

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:

Data for Field Sample ID CASA-18-148003 data begins on page 338.

[illegible]

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-147996

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11-13-17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1441		MEDIA:		
PRS ID:	NA		SAMPLE TECH CODE:	RSP	
LOCATION ID:	SCI-1		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:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

TV 11-13-17

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CASA-18-147996**WORK ORDER:****COLLECTED BY (PRINT):** A. Vigil, K. Tow

RELINQUISHED BY (Printed Name) Tanya Vander Vis (Signature) <i>Tanya Vander Vis</i>	Date/Time 11-13-17 1520	RECEIVED BY (Printed Name) S. Sherwood (Signature) <i>S. Sherwood</i>	Date/Time 11-13-17 1520
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-147997

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11-13-17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1051		MEDIA:		
PRS ID:	NA		SAMPLE TECH CODE:	RSP	
LOCATION ID:	SCI-2		FIELD PREP:	F	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / <u>NA</u>

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

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

tv 11-13-17

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CASA-18-147997**WORK ORDER:**

COLLECTED BY (PRINT): A. Vigil, K. Tow

RELINQUISHED BY (Printed Name) Tanya VanderVis (Signature) <i>Tanya VanderVis</i>	Date/Time 11-13-17 1520	RECEIVED BY (Printed Name) <i>Ranee Orstott</i> (Signature) <i>Ranee Orstott</i>	Date/Time 11/13/17 1520
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-148003

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11-13-17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1441 1406 TV 11-13-17		MEDIA:		
PRS ID:	NA		SAMPLE TECH CODE:	RSP	
LOCATION ID:	SCI-1		FIELD PREP:	UF	
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	MSGP-Hg	500 ML POLY	1	HNO3	Y	NA
	WSP-8082-PCB	1 LITER AMBER GLASS	3	ICE		
	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C- SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-GrossA/B	1 LITER POLY	1	HNO3		
	WSP-LL-H-3	1 LITER POLY	1	NONE		
	WSP-RAD	1 GAL POLY	1	HNO3		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-148003

WORK ORDER:

SAMPLE COMMENTS:

none

LOCATION COMMENTS:

none

FIELD PARAMETERS:

Sample Time	<u>1441</u>	HH:MM	Discharge Rate	<u>0.96</u> gpm	Dissolved Oxygen	<u>8.97</u> mg/L
Groundwater Elevation	<u>6364.40</u> msl		Oxidation-Reduction Potential	<u>100.2</u> mV	Period Purge Volume	<u>NA</u>
pH	<u>7.16</u>		Purge Volume	<u>4.31</u> <u>8.15</u> gal.	Specific Conductance	<u>100.2</u> μ S/cm
Temperature	<u>10.4</u> °C		Total Volume Pumped	<u>8.15</u> gal	Turbidity	<u>1.8</u> NTU

COLLECTED BY (PRINT): A. Vigil, K. Tow

RELINQUISHED BY (Printed Name) Tanya VanderVis (Signature) <i>Tanya VanderVis</i>	Date/Time 11-13-17 1520	RECEIVED BY (Printed Name) S. Sherwood (Signature) <i>S. Sherwood</i>	Date/Time 11-13-17 1520
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-148004

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11-13-17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1051		MEDIA:		
PRS ID:	NA		SAMPLE TECH CODE:	RSP	
LOCATION ID:	SCI-2		FIELD PREP:	UF	
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	MSGP-Hg	500 ML POLY	1	HNO3	Y	NA
	WSP-8082-PCB	1 LITER AMBER GLASS	3	ICE		
	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C- SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-GrossA/B	1 LITER POLY	1	HNO3		
	WSP-H-3	250 ML AMBER GLASS	1	ICE		
	WSP-RAD	1 GAL POLY	1	HNO3		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-148004

WORK ORDER:

SAMPLE COMMENTS:

none

LOCATION COMMENTS:

none

FIELD PARAMETERS:

Sample Time	1051	HH:MM	Discharge Rate	0.78gpm	Dissolved Oxygen	8.17 mg/L
Groundwater Elevation	6189.77'	msl	Oxidation-Reduction Potential	165.6 mV	Period Purge Volume	NA
pH	7.37		Purge Volume	16.38gal	Specific Conductance	621 μ S/cm
Temperature	14.1	°C	Total Volume Pumped	41.34gal	Turbidity	0.92 NTU

COLLECTED BY (PRINT): A. Vigil, K. Tow

RELINQUISHED BY (Printed Name) Tanya VanderVis (Signature) Tanya VanderVis	Date/Time 11-13-17 1520	RECEIVED BY (Printed Name) Rana Ongelt (Signature) Rana Ongelt	Date/Time 11/13/17 1520
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-148009

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11-13-17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1441		MEDIA:		
PRS ID:	NA		SAMPLE TECH CODE:	DC	
LOCATION ID:	SCI-1		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	FB	
TOP DEPTH:			SAMPLE USAGE:	QC	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8082-PCB	1 LITER AMBER GLASS	3	ICE	Y	NA
	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C- SVOA	1 LITER AMBER GLASS	2	ICE		

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

COLLECTED BY (PRINT): A. Vigil

RELINQUISHED BY (Printed Name) Tanya VanderVies (Signature) Tanya VanderVies	Date/Time 11-13-17 1520	RECEIVED BY (Printed Name) S. Sherwood (Signature) S. Sherwood	Date/Time 11/13/17 1520
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-148013

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11-13-17	OK NA 11-13-17	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1441		MEDIA:		
PRS ID:	NA		SAMPLE TECH CODE:	DC	
LOCATION ID:	SCI-1		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	1/2 11/13/17	HCL	Y	NA

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

COLLECTED BY (PRINT): A. Vigil, K. Tow

RELINQUISHED BY (Printed Name) Tanya Vander Vis (Signature) Tanya Vander Vis	Date/Time 11-13-17 1520	RECEIVED BY (Printed Name) S. Sherwood (Signature) S. Sherwood	Date/Time 11/13/17 15:20
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-148011

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11-13-17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1051		MEDIA:		
PRS ID:	NA		SAMPLE TECH CODE:	RSP	
LOCATION ID:	SCI-2		FIELD PREP:	F	
LOCATION TYPE:	NA		FIELD QC TYPE:	FD	
TOP DEPTH:			SAMPLE USAGE:	QC	
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:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CASA-18-148011**WORK ORDER:****COLLECTED BY (PRINT):** A. Vigil, K. Tow

RELINQUISHED BY (Printed Name) Tanya Vander Vis (Signature) <i>Tanya Vander Vis</i>	Date/Time 11-13-17 1520	RECEIVED BY (Printed Name) Raneel Orsola (Signature) <i>Raneel Orsola</i>	Date/Time 11/13/17 1520
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-148012

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11-13-17	OK NA 11-13-17	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1051		MEDIA:		
PRS ID:	NA		SAMPLE TECH CODE:	RSP	
LOCATION ID:	SCI-2		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	FD	
TOP DEPTH:			SAMPLE USAGE:	QC	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	500 ML POLY	1	HNO3	Y	NA
	WSP-8082-PCB	1 LITER AMBER GLASS	3	ICE		
	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C- SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-GrossA/B	1 LITER POLY	1	HNO3		
	WSP-H-3	250 ML AMBER GLASS	1	ICE		
	WSP-RAD	1 GAL POLY	1	HNO3		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CASA-18-148012**WORK ORDER:****SAMPLE COMMENTS:****LOCATION COMMENTS:****FIELD PARAMETERS:**

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

TV 11-13-17

COLLECTED BY (PRINT): A. Vigil, K. Tow

RELINQUISHED BY (Printed Name) Tanya Vander Vis (Signature) Tanya Vander Vis	Date/Time 11-13-17 1520	RECEIVED BY (Printed Name) S. Sherwood (Signature) S. Sherwood	Date/Time 11/13/17 1520
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-148014

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11-13-17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1051		MEDIA:		
PRS ID:	NA		SAMPLE TECH CODE:	DC	
LOCATION ID:	SCI-2		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	FTB	
TOP DEPTH:			SAMPLE USAGE:	QC	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / <u>NA</u>

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	11/13/17	HCL	Y	NA

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

TV 11-13-17

COLLECTED BY (PRINT): A. Vigil, K. Tow

RELINQUISHED BY (Printed Name) Tanya Vandervort (Signature) Tanya Vandervort	Date/Time 11-13-17 1520	RECEIVED BY (Printed Name) S. Shewood (Signature) S. Shewood	Date/Time 11-13-17 1520
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

1 Sampling Plan ID/Name: 11552

COC: 2018-888

TEST – Explosives		YES	NO
2 Samples collected from a WFO area?			X
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?		X	
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.			X

TEST – Field Screen			YES	NO
6 The sample has field screening measurements of alpha activity and beta activity?				X
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		X
8 Alpha ≥ 125	AND Alpha ≥ 1,250,000	AT other locations		X
9 Beta ≥ 1,500	AND Beta ≥ 15,000,000	AT any location		X
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.				X
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.				X
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.				X

TEST - Location			YES	NO
13 Prior analytical measurements of radioactive isotopes are available?			X	
Sample Activity (pCi/g)	Shipment Activity (pCi)		YES	NO
• Am-241 ≥ 27 pCi/g	AND	Am-241 ≥ 270,000 pCi Total		
• 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		X
• 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.				X
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.				X

TEST – AK		YES	NO
17 The shippers documented knowledge of the sample positively identifies appropriate labeling.			X
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.			X

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) Tanya Vander Vis	11-13-17
(Signature) Tanya Vander Vis	1520

Hazard Assessment Reviewed By:	Date/Time
(Printed Name) Renee Onstott	11/13/17
(Signature) Renee Onstott	1520

DATA VALIDATION REPORT

Chain Of Custody No. 2018-888

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
441471	EPA:900	1				

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
441471	EPA:900	1731351	1731351	1					1	1	1			1			1				

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:900	RAD	CASA-18-148003	1203951650	DUP	1	0	0	0
EPA:900	RAD	CASA-18-148003	1203951651	MS	0	0	1	0
EPA:900	RAD	CASA-18-148003	1203951652	MSD	0	0	1	0
EPA:900	RAD	CASA-18-148003	441471001	REG	1	0	0	0
EPA:900	RAD	LCS	1203951653	LCS	0	0	1	0
EPA:900	RAD	MB	1203951649	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

DATA VALIDATION REPORT

No.

6. Any surrogate recoveries outside the control limits?

No.

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

No.

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

No.

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

None.

Reason Code

Description

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Reason Code

Description

NQ

The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualifier. The analyte is detected in the sample.

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-18-148003	SCI-1	REG	EPA:900	0	1

DATA VALIDATION REPORT

Chain Of Custody No. 2018-888

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
437939	EPA:120.1	2	1			
437939	EPA:150.1	2	1			
437939	EPA:160.1	2	1			
437939	EPA:170.0	4	2	2	1	
437939	EPA:245.2	4	2			
437939	EPA:300.0	2	1			
437939	EPA:310.1	2	1			
437939	EPA:335.4	2	1			
437939	EPA:350.1	2	1			
437939	EPA:351.2	2	1			
437939	EPA:353.2	2	1			
437939	EPA:365.4	2	1			
437939	EPA:900	2	1			
437939	EPA:901.1	2	1			
437939	EPA:905.0	2	1			
437939	EPA:906.0	1	1			
437939	HASL-300:AM-241	2	1			
437939	HASL-300:ISOPU	2	1			
437939	HASL-300:ISOU	2	1			
437939	SM:A2340B	2	1			
437939	SW-846:6010C	2	1			
437939	SW-846:6020	2	1			
437939	SW-846:6850	2	1			
437939	SW-846:8082	2	1		1	
437939	SW-846:8260B	2	1	2	1	
437939	SW-846:8270D	2	1		1	
437939	SW-846:9060	2	1			

DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
437939	EPA:120.1	1719249	1719249	2	1									1				2			
437939	EPA:150.1	1720201	1720201	2	1									1				2			
437939	EPA:160.1	1719385	1719385	2	1				1					1				1			
437939	EPA:170.0	NA	NA	4	2	2	1														
437939	EPA:245.2	1722939	1722938	4	2				1	1				1				1			
437939	EPA:300.0	1719972	1719972	2	1				1					1				1			
437939	EPA:310.1	1720200	1720200	2	1					1				1				1			
437939	EPA:335.4	1719492	1719491	2	1				1	1	1			1				1			
437939	EPA:350.1	1718942	1718941	2	1				1	1				1				1			
437939	EPA:351.2	1718944	1718943	2	1				1	1				1				1			
437939	EPA:353.2	1718948	1718948	2	1				1					1				1			
437939	EPA:365.4	1718946	1718945	2	1				1	1				1				1			
437939	EPA:900	1720594	1720594	2	1				1	1	1			1				1			
437939	EPA:901.1	1718868	1718868	2	1				1					1				1			
437939	EPA:905.0	1720592	1720592	2	1				1	1				1				1			
437939	EPA:906.0	1720283	1720283	1	1				1	1				1				1			
437939	HASL-300:AM-241	1719849	1719849	2	1				1					1				1			
437939	HASL-300:ISOPU	1723433	1723433	2	1				1					1				1			
437939	HASL-300:ISOU	1719851	1719851	2	1				1					1				1			
437939	SM:A2340B	1725468	1725468	2	1																
437939	SW-846:6010C	1719265	1719264	2	1				1	1				1				1			
437939	SW-846:6020	1719282	1719281	2	1				1	1				1				1			
437939	SW-846:6850	1721630	1721628	2	1				1	1	1			1							
437939	SW-846:8082	1722631	1722630	2	1		1		1	1	1			1							
437939	SW-846:8260B	1721034	1721034	2	1	2	1		2					4							
437939	SW-846:8270D	1719364	1719362	2	1		1		1	1	1			1							
437939	SW-846:9060	1717990	1717990	1					1					1				1			
437939	SW-846:9060	1718725	1718725	1	1				1					1				1			

2. Distribution Of Analytes In EDD.

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	CASA-18-147996	437939001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-18-147997	437939007	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-18-148011	437939010	FD	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203920717	LCS	0	0	1	0
EPA:120.1	GENERAL CHEMISTRY	WST05-18-148658	1203920719	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	WST05-18-148663	1203920718	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-148055	1203923057	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-18-147996	437939001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-18-147997	437939007	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-18-148011	437939010	FD	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203923055	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	WST60-18-148791	1203923056	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-18-148120	1203920962	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-18-147996	437939001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-18-147997	437939007	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-18-148011	437939010	FD	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203920961	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203920960	MB	1	0	0	0
EPA:170.0	VOC	CASA-18-147996	437939001	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-147997	437939007	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148003	437939002	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148004	437939008	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148009	437939004	FB	1	0	0	0
EPA:170.0	VOC	CASA-18-148011	437939010	FD	1	0	0	0
EPA:170.0	VOC	CASA-18-148012	437939011	FD	1	0	0	0
EPA:170.0	VOC	CASA-18-148013	437939006	FTB	1	0	0	0
EPA:170.0	VOC	CASA-18-148014	437939013	FTB	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-147996	1203929929	DUP	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-147996	1203929931	MS	0	0	1	0
EPA:245.2	INORGANIC	CASA-18-147996	437939001	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-147997	437939007	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-148003	437939003	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-148004	437939009	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-148011	437939010	FD	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-148012	437939012	FD	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203929927	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203929926	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-18-147996	1203922407	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-18-147996	437939001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-18-147997	437939007	REG	4	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:300.0	GENERAL CHEMISTRY	CASA-18-148011	437939010	FD	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203922406	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203922405	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-148055	1203923050	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-148055	1203923054	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-18-147996	437939001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-18-147997	437939007	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-18-148011	437939010	FD	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203923046	LCS	0	0	1	0
EPA:335.4	INORGANIC	CASA-18-148003	1203921252	DUP	1	0	0	0
EPA:335.4	INORGANIC	CASA-18-148003	1203921255	MS	0	0	1	0
EPA:335.4	INORGANIC	CASA-18-148003	1203921579	MSD	0	0	1	0
EPA:335.4	INORGANIC	CASA-18-148003	437939003	REG	1	0	0	0
EPA:335.4	INORGANIC	CASA-18-148004	437939009	REG	1	0	0	0
EPA:335.4	INORGANIC	CASA-18-148012	437939012	FD	1	0	0	0
EPA:335.4	INORGANIC	LCS	1203921249	LCS	0	0	1	0
EPA:335.4	INORGANIC	MB	1203921248	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-18-147996	437939001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-18-147997	437939007	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-18-148011	437939010	FD	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203919946	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203919945	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	WST35-18-148795	1203919947	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	WST35-18-148795	1203919948	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CASA-18-148003	437939003	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-18-148004	437939009	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-18-148012	437939012	FD	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203919952	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203919951	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	WST35-18-148795	1203919953	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	WST35-18-148795	1203919954	MS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	CASA-18-147996	437939001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-18-147997	437939007	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-18-148011	437939010	FD	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203919967	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203919966	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	WST35-18-148795	1203919968	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-18-147996	437939001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-18-147997	437939007	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-18-148011	437939010	FD	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:365.4	GENERAL CHEMISTRY	LCS	1203919958	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203919957	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	WST35-18-148795	1203919961	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	WST35-18-148795	1203919962	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	CASA-18-148003	437939003	REG	2	0	0	0
EPA:900	RAD	CASA-18-148004	437939009	REG	2	0	0	0
EPA:900	RAD	CASA-18-148012	437939012	FD	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-18-148070	1203919783	DUP	5	0	0	0
EPA:901.1	RAD	CASA-18-148003	437939003	REG	5	0	0	0
EPA:901.1	RAD	CASA-18-148004	437939009	REG	5	0	0	0
EPA:901.1	RAD	CASA-18-148012	437939012	FD	5	0	0	0
EPA:901.1	RAD	LCS	1203919784	LCS	0	0	3	0
EPA:901.1	RAD	MB	1203919782	MB	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
EPA:905.0	RAD	CASA-18-148003	437939003	REG	1	0	0	0
EPA:905.0	RAD	CASA-18-148004	437939009	REG	1	0	0	0
EPA:905.0	RAD	CASA-18-148012	437939012	FD	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
EPA:906.0	RAD	CASA-18-148004	437939009	REG	1	0	0	0
EPA:906.0	RAD	CASA-18-148012	437939012	FD	1	0	0	0
EPA:906.0	RAD	LCS	1203923263	LCS	0	0	1	0
EPA:906.0	RAD	MB	1203923260	MB	1	0	0	0
EPA:906.0	RAD	WST15-17-148261	1203923261	DUP	1	0	0	0
EPA:906.0	RAD	WST15-17-148261	1203923262	MS	0	0	1	0
HASL-300:AM-241	RAD	CAMO-18-148070	1203922091	DUP	1	0	0	0
HASL-300:AM-241	RAD	CASA-18-148003	437939003	REG	1	0	0	0
HASL-300:AM-241	RAD	CASA-18-148004	437939009	REG	1	0	0	0
HASL-300:AM-241	RAD	CASA-18-148012	437939012	FD	1	0	0	0
HASL-300:AM-241	RAD	LCS	1203922092	LCS	0	0	1	0
HASL-300:AM-241	RAD	MB	1203922090	MB	1	0	0	0
HASL-300:ISOPU	RAD	CASA-18-148003	437939003	REG	2	0	0	0
HASL-300:ISOPU	RAD	CASA-18-148004	437939009	REG	2	0	0	0
HASL-300:ISOPU	RAD	CASA-18-148012	437939012	FD	2	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
HASL-300:ISOPU	RAD	LCS	1203931267	LCS	0	0	1	0
HASL-300:ISOPU	RAD	MB	1203931265	MB	2	0	0	0
HASL-300:ISOPU	RAD	WST05-18-148670	1203931266	DUP	2	0	0	0
HASL-300:ISOU	RAD	CAMO-18-148070	1203922097	DUP	3	0	0	0
HASL-300:ISOU	RAD	CASA-18-148003	437939003	REG	3	0	0	0
HASL-300:ISOU	RAD	CASA-18-148004	437939009	REG	3	0	0	0
HASL-300:ISOU	RAD	CASA-18-148012	437939012	FD	3	0	0	0
HASL-300:ISOU	RAD	LCS	1203922098	LCS	0	0	1	0
HASL-300:ISOU	RAD	MB	1203922096	MB	3	0	0	0
SM:A2340B	INORGANIC	CASA-18-147996	437939001	REG	1	0	0	0
SM:A2340B	INORGANIC	CASA-18-147997	437939007	REG	1	0	0	0
SM:A2340B	INORGANIC	CASA-18-148011	437939010	FD	1	0	0	0
SW-846:6010C	INORGANIC	CAPA-18-148455	1203920749	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CAPA-18-148455	1203920750	MS	0	0	17	0
SW-846:6010C	INORGANIC	CASA-18-147996	437939001	REG	17	0	0	0
SW-846:6010C	INORGANIC	CASA-18-147997	437939007	REG	17	0	0	0
SW-846:6010C	INORGANIC	CASA-18-148011	437939010	FD	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203920748	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203920747	MB	17	0	0	0
SW-846:6020	INORGANIC	CAPA-18-148455	1203920789	DUP	11	0	0	0
SW-846:6020	INORGANIC	CAPA-18-148455	1203920790	MS	0	0	11	0
SW-846:6020	INORGANIC	CASA-18-147996	437939001	REG	11	0	0	0
SW-846:6020	INORGANIC	CASA-18-147997	437939007	REG	11	0	0	0
SW-846:6020	INORGANIC	CASA-18-148011	437939010	FD	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203920788	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203920787	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-148055	1203926748	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-148055	1203926749	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-18-147996	437939001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-18-147997	437939007	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-18-148011	437939010	FD	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203926680	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203926679	MB	1	0	0	0
SW-846:8082	PESTPCB	CAMO-18-148117	1203929171	MS	0	2	2	0
SW-846:8082	PESTPCB	CAMO-18-148117	1203929172	MSD	0	2	2	0
SW-846:8082	PESTPCB	CASA-18-148003	437939002	REG	8	2	0	0
SW-846:8082	PESTPCB	CASA-18-148004	437939008	REG	8	2	0	0
SW-846:8082	PESTPCB	CASA-18-148009	437939004	FB	8	2	0	0
SW-846:8082	PESTPCB	CASA-18-148012	437939011	FD	8	2	0	0
SW-846:8082	PESTPCB	LCS	1203929170	LCS	0	2	2	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
SW-846:8082	PESTPCB	MB	1203929169	MB	8	2	0	0
SW-846:8260B	VOC	CASA-18-148003	437939003	REG	80	3	0	0
SW-846:8260B	VOC	CASA-18-148004	437939009	REG	80	3	0	0
SW-846:8260B	VOC	CASA-18-148009	437939005	FB	80	3	0	0
SW-846:8260B	VOC	CASA-18-148012	437939012	FD	80	3	0	0
SW-846:8260B	VOC	CASA-18-148013	437939006	FTB	80	3	0	0
SW-846:8260B	VOC	CASA-18-148014	437939013	FTB	80	3	0	0
SW-846:8260B	VOC	LCS	1203925223	LCS	0	3	70	0
SW-846:8260B	VOC	LCS	1203925224	LCS	0	3	10	0
SW-846:8260B	VOC	LCS	1203925821	LCS	0	3	70	0
SW-846:8260B	VOC	LCS	1203925822	LCS	0	3	10	0
SW-846:8260B	VOC	MB	1203925222	MB	80	3	0	0
SW-846:8260B	VOC	MB	1203925820	MB	80	3	0	0
SW-846:8270D	SVOC	CASA-18-148003	1203920932	MS	0	6	76	0
SW-846:8270D	SVOC	CASA-18-148003	1203920933	MSD	0	6	76	0
SW-846:8270D	SVOC	CASA-18-148003	437939003	REG	80	6	0	0
SW-846:8270D	SVOC	CASA-18-148004	437939009	REG	80	6	0	0
SW-846:8270D	SVOC	CASA-18-148009	437939005	FB	80	6	0	0
SW-846:8270D	SVOC	CASA-18-148012	437939012	FD	80	6	0	0
SW-846:8270D	SVOC	LCS	1203920931	LCS	0	6	76	0
SW-846:8270D	SVOC	MB	1203920930	MB	80	6	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-18-148071	1203920738	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-18-148003	437939003	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-18-148004	1203922686	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-18-148004	437939009	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-18-148012	437939012	FD	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203920735	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203922684	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203920734	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203922683	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

DATA VALIDATION REPORT

5. Any contaminants in blanks?

Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name	Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
MB	1203919951	METHOD BLANK	EPA:351.2	W	Total Kjeldahl Nitrogen	0.0803	J	mg/L	0.100
MB	1203920747	METHOD BLANK	SW-846:6010C	W	Potassium	60.3	J	ug/L	150
CASA-18-148009	437939004	FIELD BLANK	EPA:170.0	W	Temperature	2		Deg C	
CASA-18-148013	437939006	TRIP BLANK	EPA:170.0	W	Temperature	2		Deg C	
CASA-18-148014	437939013	TRIP BLANK	EPA:170.0	W	Temperature	2		Deg C	

Field Sample ID	Blank Lab	Blank Type	Analytical Method	Parameter Name	Blank Lab Result	Blank Lab Units	Lab Result	Lab Qualifier	Lab Detection Limit	Detect Flag	Detect to Nondetect Factor	Detect to Estimated Factor	Use Factors
CASA-18-148003	1203919951	METHOD BLANK	EPA:351.2	Total Kjeldahl Nitrogen	0.0803	mg/L	0.126		0.100	Y	5	100	Y
CASA-18-148004	1203919951	METHOD BLANK	EPA:351.2	Total Kjeldahl Nitrogen	0.0803	mg/L	0.155		0.100	Y	5	100	Y

6. Any surrogate recoveries outside the control limits?

No.

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

Field Sample ID	MS Lab Sample ID	MSD Lab Sample ID	Analytical Method	Parameter Name	Analysis Lot ID	Analysis Date	Sample Matrix	MS Spike Recovery	MSD Spike Recovery	MS Upper Limit	MS Lower Limit	MS Reject Limit	RPD	RPD Limit
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DATA VALIDATION REPORT

Field Sample ID	MS Lab Sample ID	MSD Lab Sample ID	Analytical Method	Parameter Name	Analysis Lot ID	Analysis Date	Sample Matrix	MS Spike Recovery	MSD Spike Recovery	MS Upper Limit	MS Lower Limit	MS Reject Limit	RPD	RPD Limit
CASA-18-148003	1203921255	1203921579	EPA:335.4	Cyanide (Total)	1719491	11-21-2017	W	112	112	110	90	10	0	20
CASA-18-148003	1203921255	1203921579	EPA:335.4	Cyanide (Total)	1719491	11-21-2017	W	112	112	110	90	10	0	20

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

LCS Lab Sample	LCSD Lab	Analytical Method	Parameter Name	Lab Lot ID	Analysis	Sample Matrix	LCS Spike Recovery	LCSD Spike Recovery	Upper Limit	Lower Limit	Upper Rejection Limit	Lower Rejection Limit	RPD	RPD Limit
1203920931		SW-846:8270D	Oxybis(1-chloropropane)[2,2'-]	1719362	11-16-2017	W	135		123	44				

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

DATA VALIDATION REPORT

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Paramter 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
SCI-1	2018-888	CASA-18-148003	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.00387	pCi/L	0.00387	pCi/L	0.0344	0.00821	W	11/13/2017		1719849	VAL	Y
SCI-1	2018-888	CASA-18-148003	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	1.1	pCi/L	1.1	pCi/L	4.07	1.04	W	11/13/2017		1718868	VAL	Y
SCI-1	2018-888	CASA-18-148003	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	-0.755	pCi/L	-0.755	pCi/L	3.89	1.09	W	11/13/2017		1718868	VAL	Y
SCI-1	2018-888	CASA-18-148003	REG	INIT	INORGANIC	EPA:335.4	Cyanide (Total)	U	UJ	I6b	N	1.67	ug/L	0.00167	mg/L			W	11/13/2017		1719492	VAL	Y
SCI-1	2018-888	CASA-18-148003	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	-1.07	pCi/L	-1.07	pCi/L	7.00	1.96	W	11/13/2017		1718868	VAL	Y
SCI-1	2018-888	CASA-18-148003	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	0.0812	pCi/L	0.0812	pCi/L	0.0855	0.0512	W	11/13/2017		1723433	VAL	Y
SCI-1	2018-888	CASA-18-148003	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	0.0058	pCi/L	0.0058	pCi/L	0.122	0.0225	W	11/13/2017		1723433	VAL	Y
SCI-1	2018-888	CASA-18-148003	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	1.97	pCi/L	1.97	pCi/L	48.2	20.2	W	11/13/2017		1718868	VAL	Y
SCI-1	2018-888	CASA-18-148003	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	0.0122	pCi/L	0.0122	pCi/L	3.07	0.850	W	11/13/2017		1718868	VAL	Y
SCI-1	2018-888	CASA-18-148003	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	0.124	pCi/L	0.124	pCi/L	0.445	0.128	W	11/13/2017		1720592	VAL	Y
SCI-1	2018-888	CASA-18-148003	REG	INIT	GENERAL CHEMISTRY	EPA:351.2	Total Kjeldahl Nitrogen		U	I4	N	0.126	mg/L	0.126	mg/L			W	11/13/2017		1718944	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.0165	pCi/L	0.0165	pCi/L	0.0368	0.0097	W	11/13/2017		1719849	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	0.94	pCi/L	0.94	pCi/L	3.79	1.07	W	11/13/2017		1718868	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	4.07	pCi/L	4.07	pCi/L	5.26	1.02	W	11/13/2017		1718868	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	1.41	pCi/L	1.41	pCi/L	2.83	0.875	W	11/13/2017		1720594	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	0.26	pCi/L	0.26	pCi/L	7.62	2.28	W	11/13/2017		1718868	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	-0.0375	pCi/L	-0.0375	pCi/L	0.0921	0.0234	W	11/13/2017		1723433	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	0.00625	pCi/L	0.00625	pCi/L	0.132	0.0165	W	11/13/2017		1723433	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	10.9	pCi/L	10.9	pCi/L	36.4	20.2	W	11/13/2017		1718868	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	-0.272	pCi/L	-0.272	pCi/L	3.71	1.00	W	11/13/2017		1718868	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	-0.176	pCi/L	-0.176	pCi/L	0.432	0.0993	W	11/13/2017		1720592	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	GENERAL CHEMISTRY	EPA:351.2	Total Kjeldahl Nitrogen		U	I4	N	0.155	mg/L	0.155	mg/L			W	11/13/2017		1718944	VAL	Y
SCI-2	2018-888	CASA-18-148004	REG	INIT	RAD	EPA:906.0	Tritium	U	U	R5	N	132	pCi/L	132	pCi/L	137	43.8	W	11/13/2017		1720283	VAL	Y
SCI-2	2018-888	CASA-18-148012	FD	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.0143	pCi/L	0.0143	pCi/L	0.0364	0.00678	W	11/13/2017		1719849	VAL	Y
SCI-2	2018-888	CASA-18-148012	FD	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	-2.18	pCi/L	-2.18	pCi/L	2.88	1.03	W	11/13/2017		1718868	VAL	Y
SCI-2	2018-888	CASA-18-148012	FD	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	-0.775	pCi/L	-0.775	pCi/L	3.80	1.01	W	11/13/2017		1718868	VAL	Y
SCI-2	2018-888	CASA-18-148012	FD	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	2.5	pCi/L	2.5	pCi/L	2.83	1.04	W	11/13/2017		1720594	VAL	Y
SCI-2	2018-888	CASA-18-148012	FD	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	2.89	pCi/L	2.89	pCi/L	7.20	1.90	W	11/13/2017		1718868	VAL	Y
SCI-2	2018-888	CASA-18-148012	FD	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	-0.01	pCi/L	-0.01	pCi/L	0.0737	0.0158	W	11/13/2017		1723433	VAL	Y
SCI-2	2018-888	CASA-18-148012	FD	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	0.00000000333	pCi/L	0.00000000333	pCi/L	0.105	0.0158	W	11/13/2017		1723433	VAL	Y
SCI-2	2018-888	CASA-18-148012	FD	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	-26.3	pCi/L	-26.3	pCi/L	44.4	12.9	W	11/13/2017		1718868	VAL	Y
SCI-2	2018-888	CASA-18-148012	FD	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	1.45	pCi/L	1.45	pCi/L	4.52	0.972	W	11/13/2017		1718868	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
SCI-2	2018-888	CASA-18-148012	FD	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	-0.0736	pCi/L	-0.0736	pCi/L	0.431	0.108	W	11/13/2017		1720592	VAL	Y

Reason Code

Description

I4

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

I6b

The associated matrix spike recovery was above the Upper Acceptance Limit (UAL). 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
CASA-18-147996	SCI-1	REG	EPA:120.1	0	1
CASA-18-147996	SCI-1	REG	EPA:150.1	0	1
CASA-18-147996	SCI-1	REG	EPA:160.1	0	1
CASA-18-147996	SCI-1	REG	EPA:170.0	0	1
CASA-18-147996	SCI-1	REG	EPA:245.2	0	1
CASA-18-147996	SCI-1	REG	EPA:300.0	0	4
CASA-18-147996	SCI-1	REG	EPA:310.1	0	2
CASA-18-147996	SCI-1	REG	EPA:350.1	0	1
CASA-18-147996	SCI-1	REG	EPA:353.2	0	1
CASA-18-147996	SCI-1	REG	EPA:365.4	0	1
CASA-18-147996	SCI-1	REG	SM:A2340B	0	1
CASA-18-147996	SCI-1	REG	SW-846:6010C	0	17
CASA-18-147996	SCI-1	REG	SW-846:6020	0	11
CASA-18-147996	SCI-1	REG	SW-846:6850	0	1
CASA-18-147997	SCI-2	REG	EPA:120.1	0	1
CASA-18-147997	SCI-2	REG	EPA:150.1	0	1
CASA-18-147997	SCI-2	REG	EPA:160.1	0	1

