.0	0.00 U	48.7	97	69-127	1	0-20
75-35-4	PSD 1,1-Dichloroethylene	50.0	0.00 U	50.0	100	59-130	4	0-20
75-09-2	PSD Methylene chloride	50.0	0.00 U	48.2	96	62-123	3	0-20
1634-04-4	PSD tert-Butyl methyl ether	50.0	0.00 U	51.7	103	69-132	1	0-20
156-60-5	PSD trans-1,2-Dichloroethylene	50.0	0.00 U	49.8	100	65-127	6	0-20
75-34-3	PSD 1,1-Dichloroethane	50.0	0.00 U	51.8	104	67-127	3	0-20
156-59-2	PSD cis-1,2-Dichloroethylene	50.0	0.00 U	49.9	100	69-127	5	0-20

Volatile
Quality Control Summary
Spike Recovery Report

Page 6 of 8

SDG Number: 2018-945

Sample Type: Post Spike Duplicate

Client ID: CASA-18-147988PSD

Matrix: W

Lab Sample ID 1203927245

Instrument: VOA6.I

Analysis Date: 11/29/2017 02:35

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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 45.0	90	66-137	4	0-20
74-97-5	PSD Bromochloromethane	50.0	0.00	U 49.9	100	71-130	4	0-20
67-66-3	PSD Chloroform	50.0	0.00	U 49.1	98	71-129	5	0-20
71-55-6	PSD 1,1,1-Trichloroethane	50.0	0.00	U 47.0	94	69-139	5	0-20
563-58-6	PSD 1,1-Dichloropropene	50.0	0.00	U 43.6	87	67-130	7	0-20
56-23-5	PSD Carbon tetrachloride	50.0	0.00	U 46.4	93	66-143	6	0-20
107-06-2	PSD 1,2-Dichloroethane	50.0	0.00	U 52.7	105	69-130	2	0-20
71-43-2	PSD Benzene	50.0	0.00	U 46.2	92	66-125	7	0-20
79-01-6	PSD Trichloroethylene	50.0	0.00	U 44.4	89	65-131	10	0-20
78-87-5	PSD 1,2-Dichloropropane	50.0	0.00	U 49.5	99	67-127	4	0-20
74-95-3	PSD Dibromomethane	50.0	0.00	U 48.8	98	72-129	5	0-20
75-27-4	PSD Bromodichloromethane	50.0	0.00	U 49.1	98	70-138	5	0-20
10061-01-5	PSD cis-1,3-Dichloropropylene	50.0	0.00	U 45.0	90	70-134	7	0-20
108-88-3	PSD Toluene	50.0	0.00	U 41.4	83	60-126	12	0-20
10061-02-6	PSD trans-1,3-Dichloropropylene	50.0	0.00	U 46.0	92	69-135	6	0-20
79-00-5	PSD 1,1,2-Trichloroethane	50.0	0.00	U 48.6	97	66-125	4	0-20
142-28-9	PSD 1,3-Dichloropropane	50.0	0.00	U 48.3	97	67-124	4	0-20
127-18-4	PSD Tetrachloroethylene	50.0	0.00	U 36.9	74	60-130	16	0-20
124-48-1	PSD Dibromochloromethane	50.0	0.00	U 49.1	98	68-143	4	0-20
106-93-4	PSD 1,2-Dibromoethane	50.0	0.00	U 50.0	100	71-127	2	0-20
108-90-7	PSD Chlorobenzene	50.0	0.00	U 38.7	77	64-124	16	0-20
100-41-4	PSD Ethylbenzene	50.0	0.00	U 36.1	72	61-130	21 *	0-20

Volatile
Quality Control Summary
Spike Recovery Report

Page 7 of 8

SDG Number: 2018-945

Sample Type: Post Spike Duplicate

Client ID: CASA-18-147988PSD

Matrix: W

Lab Sample ID 1203927245

Instrument: VOA6.I

Analysis Date: 11/29/2017 02:35

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

			Amount	Sample	Spike	Acceptance		Acceptance		
CAS No		Parmname	Added	Conc.	Conc.	Recovery	Limits	RPD	Limits	
			ug/L	ug/L	ug/L	%		%		
95-47-6	PSD	o-Xylene	50.0	0.00	U	36.6	73	62-131	19	0-20
100-42-5	PSD	Styrene	50.0	0.00	U	36.7	73	59-135	20	0-20
75-25-2	PSD	Bromoform	50.0	0.00	U	46.3	93	64-138	4	0-20
98-82-8	PSD	Isopropylbenzene	50.0	0.00	U	31.8	64	55-133	29 *	0-20
79-34-5	PSD	1,1,2,2-Tetrachloroethane	50.0	0.00	U	47.5	95	62-129	3	0-20
96-18-4	PSD	1,2,3-Trichloropropane	50.0	0.00	U	48.4	97	70-124	4	0-20
108-86-1	PSD	Bromobenzene	50.0	0.00	U	36.3	73	62-124	19	0-20
103-65-1	PSD	n-Propylbenzene	50.0	0.00	U	28.0	56	50-133	36 *	0-20
108-67-8	PSD	1,3,5-Trimethylbenzene	50.0	0.00	U	30.5	61	53-135	33 *	0-20
95-49-8	PSD	2-Chlorotoluene	50.0	0.00	U	31.7	63	56-128	28 *	0-20
106-43-4	PSD	4-Chlorotoluene	50.0	0.00	U	30.0	60	53-130	32 *	0-20
98-06-6	PSD	tert-Butylbenzene	50.0	0.00	U	29.9	60	55-135	34 *	0-20
95-63-6	PSD	1,2,4-Trimethylbenzene	50.0	0.00	U	30.0	60	53-132	33 *	0-20
135-98-8	PSD	sec-Butylbenzene	50.0	0.00	U	26.8	54	50-138	41 *	0-20
99-87-6	PSD	4-Isopropyltoluene	50.0	0.00	U	29.8	60	49-138	34 *	0-20
541-73-1	PSD	1,3-Dichlorobenzene	50.0	0.00	U	30.4	61	56-126	30 *	0-20
106-46-7	PSD	1,4-Dichlorobenzene	50.0	0.00	U	30.1	60	55-125	30 *	0-20
104-51-8	PSD	n-Butylbenzene	50.0	0.00	U	21.3	43	43-142	50 *	0-20
96-12-8	PSD	1,2-Dibromo-3-chloropropane	50.0	0.00	U	45.7	91	62-141	0	0-20
87-68-3	PSD	Hexachlorobutadiene	50.0	0.00	U	18.1	36 *	40-147	54 *	0-20
91-20-3	PSD	Naphthalene	50.0	0.00	U	42.5	85	62-134	9	0-20
87-61-6	PSD	1,2,3-Trichlorobenzene	50.0	0.00	U	32.7	65	52-135	21 *	0-20

Volatile

Page 8 of 8

Quality Control Summary
Spike Recovery Report

SDG Number: 2018-945

Sample Type: Post Spike Duplicate

Client ID: CASA-18-147988PSD

Matrix: W

Lab Sample ID 1203927245

Instrument: VOA6.I

Analysis Date: 11/29/2017 02:35

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
120-82-1	PSD 1,2,4-Trichlorobenzene	50.0	0.00	U 29.0	58	50-133	26 *	0-20
630-20-6	PSD 1,1,1,2-Tetrachloroethane	50.0	0.00	U 45.1	90	71-133	10	0-20
95-50-1	PSD 1,2-Dichlorobenzene	50.0	0.00	U 33.7	67	60-125	25 *	0-20
71-36-3	PSD n-Butyl alcohol	5000	0.00	U 5240	105	60-140	1	0-20

Volatile

Page 1 of 2

Quality Control Summary
Spike Recovery Report

SDG Number: 2018-945

Sample Type: Post Spike

Client ID: CASA-18-147988PS

Matrix: W

Lab Sample ID 1203927244

Instrument: VOA6.I

Analysis Date: 11/29/2017 03:03

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

CAS No			Parmname		Amount Added ug/L	Sample Conc. ug/L	U	Spike Conc. ug/L	Recovery %	Acceptance Limits
107-02-8	PS	Acrolein			250	0.00	U	235	94	49-141
76-13-1	PS	Trichlorotrifluoroethane			250	0.00	U	235	94	57-149
107-05-1	PS	Allyl chloride			250	0.00	U	240	96	54-128
107-13-1	PS	Acrylonitrile			250	0.00	U	287	115	59-129
107-12-0	PS	Propionitrile			250	0.00	U	285	114	58-131
126-98-7	PS	Methacrylonitrile			250	0.00	U	279	112	59-134
80-62-6	PS	Methyl methacrylate			250	0.00	U	261	104	62-135
97-63-2	PS	Ethyl methacrylate			250	0.00	U	241	96	60-136
78-83-1	PS	Isobutyl alcohol			2500	0.00	U	2900	116	60-143
126-99-8	PS	2-Chloro-1,3-butadiene			50.0	0.00	U	41.9	84	63-146

Volatile

Page 2 of 2

Quality Control Summary
Spike Recovery Report

SDG Number: 2018-945

Sample Type: Post Spike Duplicate

Client ID: CASA-18-147988PSD

Matrix: W

Lab Sample ID 1203927246

Instrument: VOA6.I

Analysis Date: 11/29/2017 03:32

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

CAS No		Parmname	Amount Added ug/L	Sample Conc. ug/L	U	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
107-02-8	PSD	Acrolein	250	0.00	U	201	81	49-141	15	0-20
76-13-1	PSD	Trichlorotrifluoroethane	250	0.00	U	238	95	57-149	1	0-20
107-05-1	PSD	Allyl chloride	250	0.00	U	243	97	54-128	1	0-20
107-13-1	PSD	Acrylonitrile	250	0.00	U	260	104	59-129	10	0-20
107-12-0	PSD	Propionitrile	250	0.00	U	253	101	58-131	12	0-20
126-98-7	PSD	Methacrylonitrile	250	0.00	U	254	101	59-134	10	0-20
80-62-6	PSD	Methyl methacrylate	250	0.00	U	240	96	62-135	8	0-20
97-63-2	PSD	Ethyl methacrylate	250	0.00	U	228	91	60-136	6	0-20
78-83-1	PSD	Isobutyl alcohol	2500	0.00	U	2540	102	60-143	13	0-20
126-99-8	PSD	2-Chloro-1,3-butadiene	50.0	0.00	U	42.8	86	63-146	2	0-20

Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 4

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721798

Matrix: WATER

Lab Sample ID 1203927507

Instrument: VOA6.I

Analysis Date: 11/29/2017 00:14

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	95.5	96	71-127
75-05-8	LCS Acetonitrile	1250	0.0	1310	105	61-125
67-64-1	LCS Acetone	250	0.0	222	89	48-157
74-88-4	LCS Iodomethane	250	0.0	249	99	72-128
75-15-0	LCS Carbon disulfide	250	0.0	252	101	69-138
108-05-4	LCS Vinyl acetate	250	0.0	240	96	67-125
78-93-3	LCS 2-Butanone	250	0.0	231	93	55-138
108-10-1	LCS 4-Methyl-2-pentanone	250	0.0	232	93	66-124
591-78-6	LCS 2-Hexanone	250	0.0	188	75	56-140
75-71-8	LCS Dichlorodifluoromethane	50.0	0.0	50.8	102	40-160
74-87-3	LCS Chloromethane	50.0	0.0	48.5	97	58-135
75-01-4	LCS Vinyl chloride	50.0	0.0	46.2	92	65-137
74-83-9	LCS Bromomethane	50.0	0.0	49.0	98	63-137
75-00-3	LCS Chloroethane	50.0	0.0	48.0	96	69-129
75-69-4	LCS Trichlorofluoromethane	50.0	0.0	46.8	94	69-138
60-29-7	LCS Ethyl ether	50.0	0.0	47.9	96	72-125
75-35-4	LCS 1,1-Dichloroethylene	50.0	0.0	52.3	105	66-126
75-09-2	LCS Methylene chloride	50.0	0.0	50.3	101	68-119
1634-04-4	LCS tert-Butyl methyl ether	50.0	0.0	51.3	103	76-128
156-60-5	LCS trans-1,2-Dichloroethylene	50.0	0.0	53.8	108	71-124
75-34-3	LCS 1,1-Dichloroethane	50.0	0.0	53.8	108	73-123
156-59-2	LCS cis-1,2-Dichloroethylene	50.0	0.0	53.1	106	75-123

Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 4

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721798

Matrix: WATER

Lab Sample ID 1203927507

Instrument: VOA6.I

Analysis Date: 11/29/2017 00:14

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	47.1	94	72-138
74-97-5	LCS Bromochloromethane	50.0	0.0	52.4	105	76-125
67-66-3	LCS Chloroform	50.0	0.0	52.0	104	76-123
71-55-6	LCS 1,1,1-Trichloroethane	50.0	0.0	49.6	99	74-136
563-58-6	LCS 1,1-Dichloropropene	50.0	0.0	48.3	97	72-129
56-23-5	LCS Carbon tetrachloride	50.0	0.0	50.1	100	72-140
107-06-2	LCS 1,2-Dichloroethane	50.0	0.0	54.7	109	74-122
71-43-2	LCS Benzene	50.0	0.0	50.5	101	72-121
79-01-6	LCS Trichloroethylene	50.0	0.0	51.6	103	74-125
78-87-5	LCS 1,2-Dichloropropane	50.0	0.0	53.0	106	73-121
74-95-3	LCS Dibromomethane	50.0	0.0	51.7	103	78-123
75-27-4	LCS Bromodichloromethane	50.0	0.0	52.9	106	77-131
10061-01-5	LCS cis-1,3-Dichloropropylene	50.0	0.0	50.7	101	78-131
108-88-3	LCS Toluene	50.0	0.0	49.0	98	71-121
10061-02-6	LCS trans-1,3-Dichloropropylene	50.0	0.0	50.6	101	78-131
79-00-5	LCS 1,1,2-Trichloroethane	50.0	0.0	50.9	102	74-118
142-28-9	LCS 1,3-Dichloropropane	50.0	0.0	50.9	102	74-118
127-18-4	LCS Tetrachloroethylene	50.0	0.0	46.9	94	69-129
124-48-1	LCS Dibromochloromethane	50.0	0.0	52.5	105	76-137
106-93-4	LCS 1,2-Dibromoethane	50.0	0.0	51.6	103	78-122
108-90-7	LCS Chlorobenzene	50.0	0.0	48.9	98	74-120
100-41-4	LCS Ethylbenzene	50.0	0.0	48.4	97	73-125

Volatile
Quality Control Summary
Spike Recovery Report

Page 3 of 4

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721798

Matrix: WATER

Lab Sample ID 1203927507

Instrument: VOA6.I

Analysis Date: 11/29/2017 00:14

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	48.5	97	74-126
100-42-5	LCS Styrene	50.0	0.0	49.0	98	72-130
75-25-2	LCS Bromoform	50.0	0.0	49.2	98	72-136
98-82-8	LCS Isopropylbenzene	50.0	0.0	47.2	94	70-130
79-34-5	LCS 1,1,2,2-Tetrachloroethane	50.0	0.0	48.2	96	70-126
96-18-4	LCS 1,2,3-Trichloropropane	50.0	0.0	49.3	99	74-122
108-86-1	LCS Bromobenzene	50.0	0.0	48.1	96	74-120
103-65-1	LCS n-Propylbenzene	50.0	0.0	46.4	93	67-128
108-67-8	LCS 1,3,5-Trimethylbenzene	50.0	0.0	48.3	97	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	47.5	95	69-125
98-06-6	LCS tert-Butylbenzene	50.0	0.0	47.9	96	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	47.5	95	70-131
99-87-6	LCS 4-Isopropyltoluene	50.0	0.0	47.6	95	71-131
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	46.8	94	72-121
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	47.0	94	71-120
104-51-8	LCS n-Butylbenzene	50.0	0.0	45.5	91	68-134
96-12-8	LCS 1,2-Dibromo-3-chloropropane	50.0	0.0	45.4	91	68-141
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	46.2	92	72-136
91-20-3	LCS Naphthalene	50.0	0.0	50.2	100	72-132
87-61-6	LCS 1,2,3-Trichlorobenzene	50.0	0.0	47.4	95	70-130

Volatile
Quality Control Summary
Spike Recovery Report

Page 4 of 4

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721798

Matrix: WATER

Lab Sample ID 1203927507

Instrument: VOA6.I

Analysis Date: 11/29/2017 00:14

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	45.5	91	71-129
630-20-6	LCS 1,1,1,2-Tetrachloroethane	50.0	0.0	51.7	103	79-127
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	48.0	96	74-120
71-36-3	LCS n-Butyl alcohol	5000	0.0	5080	102	63-138

Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 1

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721798

Matrix: WATER

Lab Sample ID 1203927508

Instrument: VOA6.I

Analysis Date: 11/29/2017 01:10

Dilution: 1

Analyst: JP1

Purge Vol: 5 mL

Batch ID: 1721798

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	197	79	60-140
76-13-1	LCS	Trichlorotrifluoroethane	250	0.0	243	97	61-148
107-05-1	LCS	Allyl chloride	250	0.0	246	98	59-125
107-13-1	LCS	Acrylonitrile	250	0.0	262	105	65-122
107-12-0	LCS	Propionitrile	250	0.0	257	103	64-124
126-98-7	LCS	Methacrylonitrile	250	0.0	260	104	64-126
80-62-6	LCS	Methyl methacrylate	250	0.0	250	100	69-127
97-63-2	LCS	Ethyl methacrylate	250	0.0	237	95	66-130
78-83-1	LCS	Isobutyl alcohol	2500	0.0	2560	102	65-135
126-99-8	LCS	2-Chloro-1,3-butadiene	50.0	0.0	44.8	90	66-147

Method Blank Summary

Page 1 of 1

SDG Number: 2018-945

Client: ARSL004

Matrix: WATER

Client ID: MB for batch 1721798

Instrument ID: VOA6.I

Data File: 112717V6\6J132BA.D

Lab Sample ID: 1203927239

Prep Date: 11/28/2017 00:37

Analyzed: 11/28/17 00:37

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 1721798	1203927241	112717V6\6J129LA.D	11/27/17	2312
02 LCS for batch 1721798	1203927242	112717V6\6J131LA.D	11/28/17	0008
03 CAMO-18-148081	438300002	112717V6\6J147.D	11/28/17	0741
04 CAMO-18-148104	438300003	112717V6\6J148.D	11/28/17	0809
05 CAMO-18-148082	438300005	112717V6\6J149.D	11/28/17	0837
06 CAMO-18-148105	438300006	112717V6\6J150.D	11/28/17	0905

Method Blank Summary

Page 1 of 1

SDG Number:	2018-945	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1721798	Instrument ID:	VOA6.I	Data File:	112817V6\6J233BA98.D
Lab Sample ID:	1203927240	Prep Date:	11/29/2017 01:39	Analyzed:	11/29/17 01:39
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 1721798	1203927507	112817V6\6J230LA98.D	11/29/17	0014
09 LCS for batch 1721798	1203927508	112817V6\6J232LA98.D	11/29/17	0110
10 CASA-18-147988PS	1203927243	112817V6\6J234.D	11/29/17	0207
11 CASA-18-147988PSD	1203927245	112817V6\6J235.D	11/29/17	0235
12 CASA-18-147988PS	1203927244	112817V6\6J236.D	11/29/17	0303
13 CASA-18-147988PSD	1203927246	112817V6\6J237.D	11/29/17	0332

Quality Control Data

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945

Matrix: WATER

Lab Sample ID: 1203927239

Client Sample: QC for batch 1721798

Client: ARSL004

Project: QC

Client ID: MB for batch 1721798

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721798

Inst: VOA6.I

Dilution: 1

Run Date: 11/28/2017 00:37

Analyst: JP1

Purge Vol: 5 mL

Prep Date: 11/28/2017 00:37

Data File: 112717V6\6J132BA.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	J	0.460	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	J	0.360	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: 2018-945
Lab Sample ID: 1203927239
Client Sample: QC for batch 1721798
Client ID: MB for batch 1721798
Batch ID: 1721798
Run Date: 11/28/2017 00:37
Prep Date: 11/28/2017 00:37
Data File: 112717V6\6J132BA.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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	J	0.490	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

Page 3 of 3

SDG Number: 2018-945

Lab Sample ID: 1203927239

Client Sample: QC for batch 1721798

Client ID: MB for batch 1721798

Batch ID: 1721798

Run Date: 11/28/2017 00:37

Prep Date: 11/28/2017 00:37

Data File: 112717V6\6J132BA.D

Matrix: WATER

Client: ARSL004

Method: SW-846:8260B

Inst: VOA6.I

Analyst: JP1

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Column: DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
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	51.0	50.0	ug/L 102	(71%-134%)
Bromofluorobenzene	51.3	50.0	ug/L 103	(70%-131%)
Toluene-d8	49.3	50.0	ug/L 99	(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: 2018-945

Matrix: WATER

Lab Sample ID: 1203927240

Client Sample: QC for batch 1721798

Client: ARSL004

Project: QC

Client ID: MB for batch 1721798

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721798

Inst: VOA6.I

Dilution: 1

Run Date: 11/29/2017 01:39

Analyst: JP1

Purge Vol: 5 mL

Prep Date: 11/29/2017 01:39

Data File: 112817V6\6J233BA98.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	J	0.410	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	J	0.330	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: 2018-945

Lab Sample ID: 1203927240

Client Sample: QC for batch 1721798

Client ID: MB for batch 1721798

Batch ID: 1721798

Run Date: 11/29/2017 01:39

Prep Date: 11/29/2017 01:39

Data File: 112817V6\6J233BA98.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA6.I

Analyst: JP1

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	J	0.490	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