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-18-147997	SCI-2	REG	EPA:170.0	0	1
CASA-18-147997	SCI-2	REG	EPA:245.2	0	1
CASA-18-147997	SCI-2	REG	EPA:300.0	0	4
CASA-18-147997	SCI-2	REG	EPA:310.1	0	2
CASA-18-147997	SCI-2	REG	EPA:350.1	0	1
CASA-18-147997	SCI-2	REG	EPA:353.2	0	1
CASA-18-147997	SCI-2	REG	EPA:365.4	0	1
CASA-18-147997	SCI-2	REG	SM:A2340B	0	1
CASA-18-147997	SCI-2	REG	SW-846:6010C	0	17
CASA-18-147997	SCI-2	REG	SW-846:6020	0	11
CASA-18-147997	SCI-2	REG	SW-846:6850	0	1
CASA-18-148003	SCI-1	REG	EPA:170.0	0	1
CASA-18-148003	SCI-1	REG	EPA:245.2	0	1
CASA-18-148003	SCI-1	REG	EPA:335.4	0	1
CASA-18-148003	SCI-1	REG	EPA:351.2	0	1
CASA-18-148003	SCI-1	REG	EPA:900	0	2
CASA-18-148003	SCI-1	REG	EPA:901.1	0	5
CASA-18-148003	SCI-1	REG	EPA:905.0	0	1
CASA-18-148003	SCI-1	REG	HASL-300:AM-241	0	1
CASA-18-148003	SCI-1	REG	HASL-300:ISOPU	0	2
CASA-18-148003	SCI-1	REG	HASL-300:ISOU	0	3
CASA-18-148003	SCI-1	REG	SW-846:8082	0	8
CASA-18-148003	SCI-1	REG	SW-846:8260B	0	80
CASA-18-148003	SCI-1	REG	SW-846:8270D	0	80
CASA-18-148003	SCI-1	REG	SW-846:9060	0	1
CASA-18-148004	SCI-2	REG	EPA:170.0	0	1
CASA-18-148004	SCI-2	REG	EPA:245.2	0	1
CASA-18-148004	SCI-2	REG	EPA:335.4	0	1
CASA-18-148004	SCI-2	REG	EPA:351.2	0	1
CASA-18-148004	SCI-2	REG	EPA:900	0	2
CASA-18-148004	SCI-2	REG	EPA:901.1	0	5
CASA-18-148004	SCI-2	REG	EPA:905.0	0	1
CASA-18-148004	SCI-2	REG	EPA:906.0	0	1
CASA-18-148004	SCI-2	REG	HASL-300:AM-241	0	1
CASA-18-148004	SCI-2	REG	HASL-300:ISOPU	0	2
CASA-18-148004	SCI-2	REG	HASL-300:ISOU	0	3
CASA-18-148004	SCI-2	REG	SW-846:8082	0	8

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-18-148004	SCI-2	REG	SW-846:8260B	0	80
CASA-18-148004	SCI-2	REG	SW-846:8270D	0	80
CASA-18-148004	SCI-2	REG	SW-846:9060	0	1
CASA-18-148009	SCI-1	FB	EPA:170.0	0	1
CASA-18-148009	SCI-1	FB	SW-846:8082	0	8
CASA-18-148009	SCI-1	FB	SW-846:8260B	0	80
CASA-18-148009	SCI-1	FB	SW-846:8270D	0	80
CASA-18-148011	SCI-2	FD	EPA:120.1	0	1
CASA-18-148011	SCI-2	FD	EPA:150.1	0	1
CASA-18-148011	SCI-2	FD	EPA:160.1	0	1
CASA-18-148011	SCI-2	FD	EPA:170.0	0	1
CASA-18-148011	SCI-2	FD	EPA:245.2	0	1
CASA-18-148011	SCI-2	FD	EPA:300.0	0	4
CASA-18-148011	SCI-2	FD	EPA:310.1	0	2
CASA-18-148011	SCI-2	FD	EPA:350.1	0	1
CASA-18-148011	SCI-2	FD	EPA:353.2	0	1
CASA-18-148011	SCI-2	FD	EPA:365.4	0	1
CASA-18-148011	SCI-2	FD	SM:A2340B	0	1
CASA-18-148011	SCI-2	FD	SW-846:6010C	0	17
CASA-18-148011	SCI-2	FD	SW-846:6020	0	11
CASA-18-148011	SCI-2	FD	SW-846:6850	0	1
CASA-18-148012	SCI-2	FD	EPA:170.0	0	1
CASA-18-148012	SCI-2	FD	EPA:245.2	0	1
CASA-18-148012	SCI-2	FD	EPA:335.4	0	1
CASA-18-148012	SCI-2	FD	EPA:351.2	0	1
CASA-18-148012	SCI-2	FD	EPA:900	0	2
CASA-18-148012	SCI-2	FD	EPA:901.1	0	5
CASA-18-148012	SCI-2	FD	EPA:905.0	0	1
CASA-18-148012	SCI-2	FD	EPA:906.0	0	1
CASA-18-148012	SCI-2	FD	HASL-300:AM-241	0	1
CASA-18-148012	SCI-2	FD	HASL-300:ISOPU	0	2
CASA-18-148012	SCI-2	FD	HASL-300:ISOU	0	3
CASA-18-148012	SCI-2	FD	SW-846:8082	0	8
CASA-18-148012	SCI-2	FD	SW-846:8260B	0	80
CASA-18-148012	SCI-2	FD	SW-846:8270D	0	80
CASA-18-148012	SCI-2	FD	SW-846:9060	0	1
CASA-18-148013	SCI-1	FTB	EPA:170.0	0	1

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-18-148013	SCI-1	FTB	SW-846:8260B	0	80
CASA-18-148014	SCI-2	FTB	EPA:170.0	0	1
CASA-18-148014	SCI-2	FTB	SW-846:8260B	0	80

December 10, 2017

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

Re: LANL- WQH Water Samples
Work Order: 437939
SDG: 2018-888

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on November 15, 2017, and analyzed for GC Semivolatile PCB, GC/MS Semivolatile, GC/MS Volatile, General Chemistry, Metals, Perchlorates by LCMSMS and Radiochemistry. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4485.

Sincerely,



Valerie Davis
Project Manager

Chain of Custody: 2018-888
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 437939
SDG: 2018-888

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 437939
SDG # : 2018-888**

December 10, 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 15, 2017 for analysis. The samples were delivered with proper chain of custody documentation and signatures. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. Containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Shipping container temperatures were checked, documented, and within specifications. Shipping container temperature was within specification (0 - 6C). There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
437939001	CASA-18-147996
437939002	CASA-18-148003
437939003	CASA-18-148003
437939004	CASA-18-148009
437939005	CASA-18-148009
437939006	CASA-18-148013
437939007	CASA-18-147997
437939008	CASA-18-148004
437939009	CASA-18-148004
437939010	CASA-18-148011
437939011	CASA-18-148012
437939012	CASA-18-148012
437939013	CASA-18-148014

Case Narrative

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

Data Package

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: GC Semivolatile PCB, GC/MS Semivolatile, GC/MS Volatile, General Chemistry, Metals, Perchlorates by LCMSMS and

Radiochemistry.

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

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

Valerie Davis
Project Manager

List of current GEL Certifications as of 10 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

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ESH</u>		SDG/AR/COC/Work Order: <u>437939</u>	
Received By: <u>ZKW</u>		Date Received: <u>11/15/17</u>	
Carrier and Tracking Number		Circle Applicable: <u>5908 1783 1949-152 (FedEx Express)</u> <u>5908 1783 1993-22 (FedEx Ground)</u> <u>5908 1783 1971-22 (UPS)</u> <u>5908 1783 1960-30 (Field Services)</u> <u>5908 1783 1950-30 (Courier)</u> Other:	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
Shipped as a DOT Hazardous?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Hazard Class Shipped: UN#:	
COC/Samples marked or classified as radioactive?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> <u>CPM</u> mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" 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"/>			Temperature Device Serial #: <u>IR3-16</u> Secondary Temperature Device Serial # (If Applicable):
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: If Preservation added, Lot#:
7 Do any samples require Volatile Analysis?	<input checked="" 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 ___ 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>Both vials for 148003 rec'd w/headspace</u>
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>			
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials

JBDate 11.14.2017Page 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
LOS ALAMOS, NM 87545
UNITED STATES US

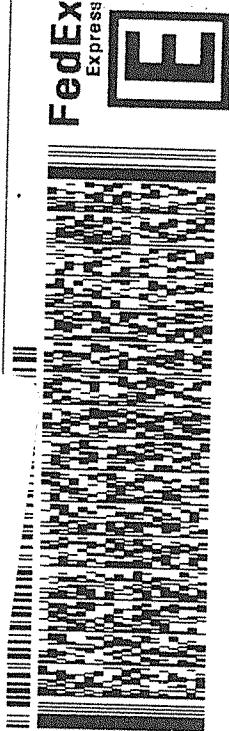
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CAD: 0014176/CAFE2916
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TO VALERIE DAVIS

GENERAL ENGINEERING LAB

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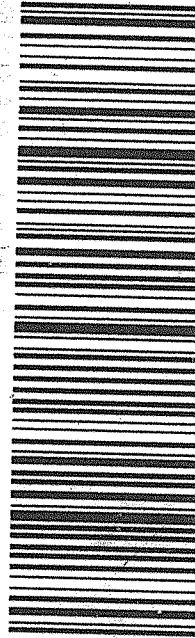


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X7 RBWA

29407
SC-US CHS



Part # 156149V-434 RIT2 06/15 99

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 666-8171
REF: 21PD0ASRGW04BAGWE0



FedEx
Express

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: 14NOV17
ACTWGT: 33.0 LB MAN
CAD: 0014176/CAFE2916

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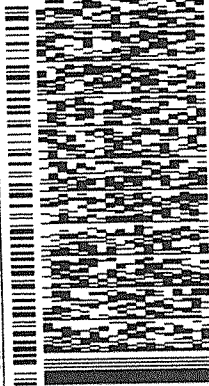
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GENERAL ENGINEERING LAB

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CHARLESTON SC 29407

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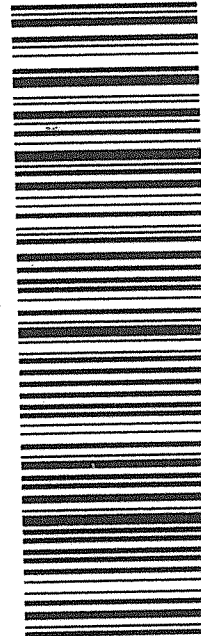


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29407
SC-US CHS



Part # 156149V-434 RIT2 06/15 99

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TO VALERIE DAVIS
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2040 SAVAGE RD

CHARLESTON SC 29407

(843) 666-8171
REF: 21PD0ASRGW04BAGWE0



FedEx
Express

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: 14NOV17
ACTWGT: 40.0 LB MAN
CAD: 0014176/CAFE2916

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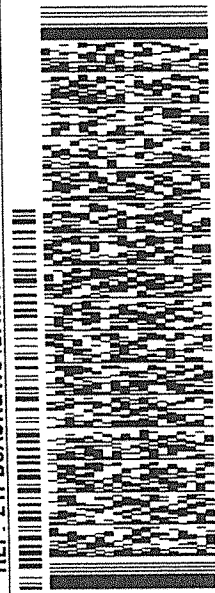
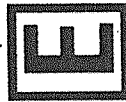
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GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171
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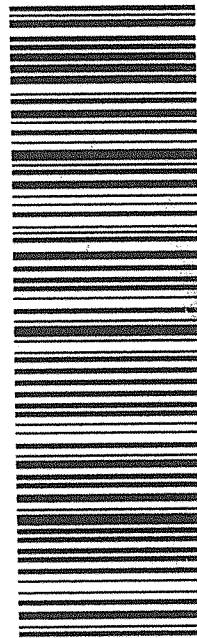
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MASTER

X7 RBWA

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SC-US CHS

Part # 156148V-434 RIT2 06/15 33



ORIGIN ID:SAFA (505) 665-5
KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 14NOV17
ACTWGT: 49.0 LB MAN
CAD: 0014176/CAFE2916

BILL SENDER

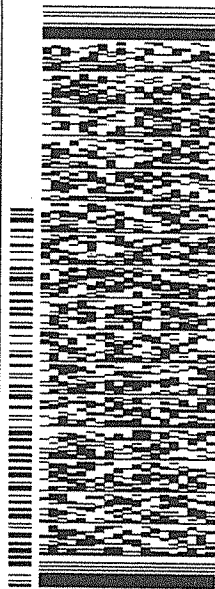
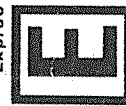
TO VALERIE DAVIS

GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171
REF: 21PD0ASRGW04BAGWEO

FedEx
Express



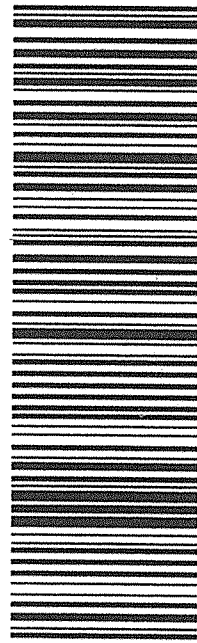
2 of 3
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MPS# 5908 1783 1950
0263
Mstr# 5908 1783 1949
0201

X7 RBWA

29407
SC-US CHS

Part # 156148V-434 RIT2 06/15 33



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 #: 2018-888
Work Order #: 437939**

Method/Analysis Information

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

Analytical Method: SW-846:8260B

Analytical Batch
Number: 1721034

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
437939003	CASA-18-148003
437939005	CASA-18-148009
437939006	CASA-18-148013
437939009	CASA-18-148004
437939012	CASA-18-148012
437939013	CASA-18-148014
1203925222	Method Blank (MB)
1203925223	Laboratory Control Sample (LCS)
1203925224	Laboratory Control Sample (LCS)
1203925225	437822002(CAMO-18-148071) Post Spike (PS)
1203925226	437822002(CAMO-18-148071) Post Spike (PS)
1203925227	437822002(CAMO-18-148071) Post Spike Duplicate (PSD)
1203925228	437822002(CAMO-18-148071) Post Spike Duplicate (PSD)
1203925820	Method Blank (MB)
1203925821	Laboratory Control Sample (LCS)
1203925822	Laboratory Control Sample (LCS)

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

The data results reported met all SOP and method criteria, unless otherwise discussed below.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-038 REV# 26.

Calibration Information

A complete list of the initial calibration data files with the correct dates and times of analysis are shown in the

Calibration History report located in the Standard Data section of the data package. The surrogate compounds were calibrated using a minimum five-point calibration curve. The surrogates were added by the auto sampler at a concentration of 50 ug/L or 20 ug/L for low level analyses. GEL Laboratories LLC will not have surrogate recoveries reported for Dibromofluoromethane. This is due to increased regulations for this analyte and an industry shortage.

Initial Calibration

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

Continuing Calibration Verification Requirements

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

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

The blanks analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

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

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 437822002 (CAMO-18-148071) was designated for spike analysis.

Matrix Spike/Matrix Spike Duplicate Recovery Statement

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

Relative Percent Difference (RPD) Statement

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

Internal Standard (ISTD) Acceptance

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

Technical Information**Holding Time Specifications**

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

Sample Preservation and Integrity

All samples met the sample preservation and integrity requirements.

Sample Dilutions/Methanol Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information**Manual Integrations**

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

manual integrations.

TIC Comment

Tentatively identified compounds (TIC) may be requested for samples 437939003 (CASA-18-148003), 437939005 (CASA-18-148009), 437939006 (CASA-18-148013), 437939009 (CASA-18-148004), 437939012 (CASA-18-148012) and 437939013 (CASA-18-148014) 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
VOA1.I	Hewlett Packard 5973 GC/MS w/ OI 4560/Archon Autosampler	HP6890/HP5973	RTX-624	Restek, 60m x 0.25mm x 1.4um	Trap 10

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2018-888 GEL Work Order: 437939

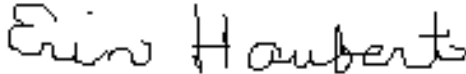
The Qualifiers in this report are defined as follows:

- * 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: Erin Haubert

Date: 11 DEC 2017

Title: Data Validator

Sample Data Summary

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-888

Lab Sample ID: 437939003

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148003

Batch ID: 1721034

Run Date: 11/22/2017 01:30

Prep Date: 11/22/2017 01:30

Data File: 112117V1\1J236.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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: 2018-888

Lab Sample ID: 437939003

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148003

Batch ID: 1721034

Run Date: 11/22/2017 01:30

Prep Date: 11/22/2017 01:30

Data File: 112117V1\1J236.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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
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	J	0.440	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: 2018-888

Lab Sample ID: 437939003

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721034

Inst: VOA1.I

Dilution: 1

Run Date: 11/22/2017 01:30

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/22/2017 01:30

Data File: 112117V1\1J236.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	45.1	50.0	ug/L 90	(71%-134%)
Bromofluorobenzene	61.7	50.0	ug/L 123	(70%-131%)
Toluene-d8	45.0	50.0	ug/L 90	(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: 2018-888

Lab Sample ID: 437939005

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721034

Inst: VOA1.I

Dilution: 1

Run Date: 11/22/2017 01:59

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/22/2017 01:59

Data File: 112117V1\1J237.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: 2018-888

Lab Sample ID: 437939005

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148009

Batch ID: 1721034

Run Date: 11/22/2017 01:59

Prep Date: 11/22/2017 01:59

Data File: 112117V1\1J237.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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
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: 2018-888

Lab Sample ID: 437939005

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721034

Inst: VOA1.I

Dilution: 1

Run Date: 11/22/2017 01:59

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/22/2017 01:59

Column: DB-624

Data File: 112117V1\1J237.D

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	45.4	50.0	ug/L 91	(71%-134%)
Bromofluorobenzene	62.2	50.0	ug/L 124	(70%-131%)
Toluene-d8	45.3	50.0	ug/L 91	(74%-124%)

Tentatively Identified Compound Summary

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

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-888

Lab Sample ID: 437939006

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721034

Inst: VOA1.I

Dilution: 1

Run Date: 11/21/2017 15:01

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/21/2017 15:01

Data File: 112117V1\1J214.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: 2018-888

Lab Sample ID: 437939006

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148013

Batch ID: 1721034

Run Date: 11/21/2017 15:01

Prep Date: 11/21/2017 15:01

Data File: 112117V1\1J214.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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
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: 2018-888
Lab Sample ID: 437939006

Date Collected: 11/13/2017 14:41
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148013

Client: ARSL004

Project: ESHL00114

Batch ID: 1721034

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Run Date: 11/21/2017 15:01

Inst: VOA1.I

Dilution: 1

Prep Date: 11/21/2017 15:01

Analyst: PXY1

Purge Vol: 5 mL

Data File: 112117V1\1J214.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	45.7	50.0	ug/L 91	(71%-134%)
Bromofluorobenzene	60.3	50.0	ug/L 121	(70%-131%)
Toluene-d8	44.6	50.0	ug/L 89	(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: 2018-888

Lab Sample ID: 437939009

Date Collected: 11/13/2017 10:51

Date Received: 11/15/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721034

Inst: VOA1.I

Dilution: 1

Run Date: 11/22/2017 02:27

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/22/2017 02:27

Data File: 112117V1\1J238.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: 2018-888

Lab Sample ID: 437939009

Date Collected: 11/13/2017 10:51

Date Received: 11/15/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721034

Inst: VOA1.I

Dilution: 1

Run Date: 11/22/2017 02:27

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/22/2017 02:27

Data File: 112117V1\1J238.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	J	0.450	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: 2018-888

Lab Sample ID: 437939009

Date Collected: 11/13/2017 10:51

Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148004

Batch ID: 1721034

Run Date: 11/22/2017 02:27

Prep Date: 11/22/2017 02:27

Data File: 112117V1\1J238.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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	45.3	50.0	ug/L 91	(71%-134%)
Bromofluorobenzene	61.8	50.0	ug/L 124	(70%-131%)
Toluene-d8	45.2	50.0	ug/L 90	(74%-124%)

Tentatively Identified Compound Summary

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

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-888

Lab Sample ID: 437939012

Date Collected: 11/13/2017 10:51

Date Received: 11/15/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721034

Inst: VOA1.I

Dilution: 1

Run Date: 11/22/2017 02:56

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/22/2017 02:56

Data File: 112117V1\1J239.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: 2018-888
Lab Sample ID: 437939012

Date Collected: 11/13/2017 10:51
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148012

Client: ARSL004

Project: ESHL00114

Batch ID: 1721034

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Run Date: 11/22/2017 02:56

Inst: VOA1.I

Dilution: 1

Prep Date: 11/22/2017 02:56

Analyst: PXY1

Purge Vol: 5 mL

Data File: 112117V1\1J239.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	J	0.460	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: 2018-888
Lab Sample ID: 437939012

Date Collected: 11/13/2017 10:51
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148012

Client: ARSL004

Project: ESHL00114

Batch ID: 1721034

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Run Date: 11/22/2017 02:56

Inst: VOA1.I

Dilution: 1

Prep Date: 11/22/2017 02:56

Analyst: PXY1

Purge Vol: 5 mL

Data File: 112117V1\1J239.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	45.9	50.0	ug/L 92	(71%-134%)
Bromofluorobenzene	61.6	50.0	ug/L 123	(70%-131%)
Toluene-d8	44.9	50.0	ug/L 90	(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: 2018-888
Lab Sample ID: 437939013

Date Collected: 11/13/2017 10:51
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148014

Client: ARSL004

Project: ESHL00114

Batch ID: 1721034

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Run Date: 11/21/2017 15:29

Inst: VOA1.I

Dilution: 1

Prep Date: 11/21/2017 15:29

Analyst: PXY1

Purge Vol: 5 mL

Data File: 112117V1\1J215.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: 2018-888

Lab Sample ID: 437939013

Date Collected: 11/13/2017 10:51

Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148014

Batch ID: 1721034

Run Date: 11/21/2017 15:29

Prep Date: 11/21/2017 15:29

Data File: 112117V1\1J215.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

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
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: 2018-888
Lab Sample ID: 437939013

Date Collected: 11/13/2017 10:51
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148014

Client: ARSL004

Project: ESHL00114

Batch ID: 1721034

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Run Date: 11/21/2017 15:29

Inst: VOA1.I

Dilution: 1

Prep Date: 11/21/2017 15:29

Analyst: PXY1

Purge Vol: 5 mL

Data File: 112117V1\1J215.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	45.7	50.0	ug/L 91	(71%-134%)
Bromofluorobenzene	60.5	50.0	ug/L 121	(70%-131%)
Toluene-d8	45.1	50.0	ug/L 90	(74%-124%)

Tentatively Identified Compound Summary

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

Quality Control Summary

Volatile
Surrogate Recovery Report

Page 1 of 1

SDG Number: 2018-888**Matrix Type: LIQUID**

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203925223	LCS for batch 1721034	88	90	108
1203925224	LCS for batch 1721034	87	89	113
1203925222	MB for batch 1721034	89	91	119
437939006	CASA-18-148013	91	89	121
437939013	CASA-18-148014	91	90	121
1203925225	CAMO-18-148071PS	85	90	108
1203925227	CAMO-18-148071PSD	85	89	109
1203925226	CAMO-18-148071PS	84	88	110
1203925228	CAMO-18-148071PSD	85	88	110
1203925821	LCS for batch 1721034	84	89	108
1203925822	LCS for batch 1721034	85	90	112
1203925820	MB for batch 1721034	85	89	119
437939003	CASA-18-148003	90	90	123
437939005	CASA-18-148009	91	91	124
437939009	CASA-18-148004	91	90	124
437939012	CASA-18-148012	92	90	123

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: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721034

Matrix: WATER

Lab Sample ID 1203925223

Instrument: VOA1.I

Analysis Date: 11/21/2017 09:43

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	102	102	71-127
75-05-8	LCS Acetonitrile	1250	0.0	1230	98	61-125
67-64-1	LCS Acetone	250	0.0	296	119	48-157
74-88-4	LCS Iodomethane	250	0.0	263	105	72-128
75-15-0	LCS Carbon disulfide	250	0.0	270	108	69-138
108-05-4	LCS Vinyl acetate	250	0.0	251	100	67-125
78-93-3	LCS 2-Butanone	250	0.0	296	118	55-138
108-10-1	LCS 4-Methyl-2-pentanone	250	0.0	251	100	66-124
591-78-6	LCS 2-Hexanone	250	0.0	286	114	56-140
75-71-8	LCS Dichlorodifluoromethane	50.0	0.0	54.0	108	40-160
74-87-3	LCS Chloromethane	50.0	0.0	52.8	106	58-135
75-01-4	LCS Vinyl chloride	50.0	0.0	56.7	113	65-137
74-83-9	LCS Bromomethane	50.0	0.0	53.9	108	63-137
75-00-3	LCS Chloroethane	50.0	0.0	49.7	99	69-129
75-69-4	LCS Trichlorofluoromethane	50.0	0.0	57.1	114	69-138
60-29-7	LCS Ethyl ether	50.0	0.0	51.2	102	72-125
75-35-4	LCS 1,1-Dichloroethylene	50.0	0.0	59.9	120	66-126
75-09-2	LCS Methylene chloride	50.0	0.0	53.7	107	68-119
1634-04-4	LCS tert-Butyl methyl ether	50.0	0.0	54.8	110	76-128
156-60-5	LCS trans-1,2-Dichloroethylene	50.0	0.0	58.2	116	71-124
75-34-3	LCS 1,1-Dichloroethane	50.0	0.0	56.3	113	73-123
156-59-2	LCS cis-1,2-Dichloroethylene	50.0	0.0	55.8	112	75-123

Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 4

SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721034

Matrix: WATER

Lab Sample ID 1203925223

Instrument: VOA1.I

Analysis Date: 11/21/2017 09:43

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	61.4	123	72-138
74-97-5	LCS Bromochloromethane	50.0	0.0	53.3	107	76-125
67-66-3	LCS Chloroform	50.0	0.0	55.6	111	76-123
71-55-6	LCS 1,1,1-Trichloroethane	50.0	0.0	59.1	118	74-136
563-58-6	LCS 1,1-Dichloropropene	50.0	0.0	58.0	116	72-129
56-23-5	LCS Carbon tetrachloride	50.0	0.0	61.5	123	72-140
107-06-2	LCS 1,2-Dichloroethane	50.0	0.0	56.8	114	74-122
71-43-2	LCS Benzene	50.0	0.0	52.9	106	72-121
79-01-6	LCS Trichloroethylene	50.0	0.0	59.1	118	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	55.7	111	78-123
75-27-4	LCS Bromodichloromethane	50.0	0.0	57.1	114	77-131
10061-01-5	LCS cis-1,3-Dichloropropylene	50.0	0.0	56.6	113	78-131
108-88-3	LCS Toluene	50.0	0.0	50.0	100	71-121
10061-02-6	LCS trans-1,3-Dichloropropylene	50.0	0.0	54.9	110	78-131
79-00-5	LCS 1,1,2-Trichloroethane	50.0	0.0	49.9	100	74-118
142-28-9	LCS 1,3-Dichloropropane	50.0	0.0	49.7	99	74-118
127-18-4	LCS Tetrachloroethylene	50.0	0.0	52.1	104	69-129
124-48-1	LCS Dibromochloromethane	50.0	0.0	53.7	107	76-137
106-93-4	LCS 1,2-Dibromoethane	50.0	0.0	52.3	105	78-122
108-90-7	LCS Chlorobenzene	50.0	0.0	50.2	100	74-120
100-41-4	LCS Ethylbenzene	50.0	0.0	52.3	105	73-125

Volatile
Quality Control Summary
Spike Recovery Report

Page 3 of 4

SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721034

Matrix: WATER

Lab Sample ID 1203925223

Instrument: VOA1.I

Analysis Date: 11/21/2017 09:43

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
95-47-6	LCS o-Xylene	50.0	0.0	52.6	105	74-126
100-42-5	LCS Styrene	50.0	0.0	52.2	104	72-130
75-25-2	LCS Bromoform	50.0	0.0	52.1	104	72-136
98-82-8	LCS Isopropylbenzene	50.0	0.0	50.5	101	70-130
79-34-5	LCS 1,1,2,2-Tetrachloroethane	50.0	0.0	46.6	93	70-126
96-18-4	LCS 1,2,3-Trichloropropane	50.0	0.0	48.4	97	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	49.6	99	67-128
108-67-8	LCS 1,3,5-Trimethylbenzene	50.0	0.0	50.4	101	70-129
95-49-8	LCS 2-Chlorotoluene	50.0	0.0	49.1	98	71-124
106-43-4	LCS 4-Chlorotoluene	50.0	0.0	48.9	98	69-125
98-06-6	LCS tert-Butylbenzene	50.0	0.0	53.0	106	72-130
95-63-6	LCS 1,2,4-Trimethylbenzene	50.0	0.0	50.5	101	70-126
135-98-8	LCS sec-Butylbenzene	50.0	0.0	51.5	103	70-131
99-87-6	LCS 4-Isopropyltoluene	50.0	0.0	52.6	105	71-131
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	46.5	93	72-121
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	47.3	95	71-120
104-51-8	LCS n-Butylbenzene	50.0	0.0	53.3	107	68-134
96-12-8	LCS 1,2-Dibromo-3-chloropropane	50.0	0.0	44.9	90	68-141
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	54.5	109	72-136
91-20-3	LCS Naphthalene	50.0	0.0	50.5	101	72-132
87-61-6	LCS 1,2,3-Trichlorobenzene	50.0	0.0	51.6	103	70-130

Volatile

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Quality Control Summary
Spike Recovery Report

SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721034

Matrix: WATER

Lab Sample ID 1203925223

Instrument: VOA1.I

Analysis Date: 11/21/2017 09:43

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	56.6	113	71-129
630-20-6	LCS 1,1,1,2-Tetrachloroethane	50.0	0.0	54.7	109	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	5300	106	63-138

Volatile

Page 1 of 1

Quality Control Summary
Spike Recovery Report

SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721034

Matrix: WATER

Lab Sample ID 1203925224

Instrument: VOA1.I

Analysis Date: 11/21/2017 10:40

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	280	112	60-140
76-13-1	LCS	Trichlorotrifluoroethane	250	0.0	227	91	61-148
107-05-1	LCS	Allyl chloride	250	0.0	225	90	59-125
107-13-1	LCS	Acrylonitrile	250	0.0	222	89	65-122
107-12-0	LCS	Propionitrile	250	0.0	217	87	64-124
126-98-7	LCS	Methacrylonitrile	250	0.0	220	88	64-126
80-62-6	LCS	Methyl methacrylate	250	0.0	226	91	69-127
97-63-2	LCS	Ethyl methacrylate	250	0.0	205	82	66-130
78-83-1	LCS	Isobutyl alcohol	2500	0.0	2360	94	65-135
126-99-8	LCS	2-Chloro-1,3-butadiene	50.0	0.0	46.0	92	66-147

Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 8

SDG Number: 2018-888

Sample Type: Post Spike

Client ID: CAMO-18-148071PS

Matrix: W

Lab Sample ID 1203925225

Instrument: VOA1.I

Analysis Date: 11/21/2017 18:50

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	96.4	96	59-132
75-05-8	PS Acetonitrile	1250	0.00 U	1140	92	56-131
67-64-1	PS Acetone	250	0.00 U	107	43	25-155
74-88-4	PS Iodomethane	250	0.00 U	246	98	66-133
75-15-0	PS Carbon disulfide	250	0.00 U	246	99	61-141
108-05-4	PS Vinyl acetate	250	0.00 U	222	89	48-133
78-93-3	PS 2-Butanone	250	0.00 U	148	59	25-143
108-10-1	PS 4-Methyl-2-pentanone	250	0.00 U	220	88	61-127
591-78-6	PS 2-Hexanone	250	0.00 U	172	69	33-138
75-71-8	PS Dichlorodifluoromethane	50.0	0.00 U	46.4	93	33-164
74-87-3	PS Chloromethane	50.0	0.00 U	46.5	93	53-139
75-01-4	PS Vinyl chloride	50.0	0.00 U	49.0	98	58-140
74-83-9	PS Bromomethane	50.0	0.00 U	50.9	102	59-146
75-00-3	PS Chloroethane	50.0	0.00 U	44.3	89	65-129
75-69-4	PS Trichlorofluoromethane	50.0	0.00 U	49.4	99	65-141
60-29-7	PS Ethyl ether	50.0	0.00 U	47.6	95	69-127
75-35-4	PS 1,1-Dichloroethylene	50.0	0.00 U	53.6	107	59-130
75-09-2	PS Methylene chloride	50.0	0.00 U	51.2	102	62-123
1634-04-4	PS tert-Butyl methyl ether	50.0	0.00 U	52.6	105	69-132
156-60-5	PS trans-1,2-Dichloroethylene	50.0	0.00 U	53.3	107	65-127
75-34-3	PS 1,1-Dichloroethane	50.0	0.00 U	52.3	105	67-127
156-59-2	PS cis-1,2-Dichloroethylene	50.0	0.00 U	53.4	107	69-127

Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 8

SDG Number: 2018-888

Sample Type: Post Spike

Client ID: CAMO-18-148071PS

Matrix: W

Lab Sample ID 1203925225

Instrument: VOA1.I

Analysis Date: 11/21/2017 18:50

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	53.3	107	66-137
74-97-5	PS Bromochloromethane	50.0	0.00 U	51.2	102	71-130
67-66-3	PS Chloroform	50.0	0.00 U	52.4	105	71-129
71-55-6	PS 1,1,1-Trichloroethane	50.0	0.00 U	52.7	105	69-139
563-58-6	PS 1,1-Dichloropropene	50.0	0.00 U	52.4	105	67-130
56-23-5	PS Carbon tetrachloride	50.0	0.00 U	55.4	111	66-143
107-06-2	PS 1,2-Dichloroethane	50.0	0.00 U	54.3	109	69-130
71-43-2	PS Benzene	50.0	0.00 U	49.3	99	66-125
79-01-6	PS Trichloroethylene	50.0	0.00 U	53.1	106	65-131
78-87-5	PS 1,2-Dichloropropane	50.0	0.00 U	50.4	101	67-127
74-95-3	PS Dibromomethane	50.0	0.00 U	52.8	106	72-129
75-27-4	PS Bromodichloromethane	50.0	0.00 U	54.1	108	70-138
10061-01-5	PS cis-1,3-Dichloropropylene	50.0	0.00 U	51.8	104	70-134
108-88-3	PS Toluene	50.0	0.00 U	46.7	93	60-126
10061-02-6	PS trans-1,3-Dichloropropylene	50.0	0.00 U	52.5	105	69-135
79-00-5	PS 1,1,2-Trichloroethane	50.0	0.00 U	48.4	97	66-125
142-28-9	PS 1,3-Dichloropropane	50.0	0.00 U	48.0	96	67-124
127-18-4	PS Tetrachloroethylene	50.0	0.00 U	48.3	97	60-130
124-48-1	PS Dibromochloromethane	50.0	0.00 U	52.8	106	68-143
106-93-4	PS 1,2-Dibromoethane	50.0	0.00 U	50.9	102	71-127
108-90-7	PS Chlorobenzene	50.0	0.00 U	47.5	95	64-124
100-41-4	PS Ethylbenzene	50.0	0.00 U	49.0	98	61-130

Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Post Spike

Client ID: CAMO-18-148071PS

Matrix: W

Lab Sample ID 1203925225

Instrument: VOA1.I

Analysis Date: 11/21/2017 18:50

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	49.9	100	62-131
100-42-5	PS Styrene	50.0	0.00 U	49.3	99	59-135
75-25-2	PS Bromoform	50.0	0.00 U	50.5	101	64-138
98-82-8	PS Isopropylbenzene	50.0	0.00 U	47.0	94	55-133
79-34-5	PS 1,1,2,2-Tetrachloroethane	50.0	0.00 U	45.1	90	62-129
96-18-4	PS 1,2,3-Trichloropropane	50.0	0.00 U	47.2	94	70-124
108-86-1	PS Bromobenzene	50.0	0.00 U	45.9	92	62-124
103-65-1	PS n-Propylbenzene	50.0	0.00 U	46.4	93	50-133
108-67-8	PS 1,3,5-Trimethylbenzene	50.0	0.00 U	47.4	95	53-135
95-49-8	PS 2-Chlorotoluene	50.0	0.00 U	46.2	92	56-128
106-43-4	PS 4-Chlorotoluene	50.0	0.00 U	45.4	91	53-130
98-06-6	PS tert-Butylbenzene	50.0	0.00 U	49.5	99	55-135
95-63-6	PS 1,2,4-Trimethylbenzene	50.0	0.00 U	47.2	94	53-132
135-98-8	PS sec-Butylbenzene	50.0	0.00 U	47.9	96	50-138
99-87-6	PS 4-Isopropyltoluene	50.0	0.00 U	49.4	99	49-138
541-73-1	PS 1,3-Dichlorobenzene	50.0	0.00 U	43.6	87	56-126
106-46-7	PS 1,4-Dichlorobenzene	50.0	0.00 U	44.3	89	55-125
104-51-8	PS n-Butylbenzene	50.0	0.00 U	48.7	97	43-142
96-12-8	PS 1,2-Dibromo-3-chloropropane	50.0	0.00 U	43.2	86	62-141
87-68-3	PS Hexachlorobutadiene	50.0	0.00 U	50.0	100	40-147
91-20-3	PS Naphthalene	50.0	0.00 U	45.9	92	62-134
87-61-6	PS 1,2,3-Trichlorobenzene	50.0	0.00 U	46.6	93	52-135

Volatile

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Quality Control Summary
Spike Recovery Report

SDG Number: 2018-888

Sample Type: Post Spike

Client ID: CAMO-18-148071PS

Matrix: W

Lab Sample ID 1203925225

Instrument: VOA1.I

Analysis Date: 11/21/2017 18:50

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	50.5	101	50-133
630-20-6	PS	1,1,1,2-Tetrachloroethane	50.0	0.00	U	52.0	104	71-133
95-50-1	PS	1,2-Dichlorobenzene	50.0	0.00	U	45.3	91	60-125
71-36-3	PS	n-Butyl alcohol	5000	0.00	U	4970	99	60-140

Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Post Spike Duplicate

Client ID: CAMO-18-148071PSD

Matrix: W

Lab Sample ID 1203925227

Instrument: VOA1.I

Analysis Date: 11/21/2017 19:19

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	93.1	93	59-132	3	0-20
75-05-8	PSD Acetonitrile	1250	0.00 U	1160	93	56-131	1	0-20
67-64-1	PSD Acetone	250	0.00 U	108	43	25-155	1	0-20
74-88-4	PSD Iodomethane	250	0.00 U	240	96	66-133	2	0-20
75-15-0	PSD Carbon disulfide	250	0.00 U	239	95	61-141	3	0-20
108-05-4	PSD Vinyl acetate	250	0.00 U	222	89	48-133	0	0-20
78-93-3	PSD 2-Butanone	250	0.00 U	150	60	25-143	1	0-20
108-10-1	PSD 4-Methyl-2-pentanone	250	0.00 U	221	88	61-127	0	0-20
591-78-6	PSD 2-Hexanone	250	0.00 U	174	70	33-138	2	0-20
75-71-8	PSD Dichlorodifluoromethane	50.0	0.00 U	43.5	87	33-164	6	0-20
74-87-3	PSD Chloromethane	50.0	0.00 U	45.3	91	53-139	3	0-20
75-01-4	PSD Vinyl chloride	50.0	0.00 U	48.6	97	58-140	1	0-20
74-83-9	PSD Bromomethane	50.0	0.00 U	49.2	98	59-146	3	0-20
75-00-3	PSD Chloroethane	50.0	0.00 U	44.2	88	65-129	0	0-20
75-69-4	PSD Trichlorofluoromethane	50.0	0.00 U	47.8	96	65-141	3	0-20
60-29-7	PSD Ethyl ether	50.0	0.00 U	48.0	96	69-127	1	0-20
75-35-4	PSD 1,1-Dichloroethylene	50.0	0.00 U	51.9	104	59-130	3	0-20
75-09-2	PSD Methylene chloride	50.0	0.00 U	50.9	102	62-123	1	0-20
1634-04-4	PSD tert-Butyl methyl ether	50.0	0.00 U	52.4	105	69-132	0	0-20
156-60-5	PSD trans-1,2-Dichloroethylene	50.0	0.00 U	51.7	103	65-127	3	0-20
75-34-3	PSD 1,1-Dichloroethane	50.0	0.00 U	51.2	102	67-127	2	0-20
156-59-2	PSD cis-1,2-Dichloroethylene	50.0	0.00 U	51.8	104	69-127	3	0-20

Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Post Spike Duplicate

Client ID: CAMO-18-148071PSD

Matrix: W

Lab Sample ID 1203925227

Instrument: VOA1.I

Analysis Date: 11/21/2017 19:19

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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 51.3	103	66-137	4	0-20
74-97-5	PSD Bromochloromethane	50.0	0.00	U 50.9	102	71-130	1	0-20
67-66-3	PSD Chloroform	50.0	0.00	U 51.2	102	71-129	2	0-20
71-55-6	PSD 1,1,1-Trichloroethane	50.0	0.00	U 51.2	102	69-139	3	0-20
563-58-6	PSD 1,1-Dichloropropene	50.0	0.00	U 50.3	101	67-130	4	0-20
56-23-5	PSD Carbon tetrachloride	50.0	0.00	U 52.7	105	66-143	5	0-20
107-06-2	PSD 1,2-Dichloroethane	50.0	0.00	U 53.2	106	69-130	2	0-20
71-43-2	PSD Benzene	50.0	0.00	U 48.5	97	66-125	2	0-20
79-01-6	PSD Trichloroethylene	50.0	0.00	U 52.0	104	65-131	2	0-20
78-87-5	PSD 1,2-Dichloropropane	50.0	0.00	U 49.6	99	67-127	2	0-20
74-95-3	PSD Dibromomethane	50.0	0.00	U 52.8	106	72-129	0	0-20
75-27-4	PSD Bromodichloromethane	50.0	0.00	U 53.2	106	70-138	2	0-20
10061-01-5	PSD cis-1,3-Dichloropropylene	50.0	0.00	U 51.8	104	70-134	0	0-20
108-88-3	PSD Toluene	50.0	0.00	U 45.3	91	60-126	3	0-20
10061-02-6	PSD trans-1,3-Dichloropropylene	50.0	0.00	U 51.6	103	69-135	2	0-20
79-00-5	PSD 1,1,2-Trichloroethane	50.0	0.00	U 47.8	96	66-125	1	0-20
142-28-9	PSD 1,3-Dichloropropane	50.0	0.00	U 47.4	95	67-124	1	0-20
127-18-4	PSD Tetrachloroethylene	50.0	0.00	U 46.4	93	60-130	4	0-20
124-48-1	PSD Dibromochloromethane	50.0	0.00	U 51.4	103	68-143	3	0-20
106-93-4	PSD 1,2-Dibromoethane	50.0	0.00	U 50.3	101	71-127	1	0-20
108-90-7	PSD Chlorobenzene	50.0	0.00	U 46.2	92	64-124	3	0-20
100-41-4	PSD Ethylbenzene	50.0	0.00	U 47.0	94	61-130	4	0-20

Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Post Spike Duplicate

Client ID: CAMO-18-148071PSD

Matrix: W

Lab Sample ID 1203925227

Instrument: VOA1.I

Analysis Date: 11/21/2017 19:19

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
95-47-6	PSD o-Xylene	50.0	0.00	U 48.3	97	62-131	3	0-20
100-42-5	PSD Styrene	50.0	0.00	U 48.3	97	59-135	2	0-20
75-25-2	PSD Bromoform	50.0	0.00	U 50.4	101	64-138	0	0-20
98-82-8	PSD Isopropylbenzene	50.0	0.00	U 46.2	92	55-133	2	0-20
79-34-5	PSD 1,1,2,2-Tetrachloroethane	50.0	0.00	U 46.0	92	62-129	2	0-20
96-18-4	PSD 1,2,3-Trichloropropane	50.0	0.00	U 48.5	97	70-124	3	0-20
108-86-1	PSD Bromobenzene	50.0	0.00	U 45.4	91	62-124	1	0-20
103-65-1	PSD n-Propylbenzene	50.0	0.00	U 44.8	90	50-133	4	0-20
108-67-8	PSD 1,3,5-Trimethylbenzene	50.0	0.00	U 45.9	92	53-135	3	0-20
95-49-8	PSD 2-Chlorotoluene	50.0	0.00	U 45.6	91	56-128	1	0-20
106-43-4	PSD 4-Chlorotoluene	50.0	0.00	U 44.0	88	53-130	3	0-20
98-06-6	PSD tert-Butylbenzene	50.0	0.00	U 47.6	95	55-135	4	0-20
95-63-6	PSD 1,2,4-Trimethylbenzene	50.0	0.00	U 45.4	91	53-132	4	0-20
135-98-8	PSD sec-Butylbenzene	50.0	0.00	U 46.3	93	50-138	3	0-20
99-87-6	PSD 4-Isopropyltoluene	50.0	0.00	U 46.9	94	49-138	5	0-20
541-73-1	PSD 1,3-Dichlorobenzene	50.0	0.00	U 42.4	85	56-126	3	0-20
106-46-7	PSD 1,4-Dichlorobenzene	50.0	0.00	U 42.9	86	55-125	3	0-20
104-51-8	PSD n-Butylbenzene	50.0	0.00	U 45.6	91	43-142	7	0-20
96-12-8	PSD 1,2-Dibromo-3-chloropropane	50.0	0.00	U 45.1	90	62-141	4	0-20
87-68-3	PSD Hexachlorobutadiene	50.0	0.00	U 46.5	93	40-147	7	0-20
91-20-3	PSD Naphthalene	50.0	0.00	U 48.5	97	62-134	5	0-20
87-61-6	PSD 1,2,3-Trichlorobenzene	50.0	0.00	U 46.4	93	52-135	0	0-20

Volatile

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Quality Control Summary
Spike Recovery Report

SDG Number: 2018-888

Sample Type: Post Spike Duplicate

Client ID: CAMO-18-148071PSD

Matrix: W

Lab Sample ID 1203925227

Instrument: VOA1.I

Analysis Date: 11/21/2017 19:19

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	49.1	98	50-133	3	0-20
630-20-6	PSD 1,1,1,2-Tetrachloroethane	50.0	0.00 U	50.8	102	71-133	2	0-20
95-50-1	PSD 1,2-Dichlorobenzene	50.0	0.00 U	44.4	89	60-125	2	0-20
71-36-3	PSD n-Butyl alcohol	5000	0.00 U	5210	104	60-140	5	0-20

Volatile

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Quality Control Summary
Spike Recovery Report

SDG Number: 2018-888

Sample Type: Post Spike

Client ID: CAMO-18-148071PS

Matrix: W

Lab Sample ID 1203925226

Instrument: VOA1.I

Analysis Date: 11/21/2017 19:47

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	199	79	49-141
76-13-1	PS	Trichlorotrifluoroethane	250	0.00	U	218	87	57-149
107-05-1	PS	Allyl chloride	250	0.00	U	221	89	54-128
107-13-1	PS	Acrylonitrile	250	0.00	U	225	90	59-129
107-12-0	PS	Propionitrile	250	0.00	U	217	87	58-131
126-98-7	PS	Methacrylonitrile	250	0.00	U	224	89	59-134
80-62-6	PS	Methyl methacrylate	250	0.00	U	230	92	62-135
97-63-2	PS	Ethyl methacrylate	250	0.00	U	204	82	60-136
78-83-1	PS	Isobutyl alcohol	2500	0.00	U	2370	95	60-143
126-99-8	PS	2-Chloro-1,3-butadiene	50.0	0.00	U	44.5	89	63-146

Volatile

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Quality Control Summary
Spike Recovery Report

SDG Number: 2018-888

Sample Type: Post Spike Duplicate

Client ID: CAMO-18-148071PSD

Matrix: W

Lab Sample ID 1203925228

Instrument: VOA1.I

Analysis Date: 11/21/2017 20:16

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

CAS No		Parmname	Amount Added ug/L	Sample Conc. ug/L		Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
107-02-8	PSD	Acrolein	250	0.00	U	207	83	49-141	4	0-20
76-13-1	PSD	Trichlorotrifluoroethane	250	0.00	U	220	88	57-149	1	0-20
107-05-1	PSD	Allyl chloride	250	0.00	U	220	88	54-128	1	0-20
107-13-1	PSD	Acrylonitrile	250	0.00	U	229	92	59-129	2	0-20
107-12-0	PSD	Propionitrile	250	0.00	U	228	91	58-131	5	0-20
126-98-7	PSD	Methacrylonitrile	250	0.00	U	227	91	59-134	1	0-20
80-62-6	PSD	Methyl methacrylate	250	0.00	U	233	93	62-135	1	0-20
97-63-2	PSD	Ethyl methacrylate	250	0.00	U	208	83	60-136	2	0-20
78-83-1	PSD	Isobutyl alcohol	2500	0.00	U	2480	99	60-143	4	0-20
126-99-8	PSD	2-Chloro-1,3-butadiene	50.0	0.00	U	43.7	87	63-146	2	0-20

Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721034

Matrix: WATER

Lab Sample ID 1203925821

Instrument: VOA1.I

Analysis Date: 11/21/2017 21:38

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	91.2	91	71-127
75-05-8	LCS Acetonitrile	1250	0.0	1130	91	61-125
67-64-1	LCS Acetone	250	0.0	206	83	48-157
74-88-4	LCS Iodomethane	250	0.0	239	96	72-128
75-15-0	LCS Carbon disulfide	250	0.0	230	92	69-138
108-05-4	LCS Vinyl acetate	250	0.0	221	89	67-125
78-93-3	LCS 2-Butanone	250	0.0	215	86	55-138
108-10-1	LCS 4-Methyl-2-pentanone	250	0.0	216	87	66-124
591-78-6	LCS 2-Hexanone	250	0.0	202	81	56-140
75-71-8	LCS Dichlorodifluoromethane	50.0	0.0	42.1	84	40-160
74-87-3	LCS Chloromethane	50.0	0.0	44.5	89	58-135
75-01-4	LCS Vinyl chloride	50.0	0.0	45.9	92	65-137
74-83-9	LCS Bromomethane	50.0	0.0	47.4	95	63-137
75-00-3	LCS Chloroethane	50.0	0.0	42.6	85	69-129
75-69-4	LCS Trichlorofluoromethane	50.0	0.0	43.6	87	69-138
60-29-7	LCS Ethyl ether	50.0	0.0	48.5	97	72-125
75-35-4	LCS 1,1-Dichloroethylene	50.0	0.0	49.7	99	66-126
75-09-2	LCS Methylene chloride	50.0	0.0	51.8	104	68-119
1634-04-4	LCS tert-Butyl methyl ether	50.0	0.0	54.3	109	76-128
156-60-5	LCS trans-1,2-Dichloroethylene	50.0	0.0	50.6	101	71-124
75-34-3	LCS 1,1-Dichloroethane	50.0	0.0	50.7	101	73-123
156-59-2	LCS cis-1,2-Dichloroethylene	50.0	0.0	51.6	103	75-123

Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 4

SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721034

Matrix: WATER

Lab Sample ID 1203925821

Instrument: VOA1.I

Analysis Date: 11/21/2017 21:38

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	48.3	97	72-138
74-97-5	LCS Bromochloromethane	50.0	0.0	51.4	103	76-125
67-66-3	LCS Chloroform	50.0	0.0	50.3	101	76-123
71-55-6	LCS 1,1,1-Trichloroethane	50.0	0.0	48.2	96	74-136
563-58-6	LCS 1,1-Dichloropropene	50.0	0.0	48.5	97	72-129
56-23-5	LCS Carbon tetrachloride	50.0	0.0	49.7	99	72-140
107-06-2	LCS 1,2-Dichloroethane	50.0	0.0	52.4	105	74-122
71-43-2	LCS Benzene	50.0	0.0	48.3	97	72-121
79-01-6	LCS Trichloroethylene	50.0	0.0	50.6	101	74-125
78-87-5	LCS 1,2-Dichloropropane	50.0	0.0	50.1	100	73-121
74-95-3	LCS Dibromomethane	50.0	0.0	52.4	105	78-123
75-27-4	LCS Bromodichloromethane	50.0	0.0	53.2	106	77-131
10061-01-5	LCS cis-1,3-Dichloropropylene	50.0	0.0	52.9	106	78-131
108-88-3	LCS Toluene	50.0	0.0	45.7	91	71-121
10061-02-6	LCS trans-1,3-Dichloropropylene	50.0	0.0	52.2	104	78-131
79-00-5	LCS 1,1,2-Trichloroethane	50.0	0.0	48.7	97	74-118
142-28-9	LCS 1,3-Dichloropropane	50.0	0.0	47.9	96	74-118
127-18-4	LCS Tetrachloroethylene	50.0	0.0	44.6	89	69-129
124-48-1	LCS Dibromochloromethane	50.0	0.0	51.6	103	76-137
106-93-4	LCS 1,2-Dibromoethane	50.0	0.0	50.6	101	78-122
108-90-7	LCS Chlorobenzene	50.0	0.0	46.5	93	74-120
100-41-4	LCS Ethylbenzene	50.0	0.0	45.8	92	73-125

Volatile
Quality Control Summary
Spike Recovery Report

Page 3 of 4

SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721034

Matrix: WATER

Lab Sample ID 1203925821

Instrument: VOA1.I

Analysis Date: 11/21/2017 21:38

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	47.9	96	74-126
100-42-5	LCS Styrene	50.0	0.0	48.1	96	72-130
75-25-2	LCS Bromoform	50.0	0.0	50.6	101	72-136
98-82-8	LCS Isopropylbenzene	50.0	0.0	45.1	90	70-130
79-34-5	LCS 1,1,2,2-Tetrachloroethane	50.0	0.0	45.2	90	70-126
96-18-4	LCS 1,2,3-Trichloropropane	50.0	0.0	47.3	95	74-122
108-86-1	LCS Bromobenzene	50.0	0.0	46.2	92	74-120
103-65-1	LCS n-Propylbenzene	50.0	0.0	44.3	89	67-128
108-67-8	LCS 1,3,5-Trimethylbenzene	50.0	0.0	46.0	92	70-129
95-49-8	LCS 2-Chlorotoluene	50.0	0.0	45.5	91	71-124
106-43-4	LCS 4-Chlorotoluene	50.0	0.0	45.1	90	69-125
98-06-6	LCS tert-Butylbenzene	50.0	0.0	47.0	94	72-130
95-63-6	LCS 1,2,4-Trimethylbenzene	50.0	0.0	45.7	91	70-126
135-98-8	LCS sec-Butylbenzene	50.0	0.0	45.7	91	70-131
99-87-6	LCS 4-Isopropyltoluene	50.0	0.0	47.3	95	71-131
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	43.2	86	72-121
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	44.1	88	71-120
104-51-8	LCS n-Butylbenzene	50.0	0.0	46.9	94	68-134
96-12-8	LCS 1,2-Dibromo-3-chloropropane	50.0	0.0	44.2	88	68-141
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	50.1	100	72-136
91-20-3	LCS Naphthalene	50.0	0.0	49.7	99	72-132
87-61-6	LCS 1,2,3-Trichlorobenzene	50.0	0.0	49.1	98	70-130

Volatile

Page 4 of 4

Quality Control Summary
Spike Recovery Report

SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721034

Matrix: WATER

Lab Sample ID 1203925821

Instrument: VOA1.I

Analysis Date: 11/21/2017 21:38

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	52.3	105	71-129
630-20-6	LCS 1,1,1,2-Tetrachloroethane	50.0	0.0	50.3	101	79-127
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	45.5	91	74-120
71-36-3	LCS n-Butyl alcohol	5000	0.0	5040	101	63-138

Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 1

SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1721034

Matrix: WATER

Lab Sample ID 1203925822

Instrument: VOA1.I

Analysis Date: 11/21/2017 22:36

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1721034

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	259	104	60-140
76-13-1	LCS	Trichlorotrifluoroethane	250	0.0	201	80	61-148
107-05-1	LCS	Allyl chloride	250	0.0	213	85	59-125
107-13-1	LCS	Acrylonitrile	250	0.0	223	89	65-122
107-12-0	LCS	Propionitrile	250	0.0	218	87	64-124
126-98-7	LCS	Methacrylonitrile	250	0.0	222	89	64-126
80-62-6	LCS	Methyl methacrylate	250	0.0	229	92	69-127
97-63-2	LCS	Ethyl methacrylate	250	0.0	208	83	66-130
78-83-1	LCS	Isobutyl alcohol	2500	0.0	2370	95	65-135
126-99-8	LCS	2-Chloro-1,3-butadiene	50.0	0.0	41.2	82	66-147

Method Blank Summary

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SDG Number: 2018-888

Client: ARSL004

Matrix: WATER

Client ID: MB for batch 1721034

Instrument ID: VOA1.I

Data File: 112117V1\1J206AR.D

Lab Sample ID: 1203925222

Prep Date: 11/21/2017 11:09

Analyzed: 11/21/17 11:09

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 1721034	1203925223	112117V1\1J203AR.D	11/21/17	0943
02 LCS for batch 1721034	1203925224	112117V1\1J205AR.D	11/21/17	1040
03 CASA-18-148013	437939006	112117V1\1J214.D	11/21/17	1501
04 CASA-18-148014	437939013	112117V1\1J215.D	11/21/17	1529
05 CAMO-18-148071PS	1203925225	112117V1\1J222.D	11/21/17	1850
06 CAMO-18-148071PSD	1203925227	112117V1\1J223.D	11/21/17	1919
07 CAMO-18-148071PS	1203925226	112117V1\1J224.D	11/21/17	1947
08 CAMO-18-148071PSD	1203925228	112117V1\1J225.D	11/21/17	2016

Method Blank Summary

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SDG Number:	2018-888	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1721034	Instrument ID:	VOA1.I	Data File:	112117V1\1J231A.D
Lab Sample ID:	1203925820	Prep Date:	11/21/2017 23:05	Analyzed:	11/21/17 23:05
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
10 LCS for batch 1721034	1203925821	112117V1\1J228A.D	11/21/17	2138
11 LCS for batch 1721034	1203925822	112117V1\1J230A.D	11/21/17	2236
12 CASA-18-148003	437939003	112117V1\1J236.D	11/22/17	0130
13 CASA-18-148009	437939005	112117V1\1J237.D	11/22/17	0159
14 CASA-18-148004	437939009	112117V1\1J238.D	11/22/17	0227
15 CASA-18-148012	437939012	112117V1\1J239.D	11/22/17	0256

Quality Control Data

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-888

Lab Sample ID: 1203925222

Client Sample: QC for batch 1721034

Client ID: MB for batch 1721034

Batch ID: 1721034

Run Date: 11/21/2017 11:09

Prep Date: 11/21/2017 11:09

Data File: 112117V1\1J206AR.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

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

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888

Lab Sample ID: 1203925222

Client Sample: QC for batch 1721034

Client ID: MB for batch 1721034

Batch ID: 1721034

Run Date: 11/21/2017 11:09

Prep Date: 11/21/2017 11:09

Data File: 112117V1\1J206AR.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

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

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888

Lab Sample ID: 1203925222

Client Sample: QC for batch 1721034

Client ID: MB for batch 1721034

Batch ID: 1721034

Run Date: 11/21/2017 11:09

Prep Date: 11/21/2017 11:09

Data File: 112117V1\1J206AR.D

Matrix: WATER

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

Column: DB-624

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	44.6	50.0	ug/L 89	(71%-134%)
Bromofluorobenzene	59.6	50.0	ug/L 119	(70%-131%)
Toluene-d8	45.5	50.0	ug/L 91	(74%-124%)

Tentatively Identified Compound Summary

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

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-888
Lab Sample ID: 1203925223
Client Sample: QC for batch 1721034
Client ID: LCS for batch 1721034
Batch ID: 1721034
Run Date: 11/21/2017 09:43
Prep Date: 11/21/2017 09:43
Data File: 112117V1\1J203AR.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: WATER

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		54.7	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		59.1	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		46.6	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		49.9	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		56.3	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		59.9	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		58.0	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		51.6	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		48.4	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		56.6	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		50.5	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		44.9	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		52.3	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		56.8	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		50.4	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		46.5	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		49.7	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		47.3	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		61.4	ug/L	0.300	1.00
78-93-3	2-Butanone		296	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene	U	0.300	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene		49.1	ug/L	0.300	1.00
591-78-6	2-Hexanone		286	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		48.9	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		52.6	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		251	ug/L	1.50	5.00
67-64-1	Acetone		296	ug/L	1.50	10.0
75-05-8	Acetonitrile		1230	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene		52.9	ug/L	0.300	1.00
108-86-1	Bromobenzene		48.1	ug/L	0.300	1.00
74-97-5	Bromochloromethane		53.3	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		57.1	ug/L	0.300	1.00
75-25-2	Bromoform		52.1	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

SDG Number: 2018-888
Lab Sample ID: 1203925223
Client Sample: QC for batch 1721034
Client ID: LCS for batch 1721034
Batch ID: 1721034
Run Date: 11/21/2017 09:43
Prep Date: 11/21/2017 09:43
Data File: 112117V1\1J203AR.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: WATER

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		53.9	ug/L	0.300	1.00
75-15-0	Carbon disulfide		270	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		61.5	ug/L	0.300	1.00
108-90-7	Chlorobenzene		50.2	ug/L	0.300	1.00
75-00-3	Chloroethane		49.7	ug/L	0.300	1.00
67-66-3	Chloroform		55.6	ug/L	0.300	1.00
74-87-3	Chloromethane		52.8	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		53.7	ug/L	0.300	1.00
74-95-3	Dibromomethane		55.7	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		54.0	ug/L	0.300	1.00
60-29-7	Ethyl ether		51.2	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		52.3	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		54.5	ug/L	0.300	1.00
74-88-4	Iodomethane		263	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		50.5	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride		53.7	ug/L	1.00	10.0
91-20-3	Naphthalene		50.5	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		52.2	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		52.1	ug/L	0.300	1.00
108-88-3	Toluene		50.0	ug/L	0.300	1.00
79-01-6	Trichloroethylene		59.1	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		57.1	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		251	ug/L	1.50	5.00
75-01-4	Vinyl chloride		56.7	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		55.8	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		56.6	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		102	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5300	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		53.3	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		49.6	ug/L	0.300	1.00
95-47-6	o-Xylene		52.6	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		51.5	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

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SDG Number:	2018-888	Matrix:	WATER
Lab Sample ID:	1203925223		
Client Sample:	QC for batch 1721034	Client:	ARSL004
Client ID:	LCS for batch 1721034	Method:	SW-846:8260B
Batch ID:	1721034	Inst:	VOA1.I
Run Date:	11/21/2017 09:43	Analyst:	PXY1
Prep Date:	11/21/2017 09:43		
Data File:	112117V1\1J203AR.D	Column:	DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		54.8	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		53.0	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		58.2	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		54.9	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	44.2	50.0	ug/L	88	(71%-134%)
Bromofluorobenzene	54.0	50.0	ug/L	108	(70%-131%)
Toluene-d8	44.8	50.0	ug/L	90	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888
Lab Sample ID: 1203925224
Client Sample: QC for batch 1721034
Client ID: LCS for batch 1721034
Batch ID: 1721034
Run Date: 11/21/2017 10:40
Prep Date: 11/21/2017 10:40
Data File: 112117V1\1J205AR.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: WATER

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene		46.0	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein		280	ug/L	1.50	5.00
107-13-1	Acrylonitrile		222	ug/L	1.50	5.00
107-05-1	Allyl chloride		225	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

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Sample Summary**

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SDG Number: 2018-888
Lab Sample ID: 1203925224
Client Sample: QC for batch 1721034
Client ID: LCS for batch 1721034
Batch ID: 1721034
Run Date: 11/21/2017 10:40
Prep Date: 11/21/2017 10:40
Data File: 112117V1\1J205AR.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: WATER

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	0.300	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	1.50	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	1.00
75-00-3	Chloroethane	U	0.300	ug/L	0.300	1.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	1.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	0.300	ug/L	0.300	1.00
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	1.00
60-29-7	Ethyl ether	U	0.300	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate		205	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		2360	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		220	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		226	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		217	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		227	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
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Sample Summary**

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SDG Number: 2018-888
Lab Sample ID: 1203925224
Client Sample: QC for batch 1721034
Client ID: LCS for batch 1721034
Batch ID: 1721034
Run Date: 11/21/2017 10:40
Prep Date: 11/21/2017 10:40
Data File: 112117V1\1J205AR.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: WATER

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

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

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	43.4	50.0	ug/L	87	(71%-134%)
Bromofluorobenzene	56.3	50.0	ug/L	113	(70%-131%)
Toluene-d8	44.3	50.0	ug/L	89	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888
Lab Sample ID: 1203925225
Client Sample: QC for batch 1721034
Client ID: CAMO-18-148071PS
Batch ID: 1721034
Run Date: 11/21/2017 18:50
Prep Date: 11/21/2017 18:50
Data File: 112117V1\1J222.D

Date Collected: 11/09/2017 13:37
Date Received: 11/14/2017 09:05
Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		52.0	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		52.7	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		45.1	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		48.4	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		52.3	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		53.6	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		52.4	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		46.6	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		47.2	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		50.5	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		47.2	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		43.2	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		50.9	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		45.3	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		54.3	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		50.4	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		47.4	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		43.6	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		48.0	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		44.3	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		53.3	ug/L	0.300	1.00
78-93-3	2-Butanone		148	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		46.2	ug/L	0.300	1.00
591-78-6	2-Hexanone		172	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		45.4	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		49.4	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		220	ug/L	1.50	5.00
67-64-1	Acetone		107	ug/L	1.50	10.0
75-05-8	Acetonitrile		1140	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		49.3	ug/L	0.300	1.00
108-86-1	Bromobenzene		45.9	ug/L	0.300	1.00
74-97-5	Bromochloromethane		51.2	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		54.1	ug/L	0.300	1.00
75-25-2	Bromoform		50.5	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

SDG Number: 2018-888
Lab Sample ID: 1203925225
Client Sample: QC for batch 1721034
Client ID: CAMO-18-148071PS
Batch ID: 1721034
Run Date: 11/21/2017 18:50
Prep Date: 11/21/2017 18:50
Data File: 112117V1\1J222.D

Date Collected: 11/09/2017 13:37
Date Received: 11/14/2017 09:05
Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		50.9	ug/L	0.300	1.00
75-15-0	Carbon disulfide		246	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		55.4	ug/L	0.300	1.00
108-90-7	Chlorobenzene		47.5	ug/L	0.300	1.00
75-00-3	Chloroethane		44.3	ug/L	0.300	1.00
67-66-3	Chloroform		52.4	ug/L	0.300	1.00
74-87-3	Chloromethane		46.5	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		52.8	ug/L	0.300	1.00
74-95-3	Dibromomethane		52.8	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		46.4	ug/L	0.300	1.00
60-29-7	Ethyl ether		47.6	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		49.0	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		50.0	ug/L	0.300	1.00
74-88-4	Iodomethane		246	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		47.0	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		51.2	ug/L	1.00	10.0
91-20-3	Naphthalene		45.9	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		49.3	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		48.3	ug/L	0.300	1.00
108-88-3	Toluene		46.7	ug/L	0.300	1.00
79-01-6	Trichloroethylene		53.1	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		49.4	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		222	ug/L	1.50	5.00
75-01-4	Vinyl chloride		49.0	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		53.4	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		51.8	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		96.4	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		4970	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		48.7	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		46.4	ug/L	0.300	1.00
95-47-6	o-Xylene		49.9	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		47.9	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	2018-888	Date Collected:	11/09/2017 13:37	Matrix:	W
Lab Sample ID:	1203925225	Date Received:	11/14/2017 09:05		
Client Sample:	QC for batch 1721034	Client:	ARSL004	Project:	QC
Client ID:	CAMO-18-148071PS	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1721034	Inst:	VOA1.I	Dilution:	1
Run Date:	11/21/2017 18:50	Analyst:	PXY1	Purge Vol:	5 mL
Prep Date:	11/21/2017 18:50				
Data File:	112117V1\1J222.D	Column:	DB-624		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		52.6	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		49.5	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		53.3	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		52.5	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	42.4	50.0	ug/L	85	(71%-134%)
Bromofluorobenzene	53.9	50.0	ug/L	108	(70%-131%)
Toluene-d8	44.9	50.0	ug/L	90	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

SDG Number: 2018-888	Date Collected: 11/09/2017 13:37	Matrix: W
Lab Sample ID: 1203925226	Date Received: 11/14/2017 09:05	
Client Sample: QC for batch 1721034	Client: ARSL004	Project: QC
Client ID: CAMO-18-148071PS	Method: SW-846:8260B	SOP Ref: GL-OA-E-038
Batch ID: 1721034	Inst: VOA1.I	Dilution: 1
Run Date: 11/21/2017 19:47	Analyst: PXY1	Purge Vol: 5 mL
Prep Date: 11/21/2017 19:47		
Data File: 112117V1\1J224.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		44.5	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		199	ug/L	1.50	5.00
107-13-1	Acrylonitrile		225	ug/L	1.50	5.00
107-05-1	Allyl chloride		221	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888
Lab Sample ID: 1203925226
Client Sample: QC for batch 1721034
Client ID: CAMO-18-148071PS
Batch ID: 1721034
Run Date: 11/21/2017 19:47
Prep Date: 11/21/2017 19:47
Data File: 112117V1\1J224.D