Page 3 of 3

SDG Number:	2018-945	Matrix:	WATER
Lab Sample ID:	1203927240		
Client Sample:	QC for batch 1721798	Client:	ARSL004
Client ID:	MB for batch 1721798	Method:	SW-846:8260B
Batch ID:	1721798	Inst:	VOA6.I
Run Date:	11/29/2017 01:39	Analyst:	JP1
Prep Date:	11/29/2017 01:39		
Data File:	112817V6\6J233BA98.D	Column:	DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	51.0	50.0	ug/L 102	(71%-134%)
Bromofluorobenzene	50.7	50.0	ug/L 101	(70%-131%)
Toluene-d8	48.9	50.0	ug/L 98	(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: 2018-945
Lab Sample ID: 1203927241
Client Sample: QC for batch 1721798
Client ID: LCS for batch 1721798
Batch ID: 1721798
Run Date: 11/27/2017 23:12
Prep Date: 11/27/2017 23:12
Data File: 112717V6\6J129LA.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		51.6	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		50.4	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		51.8	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		52.8	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		54.4	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		53.0	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		48.2	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	B	46.2	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		53.4	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	B	43.4	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		45.2	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		48.9	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		46.4	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		54.9	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		53.3	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		45.5	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		44.8	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		51.7	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		44.2	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		49.9	ug/L	0.300	1.00
78-93-3	2-Butanone		264	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		45.2	ug/L	0.300	1.00
591-78-6	2-Hexanone		219	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		45.2	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		44.5	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		248	ug/L	1.50	5.00
67-64-1	Acetone		256	ug/L	1.50	10.0
75-05-8	Acetonitrile		1360	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		51.4	ug/L	0.300	1.00
108-86-1	Bromobenzene		47.1	ug/L	0.300	1.00
74-97-5	Bromochloromethane		53.2	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		53.6	ug/L	0.300	1.00
75-25-2	Bromoform		52.4	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

SDG Number: 2018-945
Lab Sample ID: 1203927241
Client Sample: QC for batch 1721798
Client ID: LCS for batch 1721798
Batch ID: 1721798
Run Date: 11/27/2017 23:12
Prep Date: 11/27/2017 23:12
Data File: 112717V6\6J129LA.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		47.5	ug/L	0.300	1.00
75-15-0	Carbon disulfide		256	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		50.5	ug/L	0.300	1.00
108-90-7	Chlorobenzene		48.1	ug/L	0.300	1.00
75-00-3	Chloroethane		46.6	ug/L	0.300	1.00
67-66-3	Chloroform		52.8	ug/L	0.300	1.00
74-87-3	Chloromethane		48.1	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		53.4	ug/L	0.300	1.00
74-95-3	Dibromomethane		52.9	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		50.0	ug/L	0.300	1.00
60-29-7	Ethyl ether		48.2	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		47.0	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	B	38.3	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		45.3	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		50.5	ug/L	1.00	10.0
91-20-3	Naphthalene		51.5	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		48.3	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		45.7	ug/L	0.300	1.00
108-88-3	Toluene		48.7	ug/L	0.300	1.00
79-01-6	Trichloroethylene		51.7	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		45.3	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		240	ug/L	1.50	5.00
75-01-4	Vinyl chloride		45.8	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		52.5	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		92.3	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5450	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		40.0	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		43.6	ug/L	0.300	1.00
95-47-6	o-Xylene		47.2	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		43.6	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

Page 3 of 3

SDG Number: 2018-945
Lab Sample ID: 1203927241
Client Sample: QC for batch 1721798
Client ID: LCS for batch 1721798
Batch ID: 1721798
Run Date: 11/27/2017 23:12
Prep Date: 11/27/2017 23:12
Data File: 112717V6\6J129LA.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		43.9	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		54.2	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		51.9	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	50.1	50.0	ug/L	100	(71%-134%)
Bromofluorobenzene	51.2	50.0	ug/L	102	(70%-131%)
Toluene-d8	49.4	50.0	ug/L	99	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203927242
Client Sample: QC for batch 1721798
Client ID: LCS for batch 1721798
Batch ID: 1721798
Run Date: 11/28/2017 00:08
Prep Date: 11/28/2017 00:08
Data File: 112717V6\6J131LA.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		44.8	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		211	ug/L	1.50	5.00
107-13-1	Acrylonitrile		265	ug/L	1.50	5.00
107-05-1	Allyl chloride		248	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: 2018-945
 Lab Sample ID: 1203927242
 Client Sample: QC for batch 1721798
 Client ID: LCS for batch 1721798
 Batch ID: 1721798
 Run Date: 11/28/2017 00:08
 Prep Date: 11/28/2017 00:08
 Data File: 112717V6\6J131LA.D

Client: ARSL004
 Method: SW-846:8260B
 Inst: VOA6.I
 Analyst: JP1
 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		242	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		2550	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		262	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		253	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		260	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		242	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: 2018-945
Lab Sample ID: 1203927242
Client Sample: QC for batch 1721798
Client ID: LCS for batch 1721798
Batch ID: 1721798
Run Date: 11/28/2017 00:08
Prep Date: 11/28/2017 00:08
Data File: 112717V6\6J131LA.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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	50.6	50.0	ug/L 101	(71%-134%)
Bromofluorobenzene	52.2	50.0	ug/L 104	(70%-131%)
Toluene-d8	49.0	50.0	ug/L 98	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203927243
Client Sample: QC for batch 1721798
Client ID: CASA-18-147988PS
Batch ID: 1721798
Run Date: 11/29/2017 02:07
Prep Date: 11/29/2017 02:07
Data File: 112817V6\6J234.D

Date Collected: 11/16/2017 10:13
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		49.9	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		49.6	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		48.9	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		50.4	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		53.3	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		51.8	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		46.8	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	B	40.5	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		50.4	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	B	37.8	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		42.0	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		45.7	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		51.0	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		43.1	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		53.6	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		51.5	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		42.3	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		41.2	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		50.3	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		40.6	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		47.0	ug/L	0.300	1.00
78-93-3	2-Butanone		185	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		42.3	ug/L	0.300	1.00
591-78-6	2-Hexanone		173	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		41.4	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		42.2	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		235	ug/L	1.50	5.00
67-64-1	Acetone		155	ug/L	1.50	10.0
75-05-8	Acetonitrile		1330	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		49.4	ug/L	0.300	1.00
108-86-1	Bromobenzene		44.1	ug/L	0.300	1.00
74-97-5	Bromochloromethane		52.0	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		51.6	ug/L	0.300	1.00
75-25-2	Bromoform		48.0	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

SDG Number: 2018-945	Date Collected: 11/16/2017 10:13	Matrix: W
Lab Sample ID: 1203927243	Date Received: 11/18/2017 09:00	
Client Sample: QC for batch 1721798	Client: ARSL004	Project: QC
Client ID: CASA-18-147988PS	Method: SW-846:8260B	SOP Ref: GL-OA-E-038
Batch ID: 1721798	Inst: VOA6.I	Dilution: 1
Run Date: 11/29/2017 02:07	Analyst: JP1	Purge Vol: 5 mL
Prep Date: 11/29/2017 02:07		
Data File: 112817V6\6J234.D	Column: DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		51.5	ug/L	0.300	1.00
75-15-0	Carbon disulfide		250	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		49.3	ug/L	0.300	1.00
108-90-7	Chlorobenzene		45.5	ug/L	0.300	1.00
75-00-3	Chloroethane		47.8	ug/L	0.300	1.00
67-66-3	Chloroform		51.5	ug/L	0.300	1.00
74-87-3	Chloromethane		48.5	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		51.2	ug/L	0.300	1.00
74-95-3	Dibromomethane		51.2	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		51.6	ug/L	0.300	1.00
60-29-7	Ethyl ether		48.2	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		44.5	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	B	31.3	ug/L	0.300	1.00
74-88-4	Iodomethane		249	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		42.4	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		49.8	ug/L	1.00	10.0
91-20-3	Naphthalene		46.4	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		44.8	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		43.5	ug/L	0.300	1.00
108-88-3	Toluene		46.6	ug/L	0.300	1.00
79-01-6	Trichloroethylene		49.0	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		46.9	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		217	ug/L	1.50	5.00
75-01-4	Vinyl chloride		46.6	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		52.4	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		48.1	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		87.4	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5170	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		35.7	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		40.2	ug/L	0.300	1.00
95-47-6	o-Xylene		44.4	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		40.7	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

Page 3 of 3

SDG Number:	2018-945	Date Collected:	11/16/2017 10:13	Matrix:	W
Lab Sample ID:	1203927243	Date Received:	11/18/2017 09:00		
Client Sample:	QC for batch 1721798	Client:	ARSL004	Project:	QC
Client ID:	CASA-18-147988PS	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1721798	Inst:	VOA6.I	Dilution:	1
Run Date:	11/29/2017 02:07	Analyst:	JP1	Purge Vol:	5 mL
Prep Date:	11/29/2017 02:07				
Data File:	112817V6\6J234.D	Column:	DB-624		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		52.1	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		42.1	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		52.9	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		49.0	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	51.0	50.0	ug/L	102	(71%-134%)
Bromofluorobenzene	51.0	50.0	ug/L	102	(70%-131%)
Toluene-d8	50.5	50.0	ug/L	101	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203927244
Client Sample: QC for batch 1721798
Client ID: CASA-18-147988PS
Batch ID: 1721798
Run Date: 11/29/2017 03:03
Prep Date: 11/29/2017 03:03
Data File: 112817V6\6J236.D

Date Collected: 11/16/2017 10:13
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		41.9	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein		235	ug/L	1.50	5.00
107-13-1	Acrylonitrile		287	ug/L	1.50	5.00
107-05-1	Allyl chloride		240	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: 2018-945	Date Collected: 11/16/2017 10:13	Matrix: W
Lab Sample ID: 1203927244	Date Received: 11/18/2017 09:00	
Client Sample: QC for batch 1721798	Client: ARSL004	Project: QC
Client ID: CASA-18-147988PS	Method: SW-846:8260B	SOP Ref: GL-OA-E-038
Batch ID: 1721798	Inst: VOA6.I	Dilution: 1
Run Date: 11/29/2017 03:03	Analyst: JP1	Purge Vol: 5 mL
Prep Date: 11/29/2017 03:03		
Data File: 112817V6\6J236.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		241	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		2900	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		279	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		261	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		285	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		235	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:	2018-945	Date Collected:	11/16/2017 10:13	Matrix:	W
Lab Sample ID:	1203927244	Date Received:	11/18/2017 09:00		
Client Sample:	QC for batch 1721798	Client:	ARSL004	Project:	QC
Client ID:	CASA-18-147988PS	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1721798	Inst:	VOA6.I	Dilution:	1
Run Date:	11/29/2017 03:03	Analyst:	JP1	Purge Vol:	5 mL
Prep Date:	11/29/2017 03:03				
Data File:	112817V6\6J236.D	Column:	DB-624		

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

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	52.4	50.0	ug/L	105	(71%-134%)
Bromofluorobenzene	51.5	50.0	ug/L	103	(70%-131%)
Toluene-d8	49.7	50.0	ug/L	99	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203927245
Client Sample: QC for batch 1721798
Client ID: CASA-18-147988PSD
Batch ID: 1721798
Run Date: 11/29/2017 02:35
Prep Date: 11/29/2017 02:35
Data File: 112817V6\6J235.D

Date Collected: 11/16/2017 10:13
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		45.1	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		47.0	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		47.5	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		48.6	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		51.8	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		50.0	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		43.6	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	B	32.7	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		48.4	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	B	29.0	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		30.0	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		45.7	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		50.0	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		33.7	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		52.7	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		49.5	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		30.5	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		30.4	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		48.3	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		30.1	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		45.0	ug/L	0.300	1.00
78-93-3	2-Butanone		193	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		31.7	ug/L	0.300	1.00
591-78-6	2-Hexanone		182	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		30.0	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		29.8	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		244	ug/L	1.50	5.00
67-64-1	Acetone		159	ug/L	1.50	10.0
75-05-8	Acetonitrile		1370	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene		46.2	ug/L	0.300	1.00
108-86-1	Bromobenzene		36.3	ug/L	0.300	1.00
74-97-5	Bromochloromethane		49.9	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		49.1	ug/L	0.300	1.00
75-25-2	Bromoform		46.3	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

SDG Number: 2018-945	Date Collected: 11/16/2017 10:13	Matrix: W
Lab Sample ID: 1203927245	Date Received: 11/18/2017 09:00	
Client Sample: QC for batch 1721798	Client: ARSL004	Project: QC
Client ID: CASA-18-147988PSD	Method: SW-846:8260B	SOP Ref: GL-OA-E-038
Batch ID: 1721798	Inst: VOA6.I	Dilution: 1
Run Date: 11/29/2017 02:35	Analyst: JP1	Purge Vol: 5 mL
Prep Date: 11/29/2017 02:35		
Data File: 112817V6\6J235.D	Column: DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		50.1	ug/L	0.300	1.00
75-15-0	Carbon disulfide		236	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		46.4	ug/L	0.300	1.00
108-90-7	Chlorobenzene		38.7	ug/L	0.300	1.00
75-00-3	Chloroethane		46.7	ug/L	0.300	1.00
67-66-3	Chloroform		49.1	ug/L	0.300	1.00
74-87-3	Chloromethane		47.4	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		49.1	ug/L	0.300	1.00
74-95-3	Dibromomethane		48.8	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		50.3	ug/L	0.300	1.00
60-29-7	Ethyl ether		48.7	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		36.1	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	B	18.1	ug/L	0.300	1.00
74-88-4	Iodomethane		240	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		31.8	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		48.2	ug/L	1.00	10.0
91-20-3	Naphthalene		42.5	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		36.7	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		36.9	ug/L	0.300	1.00
108-88-3	Toluene		41.4	ug/L	0.300	1.00
79-01-6	Trichloroethylene		44.4	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		46.5	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		223	ug/L	1.50	5.00
75-01-4	Vinyl chloride		45.4	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		49.9	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		45.0	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		69.4	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5240	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		21.3	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		28.0	ug/L	0.300	1.00
95-47-6	o-Xylene		36.6	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		26.8	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

Page 3 of 3

SDG Number:	2018-945	Date Collected:	11/16/2017 10:13	Matrix:	W
Lab Sample ID:	1203927245	Date Received:	11/18/2017 09:00		
Client Sample:	QC for batch 1721798	Client:	ARSL004	Project:	QC
Client ID:	CASA-18-147988PSD	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1721798	Inst:	VOA6.I	Dilution:	1
Run Date:	11/29/2017 02:35	Analyst:	JP1	Purge Vol:	5 mL
Prep Date:	11/29/2017 02:35				
Data File:	112817V6\6J235.D	Column:	DB-624		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		51.7	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		29.9	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		49.8	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		46.0	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	51.3	50.0	ug/L	103	(71%-134%)
Bromofluorobenzene	50.7	50.0	ug/L	101	(70%-131%)
Toluene-d8	50.4	50.0	ug/L	101	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203927246
Client Sample: QC for batch 1721798
Client ID: CASA-18-147988PSD
Batch ID: 1721798
Run Date: 11/29/2017 03:32
Prep Date: 11/29/2017 03:32
Data File: 112817V6\6J237.D

Date Collected: 11/16/2017 10:13
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		42.8	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		201	ug/L	1.50	5.00
107-13-1	Acrylonitrile		260	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

SDG Number: 2018-945	Date Collected: 11/16/2017 10:13	Matrix: W
Lab Sample ID: 1203927246	Date Received: 11/18/2017 09:00	
Client Sample: QC for batch 1721798	Client: ARSL004	Project: QC
Client ID: CASA-18-147988PSD	Method: SW-846:8260B	SOP Ref: GL-OA-E-038
Batch ID: 1721798	Inst: VOA6.I	Dilution: 1
Run Date: 11/29/2017 03:32	Analyst: JP1	Purge Vol: 5 mL
Prep Date: 11/29/2017 03:32		
Data File: 112817V6\6J237.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		228	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		2540	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		254	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		240	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		253	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		238	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:	2018-945	Date Collected:	11/16/2017 10:13	Matrix:	W
Lab Sample ID:	1203927246	Date Received:	11/18/2017 09:00		
Client Sample:	QC for batch 1721798	Client:	ARSL004	Project:	QC
Client ID:	CASA-18-147988PSD	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1721798	Inst:	VOA6.I	Dilution:	1
Run Date:	11/29/2017 03:32	Analyst:	JP1	Purge Vol:	5 mL
Prep Date:	11/29/2017 03:32				
Data File:	112817V6\6J237.D	Column:	DB-624		

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

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	50.9	50.0	ug/L	102	(71%-134%)
Bromofluorobenzene	51.3	50.0	ug/L	103	(70%-131%)
Toluene-d8	49.7	50.0	ug/L	99	(74%-124%)

**Volatile
Certificate of Analysis
Sample Summary**

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203927507
Client Sample: QC for batch 1721798
Client ID: LCS for batch 1721798
Batch ID: 1721798
Run Date: 11/29/2017 00:14
Prep Date: 11/29/2017 00:14
Data File: 112817V6\6J230LA98.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		51.7	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		49.6	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		48.2	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		53.8	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		52.3	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		48.3	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	B	47.4	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		49.3	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	B	45.5	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		45.4	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		51.6	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		48.0	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		54.7	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		53.0	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		48.3	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		46.8	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		50.9	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		47.0	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		47.1	ug/L	0.300	1.00
78-93-3	2-Butanone		231	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		188	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		47.5	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		47.6	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		232	ug/L	1.50	5.00
67-64-1	Acetone		222	ug/L	1.50	10.0
75-05-8	Acetonitrile		1310	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		50.5	ug/L	0.300	1.00
108-86-1	Bromobenzene		48.1	ug/L	0.300	1.00
74-97-5	Bromochloromethane		52.4	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		52.9	ug/L	0.300	1.00
75-25-2	Bromoform		49.2	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

SDG Number: 2018-945
Lab Sample ID: 1203927507
Client Sample: QC for batch 1721798
Client ID: LCS for batch 1721798
Batch ID: 1721798
Run Date: 11/29/2017 00:14
Prep Date: 11/29/2017 00:14
Data File: 112817V6\6J230LA98.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		49.0	ug/L	0.300	1.00
75-15-0	Carbon disulfide		252	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		50.1	ug/L	0.300	1.00
108-90-7	Chlorobenzene		48.9	ug/L	0.300	1.00
75-00-3	Chloroethane		48.0	ug/L	0.300	1.00
67-66-3	Chloroform		52.0	ug/L	0.300	1.00
74-87-3	Chloromethane		48.5	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		52.5	ug/L	0.300	1.00
74-95-3	Dibromomethane		51.7	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		50.8	ug/L	0.300	1.00
60-29-7	Ethyl ether		47.9	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		48.4	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	B	46.2	ug/L	0.300	1.00
74-88-4	Iodomethane		249	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		47.2	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		50.3	ug/L	1.00	10.0
91-20-3	Naphthalene		50.2	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		49.0	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		46.9	ug/L	0.300	1.00
108-88-3	Toluene		49.0	ug/L	0.300	1.00
79-01-6	Trichloroethylene		51.6	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		46.8	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		240	ug/L	1.50	5.00
75-01-4	Vinyl chloride		46.2	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		53.1	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		50.7	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		95.5	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5080	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		45.5	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		46.4	ug/L	0.300	1.00
95-47-6	o-Xylene		48.5	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		47.5	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

Page 3 of 3

SDG Number:	2018-945	Matrix:	WATER
Lab Sample ID:	1203927507		
Client Sample:	QC for batch 1721798	Client:	ARSL004
Client ID:	LCS for batch 1721798	Method:	SW-846:8260B
Batch ID:	1721798	Inst:	VOA6.I
Run Date:	11/29/2017 00:14	Analyst:	JP1
Prep Date:	11/29/2017 00:14	Purge Vol:	5 mL
Data File:	112817V6\6J230LA98.D	Column:	DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		51.3	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		47.9	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		53.8	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		50.6	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	51.2	50.0	ug/L	102	(71%-134%)
Bromofluorobenzene	50.6	50.0	ug/L	101	(70%-131%)
Toluene-d8	50.1	50.0	ug/L	100	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203927508
Client Sample: QC for batch 1721798
Client ID: LCS for batch 1721798
Batch ID: 1721798
Run Date: 11/29/2017 01:10
Prep Date: 11/29/2017 01:10
Data File: 112817V6\6J232LA98.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		44.8	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		197	ug/L	1.50	5.00
107-13-1	Acrylonitrile		262	ug/L	1.50	5.00
107-05-1	Allyl chloride		246	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: 2018-945
Lab Sample ID: 1203927508
Client Sample: QC for batch 1721798
Client ID: LCS for batch 1721798
Batch ID: 1721798
Run Date: 11/29/2017 01:10
Prep Date: 11/29/2017 01:10
Data File: 112817V6\6J232LA98.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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		237	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		2560	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		260	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		250	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		257	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		243	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: 2018-945
Lab Sample ID: 1203927508
Client Sample: QC for batch 1721798
Client ID: LCS for batch 1721798
Batch ID: 1721798
Run Date: 11/29/2017 01:10
Prep Date: 11/29/2017 01:10
Data File: 112817V6\6J232LA98.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA6.I
Analyst: JP1

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	51.3	50.0	ug/L	103	(71%-134%)
Bromofluorobenzene	51.5	50.0	ug/L	103	(70%-131%)
Toluene-d8	49.3	50.0	ug/L	99	(74%-124%)

Semi-Volatile Analysis

Case Narrative

**GC/MS Semivolatile
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-945
Work Order #: 438300**

Method/Analysis Information

Procedure:	Analysis of Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry
Analytical Method:	SW846 3510C/8270D
Prep Method:	SW846 3510C
Analytical Batch Number:	1720610
Prep Batch Number:	1720609

Sample Analysis

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

Sample ID	Client ID
438300002	CAMO-18-148081
438300005	CAMO-18-148082
1203924158	Method Blank (MB)
1203924159	Laboratory Control Sample (LCS)
1203924160	438300002(CAMO-18-148081) Matrix Spike (MS)
1203924161	438300002(CAMO-18-148081) 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 Calibration Verification Standards (CCV) did not meet the acceptance criteria as outlined in Method 8270D for samples and the associated QC. However, the method allows for a designated number of outliers dependent on the requested analyte list. This SDG satisfied the 8270D outlier acceptance criteria. If required, a CRDL was analyzed after the CCVs to demonstrate that there is adequate sensitivity to detect the failed compounds at the applicable lower quantitation limit.