Date Collected: 11/09/2017 13:37
Date Received: 11/14/2017 09:05
Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
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		204	ug/L	1.50	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	U	0.300	ug/L	0.300	1.00
74-88-4	Iodomethane	U	1.50	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol		2370	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		224	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		230	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		217	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		218	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:	2018-888	Date Collected:	11/09/2017 13:37	Matrix:	W
Lab Sample ID:	1203925226	Date Received:	11/14/2017 09:05		
Client Sample:	QC for batch 1721034	Client:	ARSL004	Project:	QC
Client ID:	CAMO-18-148071PS	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1721034	Inst:	VOA1.I	Dilution:	1
Run Date:	11/21/2017 19:47	Analyst:	PXY1	Purge Vol:	5 mL
Prep Date:	11/21/2017 19:47				
Data File:	112117V1\1J224.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	42.0	50.0	ug/L	84	(71%-134%)
Bromofluorobenzene	54.9	50.0	ug/L	110	(70%-131%)
Toluene-d8	44.0	50.0	ug/L	88	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888
Lab Sample ID: 1203925227
Client Sample: QC for batch 1721034
Client ID: CAMO-18-148071PSD
Batch ID: 1721034
Run Date: 11/21/2017 19:19
Prep Date: 11/21/2017 19:19
Data File: 112117V1\1J223.D

Date Collected: 11/09/2017 13:37
Date Received: 11/14/2017 09:05
Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		50.8	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		51.2	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		46.0	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		47.8	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		51.2	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		51.9	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		50.3	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		46.4	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		48.5	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		49.1	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		45.4	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		45.1	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		50.3	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		44.4	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		53.2	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		49.6	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		45.9	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		42.4	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		47.4	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		42.9	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		51.3	ug/L	0.300	1.00
78-93-3	2-Butanone		150	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		45.6	ug/L	0.300	1.00
591-78-6	2-Hexanone		174	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		44.0	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		46.9	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		221	ug/L	1.50	5.00
67-64-1	Acetone		108	ug/L	1.50	10.0
75-05-8	Acetonitrile		1160	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		48.5	ug/L	0.300	1.00
108-86-1	Bromobenzene		45.4	ug/L	0.300	1.00
74-97-5	Bromochloromethane		50.9	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		53.2	ug/L	0.300	1.00
75-25-2	Bromoform		50.4	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

SDG Number: 2018-888
Lab Sample ID: 1203925227
Client Sample: QC for batch 1721034
Client ID: CAMO-18-148071PSD
Batch ID: 1721034
Run Date: 11/21/2017 19:19
Prep Date: 11/21/2017 19:19
Data File: 112117V1\1J223.D

Date Collected: 11/09/2017 13:37
Date Received: 11/14/2017 09:05
Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		49.2	ug/L	0.300	1.00
75-15-0	Carbon disulfide		239	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		52.7	ug/L	0.300	1.00
108-90-7	Chlorobenzene		46.2	ug/L	0.300	1.00
75-00-3	Chloroethane		44.2	ug/L	0.300	1.00
67-66-3	Chloroform		51.2	ug/L	0.300	1.00
74-87-3	Chloromethane		45.3	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		51.4	ug/L	0.300	1.00
74-95-3	Dibromomethane		52.8	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		43.5	ug/L	0.300	1.00
60-29-7	Ethyl ether		48.0	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		46.5	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		46.2	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		50.9	ug/L	1.00	10.0
91-20-3	Naphthalene		48.5	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		46.4	ug/L	0.300	1.00
108-88-3	Toluene		45.3	ug/L	0.300	1.00
79-01-6	Trichloroethylene		52.0	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		47.8	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		222	ug/L	1.50	5.00
75-01-4	Vinyl chloride		48.6	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		51.8	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		51.8	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		93.1	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5210	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		45.6	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		44.8	ug/L	0.300	1.00
95-47-6	o-Xylene		48.3	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		46.3	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

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SDG Number:	2018-888	Date Collected:	11/09/2017 13:37	Matrix:	W
Lab Sample ID:	1203925227	Date Received:	11/14/2017 09:05		
Client Sample:	QC for batch 1721034	Client:	ARSL004	Project:	QC
Client ID:	CAMO-18-148071PSD	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1721034	Inst:	VOA1.I	Dilution:	1
Run Date:	11/21/2017 19:19	Analyst:	PXY1	Purge Vol:	5 mL
Prep Date:	11/21/2017 19:19				
Data File:	112117V1\1J223.D	Column:	DB-624		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		52.4	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		47.6	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		51.7	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		51.6	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	42.6	50.0	ug/L	85	(71%-134%)
Bromofluorobenzene	54.4	50.0	ug/L	109	(70%-131%)
Toluene-d8	44.6	50.0	ug/L	89	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-888
Lab Sample ID: 1203925228
Client Sample: QC for batch 1721034
Client ID: CAMO-18-148071PSD
Batch ID: 1721034
Run Date: 11/21/2017 20:16
Prep Date: 11/21/2017 20:16
Data File: 112117V1\1J225.D

Date Collected: 11/09/2017 13:37
Date Received: 11/14/2017 09:05
Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene		43.7	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		207	ug/L	1.50	5.00
107-13-1	Acrylonitrile		229	ug/L	1.50	5.00
107-05-1	Allyl chloride		220	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888
Lab Sample ID: 1203925228
Client Sample: QC for batch 1721034
Client ID: CAMO-18-148071PSD
Batch ID: 1721034
Run Date: 11/21/2017 20:16
Prep Date: 11/21/2017 20:16
Data File: 112117V1\1J225.D

Date Collected: 11/09/2017 13:37
Date Received: 11/14/2017 09:05
Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
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		208	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		2480	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		227	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		233	ug/L	1.50	5.00
75-09-2	Methylene chloride	U	1.00	ug/L	1.00	10.0
91-20-3	Naphthalene	U	0.300	ug/L	0.300	1.00
107-12-0	Propionitrile		228	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		220	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:	2018-888	Date Collected:	11/09/2017 13:37	Matrix:	W
Lab Sample ID:	1203925228	Date Received:	11/14/2017 09:05		
Client Sample:	QC for batch 1721034	Client:	ARSL004	Project:	QC
Client ID:	CAMO-18-148071PSD	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1721034	Inst:	VOA1.I	Dilution:	1
Run Date:	11/21/2017 20:16	Analyst:	PXY1	Purge Vol:	5 mL
Prep Date:	11/21/2017 20:16				
Data File:	112117V1\1J225.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	42.7	50.0	ug/L 85	(71%-134%)
Bromofluorobenzene	55.1	50.0	ug/L 110	(70%-131%)
Toluene-d8	44.0	50.0	ug/L 88	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-888

Matrix: WATER

Lab Sample ID: 1203925820

Client Sample: QC for batch 1721034

Client: ARSL004

Project: QC

Client ID: MB for batch 1721034

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1721034

Inst: VOA1.I

Dilution: 1

Run Date: 11/21/2017 23:05

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/21/2017 23:05

Column: DB-624

Data File: 112117V1\1J231A.D

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: 2018-888
Lab Sample ID: 1203925820
Client Sample: QC for batch 1721034
Client ID: MB for batch 1721034
Batch ID: 1721034
Run Date: 11/21/2017 23:05
Prep Date: 11/21/2017 23:05
Data File: 112117V1\1J231A.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: WATER

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

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

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888

Lab Sample ID: 1203925820

Client Sample: QC for batch 1721034

Client ID: MB for batch 1721034

Batch ID: 1721034

Run Date: 11/21/2017 23:05

Prep Date: 11/21/2017 23:05

Data File: 112117V1\1J231A.D

Matrix: WATER

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

Column: DB-624

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	42.6	50.0	ug/L 85	(71%-134%)
Bromofluorobenzene	59.6	50.0	ug/L 119	(70%-131%)
Toluene-d8	44.7	50.0	ug/L 89	(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: 2018-888

Lab Sample ID: 1203925821

Client Sample: QC for batch 1721034

Client ID: LCS for batch 1721034

Batch ID: 1721034

Run Date: 11/21/2017 21:38

Prep Date: 11/21/2017 21:38

Data File: 112117V1\1J228A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		50.3	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		48.2	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		45.2	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		48.7	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		50.7	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		49.7	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		48.5	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		49.1	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		47.3	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		52.3	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		45.7	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		44.2	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		50.6	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		45.5	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		52.4	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		50.1	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		46.0	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		43.2	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		47.9	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		44.1	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		48.3	ug/L	0.300	1.00
78-93-3	2-Butanone		215	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		45.5	ug/L	0.300	1.00
591-78-6	2-Hexanone		202	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		45.1	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		47.3	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		216	ug/L	1.50	5.00
67-64-1	Acetone		206	ug/L	1.50	10.0
75-05-8	Acetonitrile		1130	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		48.3	ug/L	0.300	1.00
108-86-1	Bromobenzene		46.2	ug/L	0.300	1.00
74-97-5	Bromochloromethane		51.4	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		53.2	ug/L	0.300	1.00
75-25-2	Bromoform		50.6	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888
Lab Sample ID: 1203925821
Client Sample: QC for batch 1721034
Client ID: LCS for batch 1721034
Batch ID: 1721034
Run Date: 11/21/2017 21:38
Prep Date: 11/21/2017 21:38
Data File: 112117V1\1J228A.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: WATER

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		47.4	ug/L	0.300	1.00
75-15-0	Carbon disulfide		230	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		49.7	ug/L	0.300	1.00
108-90-7	Chlorobenzene		46.5	ug/L	0.300	1.00
75-00-3	Chloroethane		42.6	ug/L	0.300	1.00
67-66-3	Chloroform		50.3	ug/L	0.300	1.00
74-87-3	Chloromethane		44.5	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		51.6	ug/L	0.300	1.00
74-95-3	Dibromomethane		52.4	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		42.1	ug/L	0.300	1.00
60-29-7	Ethyl ether		48.5	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		45.8	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		50.1	ug/L	0.300	1.00
74-88-4	Iodomethane		239	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		45.1	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		51.8	ug/L	1.00	10.0
91-20-3	Naphthalene		49.7	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		48.1	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		44.6	ug/L	0.300	1.00
108-88-3	Toluene		45.7	ug/L	0.300	1.00
79-01-6	Trichloroethylene		50.6	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		43.6	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		221	ug/L	1.50	5.00
75-01-4	Vinyl chloride		45.9	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		51.6	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		52.9	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		91.2	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5040	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		46.9	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		44.3	ug/L	0.300	1.00
95-47-6	o-Xylene		47.9	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		45.7	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

SDG Number: 2018-888
Lab Sample ID: 1203925821
Client Sample: QC for batch 1721034
Client ID: LCS for batch 1721034
Batch ID: 1721034
Run Date: 11/21/2017 21:38
Prep Date: 11/21/2017 21:38
Data File: 112117V1\1J228A.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: WATER

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		54.3	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		47.0	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		50.6	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		52.2	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	42.0	50.0	ug/L	84	(71%-134%)
Bromofluorobenzene	54.1	50.0	ug/L	108	(70%-131%)
Toluene-d8	44.3	50.0	ug/L	89	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-888

Lab Sample ID: 1203925822

Client Sample: QC for batch 1721034

Client ID: LCS for batch 1721034

Batch ID: 1721034

Run Date: 11/21/2017 22:36

Prep Date: 11/21/2017 22:36

Data File: 112117V1\1J230A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene		41.2	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		259	ug/L	1.50	5.00
107-13-1	Acrylonitrile		223	ug/L	1.50	5.00
107-05-1	Allyl chloride		213	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888
Lab Sample ID: 1203925822
Client Sample: QC for batch 1721034
Client ID: LCS for batch 1721034
Batch ID: 1721034
Run Date: 11/21/2017 22:36
Prep Date: 11/21/2017 22:36
Data File: 112117V1\1J230A.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA1.I
Analyst: PXY1

Column: DB-624

Matrix: WATER

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	0.300	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	1.50	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	1.00
75-00-3	Chloroethane	U	0.300	ug/L	0.300	1.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	1.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	0.300	ug/L	0.300	1.00
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	1.00
60-29-7	Ethyl ether	U	0.300	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate		208	ug/L	1.50	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	U	0.300	ug/L	0.300	1.00
74-88-4	Iodomethane	U	1.50	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol		2370	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		222	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		229	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		218	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		201	ug/L	2.00	5.00
108-05-4	Vinyl acetate	U	1.50	ug/L	1.50	5.00
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	0.300	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol	U	15.0	ug/L	15.0	50.0
104-51-8	n-Butylbenzene	U	0.300	ug/L	0.300	1.00
103-65-1	n-Propylbenzene	U	0.300	ug/L	0.300	1.00
95-47-6	o-Xylene	U	0.300	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene	U	0.300	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

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SDG Number:	2018-888	Matrix:	WATER
Lab Sample ID:	1203925822		
Client Sample:	QC for batch 1721034	Client:	ARSL004
Client ID:	LCS for batch 1721034	Method:	SW-846:8260B
Batch ID:	1721034	Inst:	VOA1.I
Run Date:	11/21/2017 22:36	Analyst:	PXY1
Prep Date:	11/21/2017 22:36		
Data File:	112117V1\1J230A.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	42.5	50.0	ug/L	85	(71%-134%)
Bromofluorobenzene	55.8	50.0	ug/L	112	(70%-131%)
Toluene-d8	45.0	50.0	ug/L	90	(74%-124%)

Semi-Volatile Analysis

Case Narrative

**GC/MS Semivolatile
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-888
Work Order #: 437939**

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:	1719364
Prep Batch Number:	1719362

Sample Analysis

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

Sample ID	Client ID
437939003	CASA-18-148003
437939005	CASA-18-148009
437939009	CASA-18-148004
437939012	CASA-18-148012
1203920930	Method Blank (MB)
1203920931	Laboratory Control Sample (LCS)
1203920932	437939003(CASA-18-148003) Matrix Spike (MS)
1203920933	437939003(CASA-18-148003) 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 437939003 (CASA-18-148003), 437939005 (CASA-18-148009), 437939009 (CASA-18-148004) and 437939012 (CASA-18-148012) 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 and/or LCSD (See Below) did not meet spike recovery acceptance criteria. Since the target analytes were not detected in the associated samples above the reporting limits, the positive bias had no adverse impact on the data.

Sample	Analyte	Value
1203920931 (LCS)	bis(2-Chloro-1-methylethyl)ether	135* (44%-123%)

QC Sample Designation

Sample 437939003 (CASA-18-148003) was selected for analysis as the matrix spike and matrix spike duplicate.

Spike Recovery Statement

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

MS/MSD Relative Percent Difference (RPD) Statement

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

Internal Standard (ISTD) Acceptance

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

Technical Information:**Holding Time Specifications**

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

Preparation/Analytical Method Verification

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

Sample Dilutions

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

Sample Re-extraction/Re-analysis

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

Miscellaneous Information:**Manual Integrations**

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

Sample	Analyte	Value
1203920931 (LCS)	4-Nitrophenol	Result 17.6ug/L

TIC Comment

Tentatively identified compounds (TIC) were requested for samples 437939003 (CASA-18-148003), 437939005 (CASA-18-148009), 437939009 (CASA-18-148004) and 437939012 (CASA-18-148012) 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
MSD1.I	Agilent 6890N/5973 GC/MS w/ 7683 Autosampler	HP6890/HP5973	DB-5MS	25m x 0.2mm, 0.33um (5% Polysilarylene-95% Polydimethylsiloxane)

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: 2018-888 GEL Work Order: 437939

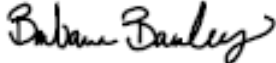
The Qualifiers in this report are defined as follows:

- * 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: 07 DEC 2017

Title: Data Validator

Sample Data Summary

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

Page 1 of 3

SDG Number: 2018-888
Lab Sample ID: 437939003

Date Collected: 11/13/2017 14:41
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148003
Batch ID: 1719364
Run Date: 11/16/2017 18:12
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1617.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 1000 mL
Column: 25x.20x.33

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	3.00	ug/L	3.00	10.0
120-82-1	1,2,4-Trichlorobenzene	U	3.00	ug/L	3.00	10.0
95-50-1	1,2-Dichlorobenzene	U	3.00	ug/L	3.00	10.0
122-66-7	Azobenzene	U	3.00	ug/L	3.00	10.0
541-73-1	<i>1,2-Diphenylhydrazine</i> 1,3-Dichlorobenzene	U	3.00	ug/L	3.00	10.0
106-46-7	1,4-Dichlorobenzene	U	3.00	ug/L	3.00	10.0
123-91-1	1,4-Dioxane	U	3.00	ug/L	3.00	10.0
90-12-0	1-Methylnaphthalene	U	0.300	ug/L	0.300	1.00
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.00	ug/L	3.00	10.0
95-95-4	2,4,5-Trichlorophenol	U	3.00	ug/L	3.00	10.0
88-06-2	2,4,6-Trichlorophenol	U	3.00	ug/L	3.00	10.0
120-83-2	2,4-Dichlorophenol	U	3.00	ug/L	3.00	10.0
105-67-9	2,4-Dimethylphenol	U	3.00	ug/L	3.00	10.0
51-28-5	2,4-Dinitrophenol	U	5.00	ug/L	5.00	20.0
121-14-2	2,4-Dinitrotoluene	U	3.00	ug/L	3.00	10.0
606-20-2	2,6-Dinitrotoluene	U	3.00	ug/L	3.00	10.0
91-58-7	2-Chloronaphthalene	U	0.410	ug/L	0.410	1.00
95-57-8	2-Chlorophenol	U	3.00	ug/L	3.00	10.0
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.00	ug/L	3.00	10.0
91-57-6	2-Methylnaphthalene	U	0.300	ug/L	0.300	1.00
88-75-5	2-Nitrophenol	U	3.00	ug/L	3.00	10.0
91-94-1	3,3'-Dichlorobenzidine	U	3.00	ug/L	3.00	10.0
101-55-3	4-Bromophenylphenylether	U	3.00	ug/L	3.00	10.0
59-50-7	Parachlorometa cresol	U	3.00	ug/L	3.00	10.0
106-47-8	<i>4-Chloro-3-methylphenol</i> 4-Chloroaniline	U	3.30	ug/L	3.30	10.0
7005-72-3	4-Chlorophenylphenylether	U	3.00	ug/L	3.00	10.0
100-02-7	4-Nitrophenol	U	3.00	ug/L	3.00	10.0
83-32-9	Acenaphthene	U	0.300	ug/L	0.300	1.00
208-96-8	Acenaphthylene	U	0.300	ug/L	0.300	1.00
62-53-3	Aniline	U	4.20	ug/L	4.20	10.0
120-12-7	Anthracene	U	0.300	ug/L	0.300	1.00
1912-24-9	Atrazine	U	3.00	ug/L	3.00	10.0
92-87-5	Benzidine	U	3.90	ug/L	3.90	10.0
56-55-3	Benzo(a)anthracene	U	0.300	ug/L	0.300	1.00
50-32-8	Benzo(a)pyrene	U	0.300	ug/L	0.300	1.00
205-99-2	Benzo(b)fluoranthene	U	0.300	ug/L	0.300	1.00
191-24-2	Benzo(ghi)perylene	U	0.300	ug/L	0.300	1.00

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

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SDG Number: 2018-888
Lab Sample ID: 437939003

Date Collected: 11/13/2017 14:41
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148003

Client: ARSL004

Project: ESHL00114

Batch ID: 1719364

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Run Date: 11/16/2017 18:12

Inst: MSD1.I

Dilution: 1

Prep Date: 11/16/2017 04:40

Analyst: JLD1

Inj. Vol: 1 uL

Data File: s111617.B\s1k1617.D

Aliquot: 1000 mL

Final Volume: 1 mL

Column: 25x.20x.33

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**

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SDG Number: 2018-888
Lab Sample ID: 437939003

Date Collected: 11/13/2017 14:41
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148003

Client: ARSL004

Project: ESHL00114

Batch ID: 1719364

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Run Date: 11/16/2017 18:12

Inst: MSD1.I

Dilution: 1

Prep Date: 11/16/2017 04:40

Analyst: JLD1

Inj. Vol: 1 uL

Data File: s111617.B\s1k1617.D

Aliquot: 1000 mL

Final Volume: 1 mL

Column: 25x.20x.33

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</i> -Nitroaniline					
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</i> -Nitroaniline					
100-01-6	4-Nitroaniline	U	3.00	ug/L	3.00	10.0
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	67.4	100	ug/L	67	(32%-124%)
2-Fluorobiphenyl	38.4	50.0	ug/L	77	(32%-112%)
2-Fluorophenol	41.0	100	ug/L	41	(15%-88%)
Nitrobenzene-d5	44.6	50.0	ug/L	89	(36%-115%)
Phenol-d5	28.1	100	ug/L	28	(15%-91%)
p-Terphenyl-d14	41.4	50.0	ug/L	83	(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: 2018-888

Lab Sample ID: 437939005

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148009

Batch ID: 1719364

Run Date: 11/16/2017 19:45

Prep Date: 11/16/2017 04:40

Data File: s111617.B\s1k1620.D

Client: ARSL004

Method: SW846 3510C/8270D

Inst: MSD1.I

Analyst: JLD1

Aliquot: 950 mL

Column: 25x.20x.33

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	3.16	ug/L	3.16	10.5
120-82-1	1,2,4-Trichlorobenzene	U	3.16	ug/L	3.16	10.5
95-50-1	1,2-Dichlorobenzene	U	3.16	ug/L	3.16	10.5
122-66-7	Azobenzene	U	3.16	ug/L	3.16	10.5
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.16	ug/L	3.16	10.5
106-46-7	1,4-Dichlorobenzene	U	3.16	ug/L	3.16	10.5
123-91-1	1,4-Dioxane	U	3.16	ug/L	3.16	10.5
90-12-0	1-Methylnaphthalene	U	0.316	ug/L	0.316	1.05
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.16	ug/L	3.16	10.5
95-95-4	2,4,5-Trichlorophenol	U	3.16	ug/L	3.16	10.5
88-06-2	2,4,6-Trichlorophenol	U	3.16	ug/L	3.16	10.5
120-83-2	2,4-Dichlorophenol	U	3.16	ug/L	3.16	10.5
105-67-9	2,4-Dimethylphenol	U	3.16	ug/L	3.16	10.5
51-28-5	2,4-Dinitrophenol	U	5.26	ug/L	5.26	21.1
121-14-2	2,4-Dinitrotoluene	U	3.16	ug/L	3.16	10.5
606-20-2	2,6-Dinitrotoluene	U	3.16	ug/L	3.16	10.5
91-58-7	2-Chloronaphthalene	U	0.432	ug/L	0.432	1.05
95-57-8	2-Chlorophenol	U	3.16	ug/L	3.16	10.5
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.16	ug/L	3.16	10.5
91-57-6	2-Methylnaphthalene	U	0.316	ug/L	0.316	1.05
88-75-5	2-Nitrophenol	U	3.16	ug/L	3.16	10.5
91-94-1	3,3'-Dichlorobenzidine	U	3.16	ug/L	3.16	10.5
101-55-3	4-Bromophenylphenylether	U	3.16	ug/L	3.16	10.5
59-50-7	Parachlorometa cresol	U	3.16	ug/L	3.16	10.5
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.47	ug/L	3.47	10.5
7005-72-3	4-Chlorophenylphenylether	U	3.16	ug/L	3.16	10.5
100-02-7	4-Nitrophenol	U	3.16	ug/L	3.16	10.5
83-32-9	Acenaphthene	U	0.316	ug/L	0.316	1.05
208-96-8	Acenaphthylene	U	0.316	ug/L	0.316	1.05
62-53-3	Aniline	U	4.42	ug/L	4.42	10.5
120-12-7	Anthracene	U	0.316	ug/L	0.316	1.05
1912-24-9	Atrazine	U	3.16	ug/L	3.16	10.5
92-87-5	Benzidine	U	4.11	ug/L	4.11	10.5
56-55-3	Benzo(a)anthracene	U	0.316	ug/L	0.316	1.05
50-32-8	Benzo(a)pyrene	U	0.316	ug/L	0.316	1.05
205-99-2	Benzo(b)fluoranthene	U	0.316	ug/L	0.316	1.05
191-24-2	Benzo(ghi)perylene	U	0.316	ug/L	0.316	1.05

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

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SDG Number: 2018-888

Lab Sample ID: 437939005

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Inst: MSD1.I

Dilution: 1

Batch ID: 1719364

Run Date: 11/16/2017 19:45

Analyst: JLD1

Inj. Vol: 1 uL

Prep Date: 11/16/2017 04:40

Aliquot: 950 mL

Final Volume: 1 mL

Data File: s111617.B\s1k1620.D

Column: 25x.20x.33

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene	U	0.316	ug/L	0.316	1.05
65-85-0	Benzoic acid	U	6.32	ug/L	6.32	21.1
100-51-6	Benzyl alcohol	U	3.16	ug/L	3.16	10.5
85-68-7	Butylbenzylphthalate	U	3.16	ug/L	3.16	10.5
218-01-9	Chrysene	U	0.316	ug/L	0.316	1.05
84-74-2	Di-n-butylphthalate	U	3.16	ug/L	3.16	10.5
117-84-0	Di-n-octylphthalate	U	3.16	ug/L	3.16	10.5
53-70-3	Dibenzo(a,h)anthracene	U	0.316	ug/L	0.316	1.05
132-64-9	Dibenzofuran	U	3.16	ug/L	3.16	10.5
84-66-2	Diethylphthalate	U	3.16	ug/L	3.16	10.5
131-11-3	Dimethylphthalate	U	3.16	ug/L	3.16	10.5
88-85-7	Dinoseb	U	3.16	ug/L	3.16	10.5
122-39-4	Diphenylamine	U	3.16	ug/L	3.16	10.5
206-44-0	Fluoranthene	U	0.316	ug/L	0.316	1.05
86-73-7	Fluorene	U	0.316	ug/L	0.316	1.05
118-74-1	Hexachlorobenzene	U	3.16	ug/L	3.16	10.5
87-68-3	Hexachlorobutadiene	U	3.16	ug/L	3.16	10.5
77-47-4	Hexachlorocyclopentadiene	U	3.16	ug/L	3.16	10.5
67-72-1	Hexachloroethane	U	3.16	ug/L	3.16	10.5
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.316	ug/L	0.316	1.05
78-59-1	Isophorone	U	3.68	ug/L	3.68	10.5
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.16	ug/L	3.16	10.5
924-16-3	N-Nitrosodi-n-butylamine	U	3.16	ug/L	3.16	10.5
55-18-5	N-Nitrosodiethylamine	U	3.16	ug/L	3.16	10.5
621-64-7	N-Nitrosodi-n-propylamine	U	3.16	ug/L	3.16	10.5
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.16	ug/L	3.16	10.5
91-20-3	Naphthalene	U	0.316	ug/L	0.316	1.05
98-95-3	Nitrobenzene	U	3.16	ug/L	3.16	10.5
608-93-5	Pentachlorobenzene	U	3.16	ug/L	3.16	10.5
87-86-5	Pentachlorophenol	U	3.16	ug/L	3.16	10.5
85-01-8	Phenanthrene	U	0.316	ug/L	0.316	1.05
108-95-2	Phenol	U	3.16	ug/L	3.16	10.5
129-00-0	Pyrene	U	0.316	ug/L	0.316	1.05
110-86-1	Pyridine	U	3.16	ug/L	3.16	10.5
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.16	ug/L	3.16	10.5
111-91-1	bis(2-Chloroethoxy)methane	U	3.16	ug/L	3.16	10.5
111-44-4	bis(2-Chloroethyl) ether	U	3.16	ug/L	3.16	10.5
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.16	ug/L	3.16	10.5

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

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SDG Number: 2018-888

Lab Sample ID: 437939005

Date Collected: 11/13/2017 14:41

Date Received: 11/15/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Batch ID: 1719364

Inst: MSD1.I

Dilution: 1

Run Date: 11/16/2017 19:45

Analyst: JLD1

Inj. Vol: 1 uL

Prep Date: 11/16/2017 04:40

Aliquot: 950 mL

Final Volume: 1 mL

Data File: s111617.B\s1k1620.D

Column: 25x.20x.33

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols	U	3.89	ug/L	3.89	10.5
99-09-2	3-Nitroaniline	U	3.16	ug/L	3.16	10.5
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol	U	3.16	ug/L	3.16	10.5
88-74-4	2-Nitroaniline	U	3.16	ug/L	3.16	10.5
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline	U	3.16	ug/L	3.16	10.5
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	68.1	105	ug/L	65	(32%-124%)
2-Fluorobiphenyl	43.1	52.6	ug/L	82	(32%-112%)
2-Fluorophenol	45.4	105	ug/L	43	(15%-88%)
Nitrobenzene-d5	49.3	52.6	ug/L	94	(36%-115%)
Phenol-d5	31.5	105	ug/L	30	(15%-91%)
p-Terphenyl-d14	44.6	52.6	ug/L	85	(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: 2018-888

Lab Sample ID: 437939009

Date Collected: 11/13/2017 10:51

Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148004

Batch ID: 1719364

Run Date: 11/16/2017 20:16

Prep Date: 11/16/2017 04:40

Data File: s111617.B\s1k1621.D

Client: ARSL004

Method: SW846 3510C/8270D

Inst: MSD1.I

Analyst: JLD1

Aliquot: 950 mL

Column: 25x.20x.33

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	3.16	ug/L	3.16	10.5
120-82-1	1,2,4-Trichlorobenzene	U	3.16	ug/L	3.16	10.5
95-50-1	1,2-Dichlorobenzene	U	3.16	ug/L	3.16	10.5
122-66-7	Azobenzene	U	3.16	ug/L	3.16	10.5
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.16	ug/L	3.16	10.5
106-46-7	1,4-Dichlorobenzene	U	3.16	ug/L	3.16	10.5
123-91-1	1,4-Dioxane	U	3.16	ug/L	3.16	10.5
90-12-0	1-Methylnaphthalene	U	0.316	ug/L	0.316	1.05
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.16	ug/L	3.16	10.5
95-95-4	2,4,5-Trichlorophenol	U	3.16	ug/L	3.16	10.5
88-06-2	2,4,6-Trichlorophenol	U	3.16	ug/L	3.16	10.5
120-83-2	2,4-Dichlorophenol	U	3.16	ug/L	3.16	10.5
105-67-9	2,4-Dimethylphenol	U	3.16	ug/L	3.16	10.5
51-28-5	2,4-Dinitrophenol	U	5.26	ug/L	5.26	21.1
121-14-2	2,4-Dinitrotoluene	U	3.16	ug/L	3.16	10.5
606-20-2	2,6-Dinitrotoluene	U	3.16	ug/L	3.16	10.5
91-58-7	2-Chloronaphthalene	U	0.432	ug/L	0.432	1.05
95-57-8	2-Chlorophenol	U	3.16	ug/L	3.16	10.5
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.16	ug/L	3.16	10.5
91-57-6	2-Methylnaphthalene	U	0.316	ug/L	0.316	1.05
88-75-5	2-Nitrophenol	U	3.16	ug/L	3.16	10.5
91-94-1	3,3'-Dichlorobenzidine	U	3.16	ug/L	3.16	10.5
101-55-3	4-Bromophenylphenylether	U	3.16	ug/L	3.16	10.5
59-50-7	Parachlorometa cresol	U	3.16	ug/L	3.16	10.5
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.47	ug/L	3.47	10.5
7005-72-3	4-Chlorophenylphenylether	U	3.16	ug/L	3.16	10.5
100-02-7	4-Nitrophenol	U	3.16	ug/L	3.16	10.5
83-32-9	Acenaphthene	U	0.316	ug/L	0.316	1.05
208-96-8	Acenaphthylene	U	0.316	ug/L	0.316	1.05
62-53-3	Aniline	U	4.42	ug/L	4.42	10.5
120-12-7	Anthracene	U	0.316	ug/L	0.316	1.05
1912-24-9	Atrazine	U	3.16	ug/L	3.16	10.5
92-87-5	Benzidine	U	4.11	ug/L	4.11	10.5
56-55-3	Benzo(a)anthracene	U	0.316	ug/L	0.316	1.05
50-32-8	Benzo(a)pyrene	U	0.316	ug/L	0.316	1.05
205-99-2	Benzo(b)fluoranthene	U	0.316	ug/L	0.316	1.05
191-24-2	Benzo(ghi)perylene	U	0.316	ug/L	0.316	1.05

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

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SDG Number: 2018-888

Lab Sample ID: 437939009

Date Collected: 11/13/2017 10:51

Date Received: 11/15/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Inst: MSD1.I