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 438300002 (CAMO-18-148081) 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 relative percent difference (RPD) between the MS and MSD (See Below) did not meet acceptance limits. As the individual MS and MSD recoveries were within the acceptance limits, the failures had no adverse impact on the reported sample data.

Sample	Analyte	Value
1203924160MS and 1203924161MSD (CAMO-18-148081)	Benzoic acid	RPD 41* (0%-30%)

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

The LCS1203924159 (LCS) was re-analyzed due to marginally low spike recoveries. The re-analysis data were reported.

Miscellaneous Information:

Manual Integrations

Manual integrations were not required on samples in this batch in this SDG for detected target analytes or surrogates.

TIC Comment

Tentatively identified compounds (TIC) were requested for samples 438300002 (CAMO-18-148081) and 438300005 (CAMO-18-148082) 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
--------------------------	-------------------	---------------------------------	----------------------	---------------------------

MSD4.I	Agilent 7890A/5975C GC/MS w/ 7683 Autosampler	HP6890/HP5973	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: 2018-945 GEL Work Order: 438300

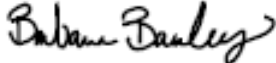
The Qualifiers in this report are defined as follows:

- * 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: 12 DEC 2017

Title: Data Validator

Sample Data Summary

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

Page 1 of 3

SDG Number: 2018-945

Lab Sample ID: 438300002

Date Collected: 11/16/2017 11:19

Date Received: 11/18/2017 09:00

Matrix: W

Client ID: CAMO-18-148081

Batch ID: 1720610

Run Date: 11/22/2017 14:07

Prep Date: 11/22/2017 11:51

Data File: s112817.B\s4k2812.D

Client: ARSL004

Method: SW846 3510C/8270D

Inst: MSD4.I

Analyst: JMB3

Aliquot: 860 mL

Column: DB-5ms

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	3.49	ug/L	3.49	11.6
120-82-1	1,2,4-Trichlorobenzene	U	3.49	ug/L	3.49	11.6
95-50-1	1,2-Dichlorobenzene	U	3.49	ug/L	3.49	11.6
122-66-7	Azobenzene	U	3.49	ug/L	3.49	11.6
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.49	ug/L	3.49	11.6
106-46-7	1,4-Dichlorobenzene	U	3.49	ug/L	3.49	11.6
123-91-1	1,4-Dioxane	U	3.49	ug/L	3.49	11.6
90-12-0	1-Methylnaphthalene	U	0.349	ug/L	0.349	1.16
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.49	ug/L	3.49	11.6
95-95-4	2,4,5-Trichlorophenol	U	3.49	ug/L	3.49	11.6
88-06-2	2,4,6-Trichlorophenol	U	3.49	ug/L	3.49	11.6
120-83-2	2,4-Dichlorophenol	U	3.49	ug/L	3.49	11.6
105-67-9	2,4-Dimethylphenol	U	3.49	ug/L	3.49	11.6
51-28-5	2,4-Dinitrophenol	U	5.81	ug/L	5.81	23.3
121-14-2	2,4-Dinitrotoluene	U	3.49	ug/L	3.49	11.6
606-20-2	2,6-Dinitrotoluene	U	3.49	ug/L	3.49	11.6
91-58-7	2-Chloronaphthalene	U	0.477	ug/L	0.477	1.16
95-57-8	2-Chlorophenol	U	3.49	ug/L	3.49	11.6
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.49	ug/L	3.49	11.6
91-57-6	2-Methylnaphthalene	U	0.349	ug/L	0.349	1.16
88-75-5	2-Nitrophenol	U	3.49	ug/L	3.49	11.6
91-94-1	3,3'-Dichlorobenzidine	U	3.49	ug/L	3.49	11.6
101-55-3	4-Bromophenylphenylether	U	3.49	ug/L	3.49	11.6
59-50-7	Parachlorometa cresol	U	3.49	ug/L	3.49	11.6
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.84	ug/L	3.84	11.6
7005-72-3	4-Chlorophenylphenylether	U	3.49	ug/L	3.49	11.6
100-02-7	4-Nitrophenol	U	3.49	ug/L	3.49	11.6
83-32-9	Acenaphthene	U	0.349	ug/L	0.349	1.16
208-96-8	Acenaphthylene	U	0.349	ug/L	0.349	1.16
62-53-3	Aniline	U	4.88	ug/L	4.88	11.6
120-12-7	Anthracene	U	0.349	ug/L	0.349	1.16
1912-24-9	Atrazine	U	3.49	ug/L	3.49	11.6
92-87-5	Benzidine	U	4.53	ug/L	4.53	11.6
56-55-3	Benzo(a)anthracene	U	0.349	ug/L	0.349	1.16
50-32-8	Benzo(a)pyrene	U	0.349	ug/L	0.349	1.16
205-99-2	Benzo(b)fluoranthene	U	0.349	ug/L	0.349	1.16
191-24-2	Benzo(ghi)perylene	U	0.349	ug/L	0.349	1.16

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

Page 2 of 3

SDG Number: 2018-945
Lab Sample ID: 438300002

Client ID: CAMO-18-148081
Batch ID: 1720610
Run Date: 11/28/2017 14:07
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2812.D

Date Collected: 11/16/2017 11:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
Aliquot: 860 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	0.349	ug/L	0.349	1.16
65-85-0	Benzoic acid	U	6.98	ug/L	6.98	23.3
100-51-6	Benzyl alcohol	U	3.49	ug/L	3.49	11.6
85-68-7	Butylbenzylphthalate	U	3.49	ug/L	3.49	11.6
218-01-9	Chrysene	U	0.349	ug/L	0.349	1.16
84-74-2	Di-n-butylphthalate	U	3.49	ug/L	3.49	11.6
117-84-0	Di-n-octylphthalate	U	3.49	ug/L	3.49	11.6
53-70-3	Dibenzo(a,h)anthracene	U	0.349	ug/L	0.349	1.16
132-64-9	Dibenzofuran	U	3.49	ug/L	3.49	11.6
84-66-2	Diethylphthalate	U	3.49	ug/L	3.49	11.6
131-11-3	Dimethylphthalate	U	3.49	ug/L	3.49	11.6
88-85-7	Dinoseb	U	3.49	ug/L	3.49	11.6
122-39-4	Diphenylamine	U	3.49	ug/L	3.49	11.6
206-44-0	Fluoranthene	U	0.349	ug/L	0.349	1.16
86-73-7	Fluorene	U	0.349	ug/L	0.349	1.16
118-74-1	Hexachlorobenzene	U	3.49	ug/L	3.49	11.6
87-68-3	Hexachlorobutadiene	U	3.49	ug/L	3.49	11.6
77-47-4	Hexachlorocyclopentadiene	U	3.49	ug/L	3.49	11.6
67-72-1	Hexachloroethane	U	3.49	ug/L	3.49	11.6
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.349	ug/L	0.349	1.16
78-59-1	Isophorone	U	4.07	ug/L	4.07	11.6
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.49	ug/L	3.49	11.6
924-16-3	N-Nitrosodi-n-butylamine	U	3.49	ug/L	3.49	11.6
55-18-5	N-Nitrosodiethylamine	U	3.49	ug/L	3.49	11.6
621-64-7	N-Nitrosodi-n-propylamine	U	3.49	ug/L	3.49	11.6
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.49	ug/L	3.49	11.6
91-20-3	Naphthalene	U	0.349	ug/L	0.349	1.16
98-95-3	Nitrobenzene	U	3.49	ug/L	3.49	11.6
608-93-5	Pentachlorobenzene	U	3.49	ug/L	3.49	11.6
87-86-5	Pentachlorophenol	U	3.49	ug/L	3.49	11.6
85-01-8	Phenanthrene	U	0.349	ug/L	0.349	1.16
108-95-2	Phenol	U	3.49	ug/L	3.49	11.6
129-00-0	Pyrene	U	0.349	ug/L	0.349	1.16
110-86-1	Pyridine	U	3.49	ug/L	3.49	11.6
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.49	ug/L	3.49	11.6
111-91-1	bis(2-Chloroethoxy)methane	U	3.49	ug/L	3.49	11.6
111-44-4	bis(2-Chloroethyl) ether	U	3.49	ug/L	3.49	11.6
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.49	ug/L	3.49	11.6

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

Page 3 of 3

SDG Number: 2018-945
Lab Sample ID: 438300002

Client ID: CAMO-18-148081
Batch ID: 1720610
Run Date: 11/28/2017 14:07
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2812.D

Date Collected: 11/16/2017 11:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
Aliquot: 860 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	4.30	ug/L	4.30	11.6
99-09-2	3-Nitroaniline	U	3.49	ug/L	3.49	11.6
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol	U	3.49	ug/L	3.49	11.6
88-74-4	2-Nitroaniline	U	3.49	ug/L	3.49	11.6
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline	U	3.49	ug/L	3.49	11.6
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	61.1	116	ug/L	53	(32%-124%)
2-Fluorobiphenyl	27.0	58.1	ug/L	46	(32%-112%)
2-Fluorophenol	42.1	116	ug/L	36	(15%-88%)
Nitrobenzene-d5	29.1	58.1	ug/L	50	(36%-115%)
Phenol-d5	28.5	116	ug/L	25	(15%-91%)
p-Terphenyl-d14	31.5	58.1	ug/L	54	(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**

Page 1 of 3

SDG Number: 2018-945

Lab Sample ID: 438300005

Date Collected: 11/16/2017 14:19

Date Received: 11/18/2017 09:00

Matrix: W

Client ID: CAMO-18-148082

Batch ID: 1720610

Run Date: 11/22/2017 15:32

Prep Date: 11/22/2017 11:51

Data File: s112817.B\s4k2815.D

Client: ARSL004

Method: SW846 3510C/8270D

Inst: MSD4.I

Analyst: JMB3

Aliquot: 930 mL

Column: DB-5ms

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	3.23	ug/L	3.23	10.8
120-82-1	1,2,4-Trichlorobenzene	U	3.23	ug/L	3.23	10.8
95-50-1	1,2-Dichlorobenzene	U	3.23	ug/L	3.23	10.8
122-66-7	Azobenzene	U	3.23	ug/L	3.23	10.8
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.23	ug/L	3.23	10.8
106-46-7	1,4-Dichlorobenzene	U	3.23	ug/L	3.23	10.8
123-91-1	1,4-Dioxane	U	3.23	ug/L	3.23	10.8
90-12-0	1-Methylnaphthalene	U	0.323	ug/L	0.323	1.08
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.23	ug/L	3.23	10.8
95-95-4	2,4,5-Trichlorophenol	U	3.23	ug/L	3.23	10.8
88-06-2	2,4,6-Trichlorophenol	U	3.23	ug/L	3.23	10.8
120-83-2	2,4-Dichlorophenol	U	3.23	ug/L	3.23	10.8
105-67-9	2,4-Dimethylphenol	U	3.23	ug/L	3.23	10.8
51-28-5	2,4-Dinitrophenol	U	5.38	ug/L	5.38	21.5
121-14-2	2,4-Dinitrotoluene	U	3.23	ug/L	3.23	10.8
606-20-2	2,6-Dinitrotoluene	U	3.23	ug/L	3.23	10.8
91-58-7	2-Chloronaphthalene	U	0.441	ug/L	0.441	1.08
95-57-8	2-Chlorophenol	U	3.23	ug/L	3.23	10.8
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.23	ug/L	3.23	10.8
91-57-6	2-Methylnaphthalene	U	0.323	ug/L	0.323	1.08
88-75-5	2-Nitrophenol	U	3.23	ug/L	3.23	10.8
91-94-1	3,3'-Dichlorobenzidine	U	3.23	ug/L	3.23	10.8
101-55-3	4-Bromophenylphenylether	U	3.23	ug/L	3.23	10.8
59-50-7	Parachlorometa cresol	U	3.23	ug/L	3.23	10.8
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.55	ug/L	3.55	10.8
7005-72-3	4-Chlorophenylphenylether	U	3.23	ug/L	3.23	10.8
100-02-7	4-Nitrophenol	U	3.23	ug/L	3.23	10.8
83-32-9	Acenaphthene	U	0.323	ug/L	0.323	1.08
208-96-8	Acenaphthylene	U	0.323	ug/L	0.323	1.08
62-53-3	Aniline	U	4.52	ug/L	4.52	10.8
120-12-7	Anthracene	U	0.323	ug/L	0.323	1.08
1912-24-9	Atrazine	U	3.23	ug/L	3.23	10.8
92-87-5	Benzidine	U	4.19	ug/L	4.19	10.8
56-55-3	Benzo(a)anthracene	U	0.323	ug/L	0.323	1.08
50-32-8	Benzo(a)pyrene	U	0.323	ug/L	0.323	1.08
205-99-2	Benzo(b)fluoranthene	U	0.323	ug/L	0.323	1.08
191-24-2	Benzo(ghi)perylene	U	0.323	ug/L	0.323	1.08

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

Page 2 of 3

SDG Number: 2018-945
Lab Sample ID: 438300005

Client ID: CAMO-18-148082
Batch ID: 1720610
Run Date: 11/28/2017 15:32
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2815.D

Date Collected: 11/16/2017 14:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
Aliquot: 930 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	0.323	ug/L	0.323	1.08
65-85-0	Benzoic acid	U	6.45	ug/L	6.45	21.5
100-51-6	Benzyl alcohol	U	3.23	ug/L	3.23	10.8
85-68-7	Butylbenzylphthalate	U	3.23	ug/L	3.23	10.8
218-01-9	Chrysene	U	0.323	ug/L	0.323	1.08
84-74-2	Di-n-butylphthalate	U	3.23	ug/L	3.23	10.8
117-84-0	Di-n-octylphthalate	U	3.23	ug/L	3.23	10.8
53-70-3	Dibenzo(a,h)anthracene	U	0.323	ug/L	0.323	1.08
132-64-9	Dibenzofuran	U	3.23	ug/L	3.23	10.8
84-66-2	Diethylphthalate	U	3.23	ug/L	3.23	10.8
131-11-3	Dimethylphthalate	U	3.23	ug/L	3.23	10.8
88-85-7	Dinoseb	U	3.23	ug/L	3.23	10.8
122-39-4	Diphenylamine	U	3.23	ug/L	3.23	10.8
206-44-0	Fluoranthene	U	0.323	ug/L	0.323	1.08
86-73-7	Fluorene	U	0.323	ug/L	0.323	1.08
118-74-1	Hexachlorobenzene	U	3.23	ug/L	3.23	10.8
87-68-3	Hexachlorobutadiene	U	3.23	ug/L	3.23	10.8
77-47-4	Hexachlorocyclopentadiene	U	3.23	ug/L	3.23	10.8
67-72-1	Hexachloroethane	U	3.23	ug/L	3.23	10.8
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.323	ug/L	0.323	1.08
78-59-1	Isophorone	U	3.76	ug/L	3.76	10.8
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.23	ug/L	3.23	10.8
924-16-3	N-Nitrosodi-n-butylamine	U	3.23	ug/L	3.23	10.8
55-18-5	N-Nitrosodiethylamine	U	3.23	ug/L	3.23	10.8
621-64-7	N-Nitrosodi-n-propylamine	U	3.23	ug/L	3.23	10.8
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.23	ug/L	3.23	10.8
91-20-3	Naphthalene	U	0.323	ug/L	0.323	1.08
98-95-3	Nitrobenzene	U	3.23	ug/L	3.23	10.8
608-93-5	Pentachlorobenzene	U	3.23	ug/L	3.23	10.8
87-86-5	Pentachlorophenol	U	3.23	ug/L	3.23	10.8
85-01-8	Phenanthrene	U	0.323	ug/L	0.323	1.08
108-95-2	Phenol	U	3.23	ug/L	3.23	10.8
129-00-0	Pyrene	U	0.323	ug/L	0.323	1.08
110-86-1	Pyridine	U	3.23	ug/L	3.23	10.8
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.23	ug/L	3.23	10.8
111-91-1	bis(2-Chloroethoxy)methane	U	3.23	ug/L	3.23	10.8
111-44-4	bis(2-Chloroethyl) ether	U	3.23	ug/L	3.23	10.8
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.23	ug/L	3.23	10.8

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

Page 3 of 3

SDG Number: 2018-945
Lab Sample ID: 438300005

Client ID: CAMO-18-148082
Batch ID: 1720610
Run Date: 11/28/2017 15:32
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2815.D

Date Collected: 11/16/2017 14:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
Aliquot: 930 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	3.98	ug/L	3.98	10.8
99-09-2	3-Nitroaniline	U	3.23	ug/L	3.23	10.8
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol	U	3.23	ug/L	3.23	10.8
88-74-4	2-Nitroaniline	U	3.23	ug/L	3.23	10.8
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline	U	3.23	ug/L	3.23	10.8
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	54.0	108	ug/L	50	(32%-124%)
2-Fluorobiphenyl	24.0	53.8	ug/L	45	(32%-112%)
2-Fluorophenol	36.4	108	ug/L	34	(15%-88%)
Nitrobenzene-d5	24.6	53.8	ug/L	46	(36%-115%)
Phenol-d5	23.2	108	ug/L	22	(15%-91%)
p-Terphenyl-d14	34.5	53.8	ug/L	64	(36%-121%)

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

Semi-Volatile
Surrogate Recovery Report

Page 1 of 1

SDG Number: 2018-945**Matrix Type: LIQUID**

Sample ID	Client ID	2FP %REC	PHL %REC	NBZ %REC	FBP %REC	TBP %REC	TPH %REC
1203924158	MB for batch 1720609	43	27	65	64	70	73
438300002	CAMO-18-148081	36	25	50	46	53	54
1203924160	CAMO-18-148081MS	48	36	52	52	67	58
1203924161	CAMO-18-148081MSD	43	32	49	47	61	66
438300005	CAMO-18-148082	34	22	46	45	50	64
1203924159	LCS for batch 1720609	54	44	65	66	80	74

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

Page 1 of 4

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720609

Matrix: WATER

Lab Sample ID 1203924159

Instrument: MSD4.I

Analysis Date: 11/28/2017 21:23

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

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	26.0	52	30-88
110-86-1	LCS Pyridine	50.0	0.0	24.7	49	27-89
62-53-3	LCS Aniline	50.0	0.0	35.0	70	49-112
108-95-2	LCS Phenol	50.0	0.0	20.0	40	16-82
111-44-4	LCS bis(2-Chloroethyl) ether	50.0	0.0	36.8	74	51-111
95-57-8	LCS 2-Chlorophenol	50.0	0.0	34.6	69	49-105
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	31.7	63	37-95
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	31.6	63	38-96
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	32.8	66	39-97
108-60-1	LCS bis(2-Chloro-1-methylethyl)ether	50.0	0.0	35.6	71	44-123
100-51-6	LCS Benzyl alcohol	50.0	0.0	32.2	64	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	34.1	68	43-102
621-64-7	LCS N-Nitrosodi--n-propylamine <i>N-Nitrosodipropylamine</i>	50.0	0.0	36.6	73	54-115
67-72-1	LCS Hexachloroethane	50.0	0.0	30.5	61	36-96
98-95-3	LCS Nitrobenzene	50.0	0.0	32.7	65	53-115
78-59-1	LCS Isophorone	50.0	0.0	34.1	68	56-117
88-75-5	LCS 2-Nitrophenol	50.0	0.0	34.5	69	51-113
105-67-9	LCS 2,4-Dimethylphenol	50.0	0.0	28.9	58	51-104
111-91-1	LCS bis(2-Chloroethoxy)methane	50.0	0.0	34.7	69	55-114
120-83-2	LCS 2,4-Dichlorophenol	50.0	0.0	36.9	74	53-109
65-85-0	LCS Benzoic acid	100	0.0	27.7	28	21-74

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 4

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720609

Matrix: WATER

Lab Sample ID 1203924159

Instrument: MSD4.I

Analysis Date: 11/28/2017 21:23

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

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	42.6	85	65-136
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	31.5	63	35-98
59-50-7	LCS Parachlorometa cresol 4-Chloro-3-methylphenol	50.0	0.0	37.1	74	55-115
91-57-6	LCS 2-Methylnaphthalene	50.0	0.0	31.7	63	42-103
91-20-3	LCS Naphthalene	50.0	0.0	31.8	64	44-102
90-12-0	LCS 1-Methylnaphthalene	50.0	0.0	32.7	65	45-108
77-47-4	LCS Hexachlorocyclopentadiene	50.0	0.0	20.5	41	34-89
88-06-2	LCS 2,4,6-Trichlorophenol	50.0	0.0	36.4	73	55-120
95-95-4	LCS 2,4,5-Trichlorophenol	50.0	0.0	37.3	75	55-116
91-58-7	LCS 2-Chloronaphthalene	50.0	0.0	33.4	67	44-107
88-74-4	LCS 2-Nitroaniline o-Nitroaniline	50.0	0.0	35.4	71	53-121
99-09-2	LCS 3-Nitroaniline m-Nitroaniline	50.0	0.0	44.7	89	61-139
131-11-3	LCS Dimethylphthalate	50.0	0.0	41.4	83	60-122
606-20-2	LCS 2,6-Dinitrotoluene	50.0	0.0	39.2	78	59-122
121-14-2	LCS 2,4-Dinitrotoluene	50.0	0.0	40.4	81	57-124
208-96-8	LCS Acenaphthylene	50.0	0.0	35.2	70	50-113
83-32-9	LCS Acenaphthene	50.0	0.0	37.7	75	49-112
51-28-5	LCS 2,4-Dinitrophenol	50.0	0.0	21.4	43	34-122
132-64-9	LCS Dibenzofuran	50.0	0.0	36.3	73	50-111
58-90-2	LCS 2,3,4,6-Tetrachlorophenol	50.0	0.0	37.7	75	54-122
84-66-2	LCS Diethylphthalate	50.0	0.0	42.0	84	57-122
100-02-7	LCS 4-Nitrophenol	50.0	0.0	21.0	42	15-137

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 3 of 4

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720609

Matrix: WATER

Lab Sample ID 1203924159

Instrument: MSD4.I

Analysis Date: 11/28/2017 21:23

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

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	36.9	74	52-114
7005-72-3	LCS 4-Chlorophenylphenylether	50.0	0.0	41.3	83	52-121
100-01-6	LCS 4-Nitroaniline	50.0	0.0	44.1	88	44-137
534-52-1	LCS 2-Methyl-4,6-dinitrophenol	50.0	0.0	34.3	69	45-124
122-39-4	LCS Diphenylamine	50.0	0.0	39.0	78	55-113
122-66-7	LCS Azobenzene	50.0	0.0	36.5	73	53-115
101-55-3	LCS 4-Bromophenylphenylether	50.0	0.0	41.7	83	54-116
118-74-1	LCS Hexachlorobenzene	50.0	0.0	41.5	83	54-115
87-86-5	LCS Pentachlorophenol	50.0	0.0	39.0	78	41-116
85-01-8	LCS Phenanthrene	50.0	0.0	39.8	80	55-110
120-12-7	LCS Anthracene	50.0	0.0	40.2	80	56-112
84-74-2	LCS Di-n-butylphthalate	50.0	0.0	44.2	88	57-123
206-44-0	LCS Fluoranthene	50.0	0.0	44.5	89	54-118
129-00-0	LCS Pyrene	50.0	0.0	32.1	64	49-121
85-68-7	LCS Butylbenzylphthalate	50.0	0.0	35.3	71	52-125
117-81-7	LCS bis(2-Ethylhexyl)phthalate	50.0	0.0	37.2	74	52-125
56-55-3	LCS Benzo(a)anthracene	50.0	0.0	41.4	83	57-112
218-01-9	LCS Chrysene	50.0	0.0	43.3	87	58-117
117-84-0	LCS Di-n-octylphthalate	50.0	0.0	40.0	80	50-129
205-99-2	LCS Benzo(b)fluoranthene	50.0	0.0	39.0	78	41-118
207-08-9	LCS Benzo(k)fluoranthene	50.0	0.0	40.6	81	42-121
50-32-8	LCS Benzo(a)pyrene	50.0	0.0	40.5	81	40-118

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 4 of 4

SDG Number: 2018-945

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720609

Matrix: WATER

Lab Sample ID 1203924159

Instrument: MSD4.I

Analysis Date: 11/28/2017 21:23

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

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	48.0	96	34-125
53-70-3	LCS Dibenzo(a,h)anthracene	50.0	0.0	48.0	96	38-129
191-24-2	LCS Benzo(ghi)perylene	50.0	0.0	45.7	91	33-131
123-91-1	LCS 1,4-Dioxane	50.0	0.0	21.9	44	38-78
930-55-2	LCS N-Nitrosopyrrolidine	50.0	0.0	39.5	79	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	47.1	94	60-131
92-87-5	LCS Benzidine	100	0.0	59.6	60	20-144
91-94-1	LCS 3,3'-Dichlorobenzidine	50.0	0.0	46.1	92	43-127
120-82-1	LCS 1,2,4-Trichlorobenzene	50.0	0.0	33.4	67	39-99

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 8

SDG Number: 2018-945

Client ID: CAMO-18-148081MS

Lab Sample ID 1203924160

Instrument: MSD4.I

Analyst: JMB3

Inj. Vol: 1 uL

Sample Type: Matrix Spike

Matrix: W

Analysis Date: 11/28/2017 14:35

Dilution: 1

Prep Batch ID: 1720609

Batch ID: 1720610

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	100	0.00 U	47.6	48	25-106
110-86-1	MS Pyridine	100	0.00 U	48.4	48	24-93
62-53-3	MS Aniline	100	0.00 U	65.2	65	37-113
108-95-2	MS Phenol	100	0.00 U	35.3	35	23-82
111-44-4	MS bis(2-Chloroethyl) ether	100	0.00 U	56.3	56	39-114
95-57-8	MS 2-Chlorophenol	100	0.00 U	54.3	54	37-108
541-73-1	MS 1,3-Dichlorobenzene	100	0.00 U	43.8	44	27-97
106-46-7	MS 1,4-Dichlorobenzene	100	0.00 U	43.7	44	28-97
95-50-1	MS 1,2-Dichlorobenzene	100	0.00 U	45.3	45	28-99
108-60-1	MS bis(2-Chloro-1-methylethyl)ether	100	0.00 U	54.2	54	32-127
100-51-6	MS Benzyl alcohol	100	0.00 U	58.9	59	37-116
95-48-7	MS o-Cresol	100	0.00 U	54.9	55	34-109
65794-96-9	MS m,p-Cresols	100	0.00 U	60.2	60	36-120
621-64-7	MS N-Nitrosodi--n-propylamine <i>N-Nitrosodipropylamine</i>	100	0.00 U	58.2	58	42-118
67-72-1	MS Hexachloroethane	100	0.00 U	41.2	41	29-94
98-95-3	MS Nitrobenzene	100	0.00 U	52.4	52	38-123
78-59-1	MS Isophorone	100	0.00 U	56.1	56	43-120
88-75-5	MS 2-Nitrophenol	100	0.00 U	56.8	57	39-115
105-67-9	MS 2,4-Dimethylphenol	100	0.00 U	47.5	48	39-107
111-91-1	MS bis(2-Chloroethoxy)methane	100	0.00 U	56.7	57	42-118
120-83-2	MS 2,4-Dichlorophenol	100	0.00 U	59.4	59	40-111
65-85-0	MS Benzoic acid	200	0.00 U	90.7	45	17-95

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 8

SDG Number: 2018-945

Sample Type: Matrix Spike

Client ID: CAMO-18-148081MS

Matrix: W

Lab Sample ID 1203924160

Instrument: MSD4.I

Analysis Date: 11/28/2017 14:35

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
106-47-8	MS 4-Chloroaniline	100	0.00 U	85.5	85	44-138
87-68-3	MS Hexachlorobutadiene	100	0.00 U	43.0	43	26-98
59-50-7	MS Parachlorometa cresol 4-Chloro-3-methylphenol	100	0.00 U	63.9	64	41-122
91-57-6	MS 2-Methylnaphthalene	100	0.00 U	48.0	48	29-109
91-20-3	MS Naphthalene	100	0.00 U	46.0	46	31-108
90-12-0	MS 1-Methylnaphthalene	100	0.00 U	49.2	49	33-112
77-47-4	MS Hexachlorocyclopentadiene	100	0.00 U	33.0	33	26-79
88-06-2	MS 2,4,6-Trichlorophenol	100	0.00 U	58.5	58	39-124
95-95-4	MS 2,4,5-Trichlorophenol	100	0.00 U	61.2	61	42-120
91-58-7	MS 2-Chloronaphthalene	100	0.00 U	49.6	50	29-113
88-74-4	MS 2-Nitroaniline o-Nitroaniline	100	0.00 U	61.0	61	41-121
99-09-2	MS 3-Nitroaniline m-Nitroaniline	100	0.00 U	88.1	88	42-144
131-11-3	MS Dimethylphthalate	100	0.00 U	67.7	68	45-128
606-20-2	MS 2,6-Dinitrotoluene	100	0.00 U	63.9	64	46-124
121-14-2	MS 2,4-Dinitrotoluene	100	0.00 U	70.0	70	45-125
208-96-8	MS Acenaphthylene	100	0.00 U	53.8	54	35-120
83-32-9	MS Acenaphthene	100	0.00 U	58.5	59	35-117
51-28-5	MS 2,4-Dinitrophenol	100	0.00 U	58.9	59	27-122
132-64-9	MS Dibenzofuran	100	0.00 U	57.8	58	38-113
58-90-2	MS 2,3,4,6-Tetrachlorophenol	100	0.00 U	65.0	65	40-128
84-66-2	MS Diethylphthalate	100	0.00 U	69.5	70	43-127
100-02-7	MS 4-Nitrophenol	100	0.00 U	45.4	45	17-85

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 3 of 8

SDG Number: 2018-945

Sample Type: Matrix Spike

Client ID: CAMO-18-148081MS

Matrix: W

Lab Sample ID 1203924160

Instrument: MSD4.I

Analysis Date: 11/28/2017 14:35

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
86-73-7	MS Fluorene	100	0.00 U	59.8	60	39-117
7005-72-3	MS 4-Chlorophenylphenylether	100	0.00 U	65.2	65	39-121
100-01-6	MS 4-Nitroaniline	100	0.00 U	85.6	86	30-133
534-52-1	MS 2-Methyl-4,6-dinitrophenol	100	0.00 U	73.2	73	32-126
122-39-4	MS Diphenylamine	100	0.00 U	60.0	60	37-118
122-66-7	MS Azobenzene	100	0.00 U	56.1	56	38-120
101-55-3	MS 4-Bromophenylphenylether	100	0.00 U	62.5	63	39-121
118-74-1	MS Hexachlorobenzene	100	0.00 U	62.9	63	40-118
87-86-5	MS Pentachlorophenol	100	0.00 U	72.3	72	35-121
85-01-8	MS Phenanthrene	100	0.00 U	63.5	64	40-115
120-12-7	MS Anthracene	100	0.00 U	64.5	64	38-120
84-74-2	MS Di-n-butylphthalate	100	0.00 U	70.4	70	41-128
206-44-0	MS Fluoranthene	100	0.00 U	75.8	76	41-119
129-00-0	MS Pyrene	100	0.00 U	49.5	50	35-128
85-68-7	MS Butylbenzylphthalate	100	0.00 U	56.7	57	40-129
117-81-7	MS bis(2-Ethylhexyl)phthalate	100	0.00 U	59.7	60	38-131
56-55-3	MS Benzo(a)anthracene	100	0.00 U	66.1	66	39-120
218-01-9	MS Chrysene	100	0.00 U	68.0	68	41-124
117-84-0	MS Di-n-octylphthalate	100	0.00 U	63.8	64	37-134
205-99-2	MS Benzo(b)fluoranthene	100	0.00 U	67.8	68	31-122
207-08-9	MS Benzo(k)fluoranthene	100	0.00 U	70.6	71	33-123
50-32-8	MS Benzo(a)pyrene	100	0.00 U	64.6	65	32-118

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 4 of 8

SDG Number: 2018-945

Sample Type: Matrix Spike

Client ID: CAMO-18-148081MS

Matrix: W

Lab Sample ID 1203924160

Instrument: MSD4.I

Analysis Date: 11/28/2017 14:35

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

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	100	0.00 U	58.1	58	27-121
53-70-3	MS Dibenzo(a,h)anthracene	100	0.00 U	59.9	60	30-125
191-24-2	MS Benzo(ghi)perylene	100	0.00 U	54.6	55	24-126
123-91-1	MS 1,4-Dioxane	100	0.00 U	50.1	50	24-110
930-55-2	MS N-Nitrosopyrrolidine	100	0.00 U	66.0	66	47-119
95-94-3	MS 1,2,4,5-Tetrachlorobenzene	100	0.00 U	50.7	51	32-101
1912-24-9	MS Atrazine	100	0.00 U	75.1	75	42-129
92-87-5	MS Benzidine	200	0.00 U	130	65	15-130
91-94-1	MS 3,3'-Dichlorobenzidine	100	0.00 U	77.1	77	34-124
120-82-1	MS 1,2,4-Trichlorobenzene	100	0.00 U	46.9	47	26-102

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 5 of 8

SDG Number: 2018-945

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148081MSD

Matrix: W

Lab Sample ID 1203924161

Instrument: MSD4.I

Analysis Date: 11/28/2017 15:04

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

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	100	0.00	U	43.6	44	25-106	9	0-30
110-86-1	MSD Pyridine	100	0.00	U	51.9	52	24-93	7	0-30
62-53-3	MSD Aniline	100	0.00	U	59.1	59	37-113	10	0-30
108-95-2	MSD Phenol	100	0.00	U	32.2	32	23-82	9	0-30
111-44-4	MSD bis(2-Chloroethyl) ether	100	0.00	U	51.9	52	39-114	8	0-30
95-57-8	MSD 2-Chlorophenol	100	0.00	U	51.1	51	37-108	6	0-30
541-73-1	MSD 1,3-Dichlorobenzene	100	0.00	U	41.6	42	27-97	5	0-30
106-46-7	MSD 1,4-Dichlorobenzene	100	0.00	U	41.4	41	28-97	5	0-30
95-50-1	MSD 1,2-Dichlorobenzene	100	0.00	U	42.7	43	28-99	6	0-30
108-60-1	MSD bis(2-Chloro-1-methylethyl)ether	100	0.00	U	49.8	50	32-127	8	0-30
100-51-6	MSD Benzyl alcohol	100	0.00	U	54.6	55	37-116	8	0-30
95-48-7	MSD o-Cresol	100	0.00	U	51.2	51	34-109	7	0-30
65794-96-9	MSD m,p-Cresols	100	0.00	U	55.1	55	36-120	9	0-30
621-64-7	MSD N-Nitrosodi--n-propylamine N-Nitrosodipropylamine	100	0.00	U	53.1	53	42-118	9	0-30
67-72-1	MSD Hexachloroethane	100	0.00	U	40.0	40	29-94	3	0-30
98-95-3	MSD Nitrobenzene	100	0.00	U	49.8	50	38-123	5	0-30
78-59-1	MSD Isophorone	100	0.00	U	52.4	52	43-120	7	0-30
88-75-5	MSD 2-Nitrophenol	100	0.00	U	54.8	55	39-115	4	0-30
105-67-9	MSD 2,4-Dimethylphenol	100	0.00	U	47.8	48	39-107	1	0-30
111-91-1	MSD bis(2-Chloroethoxy)methane	100	0.00	U	54.2	54	42-118	5	0-30
120-83-2	MSD 2,4-Dichlorophenol	100	0.00	U	57.2	57	40-111	4	0-30
65-85-0	MSD Benzoic acid	200	0.00	U	59.6	30	17-95	41 *	0-30

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 6 of 8

SDG Number: 2018-945

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148081MSD

Matrix: W

Lab Sample ID 1203924161

Instrument: MSD4.I

Analysis Date: 11/28/2017 15:04

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

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	100	0.00	U 78.6	79	44-138	8	0-30
87-68-3	MSD Hexachlorobutadiene	100	0.00	U 42.7	43	26-98	1	0-30
59-50-7	MSD Parachlorometa cresol 4-Chloro-3-methylphenol	100	0.00	U 59.0	59	41-122	8	0-30
91-57-6	MSD 2-Methylnaphthalene	100	0.00	U 45.3	45	29-109	6	0-30
91-20-3	MSD Naphthalene	100	0.00	U 43.9	44	31-108	5	0-30
90-12-0	MSD 1-Methylnaphthalene	100	0.00	U 47.0	47	33-112	5	0-30
77-47-4	MSD Hexachlorocyclopentadiene	100	0.00	U 33.7	34	26-79	2	0-30
88-06-2	MSD 2,4,6-Trichlorophenol	100	0.00	U 53.2	53	39-124	9	0-30
95-95-4	MSD 2,4,5-Trichlorophenol	100	0.00	U 57.1	57	42-120	7	0-30
91-58-7	MSD 2-Chloronaphthalene	100	0.00	U 47.3	47	29-113	5	0-30
88-74-4	MSD 2-Nitroaniline o-Nitroaniline	100	0.00	U 55.2	55	41-121	10	0-30
99-09-2	MSD 3-Nitroaniline m-Nitroaniline	100	0.00	U 82.1	82	42-144	7	0-30
131-11-3	MSD Dimethylphthalate	100	0.00	U 60.4	60	45-128	11	0-30
606-20-2	MSD 2,6-Dinitrotoluene	100	0.00	U 57.0	57	46-124	11	0-30
121-14-2	MSD 2,4-Dinitrotoluene	100	0.00	U 62.9	63	45-125	11	0-30
208-96-8	MSD Acenaphthylene	100	0.00	U 49.7	50	35-120	8	0-30
83-32-9	MSD Acenaphthene	100	0.00	U 53.2	53	35-117	9	0-30
51-28-5	MSD 2,4-Dinitrophenol	100	0.00	U 55.5	56	27-122	6	0-30
132-64-9	MSD Dibenzofuran	100	0.00	U 52.4	52	38-113	10	0-30
58-90-2	MSD 2,3,4,6-Tetrachlorophenol	100	0.00	U 59.2	59	40-128	9	0-30
84-66-2	MSD Diethylphthalate	100	0.00	U 61.7	62	43-127	12	0-30
100-02-7	MSD 4-Nitrophenol	100	0.00	U 41.4	41	17-85	9	0-30

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 7 of 8

SDG Number: 2018-945

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148081MSD

Matrix: W

Lab Sample ID 1203924161

Instrument: MSD4.I

Analysis Date: 11/28/2017 15:04

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

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	100	0.00	U 53.8	54	39-117	11	0-30
7005-72-3	MSD 4-Chlorophenylphenylether	100	0.00	U 58.4	58	39-121	11	0-30
100-01-6	MSD 4-Nitroaniline <i>p</i> -Nitroaniline	100	0.00	U 78.8	79	30-133	8	0-30
534-52-1	MSD 2-Methyl-4,6-dinitrophenol	100	0.00	U 66.9	67	32-126	9	0-30
122-39-4	MSD Diphenylamine	100	0.00	U 53.8	54	37-118	11	0-30
122-66-7	MSD Azobenzene <i>1,2-Diphenylhydrazine</i>	100	0.00	U 49.8	50	38-120	12	0-30
101-55-3	MSD 4-Bromophenylphenylether	100	0.00	U 55.8	56	39-121	11	0-30
118-74-1	MSD Hexachlorobenzene	100	0.00	U 55.8	56	40-118	12	0-30
87-86-5	MSD Pentachlorophenol	100	0.00	U 68.3	68	35-121	6	0-30
85-01-8	MSD Phenanthrene	100	0.00	U 57.1	57	40-115	11	0-30
120-12-7	MSD Anthracene	100	0.00	U 58.9	59	38-120	9	0-30
84-74-2	MSD Di-n-butylphthalate	100	0.00	U 62.7	63	41-128	12	0-30
206-44-0	MSD Fluoranthene	100	0.00	U 65.7	66	41-119	14	0-30
129-00-0	MSD Pyrene	100	0.00	U 59.2	59	35-128	18	0-30
85-68-7	MSD Butylbenzylphthalate	100	0.00	U 59.9	60	40-129	5	0-30
117-81-7	MSD bis(2-Ethylhexyl)phthalate	100	0.00	U 61.2	61	38-131	3	0-30
56-55-3	MSD Benzo(a)anthracene	100	0.00	U 61.2	61	39-120	8	0-30
218-01-9	MSD Chrysene	100	0.00	U 61.8	62	41-124	9	0-30
117-84-0	MSD Di-n-octylphthalate	100	0.00	U 49.5	50	37-134	25	0-30
205-99-2	MSD Benzo(b)fluoranthene	100	0.00	U 63.5	64	31-122	6	0-30
207-08-9	MSD Benzo(k)fluoranthene	100	0.00	U 64.8	65	33-123	9	0-30
50-32-8	MSD Benzo(a)pyrene	100	0.00	U 59.1	59	32-118	9	0-30

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 8 of 8

SDG Number: 2018-945

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148081MSD

Matrix: W

Lab Sample ID 1203924161

Instrument: MSD4.I

Analysis Date: 11/28/2017 15:04

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1720609

Inj. Vol: 1 uL

Batch ID: 1720610

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	100	0.00	U 56.1	56	27-121	3	0-30
53-70-3	MSD Dibenzo(a,h)anthracene	100	0.00	U 58.6	59	30-125	2	0-30
191-24-2	MSD Benzo(ghi)perylene	100	0.00	U 52.9	53	24-126	3	0-30
123-91-1	MSD 1,4-Dioxane	100	0.00	U 46.7	47	24-110	7	0-30
930-55-2	MSD N-Nitrosopyrrolidine	100	0.00	U 58.6	59	47-119	12	0-30
95-94-3	MSD 1,2,4,5-Tetrachlorobenzene	100	0.00	U 48.2	48	32-101	5	0-30
1912-24-9	MSD Atrazine	100	0.00	U 68.1	68	42-129	10	0-30
92-87-5	MSD Benzidine	200	0.00	U 143	72	15-130	10	0-30
91-94-1	MSD 3,3'-Dichlorobenzidine	100	0.00	U 60.9	61	34-124	24	0-30
120-82-1	MSD 1,2,4-Trichlorobenzene	100	0.00	U 45.2	45	26-102	4	0-30

Method Blank Summary

Page 1 of 1

SDG Number:	2018-945	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1720609	Instrument ID:	MSD4.I	Data File:	s112817.B\s4k2810.D
Lab Sample ID:	1203924158	Prep Date:	11/22/2017 11:51	Analyzed:	11/28/17 13:10
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 CAMO-18-148081	438300002	s112817.B\s4k2812.D	11/28/17	1407
02 CAMO-18-148081MS	1203924160	s112817.B\s4k2813.D	11/28/17	1435
03 CAMO-18-148081MSD	1203924161	s112817.B\s4k2814.D	11/28/17	1504
04 CAMO-18-148082	438300005	s112817.B\s4k2815.D	11/28/17	1532
05 LCS for batch 1720609	1203924159	s112817.B\s4k2825.D	11/28/17	2123