Dilution: 1

Batch ID: 1719364

Run Date: 11/16/2017 20:16

Analyst: JLD1

Inj. Vol: 1 uL

Prep Date: 11/16/2017 04:40

Aliquot: 950 mL

Final Volume: 1 mL

Data File: s111617.B\s1k1621.D

Column: 25x.20x.33

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene	U	0.316	ug/L	0.316	1.05
65-85-0	Benzoic acid	U	6.32	ug/L	6.32	21.1
100-51-6	Benzyl alcohol	U	3.16	ug/L	3.16	10.5
85-68-7	Butylbenzylphthalate	U	3.16	ug/L	3.16	10.5
218-01-9	Chrysene	U	0.316	ug/L	0.316	1.05
84-74-2	Di-n-butylphthalate	U	3.16	ug/L	3.16	10.5
117-84-0	Di-n-octylphthalate	U	3.16	ug/L	3.16	10.5
53-70-3	Dibenzo(a,h)anthracene	U	0.316	ug/L	0.316	1.05
132-64-9	Dibenzofuran	U	3.16	ug/L	3.16	10.5
84-66-2	Diethylphthalate	U	3.16	ug/L	3.16	10.5
131-11-3	Dimethylphthalate	U	3.16	ug/L	3.16	10.5
88-85-7	Dinoseb	U	3.16	ug/L	3.16	10.5
122-39-4	Diphenylamine	U	3.16	ug/L	3.16	10.5
206-44-0	Fluoranthene	U	0.316	ug/L	0.316	1.05
86-73-7	Fluorene	U	0.316	ug/L	0.316	1.05
118-74-1	Hexachlorobenzene	U	3.16	ug/L	3.16	10.5
87-68-3	Hexachlorobutadiene	U	3.16	ug/L	3.16	10.5
77-47-4	Hexachlorocyclopentadiene	U	3.16	ug/L	3.16	10.5
67-72-1	Hexachloroethane	U	3.16	ug/L	3.16	10.5
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.316	ug/L	0.316	1.05
78-59-1	Isophorone	U	3.68	ug/L	3.68	10.5
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.16	ug/L	3.16	10.5
924-16-3	N-Nitrosodi-n-butylamine	U	3.16	ug/L	3.16	10.5
55-18-5	N-Nitrosodiethylamine	U	3.16	ug/L	3.16	10.5
621-64-7	N-Nitrosodi-n-propylamine	U	3.16	ug/L	3.16	10.5
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.16	ug/L	3.16	10.5
91-20-3	Naphthalene	U	0.316	ug/L	0.316	1.05
98-95-3	Nitrobenzene	U	3.16	ug/L	3.16	10.5
608-93-5	Pentachlorobenzene	U	3.16	ug/L	3.16	10.5
87-86-5	Pentachlorophenol	U	3.16	ug/L	3.16	10.5
85-01-8	Phenanthrene	U	0.316	ug/L	0.316	1.05
108-95-2	Phenol	U	3.16	ug/L	3.16	10.5
129-00-0	Pyrene	U	0.316	ug/L	0.316	1.05
110-86-1	Pyridine	U	3.16	ug/L	3.16	10.5
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.16	ug/L	3.16	10.5
111-91-1	bis(2-Chloroethoxy)methane	U	3.16	ug/L	3.16	10.5
111-44-4	bis(2-Chloroethyl) ether	U	3.16	ug/L	3.16	10.5
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.16	ug/L	3.16	10.5

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

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SDG Number: 2018-888
Lab Sample ID: 437939009

Date Collected: 11/13/2017 10:51

Matrix: W

Date Received: 11/15/2017 09:05

Client: ARSL004

Project: ESHL00114

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Inst: MSD1.I

Dilution: 1

Batch ID: 1719364

Run Date: 11/16/2017 20:16

Analyst: JLD1

Inj. Vol: 1 uL

Prep Date: 11/16/2017 04:40

Aliquot: 950 mL

Final Volume: 1 mL

Data File: s111617.B\s1k1621.D

Column: 25x.20x.33

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols	U	3.89	ug/L	3.89	10.5
99-09-2	3-Nitroaniline	U	3.16	ug/L	3.16	10.5
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol	U	3.16	ug/L	3.16	10.5
88-74-4	2-Nitroaniline	U	3.16	ug/L	3.16	10.5
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline	U	3.16	ug/L	3.16	10.5
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	66.8	105	ug/L	63	(32%-124%)
2-Fluorobiphenyl	39.7	52.6	ug/L	75	(32%-112%)
2-Fluorophenol	45.6	105	ug/L	43	(15%-88%)
Nitrobenzene-d5	47.6	52.6	ug/L	90	(36%-115%)
Phenol-d5	31.9	105	ug/L	30	(15%-91%)
p-Terphenyl-d14	44.4	52.6	ug/L	84	(36%-121%)

Tentatively Identified Compound Summary

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

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

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SDG Number: 2018-888
Lab Sample ID: 437939012

Date Collected: 11/13/2017 10:51
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148012
Batch ID: 1719364
Run Date: 11/16/2017 20:47
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1622.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 950 mL
Column: 25x.20x.33

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	3.16	ug/L	3.16	10.5
120-82-1	1,2,4-Trichlorobenzene	U	3.16	ug/L	3.16	10.5
95-50-1	1,2-Dichlorobenzene	U	3.16	ug/L	3.16	10.5
122-66-7	Azobenzene	U	3.16	ug/L	3.16	10.5
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.16	ug/L	3.16	10.5
106-46-7	1,4-Dichlorobenzene	U	3.16	ug/L	3.16	10.5
123-91-1	1,4-Dioxane	U	3.16	ug/L	3.16	10.5
90-12-0	1-Methylnaphthalene	U	0.316	ug/L	0.316	1.05
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.16	ug/L	3.16	10.5
95-95-4	2,4,5-Trichlorophenol	U	3.16	ug/L	3.16	10.5
88-06-2	2,4,6-Trichlorophenol	U	3.16	ug/L	3.16	10.5
120-83-2	2,4-Dichlorophenol	U	3.16	ug/L	3.16	10.5
105-67-9	2,4-Dimethylphenol	U	3.16	ug/L	3.16	10.5
51-28-5	2,4-Dinitrophenol	U	5.26	ug/L	5.26	21.1
121-14-2	2,4-Dinitrotoluene	U	3.16	ug/L	3.16	10.5
606-20-2	2,6-Dinitrotoluene	U	3.16	ug/L	3.16	10.5
91-58-7	2-Chloronaphthalene	U	0.432	ug/L	0.432	1.05
95-57-8	2-Chlorophenol	U	3.16	ug/L	3.16	10.5
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.16	ug/L	3.16	10.5
91-57-6	2-Methylnaphthalene	U	0.316	ug/L	0.316	1.05
88-75-5	2-Nitrophenol	U	3.16	ug/L	3.16	10.5
91-94-1	3,3'-Dichlorobenzidine	U	3.16	ug/L	3.16	10.5
101-55-3	4-Bromophenylphenylether	U	3.16	ug/L	3.16	10.5
59-50-7	Parachlorometa cresol	U	3.16	ug/L	3.16	10.5
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.47	ug/L	3.47	10.5
7005-72-3	4-Chlorophenylphenylether	U	3.16	ug/L	3.16	10.5
100-02-7	4-Nitrophenol	U	3.16	ug/L	3.16	10.5
83-32-9	Acenaphthene	U	0.316	ug/L	0.316	1.05
208-96-8	Acenaphthylene	U	0.316	ug/L	0.316	1.05
62-53-3	Aniline	U	4.42	ug/L	4.42	10.5
120-12-7	Anthracene	U	0.316	ug/L	0.316	1.05
1912-24-9	Atrazine	U	3.16	ug/L	3.16	10.5
92-87-5	Benzidine	U	4.11	ug/L	4.11	10.5
56-55-3	Benzo(a)anthracene	U	0.316	ug/L	0.316	1.05
50-32-8	Benzo(a)pyrene	U	0.316	ug/L	0.316	1.05
205-99-2	Benzo(b)fluoranthene	U	0.316	ug/L	0.316	1.05
191-24-2	Benzo(ghi)perylene	U	0.316	ug/L	0.316	1.05

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

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SDG Number: 2018-888
Lab Sample ID: 437939012

Date Collected: 11/13/2017 10:51
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148012
Batch ID: 1719364
Run Date: 11/16/2017 20:47
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1622.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 950 mL
Column: 25x.20x.33

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	0.316	ug/L	0.316	1.05
65-85-0	Benzoic acid	U	6.32	ug/L	6.32	21.1
100-51-6	Benzyl alcohol	U	3.16	ug/L	3.16	10.5
85-68-7	Butylbenzylphthalate	U	3.16	ug/L	3.16	10.5
218-01-9	Chrysene	U	0.316	ug/L	0.316	1.05
84-74-2	Di-n-butylphthalate	U	3.16	ug/L	3.16	10.5
117-84-0	Di-n-octylphthalate	U	3.16	ug/L	3.16	10.5
53-70-3	Dibenzo(a,h)anthracene	U	0.316	ug/L	0.316	1.05
132-64-9	Dibenzofuran	U	3.16	ug/L	3.16	10.5
84-66-2	Diethylphthalate	U	3.16	ug/L	3.16	10.5
131-11-3	Dimethylphthalate	U	3.16	ug/L	3.16	10.5
88-85-7	Dinoseb	U	3.16	ug/L	3.16	10.5
122-39-4	Diphenylamine	U	3.16	ug/L	3.16	10.5
206-44-0	Fluoranthene	U	0.316	ug/L	0.316	1.05
86-73-7	Fluorene	U	0.316	ug/L	0.316	1.05
118-74-1	Hexachlorobenzene	U	3.16	ug/L	3.16	10.5
87-68-3	Hexachlorobutadiene	U	3.16	ug/L	3.16	10.5
77-47-4	Hexachlorocyclopentadiene	U	3.16	ug/L	3.16	10.5
67-72-1	Hexachloroethane	U	3.16	ug/L	3.16	10.5
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.316	ug/L	0.316	1.05
78-59-1	Isophorone	U	3.68	ug/L	3.68	10.5
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.16	ug/L	3.16	10.5
924-16-3	N-Nitrosodi-n-butylamine	U	3.16	ug/L	3.16	10.5
55-18-5	N-Nitrosodiethylamine	U	3.16	ug/L	3.16	10.5
621-64-7	N-Nitrosodi-n-propylamine	U	3.16	ug/L	3.16	10.5
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.16	ug/L	3.16	10.5
91-20-3	Naphthalene	U	0.316	ug/L	0.316	1.05
98-95-3	Nitrobenzene	U	3.16	ug/L	3.16	10.5
608-93-5	Pentachlorobenzene	U	3.16	ug/L	3.16	10.5
87-86-5	Pentachlorophenol	U	3.16	ug/L	3.16	10.5
85-01-8	Phenanthrene	U	0.316	ug/L	0.316	1.05
108-95-2	Phenol	U	3.16	ug/L	3.16	10.5
129-00-0	Pyrene	U	0.316	ug/L	0.316	1.05
110-86-1	Pyridine	U	3.16	ug/L	3.16	10.5
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.16	ug/L	3.16	10.5
111-91-1	bis(2-Chloroethoxy)methane	U	3.16	ug/L	3.16	10.5
111-44-4	bis(2-Chloroethyl) ether	U	3.16	ug/L	3.16	10.5
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.16	ug/L	3.16	10.5

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

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SDG Number: 2018-888
Lab Sample ID: 437939012

Date Collected: 11/13/2017 10:51
Date Received: 11/15/2017 09:05

Matrix: W

Client ID: CASA-18-148012
Batch ID: 1719364
Run Date: 11/16/2017 20:47
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1622.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 950 mL
Column: 25x.20x.33

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	3.89	ug/L	3.89	10.5
99-09-2	3-Nitroaniline	U	3.16	ug/L	3.16	10.5
95-48-7	<i>m</i> -Nitroaniline o-Cresol	U	3.16	ug/L	3.16	10.5
88-74-4	2-Nitroaniline	U	3.16	ug/L	3.16	10.5
100-01-6	<i>o</i> -Nitroaniline 4-Nitroaniline <i>p</i> -Nitroaniline	U	3.16	ug/L	3.16	10.5

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
2,4,6-Tribromophenol	66.6	105	ug/L	63 (32%-124%)
2-Fluorobiphenyl	37.0	52.6	ug/L	70 (32%-112%)
2-Fluorophenol	41.1	105	ug/L	39 (15%-88%)
Nitrobenzene-d5	42.8	52.6	ug/L	81 (36%-115%)
Phenol-d5	29.3	105	ug/L	28 (15%-91%)
p-Terphenyl-d14	39.9	52.6	ug/L	76 (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: 2018-888

Matrix Type: LIQUID

Sample ID	Client ID	2FP %REC	PHL %REC	NBZ %REC	FBP %REC	TBP %REC	TPH %REC
1203920930	MB for batch 1719362	48	32	90	75	67	85
1203920931	LCS for batch 1719362	60	38	103	83	79	94
437939003	CASA-18-148003	41	28	89	77	67	83
1203920932	CASA-18-148003MS	59	48	86	77	73	88
1203920933	CASA-18-148003MSD	62	49	91	81	77	90
437939005	CASA-18-148009	43	30	94	82	65	85
437939009	CASA-18-148004	43	30	90	75	63	84
437939012	CASA-18-148012	39	28	81	70	63	76

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: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1719362

Matrix: WATER

Lab Sample ID 1203920931

Instrument: MSD1.I

Analysis Date: 11/16/2017 15:02

Dilution: 1

Analyst: JLD1

Prep Batch ID: 1719362

Inj. Vol: 1 uL

Batch ID: 1719364

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	32.2	64	30-88
110-86-1	LCS Pyridine	50.0	0.0	23.4	47	27-89
62-53-3	LCS Aniline	50.0	0.0	39.8	80	49-112
108-95-2	LCS Phenol	50.0	0.0	20.7	41	16-82
111-44-4	LCS bis(2-Chloroethyl) ether	50.0	0.0	53.1	106	51-111
95-57-8	LCS 2-Chlorophenol	50.0	0.0	44.0	88	49-105
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	41.8	84	37-95
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	40.5	81	38-96
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	42.6	85	39-97
108-60-1	LCS bis(2-Chloro-1-methylethyl)ether	50.0	0.0	67.6	135 *	44-123
100-51-6	LCS Benzyl alcohol	50.0	0.0	40.5	81	44-102
95-48-7	LCS o-Cresol	50.0	0.0	41.7	83	41-101
65794-96-9	LCS m,p-Cresols	50.0	0.0	39.9	80	43-102
621-64-7	LCS N-Nitrosodi--n-propylamine <i>N-Nitrosodipropylamine</i>	50.0	0.0	48.4	97	54-115
67-72-1	LCS Hexachloroethane	50.0	0.0	41.4	83	36-96
98-95-3	LCS Nitrobenzene	50.0	0.0	54.9	110	53-115
78-59-1	LCS Isophorone	50.0	0.0	49.0	98	56-117
88-75-5	LCS 2-Nitrophenol	50.0	0.0	50.1	100	51-113
105-67-9	LCS 2,4-Dimethylphenol	50.0	0.0	38.7	77	51-104
111-91-1	LCS bis(2-Chloroethoxy)methane	50.0	0.0	52.2	104	55-114
120-83-2	LCS 2,4-Dichlorophenol	50.0	0.0	46.3	93	53-109
65-85-0	LCS Benzoic acid	100	0.0	39.9	40	21-74

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1719362

Matrix: WATER

Lab Sample ID 1203920931

Instrument: MSD1.I

Analysis Date: 11/16/2017 15:02

Dilution: 1

Analyst: JLD1

Prep Batch ID: 1719362

Inj. Vol: 1 uL

Batch ID: 1719364

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	49.6	99	65-136
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	35.6	71	35-98
59-50-7	LCS Parachlorometa cresol 4-Chloro-3-methylphenol	50.0	0.0	47.2	94	55-115
91-57-6	LCS 2-Methylnaphthalene	50.0	0.0	44.0	88	42-103
91-20-3	LCS Naphthalene	50.0	0.0	44.2	88	44-102
90-12-0	LCS 1-Methylnaphthalene	50.0	0.0	44.3	89	45-108
77-47-4	LCS Hexachlorocyclopentadiene	50.0	0.0	30.1	60	34-89
88-06-2	LCS 2,4,6-Trichlorophenol	50.0	0.0	43.9	88	55-120
95-95-4	LCS 2,4,5-Trichlorophenol	50.0	0.0	44.6	89	55-116
91-58-7	LCS 2-Chloronaphthalene	50.0	0.0	40.3	81	44-107
88-74-4	LCS 2-Nitroaniline o-Nitroaniline	50.0	0.0	56.2	112	53-121
99-09-2	LCS 3-Nitroaniline m-Nitroaniline	50.0	0.0	54.2	108	61-139
131-11-3	LCS Dimethylphthalate	50.0	0.0	46.8	94	60-122
606-20-2	LCS 2,6-Dinitrotoluene	50.0	0.0	47.5	95	59-122
121-14-2	LCS 2,4-Dinitrotoluene	50.0	0.0	46.5	93	57-124
208-96-8	LCS Acenaphthylene	50.0	0.0	46.0	92	50-113
83-32-9	LCS Acenaphthene	50.0	0.0	45.6	91	49-112
51-28-5	LCS 2,4-Dinitrophenol	50.0	0.0	41.6	83	34-122
132-64-9	LCS Dibenzofuran	50.0	0.0	44.2	88	50-111
58-90-2	LCS 2,3,4,6-Tetrachlorophenol	50.0	0.0	44.6	89	54-122
84-66-2	LCS Diethylphthalate	50.0	0.0	44.2	88	57-122
100-02-7	LCS 4-Nitrophenol	50.0	0.0	17.6	35	15-137

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 3 of 4

SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1719362

Matrix: WATER

Lab Sample ID 1203920931

Instrument: MSD1.I

Analysis Date: 11/16/2017 15:02

Dilution: 1

Analyst: JLD1

Prep Batch ID: 1719362

Inj. Vol: 1 uL

Batch ID: 1719364

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	42.2	84	52-114
7005-72-3	LCS 4-Chlorophenylphenylether	50.0	0.0	42.5	85	52-121
100-01-6	LCS 4-Nitroaniline	50.0	0.0	45.5	91	44-137
534-52-1	LCS 2-Methyl-4,6-dinitrophenol	50.0	0.0	46.1	92	45-124
122-39-4	LCS Diphenylamine	50.0	0.0	41.5	83	55-113
122-66-7	LCS Azobenzene	50.0	0.0	53.2	106	53-115
101-55-3	LCS 4-Bromophenylphenylether	50.0	0.0	46.3	93	54-116
118-74-1	LCS Hexachlorobenzene	50.0	0.0	42.2	84	54-115
87-86-5	LCS Pentachlorophenol	50.0	0.0	45.3	91	41-116
85-01-8	LCS Phenanthrene	50.0	0.0	42.7	85	55-110
120-12-7	LCS Anthracene	50.0	0.0	42.6	85	56-112
84-74-2	LCS Di-n-butylphthalate	50.0	0.0	43.3	87	57-123
206-44-0	LCS Fluoranthene	50.0	0.0	42.8	86	54-118
129-00-0	LCS Pyrene	50.0	0.0	47.5	95	49-121
85-68-7	LCS Butylbenzylphthalate	50.0	0.0	45.9	92	52-125
117-81-7	LCS bis(2-Ethylhexyl)phthalate	50.0	0.0	37.7	75	52-125
56-55-3	LCS Benzo(a)anthracene	50.0	0.0	45.5	91	57-112
218-01-9	LCS Chrysene	50.0	0.0	44.0	88	58-117
117-84-0	LCS Di-n-octylphthalate	50.0	0.0	36.3	73	50-129
205-99-2	LCS Benzo(b)fluoranthene	50.0	0.0	44.8	90	41-118
207-08-9	LCS Benzo(k)fluoranthene	50.0	0.0	45.7	91	42-121
50-32-8	LCS Benzo(a)pyrene	50.0	0.0	47.0	94	40-118

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1719362

Matrix: WATER

Lab Sample ID 1203920931

Instrument: MSD1.I

Analysis Date: 11/16/2017 15:02

Dilution: 1

Analyst: JLD1

Prep Batch ID: 1719362

Inj. Vol: 1 uL

Batch ID: 1719364

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	55.5	111	34-125
53-70-3	LCS Dibenzo(a,h)anthracene	50.0	0.0	55.8	112	38-129
191-24-2	LCS Benzo(ghi)perylene	50.0	0.0	56.8	114	33-131
123-91-1	LCS 1,4-Dioxane	50.0	0.0	32.8	66	38-78
930-55-2	LCS N-Nitrosopyrrolidine	50.0	0.0	45.4	91	54-113
95-94-3	LCS 1,2,4,5-Tetrachlorobenzene	50.0	0.0	42.5	85	44-102
1912-24-9	LCS Atrazine	50.0	0.0	46.6	93	60-131
92-87-5	LCS Benzidine	100	0.0	52.8	53	20-144
91-94-1	LCS 3,3'-Dichlorobenzidine	50.0	0.0	57.1	114	43-127
120-82-1	LCS 1,2,4-Trichlorobenzene	50.0	0.0	42.6	85	39-99

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Matrix Spike

Client ID: CASA-18-148003MS

Matrix: W

Lab Sample ID 1203920932

Instrument: MSD1.I

Analysis Date: 11/16/2017 18:43

Dilution: 1

Analyst: JLD1

Prep Batch ID: 1719362

Inj. Vol: 1 uL

Batch ID: 1719364

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	120	0.00 U	89.3	74	25-106
110-86-1	MS Pyridine	120	0.00 U	74.5	62	24-93
62-53-3	MS Aniline	120	0.00 U	91.2	76	37-113
108-95-2	MS Phenol	120	0.00 U	61.4	51	23-82
111-44-4	MS bis(2-Chloroethyl) ether	120	0.00 U	103	86	39-114
95-57-8	MS 2-Chlorophenol	120	0.00 U	87.4	73	37-108
541-73-1	MS 1,3-Dichlorobenzene	120	0.00 U	85.2	71	27-97
106-46-7	MS 1,4-Dichlorobenzene	120	0.00 U	81.3	68	28-97
95-50-1	MS 1,2-Dichlorobenzene	120	0.00 U	84.6	70	28-99
108-60-1	MS bis(2-Chloro-1-methylethyl)ether	120	0.00 U	134	111	32-127
100-51-6	MS Benzyl alcohol	120	0.00 U	99.4	83	37-116
95-48-7	MS o-Cresol	120	0.00 U	92.1	76	34-109
65794-96-9	MS m,p-Cresols	120	0.00 U	94.7	79	36-120
621-64-7	MS N-Nitrosodi--n-propylamine <i>N-Nitrosodipropylamine</i>	120	0.00 U	103	85	42-118
67-72-1	MS Hexachloroethane	120	0.00 U	83.0	69	29-94
98-95-3	MS Nitrobenzene	120	0.00 U	113	94	38-123
78-59-1	MS Isophorone	120	0.00 U	106	88	43-120
88-75-5	MS 2-Nitrophenol	120	0.00 U	106	88	39-115
105-67-9	MS 2,4-Dimethylphenol	120	0.00 U	85.5	71	39-107
111-91-1	MS bis(2-Chloroethoxy)methane	120	0.00 U	110	91	42-118
120-83-2	MS 2,4-Dichlorophenol	120	0.00 U	97.3	81	40-111
65-85-0	MS Benzoic acid	241	0.00 U	142	59	17-95

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Client ID: CASA-18-148003MS

Lab Sample ID 1203920932

Instrument: MSD1.I

Analyst: JLD1

Inj. Vol: 1 uL

Sample Type: Matrix Spike

Matrix: W

Analysis Date: 11/16/2017 18:43

Dilution: 1

Prep Batch ID: 1719362

Batch ID: 1719364

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
106-47-8	MS 4-Chloroaniline	120	0.00 U	107	89	44-138
87-68-3	MS Hexachlorobutadiene	120	0.00 U	75.4	63	26-98
59-50-7	MS Parachlorometa cresol 4-Chloro-3-methylphenol	120	0.00 U	108	89	41-122
91-57-6	MS 2-Methylnaphthalene	120	0.00 U	96.0	80	29-109
91-20-3	MS Naphthalene	120	0.00 U	92.6	77	31-108
90-12-0	MS 1-Methylnaphthalene	120	0.00 U	97.7	81	33-112
77-47-4	MS Hexachlorocyclopentadiene	120	0.00 U	66.0	55	26-79
88-06-2	MS 2,4,6-Trichlorophenol	120	0.00 U	98.5	82	39-124
95-95-4	MS 2,4,5-Trichlorophenol	120	0.00 U	101	83	42-120
91-58-7	MS 2-Chloronaphthalene	120	0.00 U	91.6	76	29-113
88-74-4	MS 2-Nitroaniline o-Nitroaniline	120	0.00 U	130	108	41-121
99-09-2	MS 3-Nitroaniline m-Nitroaniline	120	0.00 U	128	106	42-144
131-11-3	MS Dimethylphthalate	120	0.00 U	106	88	45-128
606-20-2	MS 2,6-Dinitrotoluene	120	0.00 U	108	90	46-124
121-14-2	MS 2,4-Dinitrotoluene	120	0.00 U	106	88	45-125
208-96-8	MS Acenaphthylene	120	0.00 U	105	87	35-120
83-32-9	MS Acenaphthene	120	0.00 U	104	87	35-117
51-28-5	MS 2,4-Dinitrophenol	120	0.00 U	92.1	76	27-122
132-64-9	MS Dibenzofuran	120	0.00 U	100	83	38-113
58-90-2	MS 2,3,4,6-Tetrachlorophenol	120	0.00 U	102	84	40-128
84-66-2	MS Diethylphthalate	120	0.00 U	102	85	43-127
100-02-7	MS 4-Nitrophenol	120	0.00 U	51.5	43	17-85

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Client ID: CASA-18-148003MS

Lab Sample ID 1203920932

Instrument: MSD1.I

Analyst: JLD1

Inj. Vol: 1 uL

Sample Type: Matrix Spike

Matrix: W

Analysis Date: 11/16/2017 18:43

Dilution: 1

Prep Batch ID: 1719362

Batch ID: 1719364

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
86-73-7	MS Fluorene	120	0.00 U	98.6	82	39-117
7005-72-3	MS 4-Chlorophenylphenylether	120	0.00 U	96.7	80	39-121
100-01-6	MS 4-Nitroaniline	120	0.00 U	105	87	30-133
534-52-1	MS 2-Methyl-4,6-dinitrophenol	120	0.00 U	101	84	32-126
122-39-4	MS Diphenylamine	120	0.00 U	90.3	75	37-118
122-66-7	MS Azobenzene	120	0.00 U	120	100	38-120
101-55-3	MS 4-Bromophenylphenylether	120	0.00 U	102	85	39-121
118-74-1	MS Hexachlorobenzene	120	0.00 U	94.2	78	40-118
87-86-5	MS Pentachlorophenol	120	0.00 U	98.7	82	35-121
85-01-8	MS Phenanthrene	120	0.00 U	96.2	80	40-115
120-12-7	MS Anthracene	120	0.00 U	94.4	78	38-120
84-74-2	MS Di-n-butylphthalate	120	0.00 U	97.4	81	41-128
206-44-0	MS Fluoranthene	120	0.00 U	97.4	81	41-119
129-00-0	MS Pyrene	120	0.00 U	105	87	35-128
85-68-7	MS Butylbenzylphthalate	120	0.00 U	103	86	40-129
117-81-7	MS bis(2-Ethylhexyl)phthalate	120	0.00 U	87.8	73	38-131
56-55-3	MS Benzo(a)anthracene	120	0.00 U	102	84	39-120
218-01-9	MS Chrysene	120	0.00 U	99.7	83	41-124
117-84-0	MS Di-n-octylphthalate	120	0.00 U	85.5	71	37-134
205-99-2	MS Benzo(b)fluoranthene	120	0.00 U	99.8	83	31-122
207-08-9	MS Benzo(k)fluoranthene	120	0.00 U	101	84	33-123
50-32-8	MS Benzo(a)pyrene	120	0.00 U	103	85	32-118

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Matrix Spike

Client ID: CASA-18-148003MS

Matrix: W

Lab Sample ID 1203920932

Instrument: MSD1.I

Analysis Date: 11/16/2017 18:43

Dilution: 1

Analyst: JLD1

Prep Batch ID: 1719362

Inj. Vol: 1 uL

Batch ID: 1719364

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	120	0.00 U	117	97	27-121
53-70-3	MS Dibenzo(a,h)anthracene	120	0.00 U	119	99	30-125
191-24-2	MS Benzo(ghi)perylene	120	0.00 U	116	97	24-126
123-91-1	MS 1,4-Dioxane	120	0.00 U	91.7	76	24-110
930-55-2	MS N-Nitrosopyrrolidine	120	0.00 U	106	88	47-119
95-94-3	MS 1,2,4,5-Tetrachlorobenzene	120	0.00 U	95.0	79	32-101
1912-24-9	MS Atrazine	120	0.00 U	105	87	42-129
92-87-5	MS Benzidine	241	0.00 U	113	47	15-130
91-94-1	MS 3,3'-Dichlorobenzidine	120	0.00 U	122	101	34-124
120-82-1	MS 1,2,4-Trichlorobenzene	120	0.00 U	88.7	74	26-102

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Matrix Spike Duplicate

Client ID: CASA-18-148003MSD

Matrix: W

Lab Sample ID 1203920933

Instrument: MSD1.I

Analysis Date: 11/16/2017 19:14

Dilution: 1

Analyst: JLD1

Prep Batch ID: 1719362

Inj. Vol: 1 uL

Batch ID: 1719364

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	120	0.00	U	95.2	79	25-106	6 0-30
110-86-1	MSD Pyridine	120	0.00	U	78.7	65	24-93	6 0-30
62-53-3	MSD Aniline	120	0.00	U	94.4	78	37-113	3 0-30
108-95-2	MSD Phenol	120	0.00	U	62.7	52	23-82	2 0-30
111-44-4	MSD bis(2-Chloroethyl) ether	120	0.00	U	111	92	39-114	8 0-30
95-57-8	MSD 2-Chlorophenol	120	0.00	U	91.3	76	37-108	4 0-30
541-73-1	MSD 1,3-Dichlorobenzene	120	0.00	U	87.6	73	27-97	3 0-30
106-46-7	MSD 1,4-Dichlorobenzene	120	0.00	U	84.5	70	28-97	4 0-30
95-50-1	MSD 1,2-Dichlorobenzene	120	0.00	U	88.2	73	28-99	4 0-30
108-60-1	MSD bis(2-Chloro-1-methylethyl)ether	120	0.00	U	143	119	32-127	7 0-30
100-51-6	MSD Benzyl alcohol	120	0.00	U	103	86	37-116	4 0-30
95-48-7	MSD o-Cresol	120	0.00	U	95.0	79	34-109	3 0-30
65794-96-9	MSD m,p-Cresols	120	0.00	U	96.4	80	36-120	2 0-30
621-64-7	MSD N-Nitrosodi--n-propylamine <i>N-Nitrosodipropylamine</i>	120	0.00	U	107	89	42-118	4 0-30
67-72-1	MSD Hexachloroethane	120	0.00	U	87.3	72	29-94	5 0-30
98-95-3	MSD Nitrobenzene	120	0.00	U	119	99	38-123	5 0-30
78-59-1	MSD Isophorone	120	0.00	U	112	93	43-120	5 0-30
88-75-5	MSD 2-Nitrophenol	120	0.00	U	110	92	39-115	5 0-30
105-67-9	MSD 2,4-Dimethylphenol	120	0.00	U	88.0	73	39-107	3 0-30
111-91-1	MSD bis(2-Chloroethoxy)methane	120	0.00	U	116	96	42-118	5 0-30
120-83-2	MSD 2,4-Dichlorophenol	120	0.00	U	102	85	40-111	5 0-30
65-85-0	MSD Benzoic acid	241	0.00	U	144	60	17-95	1 0-30

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Matrix Spike Duplicate

Client ID: CASA-18-148003MSD

Matrix: W

Lab Sample ID 1203920933

Instrument: MSD1.I

Analysis Date: 11/16/2017 19:14

Dilution: 1

Analyst: JLD1

Prep Batch ID: 1719362

Inj. Vol: 1 uL

Batch ID: 1719364

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	120	0.00 U	111	92	44-138	3	0-30
87-68-3	MSD Hexachlorobutadiene	120	0.00 U	78.6	65	26-98	4	0-30
59-50-7	MSD Parachlorometa cresol 4-Chloro-3-methylphenol	120	0.00 U	113	94	41-122	5	0-30
91-57-6	MSD 2-Methylnaphthalene	120	0.00 U	99.7	83	29-109	4	0-30
91-20-3	MSD Naphthalene	120	0.00 U	96.4	80	31-108	4	0-30
90-12-0	MSD 1-Methylnaphthalene	120	0.00 U	101	84	33-112	4	0-30
77-47-4	MSD Hexachlorocyclopentadiene	120	0.00 U	68.6	57	26-79	4	0-30
88-06-2	MSD 2,4,6-Trichlorophenol	120	0.00 U	104	86	39-124	5	0-30
95-95-4	MSD 2,4,5-Trichlorophenol	120	0.00 U	104	87	42-120	4	0-30
91-58-7	MSD 2-Chloronaphthalene	120	0.00 U	94.3	78	29-113	3	0-30
88-74-4	MSD 2-Nitroaniline o-Nitroaniline	120	0.00 U	136	113	41-121	5	0-30
99-09-2	MSD 3-Nitroaniline m-Nitroaniline	120	0.00 U	129	107	42-144	1	0-30
131-11-3	MSD Dimethylphthalate	120	0.00 U	111	92	45-128	4	0-30
606-20-2	MSD 2,6-Dinitrotoluene	120	0.00 U	112	93	46-124	3	0-30
121-14-2	MSD 2,4-Dinitrotoluene	120	0.00 U	108	89	45-125	1	0-30
208-96-8	MSD Acenaphthylene	120	0.00 U	108	90	35-120	3	0-30
83-32-9	MSD Acenaphthene	120	0.00 U	106	88	35-117	2	0-30
51-28-5	MSD 2,4-Dinitrophenol	120	0.00 U	104	86	27-122	12	0-30
132-64-9	MSD Dibenzofuran	120	0.00 U	105	87	38-113	4	0-30
58-90-2	MSD 2,3,4,6-Tetrachlorophenol	120	0.00 U	107	89	40-128	5	0-30
84-66-2	MSD Diethylphthalate	120	0.00 U	105	87	43-127	3	0-30
100-02-7	MSD 4-Nitrophenol	120	0.00 U	51.9	43	17-85	1	0-30

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Matrix Spike Duplicate

Client ID: CASA-18-148003MSD

Matrix: W

Lab Sample ID 1203920933

Instrument: MSD1.I

Analysis Date: 11/16/2017 19:14

Dilution: 1

Analyst: JLD1

Prep Batch ID: 1719362

Inj. Vol: 1 uL

Batch ID: 1719364

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	120	0.00 U	100	83	39-117	2	0-30
7005-72-3	MSD 4-Chlorophenylphenylether	120	0.00 U	101	84	39-121	4	0-30
100-01-6	MSD 4-Nitroaniline <i>p</i> -Nitroaniline	120	0.00 U	111	92	30-133	5	0-30
534-52-1	MSD 2-Methyl-4,6-dinitrophenol	120	0.00 U	115	95	32-126	13	0-30
122-39-4	MSD Diphenylamine	120	0.00 U	100	83	37-118	10	0-30
122-66-7	MSD Azobenzene <i>1,2-Diphenylhydrazine</i>	120	0.00 U	130	108	38-120	8	0-30
101-55-3	MSD 4-Bromophenylphenylether	120	0.00 U	110	92	39-121	8	0-30
118-74-1	MSD Hexachlorobenzene	120	0.00 U	100	83	40-118	6	0-30
87-86-5	MSD Pentachlorophenol	120	0.00 U	108	89	35-121	9	0-30
85-01-8	MSD Phenanthrene	120	0.00 U	103	85	40-115	6	0-30
120-12-7	MSD Anthracene	120	0.00 U	102	85	38-120	8	0-30
84-74-2	MSD Di-n-butylphthalate	120	0.00 U	103	86	41-128	6	0-30
206-44-0	MSD Fluoranthene	120	0.00 U	103	85	41-119	5	0-30
129-00-0	MSD Pyrene	120	0.00 U	108	90	35-128	3	0-30
85-68-7	MSD Butylbenzylphthalate	120	0.00 U	106	88	40-129	2	0-30
117-81-7	MSD bis(2-Ethylhexyl)phthalate	120	0.00 U	92.0	76	38-131	5	0-30
56-55-3	MSD Benzo(a)anthracene	120	0.00 U	109	90	39-120	7	0-30
218-01-9	MSD Chrysene	120	0.00 U	105	87	41-124	5	0-30
117-84-0	MSD Di-n-octylphthalate	120	0.00 U	92.5	77	37-134	8	0-30
205-99-2	MSD Benzo(b)fluoranthene	120	0.00 U	106	88	31-122	6	0-30
207-08-9	MSD Benzo(k)fluoranthene	120	0.00 U	107	89	33-123	6	0-30
50-32-8	MSD Benzo(a)pyrene	120	0.00 U	111	92	32-118	8	0-30