Quality Control Data

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

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203924158
Client Sample: QC for batch 1720609
Client ID: MB for batch 1720609
Batch ID: 1720610
Run Date: 11/28/2017 13:10
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2810.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
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**

Page 2 of 3

SDG Number: 2018-945

Lab Sample ID: 1203924158

Client Sample: QC for batch 1720609

Client ID: MB for batch 1720609

Batch ID: 1720610

Run Date: 11/28/2017 13:10

Prep Date: 11/22/2017 11:51

Data File: s112817.B\s4k2810.D

Client: ARSL004

Method: SW846 3510C/8270D

Inst: MSD4.I

Analyst: JMB3

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
Certificate of Analysis
Sample Summary**

Page 3 of 3

SDG Number: 2018-945	Matrix: WATER
Lab Sample ID: 1203924158	
Client Sample: QC for batch 1720609	Client: ARSL004
Client ID: MB for batch 1720609	Method: SW846 3510C/8270D
Batch ID: 1720610	Inst: MSD4.I
Run Date: 11/28/2017 13:10	Analyst: JMB3
Prep Date: 11/22/2017 11:51	Aliquot: 1000 mL
Data File: s112817.B\s4k2810.D	Column: DB-5ms
	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
	<i>m-Nitroaniline</i>					
95-48-7	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
	<i>o-Nitroaniline</i>					
100-01-6	4-Nitroaniline	U	3.00	ug/L	3.00	10.0
	<i>p-Nitroaniline</i>					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	69.5	100	ug/L	70	(32%-124%)
2-Fluorobiphenyl	31.9	50.0	ug/L	64	(32%-112%)
2-Fluorophenol	43.0	100	ug/L	43	(15%-88%)
Nitrobenzene-d5	32.7	50.0	ug/L	65	(36%-115%)
Phenol-d5	26.6	100	ug/L	27	(15%-91%)
p-Terphenyl-d14	36.3	50.0	ug/L	73	(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**

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203924159
Client Sample: QC for batch 1720609
Client ID: LCS for batch 1720609
Batch ID: 1720610
Run Date: 11/28/2017 21:23
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2825.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
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		33.4	ug/L	3.00	10.0
95-50-1	1,2-Dichlorobenzene		32.8	ug/L	3.00	10.0
122-66-7	Azobenzene		36.5	ug/L	3.00	10.0
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		31.7	ug/L	3.00	10.0
106-46-7	1,4-Dichlorobenzene		31.6	ug/L	3.00	10.0
123-91-1	1,4-Dioxane		21.9	ug/L	3.00	10.0
90-12-0	1-Methylnaphthalene		32.7	ug/L	0.300	1.00
58-90-2	2,3,4,6-Tetrachlorophenol		37.7	ug/L	3.00	10.0
95-95-4	2,4,5-Trichlorophenol		37.3	ug/L	3.00	10.0
88-06-2	2,4,6-Trichlorophenol		36.4	ug/L	3.00	10.0
120-83-2	2,4-Dichlorophenol		36.9	ug/L	3.00	10.0
105-67-9	2,4-Dimethylphenol		28.9	ug/L	3.00	10.0
51-28-5	2,4-Dinitrophenol		21.4	ug/L	5.00	20.0
121-14-2	2,4-Dinitrotoluene		40.4	ug/L	3.00	10.0
606-20-2	2,6-Dinitrotoluene		39.2	ug/L	3.00	10.0
91-58-7	2-Chloronaphthalene		33.4	ug/L	0.410	1.00
95-57-8	2-Chlorophenol		34.6	ug/L	3.00	10.0
534-52-1	2-Methyl-4,6-dinitrophenol		34.3	ug/L	3.00	10.0
91-57-6	2-Methylnaphthalene		31.7	ug/L	0.300	1.00
88-75-5	2-Nitrophenol		34.5	ug/L	3.00	10.0
91-94-1	3,3'-Dichlorobenzidine		46.1	ug/L	3.00	10.0
101-55-3	4-Bromophenylphenylether		41.7	ug/L	3.00	10.0
59-50-7	Parachlorometa cresol		37.1	ug/L	3.00	10.0
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		42.6	ug/L	3.30	10.0
7005-72-3	4-Chlorophenylphenylether		41.3	ug/L	3.00	10.0
100-02-7	4-Nitrophenol		21.0	ug/L	3.00	10.0
83-32-9	Acenaphthene		37.7	ug/L	0.300	1.00
208-96-8	Acenaphthylene		35.2	ug/L	0.300	1.00
62-53-3	Aniline		35.0	ug/L	4.20	10.0
120-12-7	Anthracene		40.2	ug/L	0.300	1.00
1912-24-9	Atrazine		47.1	ug/L	3.00	10.0
92-87-5	Benzidine		59.6	ug/L	3.90	10.0
56-55-3	Benzo(a)anthracene		41.4	ug/L	0.300	1.00
50-32-8	Benzo(a)pyrene		40.5	ug/L	0.300	1.00
205-99-2	Benzo(b)fluoranthene		39.0	ug/L	0.300	1.00
191-24-2	Benzo(ghi)perylene		45.7	ug/L	0.300	1.00

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

Page 2 of 3

SDG Number: 2018-945
Lab Sample ID: 1203924159
Client Sample: QC for batch 1720609
Client ID: LCS for batch 1720609
Batch ID: 1720610
Run Date: 11/28/2017 21:23
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2825.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
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		40.6	ug/L	0.300	1.00
65-85-0	Benzoic acid		27.7	ug/L	6.00	20.0
100-51-6	Benzyl alcohol		32.2	ug/L	3.00	10.0
85-68-7	Butylbenzylphthalate		35.3	ug/L	3.00	10.0
218-01-9	Chrysene		43.3	ug/L	0.300	1.00
84-74-2	Di-n-butylphthalate		44.2	ug/L	3.00	10.0
117-84-0	Di-n-octylphthalate		40.0	ug/L	3.00	10.0
53-70-3	Dibenzo(a,h)anthracene		48.0	ug/L	0.300	1.00
132-64-9	Dibenzofuran		36.3	ug/L	3.00	10.0
84-66-2	Diethylphthalate		42.0	ug/L	3.00	10.0
131-11-3	Dimethylphthalate		41.4	ug/L	3.00	10.0
88-85-7	Dinoseb	U	3.00	ug/L	3.00	10.0
122-39-4	Diphenylamine		39.0	ug/L	3.00	10.0
206-44-0	Fluoranthene		44.5	ug/L	0.300	1.00
86-73-7	Fluorene		36.9	ug/L	0.300	1.00
118-74-1	Hexachlorobenzene		41.5	ug/L	3.00	10.0
87-68-3	Hexachlorobutadiene		31.5	ug/L	3.00	10.0
77-47-4	Hexachlorocyclopentadiene		20.5	ug/L	3.00	10.0
67-72-1	Hexachloroethane		30.5	ug/L	3.00	10.0
193-39-5	Indeno(1,2,3-cd)pyrene		48.0	ug/L	0.300	1.00
78-59-1	Isophorone		34.1	ug/L	3.50	10.0
62-75-9	N-Methyl-N-nitrosomethylamine		26.0	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		36.6	ug/L	3.00	10.0
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		39.5	ug/L	3.00	10.0
91-20-3	Naphthalene		31.8	ug/L	0.300	1.00
98-95-3	Nitrobenzene		32.7	ug/L	3.00	10.0
608-93-5	Pentachlorobenzene	U	3.00	ug/L	3.00	10.0
87-86-5	Pentachlorophenol		39.0	ug/L	3.00	10.0
85-01-8	Phenanthrene		39.8	ug/L	0.300	1.00
108-95-2	Phenol		20.0	ug/L	3.00	10.0
129-00-0	Pyrene		32.1	ug/L	0.300	1.00
110-86-1	Pyridine		24.7	ug/L	3.00	10.0
108-60-1	bis(2-Chloro-1-methylethyl)ether		35.6	ug/L	3.00	10.0
111-91-1	bis(2-Chloroethoxy)methane		34.7	ug/L	3.00	10.0
111-44-4	bis(2-Chloroethyl) ether		36.8	ug/L	3.00	10.0
117-81-7	bis(2-Ethylhexyl)phthalate		37.2	ug/L	3.00	10.0

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

Page 3 of 3

SDG Number: 2018-945	Matrix: WATER
Lab Sample ID: 1203924159	
Client Sample: QC for batch 1720609	Client: ARSL004
Client ID: LCS for batch 1720609	Method: SW846 3510C/8270D
Batch ID: 1720610	Inst: MSD4.I
Run Date: 11/28/2017 21:23	Analyst: JMB3
Prep Date: 11/22/2017 11:51	Aliquot: 1000 mL
Data File: s112817.B\s4k2825.D	Column: DB-5ms
	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		34.1	ug/L	3.70	10.0
99-09-2	3-Nitroaniline		44.7	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		35.4	ug/L	3.00	10.0
	<i>o-Nitroaniline</i>					
100-01-6	4-Nitroaniline		44.1	ug/L	3.00	10.0
	<i>p-Nitroaniline</i>					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	79.8	100	ug/L	80	(32%-124%)
2-Fluorobiphenyl	32.9	50.0	ug/L	66	(32%-112%)
2-Fluorophenol	53.9	100	ug/L	54	(15%-88%)
Nitrobenzene-d5	32.4	50.0	ug/L	65	(36%-115%)
Phenol-d5	44.4	100	ug/L	44	(15%-91%)
p-Terphenyl-d14	37.1	50.0	ug/L	74	(36%-121%)

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

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203924160
Client Sample: QC for batch 1720609
Client ID: CAMO-18-148081MS
Batch ID: 1720610
Run Date: 11/28/2017 14:35
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2813.D

Date Collected: 11/16/2017 11:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
Aliquot: 500 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		50.7	ug/L	6.00	20.0
120-82-1	1,2,4-Trichlorobenzene		46.9	ug/L	6.00	20.0
95-50-1	1,2-Dichlorobenzene		45.3	ug/L	6.00	20.0
122-66-7	Azobenzene		56.1	ug/L	6.00	20.0
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		43.8	ug/L	6.00	20.0
106-46-7	1,4-Dichlorobenzene		43.7	ug/L	6.00	20.0
123-91-1	1,4-Dioxane		50.1	ug/L	6.00	20.0
90-12-0	1-Methylnaphthalene		49.2	ug/L	0.600	2.00
58-90-2	2,3,4,6-Tetrachlorophenol		65.0	ug/L	6.00	20.0
95-95-4	2,4,5-Trichlorophenol		61.2	ug/L	6.00	20.0
88-06-2	2,4,6-Trichlorophenol		58.5	ug/L	6.00	20.0
120-83-2	2,4-Dichlorophenol		59.4	ug/L	6.00	20.0
105-67-9	2,4-Dimethylphenol		47.5	ug/L	6.00	20.0
51-28-5	2,4-Dinitrophenol		58.9	ug/L	10.0	40.0
121-14-2	2,4-Dinitrotoluene		70.0	ug/L	6.00	20.0
606-20-2	2,6-Dinitrotoluene		63.9	ug/L	6.00	20.0
91-58-7	2-Chloronaphthalene		49.6	ug/L	0.820	2.00
95-57-8	2-Chlorophenol		54.3	ug/L	6.00	20.0
534-52-1	2-Methyl-4,6-dinitrophenol		73.2	ug/L	6.00	20.0
91-57-6	2-Methylnaphthalene		48.0	ug/L	0.600	2.00
88-75-5	2-Nitrophenol		56.8	ug/L	6.00	20.0
91-94-1	3,3'-Dichlorobenzidine		77.1	ug/L	6.00	20.0
101-55-3	4-Bromophenylphenylether		62.5	ug/L	6.00	20.0
59-50-7	Parachlorometa cresol		63.9	ug/L	6.00	20.0
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		85.5	ug/L	6.60	20.0
7005-72-3	4-Chlorophenylphenylether		65.2	ug/L	6.00	20.0
100-02-7	4-Nitrophenol		45.4	ug/L	6.00	20.0
83-32-9	Acenaphthene		58.5	ug/L	0.600	2.00
208-96-8	Acenaphthylene		53.8	ug/L	0.600	2.00
62-53-3	Aniline		65.2	ug/L	8.40	20.0
120-12-7	Anthracene		64.5	ug/L	0.600	2.00
1912-24-9	Atrazine		75.1	ug/L	6.00	20.0
92-87-5	Benzidine		130	ug/L	7.80	20.0
56-55-3	Benzo(a)anthracene		66.1	ug/L	0.600	2.00
50-32-8	Benzo(a)pyrene		64.6	ug/L	0.600	2.00
205-99-2	Benzo(b)fluoranthene		67.8	ug/L	0.600	2.00
191-24-2	Benzo(ghi)perylene		54.6	ug/L	0.600	2.00

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

Page 2 of 3

SDG Number: 2018-945
Lab Sample ID: 1203924160
Client Sample: QC for batch 1720609
Client ID: CAMO-18-148081MS
Batch ID: 1720610
Run Date: 11/28/2017 14:35
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2813.D

Date Collected: 11/16/2017 11:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
Aliquot: 500 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		70.6	ug/L	0.600	2.00
65-85-0	Benzoic acid		90.7	ug/L	12.0	40.0
100-51-6	Benzyl alcohol		58.9	ug/L	6.00	20.0
85-68-7	Butylbenzylphthalate		56.7	ug/L	6.00	20.0
218-01-9	Chrysene		68.0	ug/L	0.600	2.00
84-74-2	Di-n-butylphthalate		70.4	ug/L	6.00	20.0
117-84-0	Di-n-octylphthalate		63.8	ug/L	6.00	20.0
53-70-3	Dibenzo(a,h)anthracene		59.9	ug/L	0.600	2.00
132-64-9	Dibenzofuran		57.8	ug/L	6.00	20.0
84-66-2	Diethylphthalate		69.5	ug/L	6.00	20.0
131-11-3	Dimethylphthalate		67.7	ug/L	6.00	20.0
88-85-7	Dinoseb	U	6.00	ug/L	6.00	20.0
122-39-4	Diphenylamine		60.0	ug/L	6.00	20.0
206-44-0	Fluoranthene		75.8	ug/L	0.600	2.00
86-73-7	Fluorene		59.8	ug/L	0.600	2.00
118-74-1	Hexachlorobenzene		62.9	ug/L	6.00	20.0
87-68-3	Hexachlorobutadiene		43.0	ug/L	6.00	20.0
77-47-4	Hexachlorocyclopentadiene		33.0	ug/L	6.00	20.0
67-72-1	Hexachloroethane		41.2	ug/L	6.00	20.0
193-39-5	Indeno(1,2,3-cd)pyrene		58.1	ug/L	0.600	2.00
78-59-1	Isophorone		56.1	ug/L	7.00	20.0
62-75-9	N-Methyl-N-nitrosomethylamine		47.6	ug/L	6.00	20.0
924-16-3	N-Nitrosodi-n-butylamine	U	6.00	ug/L	6.00	20.0
55-18-5	N-Nitrosodiethylamine	U	6.00	ug/L	6.00	20.0
621-64-7	N-Nitrosodi-n-propylamine		58.2	ug/L	6.00	20.0
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		66.0	ug/L	6.00	20.0
91-20-3	Naphthalene		46.0	ug/L	0.600	2.00
98-95-3	Nitrobenzene		52.4	ug/L	6.00	20.0
608-93-5	Pentachlorobenzene	U	6.00	ug/L	6.00	20.0
87-86-5	Pentachlorophenol		72.3	ug/L	6.00	20.0
85-01-8	Phenanthrene		63.5	ug/L	0.600	2.00
108-95-2	Phenol		35.3	ug/L	6.00	20.0
129-00-0	Pyrene		49.5	ug/L	0.600	2.00
110-86-1	Pyridine		48.4	ug/L	6.00	20.0
108-60-1	bis(2-Chloro-1-methylethyl)ether		54.2	ug/L	6.00	20.0
111-91-1	bis(2-Chloroethoxy)methane		56.7	ug/L	6.00	20.0
111-44-4	bis(2-Chloroethyl) ether		56.3	ug/L	6.00	20.0
117-81-7	bis(2-Ethylhexyl)phthalate		59.7	ug/L	6.00	20.0

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

Page 3 of 3

SDG Number: 2018-945
Lab Sample ID: 1203924160
Client Sample: QC for batch 1720609
Client ID: CAMO-18-148081MS
Batch ID: 1720610
Run Date: 11/28/2017 14:35
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2813.D

Date Collected: 11/16/2017 11:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
Aliquot: 500 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		60.2	ug/L	7.40	20.0
99-09-2	3-Nitroaniline		88.1	ug/L	6.00	20.0
	<i>m-Nitroaniline</i>					
95-48-7	o-Cresol		54.9	ug/L	6.00	20.0
88-74-4	2-Nitroaniline		61.0	ug/L	6.00	20.0
	<i>o-Nitroaniline</i>					
100-01-6	4-Nitroaniline		85.6	ug/L	6.00	20.0
	<i>p-Nitroaniline</i>					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	134	200	ug/L	67	(32%-124%)
2-Fluorobiphenyl	51.6	100	ug/L	52	(32%-112%)
2-Fluorophenol	95.7	200	ug/L	48	(15%-88%)
Nitrobenzene-d5	51.7	100	ug/L	52	(36%-115%)
Phenol-d5	72.2	200	ug/L	36	(15%-91%)
p-Terphenyl-d14	57.9	100	ug/L	58	(36%-121%)

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

Page 1 of 3

SDG Number: 2018-945
Lab Sample ID: 1203924161
Client Sample: QC for batch 1720609
Client ID: CAMO-18-148081MSD
Batch ID: 1720610
Run Date: 11/28/2017 15:04
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2814.D

Date Collected: 11/16/2017 11:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
Aliquot: 500 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		48.2	ug/L	6.00	20.0
120-82-1	1,2,4-Trichlorobenzene		45.2	ug/L	6.00	20.0
95-50-1	1,2-Dichlorobenzene		42.7	ug/L	6.00	20.0
122-66-7	Azobenzene		49.8	ug/L	6.00	20.0
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		41.6	ug/L	6.00	20.0
106-46-7	1,4-Dichlorobenzene		41.4	ug/L	6.00	20.0
123-91-1	1,4-Dioxane		46.7	ug/L	6.00	20.0
90-12-0	1-Methylnaphthalene		47.0	ug/L	0.600	2.00
58-90-2	2,3,4,6-Tetrachlorophenol		59.2	ug/L	6.00	20.0
95-95-4	2,4,5-Trichlorophenol		57.1	ug/L	6.00	20.0
88-06-2	2,4,6-Trichlorophenol		53.2	ug/L	6.00	20.0
120-83-2	2,4-Dichlorophenol		57.2	ug/L	6.00	20.0
105-67-9	2,4-Dimethylphenol		47.8	ug/L	6.00	20.0
51-28-5	2,4-Dinitrophenol		55.5	ug/L	10.0	40.0
121-14-2	2,4-Dinitrotoluene		62.9	ug/L	6.00	20.0
606-20-2	2,6-Dinitrotoluene		57.0	ug/L	6.00	20.0
91-58-7	2-Chloronaphthalene		47.3	ug/L	0.820	2.00
95-57-8	2-Chlorophenol		51.1	ug/L	6.00	20.0
534-52-1	2-Methyl-4,6-dinitrophenol		66.9	ug/L	6.00	20.0
91-57-6	2-Methylnaphthalene		45.3	ug/L	0.600	2.00
88-75-5	2-Nitrophenol		54.8	ug/L	6.00	20.0
91-94-1	3,3'-Dichlorobenzidine		60.9	ug/L	6.00	20.0
101-55-3	4-Bromophenylphenylether		55.8	ug/L	6.00	20.0
59-50-7	Parachlorometa cresol		59.0	ug/L	6.00	20.0
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		78.6	ug/L	6.60	20.0
7005-72-3	4-Chlorophenylphenylether		58.4	ug/L	6.00	20.0
100-02-7	4-Nitrophenol		41.4	ug/L	6.00	20.0
83-32-9	Acenaphthene		53.2	ug/L	0.600	2.00
208-96-8	Acenaphthylene		49.7	ug/L	0.600	2.00
62-53-3	Aniline		59.1	ug/L	8.40	20.0
120-12-7	Anthracene		58.9	ug/L	0.600	2.00
1912-24-9	Atrazine		68.1	ug/L	6.00	20.0
92-87-5	Benzidine		143	ug/L	7.80	20.0
56-55-3	Benzo(a)anthracene		61.2	ug/L	0.600	2.00
50-32-8	Benzo(a)pyrene		59.1	ug/L	0.600	2.00
205-99-2	Benzo(b)fluoranthene		63.5	ug/L	0.600	2.00
191-24-2	Benzo(ghi)perylene		52.9	ug/L	0.600	2.00

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

Page 2 of 3

SDG Number: 2018-945
Lab Sample ID: 1203924161
Client Sample: QC for batch 1720609
Client ID: CAMO-18-148081MSD
Batch ID: 1720610
Run Date: 11/28/2017 15:04
Prep Date: 11/22/2017 11:51
Data File: s112817.B\s4k2814.D

Date Collected: 11/16/2017 11:19
Date Received: 11/18/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD4.I
Analyst: JMB3
Aliquot: 500 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		64.8	ug/L	0.600	2.00
65-85-0	Benzoic acid		59.6	ug/L	12.0	40.0
100-51-6	Benzyl alcohol		54.6	ug/L	6.00	20.0
85-68-7	Butylbenzylphthalate		59.9	ug/L	6.00	20.0
218-01-9	Chrysene		61.8	ug/L	0.600	2.00
84-74-2	Di-n-butylphthalate		62.7	ug/L	6.00	20.0
117-84-0	Di-n-octylphthalate		49.5	ug/L	6.00	20.0
53-70-3	Dibenzo(a,h)anthracene		58.6	ug/L	0.600	2.00
132-64-9	Dibenzofuran		52.4	ug/L	6.00	20.0
84-66-2	Diethylphthalate		61.7	ug/L	6.00	20.0
131-11-3	Dimethylphthalate		60.4	ug/L	6.00	20.0
88-85-7	Dinoseb	U	6.00	ug/L	6.00	20.0
122-39-4	Diphenylamine		53.8	ug/L	6.00	20.0
206-44-0	Fluoranthene		65.7	ug/L	0.600	2.00
86-73-7	Fluorene		53.8	ug/L	0.600	2.00
118-74-1	Hexachlorobenzene		55.8	ug/L	6.00	20.0
87-68-3	Hexachlorobutadiene		42.7	ug/L	6.00	20.0
77-47-4	Hexachlorocyclopentadiene		33.7	ug/L	6.00	20.0
67-72-1	Hexachloroethane		40.0	ug/L	6.00	20.0
193-39-5	Indeno(1,2,3-cd)pyrene		56.1	ug/L	0.600	2.00
78-59-1	Isophorone		52.4	ug/L	7.00	20.0
62-75-9	N-Methyl-N-nitrosomethylamine		43.6	ug/L	6.00	20.0
924-16-3	N-Nitrosodi-n-butylamine	U	6.00	ug/L	6.00	20.0
55-18-5	N-Nitrosodiethylamine	U	6.00	ug/L	6.00	20.0
621-64-7	N-Nitrosodi-n-propylamine		53.1	ug/L	6.00	20.0
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		58.6	ug/L	6.00	20.0
91-20-3	Naphthalene		43.9	ug/L	0.600	2.00
98-95-3	Nitrobenzene		49.8	ug/L	6.00	20.0
608-93-5	Pentachlorobenzene	U	6.00	ug/L	6.00	20.0
87-86-5	Pentachlorophenol		68.3	ug/L	6.00	20.0
85-01-8	Phenanthrene		57.1	ug/L	0.600	2.00
108-95-2	Phenol		32.2	ug/L	6.00	20.0
129-00-0	Pyrene		59.2	ug/L	0.600	2.00
110-86-1	Pyridine		51.9	ug/L	6.00	20.0
108-60-1	bis(2-Chloro-1-methylethyl)ether		49.8	ug/L	6.00	20.0
111-91-1	bis(2-Chloroethoxy)methane		54.2	ug/L	6.00	20.0
111-44-4	bis(2-Chloroethyl) ether		51.9	ug/L	6.00	20.0
117-81-7	bis(2-Ethylhexyl)phthalate		61.2	ug/L	6.00	20.0

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

Page 3 of 3

SDG Number: 2018-945	Date Collected: 11/16/2017 11:19	Matrix: W
Lab Sample ID: 1203924161	Date Received: 11/18/2017 09:00	
Client Sample: QC for batch 1720609	Client: ARSL004	Project: QC
Client ID: CAMO-18-148081MSD	Method: SW846 3510C/8270D	SOP Ref: GL-OA-E-009
Batch ID: 1720610	Inst: MSD4.I	Dilution: 1
Run Date: 11/28/2017 15:04	Analyst: JMB3	Inj. Vol: 1 uL
Prep Date: 11/22/2017 11:51	Aliquot: 500 mL	Final Volume: 1 mL
Data File: s112817.B\s4k2814.D	Column: DB-5ms	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols		55.1	ug/L	7.40	20.0
99-09-2	3-Nitroaniline		82.1	ug/L	6.00	20.0
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol		51.2	ug/L	6.00	20.0
88-74-4	2-Nitroaniline		55.2	ug/L	6.00	20.0
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline		78.8	ug/L	6.00	20.0
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	122	200	ug/L	61	(32%-124%)
2-Fluorobiphenyl	47.1	100	ug/L	47	(32%-112%)
2-Fluorophenol	86.2	200	ug/L	43	(15%-88%)
Nitrobenzene-d5	48.7	100	ug/L	49	(36%-115%)
Phenol-d5	64.4	200	ug/L	32	(15%-91%)
p-Terphenyl-d14	66.2	100	ug/L	66	(36%-121%)

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-945
Work Order #: 438300**

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: 1722557

Prep Batch Number: 1722555

Sample Analysis

Sample ID	Client ID
438300001	438300001 (CAMO-18-148065)
438300004	438300004 (CAMO-18-148066)
1203928965	Interference Check Sample (ICS)
1203928958	Method Blank (MB)
1203928959	Laboratory Control Sample (LCS)
1203928960	438200001(CAMO-18-147982) Matrix Spike (MS)
1203928961	438200001(CAMO-18-147982) 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 438200001 (CAMO-18-147982) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

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

Internal Standard Area Acceptance

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

Retention Time

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

Technical Information

Holding Time Specifications

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Manual Integrations

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

Method Comments

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

Additional Comments

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

Perchlorate Isotope Ratio

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

System Configuration

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

Electronic Packaging Comment

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

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

Chromatographic Columns

The LC-MS/MS Perchlorate analysis was performed on a 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: 2018-945 GEL Work Order: 438300

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: 05 DEC 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: 1722555Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-148065Date Received: 18-NOV-17GEL Job No (SDG): 2018-945GEL Sample ID: 438300001Date Filtered: 30-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	0.614	ug/L		1	01-DEC-17 23:47	per1201021a
	Perchlorate Isotope Ratio			3.09			1	01-DEC-17 23:47	per1201021a
14797-73-0	Perchlorate-101	.05	.2	0.595	ug/L		1	01-DEC-17 23:47	per1201021a
	Perchlorate-O(18)			0.505	ug/L		1	01-DEC-17 23:47	per1201021a

^ 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: 1722555Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-148066Date Received: 18-NOV-17GEL Job No (SDG): 2018-945GEL Sample ID: 438300004Date Filtered: 30-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	0.336	ug/L		1	01-DEC-17 23:57	per1201022a
	Perchlorate Isotope Ratio			2.93			1	01-DEC-17 23:57	per1201022a
14797-73-0	Perchlorate-101	.05	.2	0.343	ug/L		1	01-DEC-17 23:57	per1201022a
	Perchlorate-O(18)			0.461	ug/L		1	01-DEC-17 23:57	per1201022a

^ 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): 2018-945

Extract Batch Code: 1722555

Date Filtered: 30-NOV-17

Matrix: WATER

Sample ID: 1203928959

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.205	ug/L	103		85 - 115
Perchlorate Isotope Ratio		3.1				-
Perchlorate-101	0.200	.198	ug/L	99		85 - 115
Perchlorate-O(18)		.486	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): 2018-945

Extract Batch Code: 1722555

Date Extracted: 30-NOV-17

GEL MS/PS ID: 1203928960

Client ID: CAMO-18-147982

GEL MSD/PSD ID: 1203928961

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	0.329	ug/L	0.521	96	.532	101	2	30	75 - 125
Perchlorate Isotope Ratio	0	3.11		3		3.14		5		-
Perchlorate-101	0.200	0.317	ug/L	0.521	102	.507	95	3	30	75 - 125
Perchlorate-O(18)	0	0.483	ug/L	0.482		.469		3		-

^ 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: 1722555Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 30-NOV-17GEL Job No (SDG): 2018-945GEL Sample ID: 1203928958Date Filtered: 30-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	01-DEC-17 22:27	per1201013a
	Perchlorate Isotope Ratio						1	01-DEC-17 22:27	per1201013a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	01-DEC-17 22:27	per1201013a
	Perchlorate-O(18)			0.502	ug/L		1	01-DEC-17 22:27	per1201013a

^ 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: 1722555Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 30-NOV-17GEL Job No (SDG): 2018-945GEL Sample ID: 1203928959Date Filtered: 30-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	0.205	ug/L		1	01-DEC-17 22:37	per1201014a
	Perchlorate Isotope Ratio			3.1			1	01-DEC-17 22:37	per1201014a
14797-73-0	Perchlorate-101	.05	.2	0.198	ug/L	J	1	01-DEC-17 22:37	per1201014a
	Perchlorate-O(18)			0.486	ug/L		1	01-DEC-17 22:37	per1201014a

^ 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: 1722555Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2018-945GEL Sample ID: 1203928965Date Filtered: 30-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	0.222	ug/L		1	01-DEC-17 22:47	per1201015a
	Perchlorate Isotope Ratio			2.94			1	01-DEC-17 22:47	per1201015a
14797-73-0	Perchlorate-101	.05	.2	0.227	ug/L		1	01-DEC-17 22:47	per1201015a
	Perchlorate-O(18)			0.485	ug/L		1	01-DEC-17 22:47	per1201015a

^ 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: 1722555Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-147982MSDate Received: 17-NOV-17GEL Job No (SDG): 2018-945GEL Sample ID: 1203928960Date Filtered: 30-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	0.521	ug/L		1	01-DEC-17 23:07	per1201017a
	Perchlorate Isotope Ratio			3			1	01-DEC-17 23:07	per1201017a
14797-73-0	Perchlorate-101	.05	.2	0.521	ug/L		1	01-DEC-17 23:07	per1201017a
	Perchlorate-O(18)			0.482	ug/L		1	01-DEC-17 23:07	per1201017a

^ 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: 1722555Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-147982MSDDate Received: 17-NOV-17GEL Job No (SDG): 2018-945GEL Sample ID: 1203928961Date Filtered: 30-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	0.532	ug/L		1	01-DEC-17 23:17	per1201018a
	Perchlorate Isotope Ratio			3.14			1	01-DEC-17 23:17	per1201018a
14797-73-0	Perchlorate-101	.05	.2	0.507	ug/L		1	01-DEC-17 23:17	per1201018a
	Perchlorate-O(18)			0.469	ug/L		1	01-DEC-17 23:17	per1201018a

^ 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 =

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

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-945
Work Order #: 438300

Sample ID	Client ID
438300001	CAMO-18-148065
438300002	CAMO-18-148081
438300004	CAMO-18-148066
438300005	CAMO-18-148082
1203923721	Method Blank (MB) ICP
1203923722	Laboratory Control Sample (LCS)
1203923725	438300001(CAMO-18-148065L) Serial Dilution (SD)
1203923723	438300001(CAMO-18-148065D) Sample Duplicate (DUP)
1203923724	438300001(CAMO-18-148065S) Matrix Spike (MS)
1203923746	Method Blank (MB) ICP-MS
1203923747	Laboratory Control Sample (LCS)
1203923750	438300001(CAMO-18-148065L) Serial Dilution (SD)
1203923748	438300001(CAMO-18-148065D) Sample Duplicate (DUP)
1203923749	438300001(CAMO-18-148065S) Matrix Spike (MS)
1203932553	438300001(CAMO-18-148065PS) Post Spike (PS)
1203932779	Method Blank (MB) CVAA
1203932780	Laboratory Control Sample (LCS)
1203932783	438300001(CAMO-18-148065L) Serial Dilution (SD)
1203932781	438300001(CAMO-18-148065D) Sample Duplicate (DUP)
1203932782	438300001(CAMO-18-148065S) Matrix Spike (MS)

Sample Analysis

Samples 438300001,002,004 and 005 in this SDG were analyzed for metals and mercury on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1720445, 1720455, 1724028 and 1726356
Prep Batch :	1720444, 1720454 and 1724027
Standard Operating Procedures:	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
Analytical Method:	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.2 1974 and SM:A2340B
Prep Method :	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 CaCO₃ 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 CRDL/PQL standard recoveries met the referenced advisory control limits.

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: 438300001 (CAMO-18-148065)-ICP, ICP-MS and 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 MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits. This verifies the absence of a matrix interference in

the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

Sample	Analyte	Value
1203923749 (CAMO-18-148065MS)	Chromium	70.8* (75%-125%)

Duplicate Relative Percent Difference (RPD) Statement

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. 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.

Post Spike (PS) Recovery Statement

The PS met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the absence of matrix interferences in the post-digested sample.

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: 2018-945 GEL Work Order: 438300

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- J Value is estimated
- N Metals--The Matrix spike sample recovery is not within specified control limits
- 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: 15 DEC 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-945**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 438300001**BASIS:** As Received**DATE COLLECTED** 16-NOV-17**CLIENT ID:** CAMO-18-148065**LEVEL:** Low**DATE RECEIVED** 18-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	12/07/17 10:42	120717W2-3	1724028

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-945

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 438300001

BASIS: As Received

DATE COLLECTED 16-NOV-17

CLIENT ID: CAMO-18-148065

LEVEL: Low

DATE RECEIVED 18-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	12/13/17 07:01	121317-1	1720445
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7440-39-3	Barium	23.1	ug/L		1	5	5	1	P	HSC	12/13/17 07:01	121317-1	1720445
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	12/13/17 07:01	121317-1	1720445
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	12/13/17 07:01	121317-1	1720445
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7440-70-2	Calcium	16800	ug/L		50	200	200	1	P	HSC	12/13/17 07:01	121317-1	1720445
7440-47-3	Chromium	125	ug/L	N	3	10	10	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	12/13/17 07:01	121317-1	1720445
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	12/13/17 07:01	121317-1	1720445
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	12/13/17 07:01	121317-1	1720445
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7439-95-4	Magnesium	4800	ug/L		110	300	300	1	P	HSC	12/13/17 07:01	121317-1	1720445
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	12/13/17 07:01	121317-1	1720445
7439-98-7	Molybdenum	0.866	ug/L		0.2	0.5	0.5	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7440-02-0	Nickel	4.17	ug/L		0.6	2	2	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7440-09-7	Potassium	1360	ug/L		50	150	150	1	P	HSC	12/13/17 07:01	121317-1	1720445
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7631-86-9	Silica	67100	ug/L		53	213	213	1	P	HSC	12/13/17 07:01	121317-1	1720445
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7440-23-5	Sodium	11300	ug/L		100	300	300	1	P	HSC	12/13/17 07:01	121317-1	1720445
7440-24-6	Strontium	73.2	ug/L		1	5	5	1	P	HSC	12/13/17 07:01	121317-1	1720445
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	HSC	12/13/17 07:01	121317-1	1720445
7440-61-1	Uranium	0.499	ug/L		0.067	0.2	0.2	1	MS	BAJ	12/05/17 20:38	171205-2	1720455
7440-62-2	Vanadium	4.69	ug/L	J	1	5	5	1	P	HSC	12/13/17 07:01	121317-1	1720445
7440-66-6	Zinc	9.37	ug/L	J	3.3	10	10	1	P	HSC	12/13/17 07:01	121317-1	1720445

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-945**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 438300001**BASIS:** As Received**DATE COLLECTED** 16-NOV-17**CLIENT ID:** CAMO-18-148065**LEVEL:** Low**DATE RECEIVED** 18-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	61.8	mg/L		0.453	1.24	1.24	1		JJ2	12/14/17 10:31		1726356

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1720445	1720444	SW846 3005A	50	mL	50	mL	11/20/17	JXM8
1720455	1720454	SW846 3005A	50	mL	50	mL	11/20/17	JXM8
1724028	1724027	EPA 245.1/245.2 Prep	20	mL	20	mL	12/06/17	AXS5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-945**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 438300002**BASIS:** As Received**DATE COLLECTED** 16-NOV-17**CLIENT ID:** CAMO-18-148081**LEVEL:** Low**DATE RECEIVED** 18-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	12/07/17 10:50	120717W2-3	1724028

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1724028	1724027	EPA 245.1/245.2 Prep	20	mL	20	mL	12/06/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-945**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 438300004**BASIS:** As Received**DATE COLLECTED** 16-NOV-17**CLIENT ID:** CAMO-18-148066**LEVEL:** Low**DATE RECEIVED** 18-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	12/07/17 10:52	120717W2-3	1724028

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-945

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 438300004

BASIS: As Received

DATE COLLECTED 16-NOV-17

CLIENT ID: CAMO-18-148066

LEVEL: Low

DATE RECEIVED 18-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	12/13/17 06:49	121317-1	1720445
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7440-39-3	Barium	24.5	ug/L		1	5	5	1	P	HSC	12/13/17 06:49	121317-1	1720445
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	12/13/17 06:49	121317-1	1720445
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	12/13/17 06:49	121317-1	1720445
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7440-70-2	Calcium	11300	ug/L		50	200	200	1	P	HSC	12/13/17 06:49	121317-1	1720445
7440-47-3	Chromium	5.06	ug/L	JN	3	10	10	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	12/13/17 06:49	121317-1	1720445
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	12/13/17 06:49	121317-1	1720445
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	12/13/17 06:49	121317-1	1720445
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7439-95-4	Magnesium	3820	ug/L		110	300	300	1	P	HSC	12/13/17 06:49	121317-1	1720445
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	12/13/17 06:49	121317-1	1720445
7439-98-7	Molybdenum	1.19	ug/L		0.2	0.5	0.5	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7440-02-0	Nickel	1	ug/L	J	0.6	2	2	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7440-09-7	Potassium	1360	ug/L		50	150	150	1	P	HSC	12/13/17 06:49	121317-1	1720445
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7631-86-9	Silica	75100	ug/L		53	213	213	1	P	HSC	12/13/17 06:49	121317-1	1720445
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7440-23-5	Sodium	9920	ug/L		100	300	300	1	P	HSC	12/13/17 06:49	121317-1	1720445
7440-24-6	Strontium	50.8	ug/L		1	5	5	1	P	HSC	12/13/17 06:49	121317-1	1720445
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7440-31-5	Tin	2.84	ug/L	J	2.5	10	10	1	P	HSC	12/13/17 06:49	121317-1	1720445
7440-61-1	Uranium	0.513	ug/L		0.067	0.2	0.2	1	MS	BAJ	12/05/17 21:04	171205-2	1720455
7440-62-2	Vanadium	6.74	ug/L		1	5	5	1	P	HSC	12/13/17 06:49	121317-1	1720445
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	12/13/17 06:49	121317-1	1720445

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-945**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 438300004**BASIS:** As Received**DATE COLLECTED** 16-NOV-17**CLIENT ID:** CAMO-18-148066**LEVEL:** Low**DATE RECEIVED** 18-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	43.9	mg/L		0.453	1.24	1.24	1		JJ2	12/14/17 10:31		1726356

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1720445	1720444	SW846 3005A	50	mL	50	mL	11/20/17	JXM8
1720455	1720454	SW846 3005A	50	mL	50	mL	11/20/17	JXM8
1724028	1724027	EPA 245.1/245.2 Prep	20	mL	20	mL	12/06/17	AXS5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-945**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 438300005**BASIS:** As Received**DATE COLLECTED** 16-NOV-17**CLIENT ID:** CAMO-18-148082**LEVEL:** Low**DATE RECEIVED** 18-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	12/07/17 10:57	120717W2-3	1724028

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1724028	1724027	EPA 245.1/245.2 Prep	20	mL	20	mL	12/06/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2018-945
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>
1203923721	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	64	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
1203923746	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	0.2	ug/L	+/-0.5	U	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
1203932779	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. 2018-945 Client ID CAMO-18-148065S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 438300001 Spike ID: 1203923724

<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	4780		68	U	5000	95		P
Barium	ug/L	75-125	508		23.1		500	96.9		P
Beryllium	ug/L	75-125	491		1	U	500	98.2		P
Boron	ug/L	75-125	504		15	U	500	98.2		P
Calcium	ug/L	75-125	21500		16800		5000	93.3		P
Cobalt	ug/L	75-125	489		1	U	500	97.8		P
Copper	ug/L	75-125	493		3	U	500	98.5		P
Iron	ug/L	75-125	4780		30	U	5000	95.4		P
Magnesium	ug/L	75-125	9600		4800		5000	95.9		P
Manganese	ug/L	75-125	483		2	U	500	96.5		P
Potassium	ug/L	75-125	6210		1360		5000	97		P
Silica	ug/L		76700		67100		10700	89.5	N/A	P
Sodium	ug/L	75-125	15900		11300		5000	90.5		P
Strontium	ug/L	75-125	568		73.2		500	98.9		P
Tin	ug/L	75-125	482		2.5	U	500	96.1		P
Vanadium	ug/L	75-125	494		4.69	J	500	97.8		P
Zinc	ug/L	75-125	479		9.37	J	500	94		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2018-945 Client ID CAMO-18-148065S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 438300001 Spike ID: 1203923749

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Antimony	ug/L	75-125	45.6		1	U	50	90.2		MS
Arsenic	ug/L	75-125	50.6		2	U	50	97.9		MS
Cadmium	ug/L	75-125	47.2		0.3	U	50	94.3		MS
Chromium	ug/L	75-125	161		125		50	70.8	N	MS
Lead	ug/L	75-125	48.3		0.5	U	50	96.6		MS
Molybdenum	ug/L	75-125	51.7		0.866		50	102		MS
Nickel	ug/L	75-125	51.4		4.17		50	94.5		MS
Selenium	ug/L	75-125	50.8		2	U	50	98.2		MS
Silver	ug/L	75-125	49.7		0.3	U	50	99.5		MS
Thallium	ug/L	75-125	45.6		0.6	U	50	91.1		MS
Uranium	ug/L	75-125	49.7		0.499		50	98.3		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Spike Summary

SDG NO. 2018-945 **Client ID:** CAMO-18-148065PS**Contract:** ESHL00114 **Level:** Low**Matrix:** WATER **% Solids:****Sample ID:** 438300001 **Spike ID:** 1203932553

<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>
Chromium	ug/L	80-120	181		125		50	112		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2018-945 **Client ID:** CAMO-18-148065S**Contract:** ESHL00114 **Level:** Low**Matrix:** WATER **% Solids:****Sample ID:** 438300001 **Spike ID:** 1203932782

<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		0.067	U	2	99.8		AV

*Analytical Methods:

AV EPA 245.1/245.2

Metals
-6-
Duplicate Sample Summary

SDG No.: 2018-945

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-18-148065D

Matrix: WATER

Level: Low

Sample ID: 438300001

Duplicate ID: 1203923723

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		68 U		68 U				P
Barium	ug/L	+/-5	23.1		22.5		2.45		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L		15 U		15 U				P
Calcium	ug/L	+/-20%	16800		16600		1.3		P
Cobalt	ug/L		1 U		1 U				P
Copper	ug/L		3 U		3 U				P
Iron	ug/L		30 U		30 U				P
Magnesium	ug/L	+/-20%	4800		4760		.774		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	1360		1380		1.49		P
Silica	ug/L	+/-20%	67100		65900		1.76		P
Sodium	ug/L	+/-20%	11300		11200		1.57		P
Strontium	ug/L	+/-20%	73.2		72.8		.623		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	4.69 J		4.3 J		8.76		P
Zinc	ug/L	+/-10	9.37 J		8.48 J		9.9		P

*Analytical Methods:

P SW846 3005A/6010C

Metals
-6-
Duplicate Sample Summary

SDG No.: 2018-945

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-18-148065D

Matrix: WATER

Level: Low

Sample ID: 438300001

Duplicate ID: 1203923748

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Antimony	ug/L		1 U		1 U				MS
Arsenic	ug/L		2 U		2 U				MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-20%	125		130		3.39		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	0.866		0.816		5.95		MS
Nickel	ug/L	+/-2	4.17		4.21		1.15		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	0.499		0.484		3.05		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
–6–
Duplicate Sample Summary

SDG No.: 2018–945**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CAMO–18–148065D**Matrix:** WATER**Level:** Low**Sample ID:** 438300001**Duplicate ID:** 1203932781**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. 2018-945

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>
1203923722								
	Aluminum	ug/L	5000	4750		95.1	80-120	P
	Barium	ug/L	500	483		96.7	80-120	P
	Beryllium	ug/L	500	480		96	80-120	P
	Boron	ug/L	500	479		95.9	80-120	P
	Calcium	ug/L	5000	4790		95.7	80-120	P
	Cobalt	ug/L	500	490		98	80-120	P
	Copper	ug/L	500	486		97.1	80-120	P
	Iron	ug/L	5000	4760		95.2	80-120	P
	Magnesium	ug/L	5000	4860		97.2	80-120	P
	Manganese	ug/L	500	488		97.6	80-120	P
	Potassium	ug/L	5000	4950		99.1	80-120	P
	Silica	ug/L	10700	9850		92	80-120	P
	Sodium	ug/L	5000	4830		96.6	80-120	P
	Strontium	ug/L	500	491		98.2	80-120	P
	Tin	ug/L	500	479		95.8	80-120	P
	Vanadium	ug/L	500	487		97.4	80-120	P
	Zinc	ug/L	500	471		94.2	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2018-945

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>
1203923747								
	Antimony	ug/L	50	49.7		99.4	80-120	MS
	Arsenic	ug/L	50	53.4		107	80-120	MS
	Cadmium	ug/L	50	51.7		103	80-120	MS
	Chromium	ug/L	50	47.8		95.7	80-120	MS
	Lead	ug/L	50	52		104	80-120	MS
	Molybdenum	ug/L	50	54.4		109	80-120	MS
	Nickel	ug/L	50	49.7		99.5	80-120	MS
	Selenium	ug/L	50	54.8		110	80-120	MS
	Silver	ug/L	50	53.2		106	80-120	MS
	Thallium	ug/L	50	49		98	80-120	MS
	Uranium	ug/L	50	51.3		103	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2018-945

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>
1203932780	Mercury	ug/L	2	1.99		99.6	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2018-945

Client ID: CAMO-18-148065L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 438300001

Serial Dilution ID: 1203923725

<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	23.1		22.8	J	.913			P
Beryllium	1	U	5	U				P
Boron	15	U	75	U				P
Calcium	16800		16900		.425		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	4800		4860		1.149			P
Manganese	2	U	10	U				P
Potassium	1360		1660		22.324			P
Silica	67100		66200		1.278		10	P
Sodium	11300		11100		2.207		10	P
Strontium	73.2		70.8		3.325		10	P
Tin	2.5	U	12.5	U				P
Vanadium	4.69	J	5	U	3.17			P
Zinc	9.37	J	25.4	J	171.371			P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2018-945

Client ID: CAMO-18-148065L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 438300001

Serial Dilution ID: 1203923750

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Antimony	1	U	5	U				MS
Arsenic	2	U	10	U				MS
Cadmium	.3	U	1.5	U				MS
Chromium	125		128		2.514			MS
Lead	.5	U	2.5	U				MS
Molybdenum	.866		1	U	2.194			MS
Nickel	4.17		4.37	J	4.922			MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.499		.455	J	8.818			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2018-945 **Client ID:** CAMO-18-148065L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 438300001 **Serial Dilution ID:** 1203932783

<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 #: 2018-945
Work Order #: 438300**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1720555

Method: SW 9060 Total Organic Carbon

Sample Analysis

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

Sample ID	Client ID
438300002	CAMO-18-148081
438300005	CAMO-18-148082
1203927018	Method Blank (MB)
1203927019	Laboratory Control Sample (LCS)
1203927021	438305002(CASA-18-147963) Sample Duplicate (DUP)
1203927023	438305002(CASA-18-147963) 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 438305002 (CASA-18-147963) 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:	Cyanide and Total		
Analytical Batch:	1720228	Method:	WSP-CN(T)
Prep Batch :	1720227	Method:	EPA 335.4

Sample Analysis

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

Sample ID	Client ID
438300002	CAMO-18-148081
438300005	CAMO-18-148082
1203923112	Method Blank (MB)
1203923113	Laboratory Control Sample (LCS)
1203923114	438005001(WST05-18-148667) Sample Duplicate (DUP)
1203923116	438005001(WST05-18-148667) Matrix Spike (MS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 REV# 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

Sample 438005001 (WST05-18-148667) 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: Ion Chromatography

Analytical Batch: 1723476

Method: WSP-ANIONS

Sample Analysis

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

Sample ID	Client ID
438300001	CAMO-18-148065
438300004	CAMO-18-148066
1203931400	Method Blank (MB)
1203931401	Laboratory Control Sample (LCS)
1203931402	438912001(CTUA-17-142756) Sample Duplicate (DUP)
1203931403	438912001(CTUA-17-142756) 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-5000 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 438912001 (CTUA-17-142756) 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 Dilutions

The following samples 1203931402 (CTUA-17-142756DUP) and 1203931403 (CTUA-17-142756PS) were 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.

Sample Re-analysis

Samples 1203931402 (CTUA-17-142756DUP) and 1203931403 (CTUA-17-142756PS) were reanalyzed due to PS failure. The reanalysis data was reported.

Miscellaneous Information

Manual Integrations

Samples 1203931402 (CTUA-17-142756DUP), 438300001 (CAMO-18-148065) and 438300004 (CAMO-18-148066) 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

Product: Ammonia Nitrogen
Analytical Batch: 1720253 **Method:** NH3
Prep Batch : 1720252 **Method:** EPA 350.1 Prep

Sample Analysis

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

Sample ID	Client ID
438300001	CAMO-18-148065
438300004	CAMO-18-148066
1203923167	Method Blank (MB)
1203923168	Laboratory Control Sample (LCS)
1203923169	438210002(WST15-17-148261) Sample Duplicate (DUP)
1203923170	438210002(WST15-17-148261) 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.

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 438210002 (WST15-17-148261) 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:	Total Kjeldahl Nitrogen		
Analytical Batch:	1719954	Method:	TKN
Prep Batch :	1719953	Method:	EPA 351.2 Prep

Sample Analysis

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

Sample ID	Client ID
438300002	CAMO-18-148081
438300005	CAMO-18-148082
1203922359	Method Blank (MB)
1203922360	Laboratory Control Sample (LCS)
1203922363	438169001(WST15-18-150000) Sample Duplicate (DUP)
1203922364	438169001(WST15-18-150000) 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 438169001 (WST15-18-150000) 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	1203922364 (WST15-18-150000MS)	151* (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

Sample1203922360 (LCS) was re-analyzed due to instrument failure. The results from the reanalysis are reported. Samples438300002 (CAMO-18-148081) and 438300005 (CAMO-18-148082) 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

Product: Nitrate Nitrite by Cadmium Reduction

Analytical Batch: 1720508

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
438300001	CAMO-18-148065
438300004	CAMO-18-148066
1203923889	Method Blank (MB)
1203923890	Laboratory Control Sample (LCS)
1203923891	438300001(CAMO-18-148065) Sample Duplicate (DUP)
1203923892	438300001(CAMO-18-148065) 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 438300001 (CAMO-18-148065) 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 following samples 1203923891 (CAMO-18-148065DUP), 1203923892 (CAMO-18-148065PS) and 438300001 (CAMO-18-148065) were 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	438300
	001
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

Product:	Total Phosphorus		
Analytical Batch:	1720251	Method:	PO4
Prep Batch :	1720250	Method:	EPA 365.4 Prep

Sample Analysis

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

Sample ID	Client ID
438300001	CAMO-18-148065
438300004	CAMO-18-148066
1203923158	Method Blank (MB)
1203923159	Laboratory Control Sample (LCS)
1203923160	438169001(WST15-18-150000) Sample Duplicate (DUP)
1203923161	438169001(WST15-18-150000) 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 438169001 (WST15-18-150000) 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: 1720543

Method: TDS

Sample Analysis

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

Sample ID	Client ID
438300001	CAMO-18-148065
438300004	CAMO-18-148066
1203923971	Method Blank (MB)
1203923972	Laboratory Control Sample (LCS)
1203923973	438300001(CAMO-18-148065) 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 438300001 (CAMO-18-148065) 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	1203923973 (CAMO-18-148065DUP)	7.27* (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: 1721096

Method: EPA120.1 Specific Conductivity

Sample Analysis

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

Sample ID	Client ID
438300001	CAMO-18-148065
438300004	CAMO-18-148066
1203925380	Laboratory Control Sample (LCS)
1203925382	438005001(WST05-18-148667) 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

Calibration Verification Information

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

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 438005001 (WST05-18-148667) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: pH

Analytical Batch: 1721541 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
438300001	CAMO-18-148065
438300004	CAMO-18-148066
1203926489	Laboratory Control Sample (LCS)
1203926490	438206003(CAMO-18-147990) Sample Duplicate (DUP)
1203926491	438505010(CAMO-18-148064) 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

Samples 438206003 (CAMO-18-147990) and 438505010 (CAMO-18-148064) 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

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

Sample	Analyte	Value
1203926490 (CAMO-18-147990DUP)	pH	Received 17-NOV-17, out of holding 15-NOV-17
1203926491 (CAMO-18-148064DUP)	pH	Received 22-NOV-17, out of holding 20-NOV-17
438300001 (CAMO-18-148065)	pH	Received 18-NOV-17, out of holding 16-NOV-17
438300004 (CAMO-18-148066)	pH	Received 18-NOV-17, out of holding 16-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: 1721540 **Method:** EPA 310.1 Total Alkalinity

Sample Analysis

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

Sample ID	Client ID
438300001	CAMO-18-148065
438300004	CAMO-18-148066
1203926482	Laboratory Control Sample (LCS)
1203926485	438206003(CAMO-18-147990) Sample Duplicate (DUP)
1203926488	438206003(CAMO-18-147990) 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 438206003 (CAMO-18-147990) 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: 2018-945 GEL Work Order: 438300

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: 08 DEC 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: December 8, 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: 2018-945

Client Sample ID: CAMO-18-148065
Sample ID: 438300001
Matrix: W
Collect Date: 16-NOV-17 11:19
Receive Date: 18-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	0.0971	0.067	0.200	mg/L		1	MXL2	12/04/17	1850	1723476	1
Chloride		9.46	0.067	0.200	mg/L		1					
Fluoride		0.206	0.033	0.100	mg/L		1					
Sulfate		13.5	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.0613	0.017	0.050	mg/L	1.00	1	KLP1	11/21/17	0923	1720253	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		2.02	0.085	0.250	mg/L		5	AXH3	11/21/17	0715	1720508	3
PO4 "As Received"												
Phosphorus, Total as P	J	0.0253	0.020	0.050	mg/L	1.00	1	KLP1	11/21/17	1215	1720251	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		163	3.40	14.3	mg/L			VH1	11/22/17	1142	1720543	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		64.7	1.45	4.00	mg/L			RXB5	11/29/17	1458	1721540	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		214	1.00	1.00	umhos/cm		1	HXC1	11/27/17	1351	1721096	7
PH "As Received"												
pH at Temp 17.5C	H	7.95	0.010	0.100	SU		1	RXB5	11/29/17	1457	1721541	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	11/21/17	0800	1720252
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	AXH3	11/21/17	1030	1720250

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 8, 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: 2018-945

Client Sample ID: CAMO-18-148065
Sample ID: 438300001

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: December 8, 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: 2018-945

Client Sample ID: CAMO-18-148081
Sample ID: 438300002
Matrix: W
Collect Date: 16-NOV-17 11:19
Receive Date: 18-NOV-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	U	ND	0.330	1.00	mg/L		1	TSM	11/30/17	1846	1720555	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	11/22/17	0858	1720228	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	11/21/17	1617	1719954	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/22/17	0739	1720227
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	AXH3	11/21/17	1030	1719953

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: December 8, 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: 2018-945

Client Sample ID: CAMO-18-148066
Sample ID: 438300004
Matrix: W
Collect Date: 16-NOV-17 14:19
Receive Date: 18-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	MXL2	12/04/17	1919	1723476	1
Chloride		2.05	0.067	0.200	mg/L		1					
Fluoride		0.258	0.033	0.100	mg/L		1					
Sulfate		2.58	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	J	0.0419	0.017	0.050	mg/L	1.00	1	KLP1	11/21/17	0923	1720253	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		0.498	0.017	0.050	mg/L		1	AXH3	11/21/17	0719	1720508	3
PO4 "As Received"												
Phosphorus, Total as P	J	0.0206	0.020	0.050	mg/L	1.00	1	KLP1	11/21/17	1216	1720251	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		166	3.40	14.3	mg/L			VH1	11/22/17	1143	1720543	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		64.3	1.45	4.00	mg/L			RXB5	11/29/17	1459	1721540	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		153	1.00	1.00	umhos/cm		1	HXC1	11/27/17	1352	1721096	7
PH "As Received"												
pH at Temp 16.5C	H	8.09	0.010	0.100	SU		1	RXB5	11/29/17	1500	1721541	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	11/21/17	0800	1720252
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	AXH3	11/21/17	1030	1720250

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 8, 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: 2018-945

Client Sample ID: CAMO-18-148066
Sample ID: 438300004

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

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

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 8, 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: 2018-945

Client Sample ID: CAMO-18-148082
Sample ID: 438300005
Matrix: W
Collect Date: 16-NOV-17 14:19
Receive Date: 18-NOV-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	U	ND	0.330	1.00	mg/L		1	TSM	11/30/17	1930	1720555	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	11/22/17	0859	1720228	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	11/21/17	1618	1719954	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/22/17	0739	1720227
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	AXH3	11/21/17	1030	1719953

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

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

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 8, 2017

Page 1 of 6

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

Contact: Ms. Nita Patel

Workorder: 438300

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1720555										
QC1203927021	438305002	DUP									
Total Organic Carbon Average		J	0.550	J	0.514	mg/L	6.77 ^	(+/-1.00)	TSM	11/30/17	20:59
QC1203927019	LCS										
Total Organic Carbon Average	10.0				9.96	mg/L		99.6 (80%-120%)		11/30/17	12:35
QC1203927018	MB										
Total Organic Carbon Average			U		ND	mg/L				11/30/17	12:24
QC1203927023	438305002	PS									
Total Organic Carbon Average	10.0	J	0.550		10.7	mg/L		101 (75%-125%)		11/30/17	21:43
Flow Injection Analysis											
Batch	1720228										
QC1203923114	438005001	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	11/22/17	08:33
QC1203923113	LCS										
Cyanide, Total	50.0				49.6	ug/L		99.2 (90%-110%)		11/22/17	08:31
QC1203923112	MB										
Cyanide, Total			U		ND	ug/L				11/22/17	08:30
QC1203923116	438005001	MS									
Cyanide, Total	100	U	ND		106	ug/L		106 (90%-110%)		11/22/17	08:38
Ion Chromatography											
Batch	1723476										
QC1203931402	438912001	DUP									
Bromide		J	0.127	J	0.148	mg/L	14.6 ^	(+/-0.200)	MXL2	12/05/17	19:01

GEL LABORATORIES LLC

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

QC Summary

Workorder: 438300

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1723476										
Chloride		38.6		38.7	mg/L	0.0103		(0%-20%)	MXL2	12/05/17	17:35
Fluoride		0.382		0.313	mg/L	19.9	^	(+/-0.100)		12/05/17	19:01
Sulfate		18.8		18.7	mg/L	0.511		(0%-20%)			
QC1203931401 LCS											
Bromide	1.25			1.25	mg/L		99.8	(80%-120%)		12/04/17	16:54
Chloride	5.00			4.86	mg/L		97.2	(80%-120%)			
Fluoride	2.50			2.57	mg/L		103	(80%-120%)			
Sulfate	10.0			9.91	mg/L		99.1	(80%-120%)			
QC1203931400 MB											
Bromide			U	ND	mg/L					12/04/17	16:26
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203931403 438912001 PS											
Bromide	1.25	J	0.127	1.41	mg/L		102	(75%-125%)		12/05/17	19:30
Chloride	5.00		3.86	8.97	mg/L		102	(75%-125%)		12/05/17	18:03
Fluoride	2.50		0.382	2.76	mg/L		95.3	(75%-125%)		12/05/17	19:30
Sulfate	10.0		18.8	30.3	mg/L		114	(75%-125%)			

GEL LABORATORIES LLC

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

QC Summary

Workorder: 438300

Page 3 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1719954										
QC1203922363	438169001	DUP									
Nitrogen, Total Kjeldahl		1.15		1.18	mg/L	2.58		(0%-20%)	KLP1	11/21/17	15:50
QC1203922360	LCS										
Nitrogen, Total Kjeldahl	1.00			1.08	mg/L		108	(90%-110%)		11/21/17	15:45
QC1203922359	MB										
Nitrogen, Total Kjeldahl			U	ND	mg/L					11/21/17	15:38
QC1203922364	438169001	MS									
Nitrogen, Total Kjeldahl	1.00	1.15		2.66	mg/L		151 *	(90%-110%)		11/21/17	15:51
Batch	1720251										
QC1203923160	438169001	DUP									
Phosphorus, Total as P		0.122		0.116	mg/L	5.04 ^		(+/-0.050)	KLP1	11/21/17	12:11
QC1203923159	LCS										
Phosphorus, Total as P	1.00			1.05	mg/L		105	(80%-124%)		11/21/17	12:05
QC1203923158	MB										
Phosphorus, Total as P			U	ND	mg/L					11/21/17	12:04
QC1203923161	438169001	MS									
Phosphorus, Total as P	1.00	0.122		1.17	mg/L		105	(63%-139%)		11/21/17	12:12
Batch	1720253										
QC1203923169	438210002	DUP									
Nitrogen, Ammonia		0.0613		0.0592	mg/L	3.49 ^		(+/-0.050)	KLP1	11/21/17	09:21
QC1203923168	LCS										
Nitrogen, Ammonia	1.00			1.02	mg/L		102	(90%-110%)		11/21/17	09:13
QC1203923167	MB										
Nitrogen, Ammonia			U	ND	mg/L					11/21/17	09:12

GEL LABORATORIES LLC

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

QC Summary

Workorder: 438300

Page 4 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1720253										
QC1203923170	438210002	MS									
Nitrogen, Ammonia	1.00	0.0613		1.09	mg/L		103	(90%-110%)	KLP1	11/21/17	09:22
Batch	1720508										
QC1203923891	438300001	DUP									
Nitrogen, Nitrate/Nitrite		2.02		2.01	mg/L	0.496		(0%-20%)	AXH3	11/21/17	07:16
QC1203923890	LCS										
Nitrogen, Nitrate/Nitrite	1.00			1.01	mg/L		101	(90%-110%)		11/21/17	07:14
QC1203923889	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					11/21/17	07:13
QC1203923892	438300001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.404		1.41	mg/L		101	(90%-110%)		11/21/17	07:17
Solids Analysis											
Batch	1720543										
QC1203923973	438300001	DUP									
Total Dissolved Solids		163		151	mg/L	7.27*		(0%-5%)	VH1	11/22/17	11:42
QC1203923972	LCS										
Total Dissolved Solids	300			287	mg/L		95.7	(95%-105%)		11/22/17	11:40
QC1203923971	MB										
Total Dissolved Solids			U	ND	mg/L					11/22/17	11:39
Titration and Ion Analysis											
Batch	1721096										
QC1203925382	438005001	DUP									
Conductivity		190		188	umhos/cm	1.22		(0%-10%)	HXC1	11/27/17	13:23
QC1203925380	LCS										
Conductivity	1410			1390	umhos/cm		98.4	(95%-105%)		11/27/17	13:19

GEL LABORATORIES LLC

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

QC Summary

Workorder: 438300

Page 5 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1721540										
QC1203926485 438206003 DUP											
Alkalinity, Total as CaCO3		U	ND	U	ND	mg/L	N/A		RXB5	11/29/17	14:49
Carbonate alkalinity (CaCO3)		U	ND	U	ND	mg/L	N/A				
QC1203926482 LCS											
Alkalinity, Total as CaCO3	100				107	mg/L		107 (90%-110%)		11/29/17	14:19
QC1203926488 438206003 MS											
Alkalinity, Total as CaCO3	100	U	ND		108	mg/L		107 (80%-120%)		11/29/17	14:50
Batch	1721541										
QC1203926490 438206003 DUP											
pH		H	6.47	H	6.29	SU	2.82	(0%-5%)	RXB5	11/29/17	14:46
QC1203926491 438505010 DUP											
pH		H	8.07	H	8.08	SU	0.124	(0%-5%)		11/29/17	15:13
QC1203926489 LCS											
pH	7.00				7.00	SU		100 (99%-101%)		11/29/17	14:18

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

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

Workorder: 438300[illegible]

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 #: 2018-945
Work Order #: 438300**

Method/Analysis Information

Product: Alphaspec Am241 Liquid

Analytical Method: HASL-300:AM-241

Analytical Batch Number: 1720756

Sample ID	Client ID
438300002	CAMO-18-148081
438300005	CAMO-18-148082
1203924519	Method Blank (MB)
1203924521	Laboratory Control Sample (LCS)
1203924520	438210002(WST15-17-148261) 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 1203924519 (MB) and 1203924521 (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: 438210002 (WST15-17-148261). The QC was from ARSL work order 438210.