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-888

Sample Type: Matrix Spike Duplicate

Client ID: CASA-18-148003MSD

Matrix: W

Lab Sample ID 1203920933

Instrument: MSD1.I

Analysis Date: 11/16/2017 19:14

Dilution: 1

Analyst: JLD1

Prep Batch ID: 1719362

Inj. Vol: 1 uL

Batch ID: 1719364

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	U	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
193-39-5	MSD Indeno(1,2,3-cd)pyrene	120	0.00	U	124	103	27-121	6	0-30
53-70-3	MSD Dibenzo(a,h)anthracene	120	0.00	U	124	103	30-125	4	0-30
191-24-2	MSD Benzo(ghi)perylene	120	0.00	U	122	101	24-126	4	0-30
123-91-1	MSD 1,4-Dioxane	120	0.00	U	97.3	81	24-110	6	0-30
930-55-2	MSD N-Nitrosopyrrolidine	120	0.00	U	111	92	47-119	5	0-30
95-94-3	MSD 1,2,4,5-Tetrachlorobenzene	120	0.00	U	98.4	82	32-101	4	0-30
1912-24-9	MSD Atrazine	120	0.00	U	113	94	42-129	7	0-30
92-87-5	MSD Benzidine	241	0.00	U	134	56	15-130	17	0-30
91-94-1	MSD 3,3'-Dichlorobenzidine	120	0.00	U	133	110	34-124	9	0-30
120-82-1	MSD 1,2,4-Trichlorobenzene	120	0.00	U	93.3	77	26-102	5	0-30

Method Blank Summary

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SDG Number:	2018-888	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1719362	Instrument ID:	MSD1.I	Data File:	s111617.B\s1k1608.D
Lab Sample ID:	1203920930	Prep Date:	11/16/2017 04:40	Analyzed:	11/16/17 14:05
Column:	25x.20x.33				

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 1719362	1203920931	s111617.B\s1k1610.D	11/16/17	1502
02 CASA-18-148003	437939003	s111617.B\s1k1617.D	11/16/17	1812
03 CASA-18-148003MS	1203920932	s111617.B\s1k1618.D	11/16/17	1843
04 CASA-18-148003MSD	1203920933	s111617.B\s1k1619.D	11/16/17	1914
05 CASA-18-148009	437939005	s111617.B\s1k1620.D	11/16/17	1945
06 CASA-18-148004	437939009	s111617.B\s1k1621.D	11/16/17	2016
07 CASA-18-148012	437939012	s111617.B\s1k1622.D	11/16/17	2047

Quality Control Data

**Semi-Volatile
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Sample Summary**

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SDG Number: 2018-888
Lab Sample ID: 1203920930
Client Sample: QC for batch 1719362
Client ID: MB for batch 1719362
Batch ID: 1719364
Run Date: 11/16/2017 14:05
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1608.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 1000 mL
Column: 25x.20x.33

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

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Sample Summary**

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SDG Number: 2018-888

Lab Sample ID: 1203920930

Client Sample: QC for batch 1719362

Client ID: MB for batch 1719362

Batch ID: 1719364

Run Date: 11/16/2017 14:05

Prep Date: 11/16/2017 04:40

Data File: s111617.B\s1k1608.D

Matrix: WATER

Client: ARSL004

Method: SW846 3510C/8270D

Inst: MSD1.I

Analyst: JLD1

Aliquot: 1000 mL

Column: 25x.20x.33

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

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Sample Summary**

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SDG Number: 2018-888
Lab Sample ID: 1203920930
Client Sample: QC for batch 1719362
Client ID: MB for batch 1719362
Batch ID: 1719364
Run Date: 11/16/2017 14:05
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1608.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 1000 mL
Column: 25x.20x.33

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

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
2,4,6-Tribromophenol	66.6	100	ug/L 67	(32%-124%)
2-Fluorobiphenyl	37.7	50.0	ug/L 75	(32%-112%)
2-Fluorophenol	48.0	100	ug/L 48	(15%-88%)
Nitrobenzene-d5	44.8	50.0	ug/L 90	(36%-115%)
Phenol-d5	32.3	100	ug/L 32	(15%-91%)
p-Terphenyl-d14	42.4	50.0	ug/L 85	(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
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Sample Summary**

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SDG Number: 2018-888
Lab Sample ID: 1203920931
Client Sample: QC for batch 1719362
Client ID: LCS for batch 1719362
Batch ID: 1719364
Run Date: 11/16/2017 15:02
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1610.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 1000 mL
Column: 25x.20x.33

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		42.5	ug/L	3.00	10.0
120-82-1	1,2,4-Trichlorobenzene		42.6	ug/L	3.00	10.0
95-50-1	1,2-Dichlorobenzene		42.6	ug/L	3.00	10.0
122-66-7	Azobenzene		53.2	ug/L	3.00	10.0
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		41.8	ug/L	3.00	10.0
106-46-7	1,4-Dichlorobenzene		40.5	ug/L	3.00	10.0
123-91-1	1,4-Dioxane		32.8	ug/L	3.00	10.0
90-12-0	1-Methylnaphthalene		44.3	ug/L	0.300	1.00
58-90-2	2,3,4,6-Tetrachlorophenol		44.6	ug/L	3.00	10.0
95-95-4	2,4,5-Trichlorophenol		44.6	ug/L	3.00	10.0
88-06-2	2,4,6-Trichlorophenol		43.9	ug/L	3.00	10.0
120-83-2	2,4-Dichlorophenol		46.3	ug/L	3.00	10.0
105-67-9	2,4-Dimethylphenol		38.7	ug/L	3.00	10.0
51-28-5	2,4-Dinitrophenol		41.6	ug/L	5.00	20.0
121-14-2	2,4-Dinitrotoluene		46.5	ug/L	3.00	10.0
606-20-2	2,6-Dinitrotoluene		47.5	ug/L	3.00	10.0
91-58-7	2-Chloronaphthalene		40.3	ug/L	0.410	1.00
95-57-8	2-Chlorophenol		44.0	ug/L	3.00	10.0
534-52-1	2-Methyl-4,6-dinitrophenol		46.1	ug/L	3.00	10.0
91-57-6	2-Methylnaphthalene		44.0	ug/L	0.300	1.00
88-75-5	2-Nitrophenol		50.1	ug/L	3.00	10.0
91-94-1	3,3'-Dichlorobenzidine		57.1	ug/L	3.00	10.0
101-55-3	4-Bromophenylphenylether		46.3	ug/L	3.00	10.0
59-50-7	Parachlorometa cresol		47.2	ug/L	3.00	10.0
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		49.6	ug/L	3.30	10.0
7005-72-3	4-Chlorophenylphenylether		42.5	ug/L	3.00	10.0
100-02-7	4-Nitrophenol		17.6	ug/L	3.00	10.0
83-32-9	Acenaphthene		45.6	ug/L	0.300	1.00
208-96-8	Acenaphthylene		46.0	ug/L	0.300	1.00
62-53-3	Aniline		39.8	ug/L	4.20	10.0
120-12-7	Anthracene		42.6	ug/L	0.300	1.00
1912-24-9	Atrazine		46.6	ug/L	3.00	10.0
92-87-5	Benzidine		52.8	ug/L	3.90	10.0
56-55-3	Benzo(a)anthracene		45.5	ug/L	0.300	1.00
50-32-8	Benzo(a)pyrene		47.0	ug/L	0.300	1.00
205-99-2	Benzo(b)fluoranthene		44.8	ug/L	0.300	1.00
191-24-2	Benzo(ghi)perylene		56.8	ug/L	0.300	1.00

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Sample Summary**

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SDG Number: 2018-888
Lab Sample ID: 1203920931
Client Sample: QC for batch 1719362
Client ID: LCS for batch 1719362
Batch ID: 1719364
Run Date: 11/16/2017 15:02
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1610.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 1000 mL
Column: 25x.20x.33

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		45.7	ug/L	0.300	1.00
65-85-0	Benzoic acid		39.9	ug/L	6.00	20.0
100-51-6	Benzyl alcohol		40.5	ug/L	3.00	10.0
85-68-7	Butylbenzylphthalate		45.9	ug/L	3.00	10.0
218-01-9	Chrysene		44.0	ug/L	0.300	1.00
84-74-2	Di-n-butylphthalate		43.3	ug/L	3.00	10.0
117-84-0	Di-n-octylphthalate		36.3	ug/L	3.00	10.0
53-70-3	Dibenzo(a,h)anthracene		55.8	ug/L	0.300	1.00
132-64-9	Dibenzofuran		44.2	ug/L	3.00	10.0
84-66-2	Diethylphthalate		44.2	ug/L	3.00	10.0
131-11-3	Dimethylphthalate		46.8	ug/L	3.00	10.0
88-85-7	Dinoseb	U	3.00	ug/L	3.00	10.0
122-39-4	Diphenylamine		41.5	ug/L	3.00	10.0
206-44-0	Fluoranthene		42.8	ug/L	0.300	1.00
86-73-7	Fluorene		42.2	ug/L	0.300	1.00
118-74-1	Hexachlorobenzene		42.2	ug/L	3.00	10.0
87-68-3	Hexachlorobutadiene		35.6	ug/L	3.00	10.0
77-47-4	Hexachlorocyclopentadiene		30.1	ug/L	3.00	10.0
67-72-1	Hexachloroethane		41.4	ug/L	3.00	10.0
193-39-5	Indeno(1,2,3-cd)pyrene		55.5	ug/L	0.300	1.00
78-59-1	Isophorone		49.0	ug/L	3.50	10.0
62-75-9	N-Methyl-N-nitrosomethylamine		32.2	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		48.4	ug/L	3.00	10.0
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		45.4	ug/L	3.00	10.0
91-20-3	Naphthalene		44.2	ug/L	0.300	1.00
98-95-3	Nitrobenzene		54.9	ug/L	3.00	10.0
608-93-5	Pentachlorobenzene	U	3.00	ug/L	3.00	10.0
87-86-5	Pentachlorophenol		45.3	ug/L	3.00	10.0
85-01-8	Phenanthrene		42.7	ug/L	0.300	1.00
108-95-2	Phenol		20.7	ug/L	3.00	10.0
129-00-0	Pyrene		47.5	ug/L	0.300	1.00
110-86-1	Pyridine		23.4	ug/L	3.00	10.0
108-60-1	bis(2-Chloro-1-methylethyl)ether		67.6	ug/L	3.00	10.0
111-91-1	bis(2-Chloroethoxy)methane		52.2	ug/L	3.00	10.0
111-44-4	bis(2-Chloroethyl) ether		53.1	ug/L	3.00	10.0
117-81-7	bis(2-Ethylhexyl)phthalate		37.7	ug/L	3.00	10.0

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Sample Summary**

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SDG Number: 2018-888	Matrix: WATER
Lab Sample ID: 1203920931	
Client Sample: QC for batch 1719362	Client: ARSL004
Client ID: LCS for batch 1719362	Method: SW846 3510C/8270D
Batch ID: 1719364	Inst: MSD1.I
Run Date: 11/16/2017 15:02	Analyst: JLD1
Prep Date: 11/16/2017 04:40	Aliquot: 1000 mL
Data File: s111617.B\s1k1610.D	Column: 25x.20x.33
	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		39.9	ug/L	3.70	10.0
99-09-2	3-Nitroaniline		54.2	ug/L	3.00	10.0
	<i>m-Nitroaniline</i>					
95-48-7	o-Cresol		41.7	ug/L	3.00	10.0
88-74-4	2-Nitroaniline		56.2	ug/L	3.00	10.0
	<i>o-Nitroaniline</i>					
100-01-6	4-Nitroaniline		45.5	ug/L	3.00	10.0
	<i>p-Nitroaniline</i>					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	79.0	100	ug/L	79	(32%-124%)
2-Fluorobiphenyl	41.7	50.0	ug/L	83	(32%-112%)
2-Fluorophenol	59.9	100	ug/L	60	(15%-88%)
Nitrobenzene-d5	51.5	50.0	ug/L	103	(36%-115%)
Phenol-d5	38.1	100	ug/L	38	(15%-91%)
p-Terphenyl-d14	47.0	50.0	ug/L	94	(36%-121%)

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Sample Summary**

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SDG Number: 2018-888
Lab Sample ID: 1203920932
Client Sample: QC for batch 1719362
Client ID: CASA-18-148003MS
Batch ID: 1719364
Run Date: 11/16/2017 18:43
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1618.D

Date Collected: 11/15/2017 12:00
Date Received: 11/15/2017 12:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 415 mL
Column: 25x.20x.33

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		95.0	ug/L	7.23	24.1
120-82-1	1,2,4-Trichlorobenzene		88.7	ug/L	7.23	24.1
95-50-1	1,2-Dichlorobenzene		84.6	ug/L	7.23	24.1
122-66-7	Azobenzene		120	ug/L	7.23	24.1
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		85.2	ug/L	7.23	24.1
106-46-7	1,4-Dichlorobenzene		81.3	ug/L	7.23	24.1
123-91-1	1,4-Dioxane		91.7	ug/L	7.23	24.1
90-12-0	1-Methylnaphthalene		97.7	ug/L	0.723	2.41
58-90-2	2,3,4,6-Tetrachlorophenol		102	ug/L	7.23	24.1
95-95-4	2,4,5-Trichlorophenol		101	ug/L	7.23	24.1
88-06-2	2,4,6-Trichlorophenol		98.5	ug/L	7.23	24.1
120-83-2	2,4-Dichlorophenol		97.3	ug/L	7.23	24.1
105-67-9	2,4-Dimethylphenol		85.5	ug/L	7.23	24.1
51-28-5	2,4-Dinitrophenol		92.1	ug/L	12.0	48.2
121-14-2	2,4-Dinitrotoluene		106	ug/L	7.23	24.1
606-20-2	2,6-Dinitrotoluene		108	ug/L	7.23	24.1
91-58-7	2-Chloronaphthalene		91.6	ug/L	0.988	2.41
95-57-8	2-Chlorophenol		87.4	ug/L	7.23	24.1
534-52-1	2-Methyl-4,6-dinitrophenol		101	ug/L	7.23	24.1
91-57-6	2-Methylnaphthalene		96.0	ug/L	0.723	2.41
88-75-5	2-Nitrophenol		106	ug/L	7.23	24.1
91-94-1	3,3'-Dichlorobenzidine		122	ug/L	7.23	24.1
101-55-3	4-Bromophenylphenylether		102	ug/L	7.23	24.1
59-50-7	Parachlorometa cresol		108	ug/L	7.23	24.1
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		107	ug/L	7.95	24.1
7005-72-3	4-Chlorophenylphenylether		96.7	ug/L	7.23	24.1
100-02-7	4-Nitrophenol		51.5	ug/L	7.23	24.1
83-32-9	Acenaphthene		104	ug/L	0.723	2.41
208-96-8	Acenaphthylene		105	ug/L	0.723	2.41
62-53-3	Aniline		91.2	ug/L	10.1	24.1
120-12-7	Anthracene		94.4	ug/L	0.723	2.41
1912-24-9	Atrazine		105	ug/L	7.23	24.1
92-87-5	Benzidine		113	ug/L	9.40	24.1
56-55-3	Benzo(a)anthracene		102	ug/L	0.723	2.41
50-32-8	Benzo(a)pyrene		103	ug/L	0.723	2.41
205-99-2	Benzo(b)fluoranthene		99.8	ug/L	0.723	2.41
191-24-2	Benzo(ghi)perylene		116	ug/L	0.723	2.41

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

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SDG Number: 2018-888
Lab Sample ID: 1203920932
Client Sample: QC for batch 1719362
Client ID: CASA-18-148003MS
Batch ID: 1719364
Run Date: 11/16/2017 18:43
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1618.D

Date Collected: 11/15/2017 12:00
Date Received: 11/15/2017 12:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 415 mL
Column: 25x.20x.33

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		101	ug/L	0.723	2.41
65-85-0	Benzoic acid		142	ug/L	14.5	48.2
100-51-6	Benzyl alcohol		99.4	ug/L	7.23	24.1
85-68-7	Butylbenzylphthalate		103	ug/L	7.23	24.1
218-01-9	Chrysene		99.7	ug/L	0.723	2.41
84-74-2	Di-n-butylphthalate		97.4	ug/L	7.23	24.1
117-84-0	Di-n-octylphthalate		85.5	ug/L	7.23	24.1
53-70-3	Dibenzo(a,h)anthracene		119	ug/L	0.723	2.41
132-64-9	Dibenzofuran		100	ug/L	7.23	24.1
84-66-2	Diethylphthalate		102	ug/L	7.23	24.1
131-11-3	Dimethylphthalate		106	ug/L	7.23	24.1
88-85-7	Dinoseb	U	7.23	ug/L	7.23	24.1
122-39-4	Diphenylamine		90.3	ug/L	7.23	24.1
206-44-0	Fluoranthene		97.4	ug/L	0.723	2.41
86-73-7	Fluorene		98.6	ug/L	0.723	2.41
118-74-1	Hexachlorobenzene		94.2	ug/L	7.23	24.1
87-68-3	Hexachlorobutadiene		75.4	ug/L	7.23	24.1
77-47-4	Hexachlorocyclopentadiene		66.0	ug/L	7.23	24.1
67-72-1	Hexachloroethane		83.0	ug/L	7.23	24.1
193-39-5	Indeno(1,2,3-cd)pyrene		117	ug/L	0.723	2.41
78-59-1	Isophorone		106	ug/L	8.43	24.1
62-75-9	N-Methyl-N-nitrosomethylamine		89.3	ug/L	7.23	24.1
924-16-3	N-Nitrosodi-n-butylamine	U	7.23	ug/L	7.23	24.1
55-18-5	N-Nitrosodiethylamine	U	7.23	ug/L	7.23	24.1
621-64-7	N-Nitrosodi-n-propylamine		103	ug/L	7.23	24.1
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		106	ug/L	7.23	24.1
91-20-3	Naphthalene		92.6	ug/L	0.723	2.41
98-95-3	Nitrobenzene		113	ug/L	7.23	24.1
608-93-5	Pentachlorobenzene	U	7.23	ug/L	7.23	24.1
87-86-5	Pentachlorophenol		98.7	ug/L	7.23	24.1
85-01-8	Phenanthrene		96.2	ug/L	0.723	2.41
108-95-2	Phenol		61.4	ug/L	7.23	24.1
129-00-0	Pyrene		105	ug/L	0.723	2.41
110-86-1	Pyridine		74.5	ug/L	7.23	24.1
108-60-1	bis(2-Chloro-1-methylethyl)ether		134	ug/L	7.23	24.1
111-91-1	bis(2-Chloroethoxy)methane		110	ug/L	7.23	24.1
111-44-4	bis(2-Chloroethyl) ether		103	ug/L	7.23	24.1
117-81-7	bis(2-Ethylhexyl)phthalate		87.8	ug/L	7.23	24.1

**Semi-Volatile
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Sample Summary**

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SDG Number: 2018-888
Lab Sample ID: 1203920932
Client Sample: QC for batch 1719362
Client ID: CASA-18-148003MS
Batch ID: 1719364
Run Date: 11/16/2017 18:43
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1618.D

Date Collected: 11/15/2017 12:00
Date Received: 11/15/2017 12:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 415 mL
Column: 25x.20x.33

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		94.7	ug/L	8.92	24.1
99-09-2	3-Nitroaniline		128	ug/L	7.23	24.1
	<i>m-Nitroaniline</i>					
95-48-7	o-Cresol		92.1	ug/L	7.23	24.1
88-74-4	2-Nitroaniline		130	ug/L	7.23	24.1
	<i>o-Nitroaniline</i>					
100-01-6	4-Nitroaniline		105	ug/L	7.23	24.1
	<i>p-Nitroaniline</i>					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	177	241	ug/L	73	(32%-124%)
2-Fluorobiphenyl	93.3	120	ug/L	77	(32%-112%)
2-Fluorophenol	142	241	ug/L	59	(15%-88%)
Nitrobenzene-d5	103	120	ug/L	86	(36%-115%)
Phenol-d5	117	241	ug/L	48	(15%-91%)
p-Terphenyl-d14	106	120	ug/L	88	(36%-121%)

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

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SDG Number: 2018-888
Lab Sample ID: 1203920933
Client Sample: QC for batch 1719362
Client ID: CASA-18-148003MSD
Batch ID: 1719364
Run Date: 11/16/2017 19:14
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1619.D

Date Collected: 11/15/2017 12:00
Date Received: 11/15/2017 12:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 415 mL
Column: 25x.20x.33

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		98.4	ug/L	7.23	24.1
120-82-1	1,2,4-Trichlorobenzene		93.3	ug/L	7.23	24.1
95-50-1	1,2-Dichlorobenzene		88.2	ug/L	7.23	24.1
122-66-7	Azobenzene		130	ug/L	7.23	24.1
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		87.6	ug/L	7.23	24.1
106-46-7	1,4-Dichlorobenzene		84.5	ug/L	7.23	24.1
123-91-1	1,4-Dioxane		97.3	ug/L	7.23	24.1
90-12-0	1-Methylnaphthalene		101	ug/L	0.723	2.41
58-90-2	2,3,4,6-Tetrachlorophenol		107	ug/L	7.23	24.1
95-95-4	2,4,5-Trichlorophenol		104	ug/L	7.23	24.1
88-06-2	2,4,6-Trichlorophenol		104	ug/L	7.23	24.1
120-83-2	2,4-Dichlorophenol		102	ug/L	7.23	24.1
105-67-9	2,4-Dimethylphenol		88.0	ug/L	7.23	24.1
51-28-5	2,4-Dinitrophenol		104	ug/L	12.0	48.2
121-14-2	2,4-Dinitrotoluene		108	ug/L	7.23	24.1
606-20-2	2,6-Dinitrotoluene		112	ug/L	7.23	24.1
91-58-7	2-Chloronaphthalene		94.3	ug/L	0.988	2.41
95-57-8	2-Chlorophenol		91.3	ug/L	7.23	24.1
534-52-1	2-Methyl-4,6-dinitrophenol		115	ug/L	7.23	24.1
91-57-6	2-Methylnaphthalene		99.7	ug/L	0.723	2.41
88-75-5	2-Nitrophenol		110	ug/L	7.23	24.1
91-94-1	3,3'-Dichlorobenzidine		133	ug/L	7.23	24.1
101-55-3	4-Bromophenylphenylether		110	ug/L	7.23	24.1
59-50-7	Parachlorometa cresol		113	ug/L	7.23	24.1
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		111	ug/L	7.95	24.1
7005-72-3	4-Chlorophenylphenylether		101	ug/L	7.23	24.1
100-02-7	4-Nitrophenol		51.9	ug/L	7.23	24.1
83-32-9	Acenaphthene		106	ug/L	0.723	2.41
208-96-8	Acenaphthylene		108	ug/L	0.723	2.41
62-53-3	Aniline		94.4	ug/L	10.1	24.1
120-12-7	Anthracene		102	ug/L	0.723	2.41
1912-24-9	Atrazine		113	ug/L	7.23	24.1
92-87-5	Benzidine		134	ug/L	9.40	24.1
56-55-3	Benzo(a)anthracene		109	ug/L	0.723	2.41
50-32-8	Benzo(a)pyrene		111	ug/L	0.723	2.41
205-99-2	Benzo(b)fluoranthene		106	ug/L	0.723	2.41
191-24-2	Benzo(ghi)perylene		122	ug/L	0.723	2.41

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

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SDG Number: 2018-888
Lab Sample ID: 1203920933
Client Sample: QC for batch 1719362
Client ID: CASA-18-148003MSD
Batch ID: 1719364
Run Date: 11/16/2017 19:14
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1619.D

Date Collected: 11/15/2017 12:00
Date Received: 11/15/2017 12:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 415 mL
Column: 25x.20x.33

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		107	ug/L	0.723	2.41
65-85-0	Benzoic acid		144	ug/L	14.5	48.2
100-51-6	Benzyl alcohol		103	ug/L	7.23	24.1
85-68-7	Butylbenzylphthalate		106	ug/L	7.23	24.1
218-01-9	Chrysene		105	ug/L	0.723	2.41
84-74-2	Di-n-butylphthalate		103	ug/L	7.23	24.1
117-84-0	Di-n-octylphthalate		92.5	ug/L	7.23	24.1
53-70-3	Dibenzo(a,h)anthracene		124	ug/L	0.723	2.41
132-64-9	Dibenzofuran		105	ug/L	7.23	24.1
84-66-2	Diethylphthalate		105	ug/L	7.23	24.1
131-11-3	Dimethylphthalate		111	ug/L	7.23	24.1
88-85-7	Dinoseb	U	7.23	ug/L	7.23	24.1
122-39-4	Diphenylamine		100	ug/L	7.23	24.1
206-44-0	Fluoranthene		103	ug/L	0.723	2.41
86-73-7	Fluorene		100	ug/L	0.723	2.41
118-74-1	Hexachlorobenzene		100	ug/L	7.23	24.1
87-68-3	Hexachlorobutadiene		78.6	ug/L	7.23	24.1
77-47-4	Hexachlorocyclopentadiene		68.6	ug/L	7.23	24.1
67-72-1	Hexachloroethane		87.3	ug/L	7.23	24.1
193-39-5	Indeno(1,2,3-cd)pyrene		124	ug/L	0.723	2.41
78-59-1	Isophorone		112	ug/L	8.43	24.1
62-75-9	N-Methyl-N-nitrosomethylamine		95.2	ug/L	7.23	24.1
924-16-3	N-Nitrosodi-n-butylamine	U	7.23	ug/L	7.23	24.1
55-18-5	N-Nitrosodiethylamine	U	7.23	ug/L	7.23	24.1
621-64-7	N-Nitrosodi-n-propylamine		107	ug/L	7.23	24.1
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		111	ug/L	7.23	24.1
91-20-3	Naphthalene		96.4	ug/L	0.723	2.41
98-95-3	Nitrobenzene		119	ug/L	7.23	24.1
608-93-5	Pentachlorobenzene	U	7.23	ug/L	7.23	24.1
87-86-5	Pentachlorophenol		108	ug/L	7.23	24.1
85-01-8	Phenanthrene		103	ug/L	0.723	2.41
108-95-2	Phenol		62.7	ug/L	7.23	24.1
129-00-0	Pyrene		108	ug/L	0.723	2.41
110-86-1	Pyridine		78.7	ug/L	7.23	24.1
108-60-1	bis(2-Chloro-1-methylethyl)ether		143	ug/L	7.23	24.1
111-91-1	bis(2-Chloroethoxy)methane		116	ug/L	7.23	24.1
111-44-4	bis(2-Chloroethyl) ether		111	ug/L	7.23	24.1
117-81-7	bis(2-Ethylhexyl)phthalate		92.0	ug/L	7.23	24.1

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

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SDG Number: 2018-888
Lab Sample ID: 1203920933
Client Sample: QC for batch 1719362
Client ID: CASA-18-148003MSD
Batch ID: 1719364
Run Date: 11/16/2017 19:14
Prep Date: 11/16/2017 04:40
Data File: s111617.B\s1k1619.D

Date Collected: 11/15/2017 12:00
Date Received: 11/15/2017 12:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD1.I
Analyst: JLD1
Aliquot: 415 mL
Column: 25x.20x.33

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		96.4	ug/L	8.92	24.1
99-09-2	3-Nitroaniline		129	ug/L	7.23	24.1
	<i>m-Nitroaniline</i>					
95-48-7	o-Cresol		95.0	ug/L	7.23	24.1
88-74-4	2-Nitroaniline		136	ug/L	7.23	24.1
	<i>o-Nitroaniline</i>					
100-01-6	4-Nitroaniline		111	ug/L	7.23	24.1
	<i>p-Nitroaniline</i>					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	185	241	ug/L	77	(32%-124%)
2-Fluorobiphenyl	97.7	120	ug/L	81	(32%-112%)
2-Fluorophenol	150	241	ug/L	62	(15%-88%)
Nitrobenzene-d5	110	120	ug/L	91	(36%-115%)
Phenol-d5	119	241	ug/L	49	(15%-91%)
p-Terphenyl-d14	108	120	ug/L	90	(36%-121%)

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-888
Work Order #: 437939**

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:	1721630
Prep Batch Number:	1721628

Sample Analysis

Sample ID	Client ID
437939001	437939001 (CASA-18-147996)
437939007	437939007 (CASA-18-147997)
437939010	437939010 (CASA-18-148011)
1203926747	Interference Check Sample (ICS)
1203926679	Method Blank (MB)
1203926680	Laboratory Control Sample (LCS)
1203926748	437822001(CAMO-18-148055) Matrix Spike (MS)
1203926749	437822001(CAMO-18-148055) 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 437822001 (CAMO-18-148055) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

One or more of the required spiking analytes were not within the acceptance limits in 1203926748 (CAMO-18-148055MS) and 1203926749 (CAMO-18-148055MSD)). A 0% recovery for Perchlorate and Perchlorate-101 was observed in both matrix spikes. The acceptance range is from 75-125%. The non-conforming recoveries are due to the background concentration in the parent sample, 437822001 (CAMO-18-148055) and the need to dilute all at a 1:100 dilution.

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

Samples 1203926748 (CAMO-18-148055MS) and 1203926749 (CAMO-18-148055MSD) were diluted to bring the over range concentrations within the calibration range.

Sample Re-extraction/Re-analysis

The analytical batch was re-analyzed due to non-conforming CCV and CRI recoveries in the original analysis. The re-analysis data are reported.

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: 2018-888 GEL Work Order: 437939

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: 01 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: 1721628Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-18-147996Date Received: 15-NOV-17GEL Job No (SDG): 2018-888GEL Sample ID: 437939001Date Filtered: 27-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	0.826	ug/L		1	28-NOV-17 20:20	per1128026a
	Perchlorate Isotope Ratio			3.15			1	28-NOV-17 20:20	per1128026a
14797-73-0	Perchlorate-101	.05	.2	0.756	ug/L		1	28-NOV-17 20:20	per1128026a
	Perchlorate-O(18)			0.522	ug/L		1	28-NOV-17 20:20	per1128026a

^ 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: 1721628Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-18-147997Date Received: 15-NOV-17GEL Job No (SDG): 2018-888GEL Sample ID: 437939007Date Filtered: 27-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	0.937	ug/L		1	28-NOV-17 20:31	per1128027a
	Perchlorate Isotope Ratio			2.92			1	28-NOV-17 20:31	per1128027a
14797-73-0	Perchlorate-101	.05	.2	0.925	ug/L		1	28-NOV-17 20:31	per1128027a
	Perchlorate-O(18)			0.534	ug/L		1	28-NOV-17 20:31	per1128027a

^ 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: 1721628Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-18-148011Date Received: 15-NOV-17GEL Job No (SDG): 2018-888GEL Sample ID: 437939010Date Filtered: 27-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	0.917	ug/L		1	28-NOV-17 20:42	per1128028a
	Perchlorate Isotope Ratio			3.15			1	28-NOV-17 20:42	per1128028a
14797-73-0	Perchlorate-101	.05	.2	0.839	ug/L		1	28-NOV-17 20:42	per1128028a
	Perchlorate-O(18)			0.559	ug/L		1	28-NOV-17 20:42	per1128028a

^ 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): 2018-888

Extract Batch Code: 1721628

Date Filtered: 27-NOV-17

Matrix: WATER

Sample ID: 1203926680

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.193	ug/L	97		85 - 115
Perchlorate Isotope Ratio		3.02				-
Perchlorate-101	0.200	.184	ug/L	92		85 - 115
Perchlorate-O(18)		.264	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): 2018-888

Extract Batch Code: 1721628

Date Extracted: 27-NOV-17

GEL MS/PS ID: 1203926748

Client ID: CAMO-18-148055

GEL MSD/PSD ID: 1203926749

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	87.5	ug/L	86.4	0 *	84.8	0 *	2	30	75 - 125
Perchlorate Isotope Ratio	0	2.85		3.2		3.02		6		-
Perchlorate-101	0.200	88.5	ug/L	77.7	0 *	80.8	0 *	4	30	75 - 125
Perchlorate-O(18)	0	50.4	ug/L	53.0		50.4		5		-

^ 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 LLC

Client Sample No.

MBLab Code: GELDate Received: 27-NOV-17Instrument: LCMSMSGEL Job No (SDG): 2018-888Method: EPA 6850 ModifiedGEL Sample ID: 1203926679Matrix: WATERDate Filtered: 27-NOV-17Extraction Batch ID: 1721628Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL%Solids: Concentrated Extract Volume: 10.0

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	28-NOV-17 17:57	per1128013a
	Perchlorate Isotope Ratio						1	28-NOV-17 17:57	per1128013a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	28-NOV-17 17:57	per1128013a
	Perchlorate-O(18)			0.295	ug/L		1	28-NOV-17 17:57	per1128013a

^ 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: 1721628Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 27-NOV-17GEL Job No (SDG): 2018-888GEL Sample ID: 1203926680Date Filtered: 27-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	0.193	ug/L	J	1	28-NOV-17 18:08	per1128014a
	Perchlorate Isotope Ratio			3.02			1	28-NOV-17 18:08	per1128014a
14797-73-0	Perchlorate-101	.05	.2	0.184	ug/L	J	1	28-NOV-17 18:08	per1128014a
	Perchlorate-O(18)			0.264	ug/L		1	28-NOV-17 18:08	per1128014a

^ 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: 1721628Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2018-888GEL Sample ID: 1203926747Date Filtered: 27-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	0.234	ug/L		1	28-NOV-17 18:19	per1128015a
	Perchlorate Isotope Ratio			3.1			1	28-NOV-17 18:19	per1128015a
14797-73-0	Perchlorate-101	.05	.2	0.217	ug/L		1	28-NOV-17 18:19	per1128015a
	Perchlorate-O(18)			0.257	ug/L		1	28-NOV-17 18:19	per1128015a

^ 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: 1721628Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-148055MSDate Received: 14-NOV-17GEL Job No (SDG): 2018-888GEL Sample ID: 1203926748Date Filtered: 27-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	5	20	86.4	ug/L		100	28-NOV-17 18:41	per1128017a
	Perchlorate Isotope Ratio			3.2			100	28-NOV-17 18:41	per1128017a
14797-73-0	Perchlorate-101	5	20	77.7	ug/L		100	28-NOV-17 18:41	per1128017a
	Perchlorate-O(18)			53.0	ug/L		100	28-NOV-17 18:41	per1128017a

^ 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: 1721628Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-148055MSDDate Received: 14-NOV-17GEL Job No (SDG): 2018-888GEL Sample ID: 1203926749Date Filtered: 27-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	5	20	84.8	ug/L		100	28-NOV-17 18:52	per1128018a
	Perchlorate Isotope Ratio			3.02			100	28-NOV-17 18:52	per1128018a
14797-73-0	Perchlorate-101	5	20	80.8	ug/L		100	28-NOV-17 18:52	per1128018a
	Perchlorate-O(18)			50.4	ug/L		100	28-NOV-17 18:52	per1128018a

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

*Concentration =

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

PCB Analysis

Case Narrative

**GC Semivolatile PCB
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-888
Work Order #: 437939**

Method/Analysis Information

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

Sample Analysis

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

Sample ID	Client ID
437939002	CASA-18-148003
437939004	CASA-18-148009
437939008	CASA-18-148004
437939011	CASA-18-148012
1203929169	Method Blank (MB)
1203929170	Laboratory Control Sample (LCS)
1203929171	437508003(CAMO-18-148117) Matrix Spike (MS)
1203929172	437508003(CAMO-18-148117) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-040 REV# 24.

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

Calibration Information

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

Initial Calibration

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS/LCSD) Recovery

The LCS/LCSD spike recoveries met the acceptance limits.

QC Sample Designation

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

Matrix Spike (MS/MSD) Recovery Statement

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

MS/MSD Relative Percent Difference (RPD) Statement

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

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

Sample Dilutions

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

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Electronic Package Comment

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

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

Manual integrations

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

Additional Comments

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

System Configuration

The Semi-Volatiles-PCB analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD9A.I_1	Agilent 7890A Gas Chromatograph/Dual ECD w/ 7693 Autosampler	7890A GC/ECD	Restek Rtx-CLPest 1	30m x 0.25mm, 0.25um
ECD9A.I_2	Agilent 7890A Gas Chromatograph/Dual ECD w/ 7693 Autosampler	7890A GC/ECD	Restek Rtx-CLPest 2	30m x 0.25mm, 0.20um

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2018-888 GEL Work Order: 437939

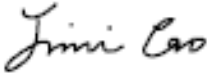
The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Jimin Cao

Date: 05 DEC 2017

Title: Data Validator

Sample Data Summary

PCB
Certificate of Analysis
Sample Summary

Page 1 of 1

SDG Number: 2018-888
Lab Sample ID: 437939002
Client Sample: PCB
Client ID: CASA-18-148003
Batch ID: 1722631
Run Date: 12/01/2017 19:58
Prep Date: 12/01/2017 04:50
Data File: 120117.S\E910162.D
 120117.S\E910162.D

Date Collected: 11/13/2017 14:41
Date Received: 11/15/2017 09:05
Client: ARSL004
Method: SW846 3535A/8082
Inst: ECD9A.I
Analyst: YS1
Aliquot: 920 mL
Column: 1 RTX-CLPEST 1
 2 RTX-CLPEST 2

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

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
4cmx	0.158	0.217	ug/L 73	(33%-122%)
Decachlorobiphenyl	0.222	0.217	ug/L 102	(35%-138%)

PCB
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888
Lab Sample ID: 437939004
Client Sample: PCB
Client ID: CASA-18-148009
Batch ID: 1722631
Run Date: 12/01/2017 20:14
Prep Date: 12/01/2017 04:50
Data File: 120117.S\E910163.D
 120117.S\E910163.D

Date Collected: 11/13/2017 14:41
Date Received: 11/15/2017 09:05
Client: ARSL004
Method: SW846 3535A/8082
Inst: ECD9A.I
Analyst: YS1
Aliquot: 940 mL
Column: 1 RTX-CLPEST 1
 2 RTX-CLPEST 2

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
12674-11-2	Aroclor-1016	U	0.0354	ug/L	0.0354	0.106	1
11104-28-2	Aroclor-1221	U	0.0354	ug/L	0.0354	0.106	1
11141-16-5	Aroclor-1232	U	0.0354	ug/L	0.0354	0.106	1
53469-21-9	Aroclor-1242	U	0.0354	ug/L	0.0354	0.106	1
12672-29-6	Aroclor-1248	U	0.0354	ug/L	0.0354	0.106	1
11097-69-1	Aroclor-1254	U	0.0354	ug/L	0.0354	0.106	1
11096-82-5	Aroclor-1260	U	0.0354	ug/L	0.0354	0.106	1
37324-23-5	Aroclor-1262	U	0.0354	ug/L	0.0354	0.106	1

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
4cmx	0.176	0.213	ug/L 83	(33%-122%)
Decachlorobiphenyl	0.228	0.213	ug/L 107	(35%-138%)

PCB
Certificate of Analysis
Sample Summary

Page 1 of 1

SDG Number: 2018-888
Lab Sample ID: 437939008
Client Sample: PCB
Client ID: CASA-18-148004
Batch ID: 1722631
Run Date: 12/01/2017 20:30
Prep Date: 12/01/2017 04:50
Data File: 120117.S\E910164.D
 120117.S\E910164.D

Date Collected: 11/13/2017 10:51
Date Received: 11/15/2017 09:05
Client: ARSL004
Method: SW846 3535A/8082
Inst: ECD9A.I
Analyst: YS1
Aliquot: 930 mL
Column: 1 RTX-CLPEST 1
 2 RTX-CLPEST 2

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	Column
12674-11-2	Aroclor-1016	U	0.0358	ug/L	0.0358	0.108	1
11104-28-2	Aroclor-1221	U	0.0358	ug/L	0.0358	0.108	1
11141-16-5	Aroclor-1232	U	0.0358	ug/L	0.0358	0.108	1
53469-21-9	Aroclor-1242	U	0.0358	ug/L	0.0358	0.108	1
12672-29-6	Aroclor-1248	U	0.0358	ug/L	0.0358	0.108	1
11097-69-1	Aroclor-1254	U	0.0358	ug/L	0.0358	0.108	1
11096-82-5	Aroclor-1260	U	0.0358	ug/L	0.0358	0.108	1
37324-23-5	Aroclor-1262	U	0.0358	ug/L	0.0358	0.108	1

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
4cmx	0.161	0.215	ug/L 75	(33%-122%)
Decachlorobiphenyl	0.217	0.215	ug/L 101	(35%-138%)

PCB
Certificate of Analysis
Sample Summary

Page 1 of 1

SDG Number: 2018-888
Lab Sample ID: 437939011
Client Sample: PCB
Client ID: CASA-18-148012
Batch ID: 1722631
Run Date: 12/01/2017 20:46
Prep Date: 12/01/2017 04:50
Data File: 120117.S\E910165.D
 120117.S\E910165.D

Date Collected: 11/13/2017 10:51
Date Received: 11/15/2017 09:05
Client: ARSL004
Method: SW846 3535A/8082
Inst: ECD9A.I
Analyst: YS1
Aliquot: 920 mL
Column: 1 RTX-CLPEST 1
 2 RTX-CLPEST 2

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

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
4cmx	0.157	0.217	ug/L 72	(33%-122%)
Decachlorobiphenyl	0.207	0.217	ug/L 95	(35%-138%)

Quality Control Summary

PCB
Surrogate Recovery Report

Page 1 of 1

SDG Number: 2018-888**Matrix Type: LIQUID**

Sample ID	Client ID	4CMX 1 %REC #	4CMX 2 %REC #	DCB 1 %REC #	DCB 2 %REC #
1203929169	MB for batch 1722630	94	89	115	107
1203929170	LCS for batch 1722630	62	61	78	75
1203929171	CAMO-18-148117MS	74	71	82	83
1203929172	CAMO-18-148117MSD	64	62	75	72
437939002	CASA-18-148003	77	73	109	102
437939004	CASA-18-148009	87	83	114	107
437939008	CASA-18-148004	82	75	107	101
437939011	CASA-18-148012	75	72	101	95

Surrogate**Acceptance Limits**

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

DCB = Decachlorobiphenyl (35%-138%)

* Recovery outside Acceptance Limits

Column to be used to flag recovery values

D Sample Diluted

PCB
Quality Control Summary
Spike Recovery Report

Page 1 of 1

SDG Number: 2018-888

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1722630

Matrix: WATER

Lab Sample ID 1203929170

Instrument: ECD9A.I

Analysis Date: 12/01/2017 15:50

Dilution: 1

Analyst: YS1

Prep Batch ID: 1722630

Inj. Vol: 1 uL

Batch ID: 1722631

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

PCB
Quality Control Summary
Spike Recovery Report

Page 1 of 2

SDG Number: 2018-888

Sample Type: Matrix Spike

Client ID: CAMO-18-148117MS

Matrix: W

Lab Sample ID 1203929171

Instrument: ECD9A.I

Analysis Date: 12/01/2017 16:19

Dilution: 1

Analyst: YS1

Prep Batch ID: 1722630

Inj. Vol: 1 uL

Batch ID: 1722631

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

PCB
Quality Control Summary
Spike Recovery Report

Page 2 of 2

SDG Number: 2018-888

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148117MSD

Matrix: W

Lab Sample ID 1203929172

Instrument: ECD9A.I

Analysis Date: 12/01/2017 16:35

Dilution: 1

Analyst: YS1

Prep Batch ID: 1722630

Inj. Vol: 1 uL

Batch ID: 1722631

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

Method Blank Summary

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SDG Number:	2018-888	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1722630	Instrument ID:	ECD9A.I_1	Data File:	120117.S\E9I0145.D
Lab Sample ID:	1203929169		ECD9A.I_2		120117.S\E9I0145.D
Column:	RTX-CLPEST 1	Prep Date:	12/01/2017 04:50	Analyzed:	12/01/17 15:38
	RTX-CLPEST 2				

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

Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01 LCS for batch 1722630	1203929170	120117.S\E9I0146.D 120117.S\E9I0146.D	12/01/17	1550
02 CAMO-18-148117MS	1203929171	120117.S\E9I0148.D 120117.S\E9I0148.D	12/01/17	1619
03 CAMO-18-148117MSD	1203929172	120117.S\E9I0149.D 120117.S\E9I0149.D	12/01/17	1635
04 CASA-18-148003	437939002	120117.S\E9I0162.D 120117.S\E9I0162.D	12/01/17	1958
05 CASA-18-148009	437939004	120117.S\E9I0163.D 120117.S\E9I0163.D	12/01/17	2014
06 CASA-18-148004	437939008	120117.S\E9I0164.D 120117.S\E9I0164.D	12/01/17	2030
07 CASA-18-148012	437939011	120117.S\E9I0165.D 120117.S\E9I0165.D	12/01/17	2046

Quality Control Data

PCB
Certificate of Analysis
Sample Summary

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SDG Number: 2018-888
Lab Sample ID: 1203929169
Client Sample: QC for batch 1722630
Client ID: MB for batch 1722630
Batch ID: 1722631
Run Date: 12/01/2017 15:38
Prep Date: 12/01/2017 04:50
Data File: 120117.S\E910145.D
 120117.S\E910145.D

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

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

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

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

PCB
Certificate of Analysis
Sample Summary

Page 1 of 1

SDG Number: 2018-888
Lab Sample ID: 1203929170
Client Sample: QC for batch 1722630
Client ID: LCS for batch 1722630
Batch ID: 1722631
Run Date: 12/01/2017 15:50
Prep Date: 12/01/2017 04:50
Data File: 120117.S\E910146.D
 120117.S\E910146.D

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

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

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

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

PCB
Certificate of Analysis
Sample Summary

Page 1 of 1

SDG Number: 2018-888
Lab Sample ID: 1203929171
Client Sample: QC for batch 1722630
Client ID: CAMO-18-148117MS
Batch ID: 1722631
Run Date: 12/01/2017 16:19
Prep Date: 12/01/2017 04:50
Data File: 120117.S\E910148.D
 120117.S\E910148.D

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

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

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

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

PCB
Certificate of Analysis
Sample Summary

Page 1 of 1

SDG Number: 2018-888	Date Collected: 11/07/2017 12:21	Matrix: W
Lab Sample ID: 1203929172	Date Received: 11/09/2017 09:00	
Client Sample: QC for batch 1722630	Client: ARSL004	Project: QC
Client ID: CAMO-18-148117MSD	Method: SW846 3535A/8082	SOP Ref: GL-OA-E-040
Batch ID: 1722631	Inst: ECD9A.I	Dilution: 1
Run Date: 12/01/2017 16:35	Analyst: YS1	Inj. Vol: 1 uL
Prep Date: 12/01/2017 04:50	Aliquot: 500 mL	Final Volume: .5 mL
Data File: 120117.S\E910149.D	Column: 1 RTX-CLPEST 1	
120117.S\E910149.D	2 RTX-CLPEST 2	

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

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

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-888
Work Order #: 437939

Sample ID	Client ID
437939001	CASA-18-147996
437939003	CASA-18-148003
437939007	CASA-18-147997
437939009	CASA-18-148004
437939010	CASA-18-148011
437939012	CASA-18-148012
1203920747	Method Blank (MB) ICP
1203920748	Laboratory Control Sample (LCS)
1203920751	437950002(NonSDGL) Serial Dilution (SD)
1203920749	437950002(NonSDGD) Sample Duplicate (DUP)
1203920750	437950002(NonSDGS) Matrix Spike (MS)
1203920787	Method Blank (MB) ICP-MS
1203920788	Laboratory Control Sample (LCS)
1203920791	437950002(NonSDGL) Serial Dilution (SD)
1203920789	437950002(NonSDGD) Sample Duplicate (DUP)
1203920790	437950002(NonSDGS) Matrix Spike (MS)
1203929926	Method Blank (MB) CVAA
1203929927	Laboratory Control Sample (LCS)
1203929933	437939001(CASA-18-147996L) Serial Dilution (SD)
1203929929	437939001(CASA-18-147996D) Sample Duplicate (DUP)
1203929931	437939001(CASA-18-147996S) Matrix Spike (MS)

Sample Analysis

Samples 437939001,003,007,009,010 and 012 in this SDG were analyzed for metals and mercury on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1719265, 1719282, 1722939 and 1725468
Prep Batch :	1719264, 1719281 and 1722938
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 PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of potassium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 437939001 (CASA-18-147996), 437939007 (CASA-18-147997) and 437939010 (CASA-18-148011)-ICP.

ICSA/ICSAB Statement

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

Continuing Calibration Blanks (CCB) Requirements

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 437950002

(NonSDG)-ICP and ICP-MS and 437939001 (CASA-18-147996)-CVAA.

Matrix Spike (MS/MSD) Recovery Statement

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

Duplicate Relative Percent Difference (RPD) Statement

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

Serial Dilution % Difference Statement

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

Technical Information

Holding Time Specifications

GEL assigns holding times based on the associated methodology. Holding time is measured by comparison of the date and time of sample collection to the date and time of sample preparation and analysis. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

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. Samples 437939007 (CASA-18-147997) and 437939010 (CASA-18-148011)-ICP-MS were diluted to ensure that the analyte concentrations were within the linear calibration range of the instrument.

Analyte	437939	
	007	010
Chromium	10X	10X

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: 2018-888 GEL Work Order: 437939

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature:



Name: Jamie Johnson

Date: 12 DEC 2017

Title: Group Leader

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437939001**BASIS:** As Received**DATE COLLECTED** 13-NOV-17**CLIENT ID:** CASA-18-147996**LEVEL:** Low**DATE RECEIVED** 15-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	12/04/17 10:54	120417W1-5	1722939

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 437939001

BASIS: As Received

DATE COLLECTED 13-NOV-17

CLIENT ID: CASA-18-147996

LEVEL: Low

DATE RECEIVED 15-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	TXT1	12/11/17 12:34	121117-1	1719265
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	12/01/17 18:21	171201-2	1719282
7440-38-2	Arsenic	3.16	ug/L	J	2	5	5	1	MS	BAJ	12/02/17 14:26	171202-3	1719282
7440-39-3	Barium	30	ug/L		1	5	5	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7440-42-8	Boron	40.8	ug/L	J	15	50	50	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	12/01/17 18:21	171201-2	1719282
7440-70-2	Calcium	56800	ug/L		50	200	200	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7440-47-3	Chromium	9.52	ug/L	J	3	10	10	1	MS	BAJ	12/02/17 14:26	171202-3	1719282
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	12/01/17 18:21	171201-2	1719282
7439-95-4	Magnesium	8510	ug/L		110	300	300	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7439-98-7	Molybdenum	67.9	ug/L		0.2	0.5	0.5	1	MS	BAJ	12/01/17 18:21	171201-2	1719282
7440-02-0	Nickel	3.96	ug/L		0.6	2	2	1	MS	BAJ	12/02/17 14:26	171202-3	1719282
7440-09-7	Potassium	1450	ug/L		50	150	150	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	12/02/17 14:26	171202-3	1719282
7631-86-9	Silica	60900	ug/L		53	213	213	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	12/01/17 18:21	171201-2	1719282
7440-23-5	Sodium	63100	ug/L		100	300	300	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7440-24-6	Strontium	250	ug/L		1	5	5	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	12/01/17 18:21	171201-2	1719282
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7440-61-1	Uranium	1.52	ug/L		0.067	0.2	0.2	1	MS	BAJ	12/01/17 18:21	171201-2	1719282
7440-62-2	Vanadium	2.15	ug/L	J	1	5	5	1	P	TXT1	12/11/17 12:34	121117-1	1719265
7440-66-6	Zinc	3.9	ug/L	J	3.3	10	10	1	P	TXT1	12/11/17 12:34	121117-1	1719265

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 437939001**BASIS:** As Received**DATE COLLECTED** 13-NOV-17**CLIENT ID:** CASA-18-147996**LEVEL:** Low**DATE RECEIVED** 15-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	177	mg/L		0.453	1.24	1.24	1		JJ2	12/11/17 15:26		1725468

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1719265	1719264	SW846 3005A	50	mL	50	mL	11/15/17	JXM8
1719282	1719281	SW846 3005A	50	mL	50	mL	11/15/17	JXM8
1722939	1722938	EPA 245.1/245.2 Prep	20	mL	20	mL	12/01/17	AXS5

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437939003**BASIS:** As Received**DATE COLLECTED** 13-NOV-17**CLIENT ID:** CASA-18-148003**LEVEL:** Low**DATE RECEIVED** 15-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	12/04/17 11:06	120417W1-5	1722939

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1722939	1722938	EPA 245.1/245.2 Prep	20	mL	20	mL	12/01/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437939007**BASIS:** As Received**DATE COLLECTED** 13-NOV-17**CLIENT ID:** CASA-18-147997**LEVEL:** Low**DATE RECEIVED** 15-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	12/04/17 11:08	120417W1-5	1722939

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 437939007

BASIS: As Received

DATE COLLECTED 13-NOV-17

CLIENT ID: CASA-18-147997

LEVEL: Low

DATE RECEIVED 15-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	TXT1	12/11/17 12:37	121117-1	1719265
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	12/01/17 18:24	171201-2	1719282
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	12/02/17 14:28	171202-3	1719282
7440-39-3	Barium	72.4	ug/L		1	5	5	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	12/01/17 18:24	171201-2	1719282
7440-70-2	Calcium	69800	ug/L		50	200	200	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7440-47-3	Chromium	387	ug/L		30	100	100	10	MS	BAJ	12/03/17 15:31	171203-4	1719282
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	12/01/17 18:24	171201-2	1719282
7439-95-4	Magnesium	16100	ug/L		110	300	300	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7439-98-7	Molybdenum	0.629	ug/L		0.2	0.5	0.5	1	MS	BAJ	12/01/17 18:24	171201-2	1719282
7440-02-0	Nickel	17.7	ug/L		0.6	2	2	1	MS	BAJ	12/02/17 14:28	171202-3	1719282
7440-09-7	Potassium	3860	ug/L		50	150	150	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	12/02/17 14:28	171202-3	1719282
7631-86-9	Silica	61000	ug/L		53	213	213	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	12/01/17 18:24	171201-2	1719282
7440-23-5	Sodium	22900	ug/L		100	300	300	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7440-24-6	Strontium	336	ug/L		1	5	5	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	12/01/17 18:24	171201-2	1719282
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7440-61-1	Uranium	1.94	ug/L		0.067	0.2	0.2	1	MS	BAJ	12/01/17 18:24	171201-2	1719282
7440-62-2	Vanadium	1.49	ug/L	J	1	5	5	1	P	TXT1	12/11/17 12:37	121117-1	1719265
7440-66-6	Zinc	10.8	ug/L		3.3	10	10	1	P	TXT1	12/11/17 12:37	121117-1	1719265

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 437939007**BASIS:** As Received**DATE COLLECTED** 13-NOV-17**CLIENT ID:** CASA-18-147997**LEVEL:** Low**DATE RECEIVED** 15-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	241	mg/L		0.453	1.24	1.24	1		JJ2	12/11/17 15:26		1725468

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1719265	1719264	SW846 3005A	50	mL	50	mL	11/15/17	JXM8
1719282	1719281	SW846 3005A	50	mL	50	mL	11/15/17	JXM8
1722939	1722938	EPA 245.1/245.2 Prep	20	mL	20	mL	12/01/17	AXS5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437939009**BASIS:** As Received**DATE COLLECTED** 13-NOV-17**CLIENT ID:** CASA-18-148004**LEVEL:** Low**DATE RECEIVED** 15-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	12/04/17 11:10	120417W1-5	1722939

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1722939	1722938	EPA 245.1/245.2 Prep	20	mL	20	mL	12/01/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437939010**BASIS:** As Received**DATE COLLECTED** 13-NOV-17**CLIENT ID:** CASA-18-148011**LEVEL:** Low**DATE RECEIVED** 15-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	12/04/17 11:11	120417W1-5	1722939

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 437939010

BASIS: As Received

DATE COLLECTED 13-NOV-17

CLIENT ID: CASA-18-148011

LEVEL: Low

DATE RECEIVED 15-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	TXT1	12/11/17 12:39	121117-1	1719265
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	12/01/17 18:27	171201-2	1719282
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	12/02/17 14:30	171202-3	1719282
7440-39-3	Barium	75.1	ug/L		1	5	5	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	12/01/17 18:27	171201-2	1719282
7440-70-2	Calcium	71400	ug/L		50	200	200	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7440-47-3	Chromium	331	ug/L		30	100	100	10	MS	BAJ	12/03/17 15:32	171203-4	1719282
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	12/01/17 18:27	171201-2	1719282
7439-95-4	Magnesium	16600	ug/L		110	300	300	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7439-98-7	Molybdenum	0.523	ug/L		0.2	0.5	0.5	1	MS	BAJ	12/01/17 18:27	171201-2	1719282
7440-02-0	Nickel	15.9	ug/L		0.6	2	2	1	MS	BAJ	12/02/17 14:30	171202-3	1719282
7440-09-7	Potassium	3940	ug/L		50	150	150	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	12/02/17 14:30	171202-3	1719282
7631-86-9	Silica	63600	ug/L		53	213	213	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	12/01/17 18:27	171201-2	1719282
7440-23-5	Sodium	23500	ug/L		100	300	300	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7440-24-6	Strontium	344	ug/L		1	5	5	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	12/01/17 18:27	171201-2	1719282
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7440-61-1	Uranium	1.88	ug/L		0.067	0.2	0.2	1	MS	BAJ	12/01/17 18:27	171201-2	1719282
7440-62-2	Vanadium	1.23	ug/L	J	1	5	5	1	P	TXT1	12/11/17 12:39	121117-1	1719265
7440-66-6	Zinc	5.69	ug/L	J	3.3	10	10	1	P	TXT1	12/11/17 12:39	121117-1	1719265

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 437939010**BASIS:** As Received**DATE COLLECTED** 13-NOV-17**CLIENT ID:** CASA-18-148011**LEVEL:** Low**DATE RECEIVED** 15-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	247	mg/L		0.453	1.24	1.24	1		JJ2	12/11/17 15:26		1725468

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1719265	1719264	SW846 3005A	50	mL	50	mL	11/15/17	JXM8
1719282	1719281	SW846 3005A	50	mL	50	mL	11/15/17	JXM8
1722939	1722938	EPA 245.1/245.2 Prep	20	mL	20	mL	12/01/17	AXS5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-888**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437939012**BASIS:** As Received**DATE COLLECTED** 13-NOV-17**CLIENT ID:** CASA-18-148012**LEVEL:** Low**DATE RECEIVED** 15-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	12/04/17 11:13	120417W1-5	1722939

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1722939	1722938	EPA 245.1/245.2 Prep	20	mL	20	mL	12/01/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2018-888
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>
1203920747	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	60.3	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
1203920787	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
1203929926	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. 2018-888

Client ID: CAPA-18-148455S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 437950002

Spike ID: 1203920750

<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	5160		68	U	5000	102		P
Barium	ug/L	75-125	496		1	U	500	99.1		P
Beryllium	ug/L	75-125	484		1	U	500	96.8		P
Boron	ug/L	75-125	488		15	U	500	97.4		P
Calcium	ug/L	75-125	5050		198	J	5000	97		P
Cobalt	ug/L	75-125	505		1	U	500	101		P
Copper	ug/L	75-125	515		3	U	500	103		P
Iron	ug/L	75-125	5040		37	J	5000	100		P
Magnesium	ug/L	75-125	4960		110	U	5000	98.5		P
Manganese	ug/L	75-125	515		4.42	J	500	102		P
Potassium	ug/L	75-125	5010		50	U	5000	99.3		P
Silica	ug/L	75-125	10600		214		10700	97.1		P
Sodium	ug/L	75-125	5300		439		5000	97.2		P
Strontium	ug/L	75-125	499		1	U	500	99.7		P
Tin	ug/L	75-125	491		2.5	U	500	98.2		P
Vanadium	ug/L	75-125	507		1	U	500	101		P
Zinc	ug/L	75-125	487		3.3	U	500	97		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Matrix Spike Summary

SDG NO. 2018-888

Client ID: CAPA-18-148455S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 437950002

Spike ID: 1203920790

<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	50.4		1	U	50	101		MS
Arsenic	ug/L	75-125	50.9		2	U	50	100		MS
Cadmium	ug/L	75-125	51.9		0.3	U	50	104		MS
Chromium	ug/L	75-125	56.2		3	U	50	110		MS
Lead	ug/L	75-125	49.8		0.5	U	50	99.4		MS
Molybdenum	ug/L	75-125	52.1		0.2	U	50	104		MS
Nickel	ug/L	75-125	58		0.992	J	50	114		MS
Selenium	ug/L	75-125	50.3		2	U	50	99.7		MS
Silver	ug/L	75-125	53.1		0.3	U	50	106		MS
Thallium	ug/L	75-125	47.1		0.6	U	50	94.1		MS
Uranium	ug/L	75-125	48.9		0.067	U	50	97.7		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Matrix Spike Summary

SDG NO. 2018-888

Client ID: CASA-18-147996S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 437939001

Spike ID: 1203929931

<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	2.09		0.067	U	2	105		AV

*Analytical Methods:

AV EPA 245.1/245.2

Metals
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Duplicate Sample Summary

SDG No.: 2018–888

Lab Code: GEL

Contract: ESHL00114

Client ID: CAPA–18–148455D

Matrix: WATER

Level: Low

Sample ID: 437950002

Duplicate ID: 1203920749

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		1 U		1 U				P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L		15 U		15 U				P
Calcium	ug/L	+/-200	198 J		73 J		92.4		P
Cobalt	ug/L		1 U		1 U				P
Copper	ug/L		3 U		3 U				P
Iron	ug/L	+/-100	37 J		36.4 J		1.74		P
Magnesium	ug/L		110 U		110 U				P
Manganese	ug/L	+/-10	4.42 J		4.2 J		5.01		P
Potassium	ug/L		50 U		50.2 J		200		P
Silica	ug/L	+/-213	214		191 J		11.5		P
Sodium	ug/L	+/-300	439		431		1.78		P
Strontium	ug/L		1 U		1 U				P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L		1 U		1 U				P
Zinc	ug/L		3.3 U		3.3 U				P

*Analytical Methods:

P SW846 3005A/6010C

Metals
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Duplicate Sample Summary

SDG No.: 2018–888

Lab Code: GEL

Contract: ESHL00114

Client ID: CAPA–18–148455D

Matrix: WATER

Level: Low

Sample ID: 437950002

Duplicate ID: 1203920789

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Antimony	ug/L		1 U		1 U				MS
Arsenic	ug/L		2 U		2 U				MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L		3 U		3 U				MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L		0.2 U		0.2 U				MS
Nickel	ug/L	+/-2	0.992 J		1.07 J		7.94		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		0.067 U		0.067 U				MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
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Duplicate Sample Summary

SDG No.: 2018–888**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CASA–18–147996D**Matrix:** WATER**Level:** Low**Sample ID:** 437939001**Duplicate ID:** 1203929929**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

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Laboratory Control Sample Summary

SDG NO. 2018-888

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>
1203920748								
	Aluminum	ug/L	5000	5030		101	80-120	P
	Barium	ug/L	500	502		100	80-120	P
	Beryllium	ug/L	500	498		99.6	80-120	P
	Boron	ug/L	500	494		98.7	80-120	P
	Calcium	ug/L	5000	5020		100	80-120	P
	Cobalt	ug/L	500	512		102	80-120	P
	Copper	ug/L	500	491		98.3	80-120	P
	Iron	ug/L	5000	5060		101	80-120	P
	Magnesium	ug/L	5000	5040		101	80-120	P
	Manganese	ug/L	500	490		98.1	80-120	P
	Potassium	ug/L	5000	4940		98.8	80-120	P
	Silica	ug/L	10700	9840		91.9	80-120	P
	Sodium	ug/L	5000	4910		98.2	80-120	P
	Strontium	ug/L	500	496		99.3	80-120	P
	Tin	ug/L	500	482		96.4	80-120	P
	Vanadium	ug/L	500	486		97.1	80-120	P
	Zinc	ug/L	500	470		94	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Laboratory Control Sample Summary

SDG NO. 2018-888

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>
1203920788								
	Antimony	ug/L	50	46.5		93	80-120	MS
	Arsenic	ug/L	50	50.1		100	80-120	MS
	Cadmium	ug/L	50	49.6		99.3	80-120	MS
	Chromium	ug/L	50	54.8		110	80-120	MS
	Lead	ug/L	50	47.9		95.8	80-120	MS
	Molybdenum	ug/L	50	50.5		101	80-120	MS
	Nickel	ug/L	50	57.6		115	80-120	MS
	Selenium	ug/L	50	51.4		103	80-120	MS
	Silver	ug/L	50	49.6		99.3	80-120	MS
	Thallium	ug/L	50	47.8		95.6	80-120	MS
	Uranium	ug/L	50	47.8		95.6	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Laboratory Control Sample Summary

SDG NO. 2018-888

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>
1203929927	Mercury	ug/L	2	2.06		103	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

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Serial Dilution Sample Summary

SDG NO. 2018-888

Client ID: CAPA-18-148455L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 437950002

Serial Dilution ID: 1203920751

<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	1	U	5	U				P
Beryllium	1	U	5	U				P
Boron	15	U	75	U				P
Calcium	198	J	250	U	50.562			P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	37	J	150	U	49.412			P
Magnesium	110	U	550	U				P
Manganese	4.42	J	10	U	.084			P
Potassium	50	U	250	U				P
Silica	214		265	U	8.509			P
Sodium	439		500	U	10.989			P
Strontium	1	U	5	U				P
Tin	2.5	U	12.5	U				P
Vanadium	1	U	5	U				P
Zinc	3.3	U	16.5	U				P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Serial Dilution Sample Summary

SDG NO. 2018-888

Client ID: CAPA-18-148455L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 437950002

Serial Dilution ID: 1203920791

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Antimony	1	U	5	U				MS
Arsenic	2	U	10	U				MS
Cadmium	.3	U	1.5	U				MS
Chromium	3	U	15	U				MS
Lead	.5	U	2.5	U				MS
Molybdenum	.2	U	1	U				MS
Nickel	.992	J	3	U	15.927			MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.067	U	.335	U				MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Serial Dilution Sample Summary

SDG NO. 2018-888 **Client ID:** CASA-18-147996L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 437939001 **Serial Dilution ID:** 1203929933

<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 #: 2018-888
Work Order #: 437939**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1717990 and 1718725 **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
437939003	CASA-18-148003
437939009	CASA-18-148004
437939012	CASA-18-148012
1203920734	Method Blank (MB)
1203922683	Method Blank (MB)
1203920735	Laboratory Control Sample (LCS)
1203922684	Laboratory Control Sample (LCS)
1203920738	437822002(CAMO-18-148071) Sample Duplicate (DUP)
1203922686	437939009(CASA-18-148004) Sample Duplicate (DUP)
1203920741	437822002(CAMO-18-148071) Post Spike (PS)
1203922689	437939009(CASA-18-148004) 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 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) Designation

Samples 437822002 (CAMO-18-148071) and 437939009 (CASA-18-148004) were selected for QC analysis.

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

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

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 following sample was diluted in the first analytical run, and a dilution was not required, therefore the sample was rerun neat. The results from the reanalysis are reported. 437939003 (CASA-18-148003).