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: ISOPU
Analytical Method: HASL-300:ISOPU
Analytical Batch Number: 1720757

Sample ID	Client ID
438300002	CAMO-18-148081
438300005	CAMO-18-148082
1203924522	Method Blank (MB)
1203924524	Laboratory Control Sample (LCS)
1203924523	438210002(WST15-17-148261) 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 1203924522 (MB) and 1203924524 (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: 438210002 (WST15-17-148261). The QC was from ARSL work order 438210.

Duplication Criteria between QC Sample and Duplicate Sample

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

RDL Met

Sample (See Below) did not meet the detection limit 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 sample was counted the maximum count time of in order to achieve the lowest possible MDAs.

Sample	Analyte	Value
438300002 (CAMO-18-148081)	Plutonium-239/240	Result 0.00000000353 < MDA 0.0558 > 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 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

Sample 438300005 (CAMO-18-148082) 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.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product: IsoU
Analytical Method: HASL-300:ISOU
Analytical Batch Number: 1720758

Sample ID	Client ID
438300002	CAMO-18-148081
438300005	CAMO-18-148082
1203924525	Method Blank (MB)
1203924527	Laboratory Control Sample (LCS)
1203924526	438210002(WST15-17-148261) 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 1203924525 (MB) and 1203924527 (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
1203924525 (MB)	Uranium-233/234	Blank result > 1.65 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: 438210002 (WST15-17-148261). The QC was from ARSL work order 438210.

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:

Gammascpec

Analytical Method: EPA:901.1

Analytical Batch Number: 1720336

Sample ID	Client ID
438300002	CAMO-18-148081
438300005	CAMO-18-148082
1203923398	Method Blank (MB)
1203923400	Laboratory Control Sample (LCS)
1203923399	438210002(WST15-17-148261) 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, July 2017, October 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 volume in this batch.

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: 438210002 (WST15-17-148261). The QC was from ARSL work order 438210.

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

None of the samples in this sample set were recounted.

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: 1720592

Sample ID	Client ID
438300002	CAMO-18-148081
438300005	CAMO-18-148082
1203924110	Method Blank (MB)
1203924113	Laboratory Control Sample (LCS)
1203924111	438200003(CAMO-18-147983) Sample Duplicate (DUP)
1203924112	438200003(CAMO-18-147983) 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

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 1203924110 (MB) and 1203924113 (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: 438200003 (CAMO-18-147983). The QC was from ARSL work order 438200.

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 1203924111 (CAMO-18-147983DUP) 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

The matrix spike, 1203924112 (CAMO-18-147983MS), aliquot was reduced to conserve sample volume.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product:	WSP-GrossA/B
Analytical Method:	EPA 900.0/SW846 9310
Analytical Batch Number:	1720594

Sample ID	Client ID
438300002	CAMO-18-148081
438300005	CAMO-18-148082
1203924114	Method Blank (MB)
1203924118	Laboratory Control Sample (LCS)
1203924115	438300002(CAMO-18-148081) Sample Duplicate (DUP)
1203924116	438300002(CAMO-18-148081) Matrix Spike (MS)
1203924117	438300002(CAMO-18-148081) 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 Calibrations were performed in December 2016 and December 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 1203924114 (MB) and 1203924118 (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: 438300002 (CAMO-18-148081). The QC was from ARSL work order 438300.

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

Samples 1203924115 (CAMO-18-148081DUP) and 438300002 (CAMO-18-148081) were recounted due to high relative percent difference/relative error ratio. The recounts are 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, 1203924116 (CAMO-18-148081MS) and 1203924117 (CAMO-18-148081MSD), 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: 2018-945 GEL Work Order: 438300

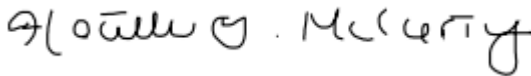
The Qualifiers in this report are defined as follows:

- * 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.

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: 14 DEC 2017

Title: Analyst II

Sample Data Summary

GEL LABORATORIES LLC

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

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 14, 2017

Client Sample ID: CAMO-18-148081
Sample ID: 438300002
Matrix: W
Collect Date: 16-NOV-17
Receive Date: 18-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.
Rad Alpha Spec Analysis															
<i>Alphaspec Am241 Liquid "As Received"</i>															
Americium-241	U	0.00792	+/-0.0056	0.0353	0.0149	+/-0.00561	0.050	pCi/L			BXA4	11/28/17	1323	1720756	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	0.0159	+/-0.00837	0.039	0.0159	+/-0.00839	0.050	pCi/L			BXA4	11/28/17	1323	1720757	2
Plutonium-239/240	U	3.53E-09	+/-0.0112	0.0558	0.0243	+/-0.0112	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		0.358	+/-0.0471	0.247	0.116	+/-0.0518	1.00	pCi/L			BXA4	11/28/17	1311	1720758	3
Uranium-235/236	U	0.0561	+/-0.0231	0.109	0.0448	+/-0.0233	1.00	pCi/L							
Uranium-238		0.182	+/-0.0335	0.146	0.0651	+/-0.0352	0.500	pCi/L							
Rad Gamma Spec Analysis															
<i>Gammasespec "As Received"</i>															
Cesium-137	U	-1.7	+/-1.59	5.73	2.60	+/-1.64	8.00	pCi/L			BSW1	11/28/17	1307	1720336	4
Cobalt-60	U	3.30	+/-1.12	5.65	2.44	+/-1.36	8.00	pCi/L							
Neptunium-237	U	-0.354	+/-2.08	7.74	3.53	+/-2.09		pCi/L							
Potassium-40	U	-7.59	+/-15.2	59.6	26.0	+/-15.3		pCi/L							
Sodium-22	U	0.533	+/-0.934	4.09	1.67	+/-0.943		pCi/L							
Rad Gas Flow Proportional Counting															
<i>GFPC, Sr90, liquid "As Received"</i>															
Strontium-90	U	0.00748	+/-0.0986	0.365	0.161	+/-0.0986	0.500	pCi/L			LXB3	12/01/17	0827	1720592	5
<i>WSP-GrossA/B "As Received"</i>															
Beta	U	1.13	+/-0.822	2.76	1.22	+/-0.828	3.00	pCi/L			AXH4	11/30/17	1503	1720594	6
Alpha	U	0.232	+/-0.654	2.82	0.983	+/-0.654	3.00	pCi/L			AXH4	12/01/17	1133	1720594	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"	1720756	92.5	(50%-105%)
Plutonium-242 Tracer	ISOPU "As Received"	1720757	68	(50%-105%)
Uranium-232 Tracer	IsoU "As Received"	1720758	75.3	(50%-105%)

GEL LABORATORIES LLC

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

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-18-148081

Sample ID: 438300002

Project: ESHL00114

Client ID: ARSL004

Report Date: December 14, 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"							1720592	103	(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

GEL LABORATORIES LLC

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

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-18-148082

Sample ID: 438300005

Matrix: W

Collect Date: 16-NOV-17

Receive Date: 18-NOV-17

Collector: Client

Report Date: December 14, 2017

Project: ESHL00114

Client ID: ARSL004

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Analysis															
<i>Alphaspec Am241 Liquid "As Received"</i>															
Americium-241	U	0.0219	+/-0.00772	0.0355	0.015	+/-0.00778	0.050	pCi/L			BXA4	11/28/17	1323	1720756	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	0.00885	+/-0.00626	0.0326	0.0133	+/-0.00627	0.050	pCi/L			BXA4	11/28/17	1323	1720757	2
Plutonium-239/240	U	0.00664	+/-0.00734	0.0467	0.0203	+/-0.00735	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		0.518	+/-0.0488	0.192	0.090	+/-0.0567	1.00	pCi/L			BXA4	11/28/17	1311	1720758	3
Uranium-235/236	U	0.0708	+/-0.0216	0.0843	0.0348	+/-0.022	1.00	pCi/L							
Uranium-238		0.172	+/-0.031	0.113	0.0505	+/-0.0324	0.500	pCi/L							
Rad Gamma Spec Analysis															
<i>Gammasespec "As Received"</i>															
Cesium-137	U	-2.09	+/-1.46	4.64	2.02	+/-1.54	8.00	pCi/L			BSW1	11/28/17	1307	1720336	4
Cobalt-60	U	-1.76	+/-1.50	5.18	2.17	+/-1.56	8.00	pCi/L							
Neptunium-237	U	1.15	+/-2.14	8.03	3.64	+/-2.16		pCi/L							
Potassium-40	U	22.2	+/-18.4	76.8	34.2	+/-19.2		pCi/L							
Sodium-22	U	0.908	+/-1.22	5.22	2.20	+/-1.24		pCi/L							
Rad Gas Flow Proportional Counting															
<i>GFPC, Sr90, liquid "As Received"</i>															
Strontium-90	U	-0.268	+/-0.0947	0.440	0.193	+/-0.0948	0.500	pCi/L			LXB3	12/01/17	0825	1720592	5
<i>WSP-GrossA/B "As Received"</i>															
Beta	U	0.166	+/-0.800	2.90	1.29	+/-0.801	3.00	pCi/L			AXH4	11/29/17	1524	1720594	6
Alpha	U	1.72	+/-0.934	2.96	1.14	+/-0.945	3.00	pCi/L			AXH4	12/01/17	1133	1720594	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"	1720756	88	(50%-105%)
Plutonium-242 Tracer		ISOPU "As Received"	1720757	74.8	(50%-105%)
Uranium-232 Tracer		IsoU "As Received"	1720758	72.8	(50%-105%)
Strontium Carrier		GFPC, Sr90, liquid "As Received"	1720592	90.4	(50%-105%)

GEL LABORATORIES LLC

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

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-18-148082

Sample ID: 438300005

Project: ESHL00114

Client ID: ARSL004

Report Date: December 14, 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	

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 14, 2017

Page 1 of 6

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

Los Alamos, New Mexico

Contact: Ms. Nita Patel

Workorder: 438300

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	1720756										
QC1203924520	438210002	DUP									
Americium-241	U	0.022	U	0.00519	pCi/L	0.474		(0-1)	BXA4	11/28/17	13:23
	Uncert:	+/-0.00869		+/-0.00898							
	TPU:	+/-0.00875		+/-0.00898							
**Americium-243 Tracer	2.62	1.66		1.80	pCi/L		68.5	(50%-105%)			
	Uncert:	+/-0.0844		+/-0.0822							
	TPU:	+/-0.148		+/-0.146							
QC1203924521	LCS										
Americium-241	1.97			1.87	pCi/L		95.1	(80%-120%)	BXA4	11/28/17	13:16
	Uncert:			+/-0.0633							
	TPU:			+/-0.107							
**Americium-243 Tracer	2.10			1.93	pCi/L		92	(50%-105%)			
	Uncert:			+/-0.0665							
	TPU:			+/-0.118							
QC1203924519	MB										
Americium-241			U	0.00686	pCi/L				BXA4	11/28/17	13:23
	Uncert:			+/-0.0042							
	TPU:			+/-0.00421							
**Americium-243 Tracer	2.10			1.83	pCi/L		87.1	(50%-105%)			
	Uncert:			+/-0.0596							
	TPU:			+/-0.110							
Batch	1720757										
QC1203924523	438210002	DUP									
Plutonium-238	U	1.32E-09	U	0.00432	pCi/L	0.139		(0-1)	BXA4	11/28/17	13:23
	Uncert:	+/-0.00747		+/-0.00809							
	TPU:	+/-0.00748		+/-0.00809							
Plutonium-239/240	U	0.0106	U	-0.00864	pCi/L	0.596		(0-1)			
	Uncert:	+/-0.00747		+/-0.00864							
	TPU:	+/-0.00749		+/-0.00864							
**Plutonium-242 Tracer	2.47	1.59		1.86	pCi/L		75.6	(50%-105%)			
	Uncert:	+/-0.081		+/-0.0738							
	TPU:	+/-0.134		+/-0.125							
QC1203924524	LCS										
Plutonium-238			U	0.0145	pCi/L			(80%-120%)	BXA4	11/28/17	13:16
	Uncert:			+/-0.0096							
	TPU:			+/-0.00963							
Plutonium-239/240	1.98			1.66	pCi/L		83.9	(80%-120%)			
	Uncert:			+/-0.0699							
	TPU:			+/-0.106							
**Plutonium-242 Tracer	1.97			1.39	pCi/L		70.6	(50%-105%)			
	Uncert:			+/-0.0762							
	TPU:			+/-0.121							

GEL LABORATORIES LLC

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

QC Summary

Workorder: 438300

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	1720757										
QC1203924522	MB										
Plutonium-238			U	0.0078	pCi/L				BXA4	11/28/17	13:23
				Uncert:							
				TPU:							
Plutonium-239/240			U	0.00195	pCi/L						
				Uncert:							
				TPU:							
**Plutonium-242 Tracer	1.97			1.40	pCi/L		71	(50%-105%)			
				Uncert:							
				TPU:							
Batch	1720758										
QC1203924526	438210002	DUP									
Uranium-234		0.786		0.812	pCi/L	0.0855		(0-1)	BXA4	11/28/17	13:11
		Uncert:		+/-0.0586							
		TPU:		+/-0.0737							
Uranium-235/236		U	0.0448	U	0.0405	pCi/L	0.0599	(0-1)			
		Uncert:		+/-0.0166							
		TPU:		+/-0.0168							
Uranium-238		0.388		0.359	pCi/L	0.151		(0-1)			
		Uncert:		+/-0.0401							
		TPU:		+/-0.0447							
**Uranium-232 Tracer	2.62	1.85		2.11	pCi/L		80.5	(50%-105%)			
		Uncert:		+/-0.106							
		TPU:		+/-0.179							
QC1203924527	LCS										
Uranium-234				2.61	pCi/L				BXA4	11/28/17	13:11
		Uncert:		+/-0.105							
		TPU:		+/-0.186							
Uranium-235/236				0.215	pCi/L						
		Uncert:		+/-0.0342							
		TPU:		+/-0.0365							
Uranium-238	2.70			2.65	pCi/L		98.3	(80%-120%)			
		Uncert:		+/-0.106							
		TPU:		+/-0.188							
**Uranium-232 Tracer	2.09			1.50	pCi/L		71.4	(50%-105%)			
		Uncert:		+/-0.0949							
		TPU:		+/-0.155							
QC1203924525	MB										
Uranium-234			U	0.0381	pCi/L				BXA4	11/28/17	13:11
		Uncert:		+/-0.0141							
		TPU:		+/-0.0143							
Uranium-235/236			U	-0.00216	pCi/L						
		Uncert:		+/-0.00875							
		TPU:		+/-0.00876							
Uranium-238			U	0.0149	pCi/L						
		Uncert:		+/-0.0103							
		TPU:		+/-0.0103							

GEL LABORATORIES LLC

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

QC Summary

Workorder: 438300

Page 3 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	1720758										
**Uranium-232 Tracer	2.09			1.70	pCi/L		81	(50%-105%)			
	Uncert:			+/-0.0846							
	TPU:			+/-0.143							
Rad Gamma Spec											
Batch	1720336										
QC1203923399	438210002	DUP									
Cesium-137	U	-1.38	U	-2.98	pCi/L	0.27		(0-1)	BSW1	11/28/17	16:08
	Uncert:	+/-1.41		+/-1.35							
	TPU:	+/-1.44		+/-1.52							
Cobalt-60	U	1.56	U	0.927	pCi/L	0.132		(0-1)			
	Uncert:	+/-1.51		+/-0.814							
	TPU:	+/-1.55		+/-0.842							
Neptunium-237	U	-0.677	U	2.23	pCi/L	0.297		(0-1)			
	Uncert:	+/-2.32		+/-2.51							
	TPU:	+/-2.32		+/-2.57							
Potassium-40	U	2.63	U	-21.2	pCi/L	0.359		(0-1)			
	Uncert:	+/-14.6		+/-17.9							
	TPU:	+/-14.6		+/-18.6							
Sodium-22	U	1.15	U	-0.236	pCi/L	0.266		(0-1)			
	Uncert:	+/-1.50		+/-1.07							
	TPU:	+/-1.52		+/-1.08							
QC1203923400	LCS										
Americium-241	34300			37200	pCi/L		108	(80%-120%)	BSW1	11/29/17	05:36
	Uncert:			+/-864							
	TPU:			+/-1970							
Cesium-137	13000			13000	pCi/L		100	(80%-120%)			
	Uncert:			+/-176							
	TPU:			+/-572							
Cobalt-60	11200			11700	pCi/L		105	(80%-120%)			
	Uncert:			+/-193							
	TPU:			+/-560							
Neptunium-237			U	3.70	pCi/L						
	Uncert:			+/-61.1							
	TPU:			+/-61.1							
Potassium-40			U	54.5	pCi/L						
	Uncert:			+/-102							
	TPU:			+/-103							
Sodium-22			U	11.2	pCi/L						
	Uncert:			+/-18.9							
	TPU:			+/-19.0							
QC1203923398	MB										
Cesium-137			U	-0.541	pCi/L				BSW1	11/28/17	13:08
	Uncert:			+/-1.74							
	TPU:			+/-1.75							
Cobalt-60			U	-1.43	pCi/L						
	Uncert:			+/-1.32							

GEL LABORATORIES LLC

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

QC Summary

Workorder: 438300

Page 4 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	1720336										
Neptunium-237	TPU:			+/-1.36							
			U	-1.36	pCi/L						
	Uncert:			+/-2.77							
Potassium-40	TPU:			+/-2.79							
			U	-29.1	pCi/L						
	Uncert:			+/-21.4							
Sodium-22	TPU:			+/-22.4							
			U	0.625	pCi/L						
	Uncert:			+/-1.26							
	TPU:			+/-1.27							
Rad Gas Flow											
Batch	1720592										
QC1203924111	438200003	DUP									
Strontium-90	U	-0.0179	U	0.00971	pCi/L	0.0626		(0-1)	LXB3	12/04/17	07:55
	Uncert:	+/-0.115		+/-0.106							
	TPU:	+/-0.115		+/-0.106							
**Strontium Carrier	7.85	7.30		6.10	mg		77.7	(50%-105%)			
QC1203924113	LCS										
Strontium-90	23.7			22.2	pCi/L		93.8	(80%-120%)	LXB3	12/01/17	08:27
	Uncert:			+/-0.618							
	TPU:			+/-1.95							
**Strontium Carrier	7.85			6.90	mg		87.9	(50%-105%)			
QC1203924110	MB										
Strontium-90			U	0.0368	pCi/L				LXB3	12/01/17	08:22
	Uncert:			+/-0.0762							
	TPU:			+/-0.0763							
**Strontium Carrier	7.85			7.30	mg		93	(50%-105%)			
QC1203924112	438200003	MS									
Strontium-90	474	U	-0.0179	461	pCi/L		97.3	(75%-125%)	LXB3	12/01/17	08:27
	Uncert:		+/-0.115	+/-13.0							
	TPU:		+/-0.115	+/-40.6							
**Strontium Carrier	7.85	7.30		6.60	mg		84.1	(50%-105%)			
Batch	1720594										
QC1203924115	438300002	DUP									
Alpha	U	0.232	U	1.26	pCi/L	0.346		(0-1)	AXH4	12/01/17	11:33
	Uncert:	+/-0.654		+/-0.827							
	TPU:	+/-0.654		+/-0.834							
Beta	U	1.13	U	0.430	pCi/L	0.219		(0-1)		11/30/17	15:02
	Uncert:	+/-0.822		+/-0.763							
	TPU:	+/-0.828		+/-0.764							
QC1203924118	LCS										
Alpha	12.1			13.0	pCi/L		107	(80%-120%)	AXH4	12/01/17	11:33
	Uncert:			+/-0.597							
	TPU:			+/-1.24							
Beta	47.3			52.3	pCi/L		110	(80%-120%)		11/29/17	15:24

GEL LABORATORIES LLC

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

QC Summary

Workorder: 438300

Page 5 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	1720594										
				Uncert:							
				TPU:							
QC1203924114	MB										
Alpha			U	-0.0732	pCi/L				AXH4	12/01/17	11:33
				Uncert:							
				TPU:							
Beta			U	-0.0531	pCi/L					11/29/17	15:24
				Uncert:							
				TPU:							
QC1203924116	438300002	MS									
Alpha	483	U	0.232	496	pCi/L		103	(75%-125%)	AXH4	12/01/17	11:33
				Uncert:							
				TPU:							
Beta	1890	U	1.13	1960	pCi/L		104	(75%-125%)		11/29/17	15:24
				Uncert:							
				TPU:							
QC1203924117	438300002	MSD									
Alpha	483	U	0.232	489	pCi/L	0.0347	101	(0-1)	AXH4	12/01/17	11:33
				Uncert:							
				TPU:							
Beta	1890	U	1.13	2120	pCi/L	0.225	112	(0-1)		11/29/17	15:24
				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.

GEL LABORATORIES LLC

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

QC Summary

Workorder: 438300

Page 6 of 6

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.