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: 1719492 **Method:** WSP-CN(T)

Prep Batch : 1719491 **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
437939003	CASA-18-148003
437939009	CASA-18-148004
437939012	CASA-18-148012
1203921248	Method Blank (MB)
1203921249	Laboratory Control Sample (LCS)
1203921252	437939003(CASA-18-148003) Sample Duplicate (DUP)
1203921255	437939003(CASA-18-148003) Matrix Spike (MS)
1203921579	437939003(CASA-18-148003) Matrix Spike Duplicate (MSD)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 REV# 21.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

acceptance limits.

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 437939003 (CASA-18-148003) 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
Cyanide, Total	1203921255 (CASA-18-148003MS) and 1203921579 (CASA-18-148003MSD)	112* (90.0%-110.0%)

MS/MSD Relative Percent Difference (RPD) Statement

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Ion Chromatography
Analytical Batch: 1719972 **Method:** WSP-ANIONS

Sample Analysis

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

Sample ID	Client ID
437939001	CASA-18-147996
437939007	CASA-18-147997
437939010	CASA-18-148011
1203922405	Method Blank (MB)
1203922406	Laboratory Control Sample (LCS)
1203922407	437939001(CASA-18-147996) Sample Duplicate (DUP)
1203922408	437939001(CASA-18-147996) 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-1600 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 437939001 (CASA-18-147996) 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 1203922407 (CASA-18-147996DUP), 1203922408 (CASA-18-147996PS), 437939001 (CASA-18-147996), 437939007 (CASA-18-147997) and 437939010 (CASA-18-148011) 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	437939		
	001	007	010
Chloride	20X	10X	10X
Sulfate	20X	10X	10X

Sample Re-analysis

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

Miscellaneous Information

Manual Integrations

Samples 1203922407 (CASA-18-147996DUP), 1203922408 (CASA-18-147996PS), 437939001 (CASA-18-147996), 437939007 (CASA-18-147997) and 437939010 (CASA-18-148011) 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:	1718942	Method:	NH3
Prep Batch :	1718941	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
437939001	CASA-18-147996
437939007	CASA-18-147997
437939010	CASA-18-148011
1203919945	Method Blank (MB)
1203919946	Laboratory Control Sample (LCS)
1203919947	437828001(WST35-18-148795) Sample Duplicate (DUP)
1203919948	437828001(WST35-18-148795) Matrix Spike (MS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-106 REV# 10.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 437828001 (WST35-18-148795) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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:	1718944	Method:	TKN
Prep Batch :	1718943	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
437939003	CASA-18-148003
437939009	CASA-18-148004
437939012	CASA-18-148012
1203919951	Method Blank (MB)
1203919952	Laboratory Control Sample (LCS)
1203919953	437828001(WST35-18-148795) Sample Duplicate (DUP)
1203919954	437828001(WST35-18-148795) 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 437828001 (WST35-18-148795) 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

Sample1203919952 (LCS) was re-analyzed due to instrument failure. The results from the reanalysis are reported. Samples1203919953 (WST35-18-148795DUP), 1203919954 (WST35-18-148795MS), 437939003 (CASA-18-148003) and 437939009 (CASA-18-148004) 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:

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Method/Analysis Information

Product: Nitrate Nitrite by Cadmium Reduction

Analytical Batch: 1718948

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
437939001	CASA-18-147996
437939007	CASA-18-147997
437939010	CASA-18-148011
1203919966	Method Blank (MB)
1203919967	Laboratory Control Sample (LCS)
1203919968	437828001(WST35-18-148795) Sample Duplicate (DUP)
1203919972	437828001(WST35-18-148795) 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 437828001 (WST35-18-148795) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The following samples 437939001 (CASA-18-147996), 437939007 (CASA-18-147997) and 437939010 (CASA-18-148011) 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	437939		
	001	007	010
Nitrogen, Nitrate/Nitrite	5X	5X	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:

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Method/Analysis Information

Product:	Total Phosphorus		
Analytical Batch:	1718946	Method:	PO4
Prep Batch :	1718945	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
437939001	CASA-18-147996
437939007	CASA-18-147997
437939010	CASA-18-148011
1203919957	Method Blank (MB)
1203919958	Laboratory Control Sample (LCS)
1203919961	437828001(WST35-18-148795) Sample Duplicate (DUP)
1203919962	437828001(WST35-18-148795) 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 437828001 (WST35-18-148795) 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: 1719385

Method: TDS

Sample Analysis

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

Sample ID	Client ID
437939001	CASA-18-147996
437939007	CASA-18-147997
437939010	CASA-18-148011
1203920960	Method Blank (MB)
1203920961	Laboratory Control Sample (LCS)
1203920962	437947002(CAMO-18-148120) 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 437947002 (CAMO-18-148120) 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: Specific Conductivity

Analytical Batch: 1719249

Method: EPA120.1 Specific Conductivity

Sample Analysis

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

Sample ID	Client ID
437939001	CASA-18-147996
437939007	CASA-18-147997
437939010	CASA-18-148011
1203920717	Laboratory Control Sample (LCS)
1203920718	437595001(WST05-18-148663) Sample Duplicate (DUP)
1203920719	437605001(WST05-18-148658) Sample Duplicate (DUP)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-009 REV# 15.

Preparation/Analytical Method Verification

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

Calibration Information

The Titration and Ion analysis was performed on a Orion 160 Conductivity Meter.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 437595001 (WST05-18-148663) and 437605001 (WST05-18-148658) were selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: pH

Analytical Batch: 1720201 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
437939001	CASA-18-147996
437939007	CASA-18-147997
437939010	CASA-18-148011
1203923055	Laboratory Control Sample (LCS)
1203923056	437780001(WST60-18-148791) Sample Duplicate (DUP)
1203923057	437822001(CAMO-18-148055) 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 437780001 (WST60-18-148791) and 437822001 (CAMO-18-148055) 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
1203923056 (WST60-18-148791DUP)	pH	Received 14-NOV-17, out of holding 09-NOV-17
1203923057 (CAMO-18-148055DUP)	pH	Received 14-NOV-17, out of holding 09-NOV-17
437939001 (CASA-18-147996)	pH	Received 15-NOV-17, out of holding 13-NOV-17
437939007 (CASA-18-147997)	pH	Received 15-NOV-17, out of holding 13-NOV-17
437939010 (CASA-18-148011)	pH	Received 15-NOV-17, out of holding 13-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: 1720200 **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
437939001	CASA-18-147996
437939007	CASA-18-147997
437939010	CASA-18-148011
1203923046	Laboratory Control Sample (LCS)
1203923050	437822001(CAMO-18-148055) Sample Duplicate (DUP)
1203923054	437822001(CAMO-18-148055) 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 437822001 (CAMO-18-148055) 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

Samples (See Below) were accidentally analyzed outside of the method specified holding time. The analysis was performed as soon as possible by the analyst. The data is qualified.

Sample	Analyte	Value
1203923050 (CAMO-18-148055DUP)	Alkalinity, Total as CaCO ₃ and Carbonate alkalinity (CaCO ₃)	Received 14-NOV-17, within holding, analyzed 24-NOV-17, out of holding 23-NOV-17
1203923054 (CAMO-18-148055MS)	Alkalinity, Total as CaCO ₃	Received 14-NOV-17, within holding, analyzed 24-NOV-17, out of holding 23-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.

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.

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Qualifier Definition Report for

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

Client SDG: 2018-888 GEL Work Order: 437939

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

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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: 2018-888

Client Sample ID: CASA-18-147996
Sample ID: 437939001
Matrix: W
Collect Date: 13-NOV-17 14:41
Receive Date: 15-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		0.609	0.067	0.200	mg/L		1	MXL2	11/16/17	1741	1719972	1
Fluoride		0.153	0.033	0.100	mg/L		1					
Chloride		114	1.34	4.00	mg/L		20	MXL2	11/17/17	1625	1719972	2
Sulfate		46.9	2.66	8.00	mg/L		20					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.123	0.017	0.050	mg/L	1.00	1	KLP1	11/16/17	1429	1718942	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		1.63	0.085	0.250	mg/L		5	KLP1	11/16/17	1412	1718948	4
PO4 "As Received"												
Phosphorus, Total as P		1.31	0.020	0.050	mg/L	1.00	1	KLP1	11/16/17	1611	1718946	5
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		431	3.40	14.3	mg/L			KLP1	11/16/17	1018	1719385	6
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		102	1.45	4.00	mg/L			RXB5	11/24/17	1440	1720200	7
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		715	1.00	1.00	umhos/cm		1	VH1	11/21/17	1322	1719249	8
PH "As Received"												
pH at Temp 16.7C	H	7.71	0.010	0.100	SU		1	RXB5	11/24/17	1441	1720201	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	11/16/17	1204	1718941
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	AXH3	11/16/17	0930	1718945

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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: 2018-888

Client Sample ID: CASA-18-147996
Sample ID: 437939001

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:300.0											
3	EPA:350.1											
4	EPA:353.2											
5	EPA 365.4 1974											
6	EPA:160.1											
7	EPA:310.1											
8	EPA:120.1											
9	EPA 150.1 1982											

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: 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: 2018-888

Client Sample ID: CASA-18-148003
Sample ID: 437939003
Matrix: W
Collect Date: 13-NOV-17 14:41
Receive Date: 15-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		1.13	0.330	1.00	mg/L		1	TSM	11/20/17	1338	1717990	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	11/21/17	0836	1719492	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl		0.126	0.033	0.100	mg/L	1.00	1	KLP1	11/16/17	1246	1718944	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/21/17	0759	1719491
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	AXH3	11/16/17	0930	1718943

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

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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: 2018-888

Client Sample ID: CASA-18-147997
Sample ID: 437939007
Matrix: W
Collect Date: 13-NOV-17 10:51
Receive Date: 15-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		0.688	0.067	0.200	mg/L		1	MXL2	11/16/17	1908	1719972	1
Fluoride		0.144	0.033	0.100	mg/L		1					
Chloride		72.9	0.670	2.00	mg/L		10	MXL2	11/17/17	1751	1719972	2
Sulfate		89.6	1.33	4.00	mg/L		10					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.0716	0.017	0.050	mg/L	1.00	1	KLP1	11/16/17	1430	1718942	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		4.08	0.085	0.250	mg/L		5	KLP1	11/16/17	1413	1718948	4
PO4 "As Received"												
Phosphorus, Total as P		0.0589	0.020	0.050	mg/L	1.00	1	KLP1	11/16/17	1617	1718946	5
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		473	3.40	14.3	mg/L			KLP1	11/16/17	1018	1719385	6
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		90.7	1.45	4.00	mg/L			RXB5	11/24/17	1445	1720200	7
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		651	1.00	1.00	umhos/cm		1	VH1	11/21/17	1323	1719249	8
PH "As Received"												
pH at Temp 15.4C	H	7.71	0.010	0.100	SU		1	RXB5	11/24/17	1444	1720201	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	11/16/17	1204	1718941
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	AXH3	11/16/17	0930	1718945

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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: 2018-888

Client Sample ID: CASA-18-147997
Sample ID: 437939007

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:300.0											
3	EPA:350.1											
4	EPA:353.2											
5	EPA 365.4 1974											
6	EPA:160.1											
7	EPA:310.1											
8	EPA:120.1											
9	EPA 150.1 1982											

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: 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: 2018-888

Client Sample ID: CASA-18-148004
Sample ID: 437939009
Matrix: W
Collect Date: 13-NOV-17 10:51
Receive Date: 15-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	J	0.910	0.330	1.00	mg/L		1	TSM	11/18/17	1851	1718725	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total		6.59	1.67	5.00	ug/L	1.00	1	AXH3	11/21/17	0840	1719492	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl		0.155	0.033	0.100	mg/L	1.00	1	KLP1	11/16/17	1247	1718944	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/21/17	0759	1719491
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	AXH3	11/16/17	0930	1718943

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

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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: 2018-888

Client Sample ID: CASA-18-148011
Sample ID: 437939010
Matrix: W
Collect Date: 13-NOV-17 10:51
Receive Date: 15-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		0.695	0.067	0.200	mg/L		1	MXL2	11/16/17	1937	1719972	1
Fluoride		0.132	0.033	0.100	mg/L		1					
Chloride		73.5	0.670	2.00	mg/L		10	MXL2	11/17/17	1820	1719972	2
Sulfate		90.1	1.33	4.00	mg/L		10					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	J	0.0421	0.017	0.050	mg/L	1.00	1	KLP1	11/16/17	1431	1718942	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		3.64	0.085	0.250	mg/L		5	KLP1	11/16/17	1415	1718948	4
PO4 "As Received"												
Phosphorus, Total as P		0.0505	0.020	0.050	mg/L	1.00	1	KLP1	11/16/17	1617	1718946	5
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		423	3.40	14.3	mg/L			KLP1	11/16/17	1018	1719385	6
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		90.1	1.45	4.00	mg/L			RXB5	11/24/17	1448	1720200	7
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		652	1.00	1.00	umhos/cm		1	VH1	11/21/17	1323	1719249	8
PH "As Received"												
pH at Temp 14.4C	H	7.71	0.010	0.100	SU		1	RXB5	11/24/17	1446	1720201	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	11/16/17	1204	1718941
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	AXH3	11/16/17	0930	1718945

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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: 2018-888

Client Sample ID: CASA-18-148011
Sample ID: 437939010

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:300.0											
3	EPA:350.1											
4	EPA:353.2											
5	EPA 365.4 1974											
6	EPA:160.1											
7	EPA:310.1											
8	EPA:120.1											
9	EPA 150.1 1982											

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: 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: 2018-888

Client Sample ID: CASA-18-148012
Sample ID: 437939012
Matrix: W
Collect Date: 13-NOV-17 10:51
Receive Date: 15-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	J	0.865	0.330	1.00	mg/L		1	TSM	11/18/17	2111	1718725	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total		6.27	1.67	5.00	ug/L	1.00	1	AXH3	11/21/17	0841	1719492	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	11/16/17	1248	1718944	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/21/17	0759	1719491
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	AXH3	11/16/17	0930	1718943

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

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QC Summary

Report Date: December 8, 2017

Page 1 of 7

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

Contact: Ms. Nita Patel

Workorder: 437939

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1717990										
QC1203920738	437822002	DUP									
Total Organic Carbon Average	J	0.959		1.02	mg/L	5.77	^	(+/-1.00)	TSM	11/18/17	06:19
QC1203920735	LCS										
Total Organic Carbon Average	10.0			10.5	mg/L			(80%-120%)		11/17/17	14:30
QC1203920734	MB										
Total Organic Carbon Average			U	ND	mg/L					11/17/17	14:18
QC1203920741	437822002	PS									
Total Organic Carbon Average	10.0	J	0.959	11.4	mg/L			(75%-125%)		11/18/17	07:06
Batch	1718725										
QC1203922686	437939009	DUP									
Total Organic Carbon Average	J	0.910	J	0.829	mg/L	9.32	^	(+/-1.00)	TSM	11/18/17	19:37
QC1203922684	LCS										
Total Organic Carbon Average	10.0			10.5	mg/L			(80%-120%)		11/18/17	12:22
QC1203922683	MB										
Total Organic Carbon Average			U	ND	mg/L					11/18/17	12:11
QC1203922689	437939009	PS									
Total Organic Carbon Average	10.0	J	0.910	11.1	mg/L			(75%-125%)		11/18/17	20:24
Flow Injection Analysis											
Batch	1719492										
QC1203921252	437939003	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	11/21/17	08:37

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QC Summary

Workorder: 437939

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Flow Injection Analysis											
Batch	1719492										
QC1203921249	LCS										
Cyanide, Total	50.0			51.1	ug/L		102	(90%-110%)	AXH3	11/21/17	08:07
QC1203921248	MB										
Cyanide, Total			U	ND	ug/L					11/21/17	08:06
QC1203921255	437939003	MS									
Cyanide, Total	100	U	ND	112	ug/L		112 *	(90%-110%)		11/21/17	08:38
QC1203921579	437939003	MSD									
Cyanide, Total	100	U	ND	112	ug/L	0	112 *	(0%-20%)		11/21/17	08:39
Ion Chromatography											
Batch	1719972										
QC1203922407	437939001	DUP									
Bromide			0.609	0.600	mg/L	1.44	^	(+/-0.200)	MXL2	11/16/17	18:10
Chloride			114	114	mg/L	0.129		(0%-20%)		11/17/17	16:53
Fluoride			0.153	0.155	mg/L	1.36	^	(+/-0.100)		11/16/17	18:10
Sulfate			46.9	46.7	mg/L	0.436		(0%-20%)		11/17/17	16:53
QC1203922406	LCS										
Bromide	1.25			1.33	mg/L		106	(80%-120%)		11/16/17	17:13
Chloride	5.00			4.81	mg/L		96.2	(80%-120%)			
Fluoride	2.50			2.35	mg/L		94	(80%-120%)			
Sulfate	10.0			10.2	mg/L		102	(80%-120%)			

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QC Summary

Workorder: 437939

Page 3 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1719972										
QC1203922405	MB										
Bromide			U	ND	mg/L				MXL2	11/16/17	16:44
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203922408	437939001	PS									
Bromide	1.25	0.609		1.85	mg/L		99.1	(75%-125%)		11/16/17	18:39
Chloride	5.00	5.72		11.3	mg/L		111	(75%-125%)		11/17/17	17:22
Fluoride	2.50	0.153		2.48	mg/L		93.1	(75%-125%)		11/16/17	18:39
Sulfate	10.0	2.34		12.5	mg/L		101	(75%-125%)		11/17/17	17:22
Nutrient Analysis											
Batch	1718942										
QC1203919947	437828001	DUP									
Nitrogen, Ammonia	J	0.0258	J	0.0417	mg/L	47.1	^	(+/-0.050)	KLP1	11/16/17	14:19
QC1203919946	LCS										
Nitrogen, Ammonia	1.00			0.958	mg/L		95.8	(90%-110%)		11/16/17	14:03
QC1203919945	MB										
Nitrogen, Ammonia			U	ND	mg/L					11/16/17	14:02
QC1203919948	437828001	MS									
Nitrogen, Ammonia	1.00	J	0.0258	1.08	mg/L		105	(90%-110%)		11/16/17	14:20

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QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1718944										
QC1203919953	437828001	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A		KLP1	11/16/17	12:39
QC1203919952	LCS										
Nitrogen, Total Kjeldahl	1.00				0.943	mg/L	94.3	(90%-110%)		11/16/17	12:33
QC1203919951	MB										
Nitrogen, Total Kjeldahl			J		0.0803	mg/L				11/16/17	11:55
QC1203919954	437828001	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND		0.970	mg/L	96.9	(90%-110%)		11/16/17	12:39
Batch	1718946										
QC1203919961	437828001	DUP									
Phosphorus, Total as P			0.130		0.102	mg/L	24.1 ^	(+/-0.050)	KLP1	11/16/17	16:06
QC1203919958	LCS										
Phosphorus, Total as P	1.00				1.01	mg/L	101	(80%-124%)		11/16/17	15:52
QC1203919957	MB										
Phosphorus, Total as P			U		ND	mg/L				11/16/17	15:51
QC1203919962	437828001	MS									
Phosphorus, Total as P	1.00		0.130		1.17	mg/L	104	(63%-139%)		11/16/17	16:07
Batch	1718948										
QC1203919968	437828001	DUP									
Nitrogen, Nitrate/Nitrite			0.916		0.919	mg/L	0.327	(0%-20%)	KLP1	11/16/17	14:03
QC1203919967	LCS										
Nitrogen, Nitrate/Nitrite	1.00				0.955	mg/L	95.5	(90%-110%)		11/16/17	13:37
QC1203919966	MB										
Nitrogen, Nitrate/Nitrite			U		ND	mg/L				11/16/17	13:36

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QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1718948										
QC1203919972	437828001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.916		1.83	mg/L		91.4	(90%-110%)	KLP1	11/16/17	14:09
Solids Analysis											
Batch	1719385										
QC1203920962	437947002	DUP									
Total Dissolved Solids		366		383	mg/L	3.42		(0%-5%)	KLP1	11/16/17	10:18
QC1203920961	LCS										
Total Dissolved Solids	300			300	mg/L		100	(95%-105%)		11/16/17	10:18
QC1203920960	MB										
Total Dissolved Solids			U	ND	mg/L					11/16/17	10:18
Titration and Ion Analysis											
Batch	1719249										
QC1203920718	437595001	DUP									
Conductivity		195		195	umhos/cm	0.103		(0%-10%)	VH1	11/21/17	13:16
QC1203920719	437605001	DUP									
Conductivity		176		177	umhos/cm	0.509		(0%-10%)		11/21/17	13:17
QC1203920717	LCS										
Conductivity	1410			1400	umhos/cm		99.3	(95%-105%)		11/21/17	13:14
Batch	1720200										
QC1203923050	437822001	DUP									
Alkalinity, Total as CaCO3	H	91.7	H	90.3	mg/L	1.55		(0%-20%)	RXB5	11/24/17	14:19
Carbonate alkalinity (CaCO3)	HU	ND	HU	ND	mg/L	N/A					
QC1203923046	LCS										
Alkalinity, Total as CaCO3	100			108	mg/L		108	(90%-110%)		11/24/17	13:15

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1720200										
QC1203923054	437822001	MS									
Alkalinity, Total as CaCO3	100	H	91.7	H	195	mg/L	103	(80%-120%)	RXB5	11/24/17	14:20
Batch	1720201										
QC1203923056	437780001	DUP									
pH		H	9.15	H	9.15	SU	0	(0%-5%)	RXB5	11/24/17	14:22
QC1203923057	437822001	DUP									
pH		H	7.48	H	7.40	SU	1.08	(0%-5%)		11/24/17	14:18
QC1203923055	LCS										
pH	7.00				6.99	SU	99.9	(99%-101%)		11/24/17	13:16

Notes:

- < Result is less than value reported
- > Result is greater than value reported
- B The target analyte was detected in the associated blank.
- E General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
- H Analytical holding time was exceeded
- J Value is estimated
- N/A RPD or %Recovery limits do not apply.
- N1 See case narrative
- ND Analyte concentration is not detected above the detection limit
- NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Q One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
- R Per section 9.3.4.1 of Method 1664 Revision B, due to matrix spike recovery issues, this result may not be reported or used for regulatory compliance purposes.
- R Sample results are rejected
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Paint Filter Test--Particulates passed through the filter, however no free liquids were observed.
- ^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
- d 5-day BOD--The 2:1 depletion requirement was not met for this sample
- e 5-day BOD--Test replicates show more than 30% difference between high and low values. The data is qualified per the method and can be used for reporting purposes

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QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
h	Preparation or preservation holding time was exceeded										

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-888
Work Order #: 437939**

Method/Analysis Information

Product: Alphaspec Am241 Liquid

Analytical Method: HASL-300:AM-241

Analytical Batch Number: 1719849

Sample ID	Client ID
437939003	CASA-18-148003
437939009	CASA-18-148004
437939012	CASA-18-148012
1203922090	Method Blank (MB)
1203922092	Laboratory Control Sample (LCS)
1203922091	437794002(CAMO-18-148070) 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 1203922090 (MB) and 1203922092 (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: 437794002 (CAMO-18-148070). The QC was from ARSL work order 437794.

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 prep or reanalysis.

Recounts

Samples 1203922090 (MB) and 1203922091 (CAMO-18-148070DUP) were recounted due to a peak shift. The recounts are reported.

Miscellaneous Information:**Manual Integration**

No manual integrations were performed on data in this batch.

Sample-Specific MDA/MDC

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

Additional Comments

Additional comments were not required for this sample set.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product: IsoU
Analytical Method: HASL-300:ISOU
Analytical Batch Number: 1719851

Sample ID	Client ID
437939003	CASA-18-148003
437939009	CASA-18-148004
437939012	CASA-18-148012
1203922096	Method Blank (MB)
1203922098	Laboratory Control Sample (LCS)
1203922097	437794002(CAMO-18-148070) 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 1203922096 (MB) and 1203922098 (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
--------	---------	-------

1203922096 (MB)	Uranium-233/234 and Uranium-235/236	Blank result > 1.65 CSU
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Blank Decision Level

The blank (See Below) result is greater than the decision level but less than the MDC.

Sample	Analyte	Value
1203922096 (MB)	Uranium-233/234 and Uranium-235/236	Blank result > DL

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: 437794002 (CAMO-18-148070). The QC was from ARSL work order 437794.

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: 1723433

Sample ID	Client ID
437939003	CASA-18-148003
437939009	CASA-18-148004
437939012	CASA-18-148012
1203931265	Method Blank (MB)
1203931267	Laboratory Control Sample (LCS)
1203931266	438005005(WST05-18-148670) 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 1203931265 (MB) and 1203931267 (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: 438005005 (WST05-18-148670). The QC was from ARSL work order 438005.

Duplication Criteria between QC Sample and Duplicate Sample

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

RDL Met

Samples (See Below) did not meet the detection limits due to the small sample aliquots used. The aliquots were reduced due to the matrix of the samples. The samples were counted the maximum count time in order to achieve the lowest possible MDAs.

Sample	Analyte	Value
1203931266 (WST05-18-148670DUP)	Plutonium-238	Result -0.0188 < MDA 0.0691 > RDL 0.05 pCi/L
	Plutonium-239/240	Result 0.00000000156 < MDA 0.0988 > RDL 0.05 pCi/L
437939003 (CASA-18-148003)	Plutonium-238	Result 0.0812 < MDA 0.0855 > RDL 0.05 pCi/L
	Plutonium-239/240	Result 0.0058 < MDA 0.122 > RDL 0.05 pCi/L
437939009 (CASA-18-148004)	Plutonium-238	Result -0.0375 < MDA 0.0921 > RDL 0.05 pCi/L
	Plutonium-239/240	Result 0.00625 < MDA 0.132 > RDL 0.05 pCi/L
437939012 (CASA-18-148012)	Plutonium-238	Result -0.01 < MDA 0.0737 > RDL 0.05 pCi/L
	Plutonium-239/240	Result 0.00000000333 < MDA 0.105 > 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

Samples were re-prepped due to low carrier/tracer yield. The re-analysis is being reported.

Recounts

Samples 437939003 (CASA-18-148003) and 437939009 (CASA-18-148004) were recounted due to a peak shift. The recounts are reported.

Miscellaneous Information:

Manual Integration

No manual integrations were performed on data in this batch.

Sample-Specific MDA/MDC

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

Additional Comments

Samples 1203931266 (WST05-18-148670DUP) and 1203931267 (LCS) 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 peaks are within the tracer region of interest.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product: Gammaspec

Analytical Method: EPA:901.1

Analytical Batch Number: 1718868

Sample ID	Client ID
437939003	CASA-18-148003
437939009	CASA-18-148004
437939012	CASA-18-148012
1203919782	Method Blank (MB)
1203919784	Laboratory Control Sample (LCS)
1203919783	437794002(CAMO-18-148070) 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, February 2017, June 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: 437794002 (CAMO-18-148070). The QC was from ARSL work order 437794.

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
437939003	CASA-18-148003
437939009	CASA-18-148004
437939012	CASA-18-148012
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 GL-RAD-A-004 REV# 19.

Calibration Information:

Calibration Information

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

Standards Information

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

Sample Geometry

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

Quality Control (QC) Information:

Blank Information

Aliquots for samples 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
437939003	CASA-18-148003
437939009	CASA-18-148004
437939012	CASA-18-148012
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

Sample 1203924115 (CAMO-18-148081DUP) was recounted due to high relative percent difference/relative error ratio. The recount is reported.

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

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

Additional Comments

The matrix spike and matrix spike duplicate, 1203924116 (CAMO-18-148081MS) and 1203924117 (CAMO-18-148081MSD), aliquots were reduced to conserve sample volume.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product: WSP-H-3

Analytical Method: EPA:906.0

Analytical Batch Number: 1720283

Sample ID	Client ID
437939009	CASA-18-148004
437939012	CASA-18-148012
1203923260	Method Blank (MB)
1203923263	Laboratory Control Sample (LCS)
1203923261	438210002(WST15-17-148261) Sample Duplicate (DUP)
1203923262	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-RAD-A-002 REV# 22.

Calibration Information:

Calibration Information

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

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 437939012 (CASA-18-148012) was recounted to verify sample results. The recount results are similar to the original results. Original results 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, 1203923262 (WST15-17-148261MS), aliquot was 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.

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Qualifier Definition Report for

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

Client SDG: 2018-888 GEL Work Order: 437939

The Qualifiers in this report are defined as follows:

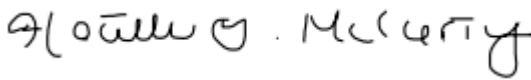
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

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: 09 DEC 2017

Title: Analyst II

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Report Date: December 9, 2017

Client Sample ID: CASA-18-148003
Sample ID: 437939003
Matrix: W
Collect Date: 13-NOV-17
Receive Date: 15-NOV-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

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

Alphaspec Am241 Liquid "As Received"

Americium-241	U	0.00387	+/-0.00821	0.0344	0.0146	+/-0.00821	0.050	pCi/L			JXR5	11/29/17	1351	1719849	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	0.0812	+/-0.0512	0.0855	0.0349	+/-0.0514	0.050	pCi/L			JXR5	12/06/17	1353	1723433	2
Plutonium-239/240	U	0.0058	+/-0.0225	0.122	0.0533	+/-0.0225	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		1.86	+/-0.0718	0.136	0.0641	+/-0.117	1.00	pCi/L			JXR5	11/29/17	1544	1719851	3
Uranium-235/236		0.158	+/-0.0236	0.0587	0.0248	+/-0.0249	1.00	pCi/L							
Uranium-238		0.935	+/-0.0509	0.0794	0.036	+/-0.0688	0.500	pCi/L							

Rad Gamma Spec Analysis

Gammasespec "As Received"

Cesium-137	U	1.10	+/-1.04	4.07	1.81	+/-1.07	8.00	pCi/L			BSW1	11/29/17	0825	1718868	4
Cobalt-60	U	-0.755	+/-1.09	3.89	1.62	+/-1.10	8.00	pCi/L							
Neptunium-237	U	-1.07	+/-1.96	7.00	3.20	+/-1.97		pCi/L							
Potassium-40	U	1.97	+/-20.2	48.2	20.9	+/-20.2		pCi/L							
Sodium-22	U	0.0122	+/-0.850	3.07	1.22	+/-0.850		pCi/L							

Rad Gas Flow Proportional Counting

GFPC, Sr90, liquid "As Received"

Strontium-90	U	0.124	+/-0.128	0.445	0.196	+/-0.129	0.500	pCi/L			LXB3	12/01/17	0826	1720592	5
<i>WSP-GrossA/B "As Received"</i>															
Beta		27.3	+/-1.05	2.11	1.02	+/-2.62	3.00	pCi/L			AXH4	11/29/17	1951	1720594	6
Alpha		50.0	+/-3.92	2.95	1.02	+/-5.77	3.00	pCi/L			AXH4	12/01/17	1134	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"	1719849	95.1	(50%-105%)
Plutonium-242 Tracer	ISOPU "As Received"	1723433	68.6	(50%-105%)
Uranium-232 Tracer	IsoU "As Received"	1719851	73.5	(50%-105%)

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Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-148003

Sample ID: 437939003

Project: ESHL00114

Client ID: ARSL004

Report Date: December 9, 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	89.2	(50%-105%)				

Notes:

The MDC is a sample specific MDC.

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

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

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Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-148004

Sample ID: 437939009

Matrix: W

Collect Date: 13-NOV-17

Receive Date: 15-NOV-17

Collector: Client

Report Date: December 9, 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	0.0165	+/-0.0097	0.0368	0.0156	+/-0.00972	0.050	pCi/L			JXR5	11/29/17	1351	1719849	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	-0.0375	+/-0.0234	0.0921	0.0376	+/-0.0234	0.050	pCi/L			JXR5	12/06/17	1353	1723433	2
Plutonium-239/240	U	0.00625	+/-0.0165	0.132	0.0574	+/-0.0165	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		1.28	+/-0.0636	0.153	0.0724	+/-0.091	1.00	pCi/L			JXR5	11/29/17	1544	1719851	3
Uranium-235/236		0.179	+/-0.0266	0.0662	0.028	+/-0.0281	1.00	pCi/L							
Uranium-238		0.686	+/-0.0469	0.0896	0.0406	+/-0.0585	0.500	pCi/L							
Rad Gamma Spec Analysis															
<i>Gammasec "As Received"</i>															
Cesium-137	U	0.940	+/-1.07	3.79	1.66	+/-1.09	8.00	pCi/L			BSW1	11/29/17	0830	1718868	4
Cobalt-60	U	4.07	+/-1.02	5.26	2.29	+/-1.40	8.00	pCi/L							
Neptunium-237	U	0.260	+/-2.28	7.62	3.50	+/-2.28		pCi/L							
Potassium-40	U	10.9	+/-20.2	36.4	14.8	+/-20.2		pCi/L							
Sodium-22	U	-0.272	+/-1.00	3.71	1.52	+/-1.00		pCi/L							
Rad Gas Flow Proportional Counting															
<i>GFPC, Sr90, liquid "As Received"</i>															
Strontium-90	U	-0.176	+/-0.0993	0.432	0.188	+/-0.0993	0.500	pCi/L			LXB3	12/01/17	0824	1720592	5
<i>WSP-GrossA/B "As Received"</i>															
Beta		3.41	+/-0.948	2.78	1.25	+/-0.991	3.00	pCi/L			AXH4	11/29/17	1433	1720594	6
Alpha	U	1.41	+/-0.875	2.83	0.988	+/-0.883	3.00	pCi/L			AXH4	12/01/17	1134	1720594	7
Rad Liquid Scintillation Analysis															
<i>WSP-H-3 "As Received"</i>															
Tritium	U	132	+/-43.8	137	64.1	+/-45.7	200	pCi/L			BXM4	11/28/17	0613	1720283	8

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
8	EPA:906.0

Surrogate/Tracer	Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Americium-243 Tracer		Alphaspec Am241 Liquid "As Received"	1719849	85.8	(50%-105%)

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Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-148004
Sample ID: 437939009

Project: ESHL00114
Client ID: ARSL004

Report Date: December 9, 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				
Plutonium-242 Tracer	ISOPU "As Received"							1723433	70	(50%-105%)				
Uranium-232 Tracer	IsoU "As Received"							1719851	54.3	(50%-105%)				
Strontium Carrier	GFPC, Sr90, liquid "As Received"							1720592	85.4	(50%-105%)				

Notes:

The MDC is a sample specific MDC.

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

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

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Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-148012

Sample ID: 437939012

Matrix: W

Collect Date: 13-NOV-17

Receive Date: 15-NOV-17

Collector: Client

Report Date: December 9, 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	0.0143	+/-0.00678	0.0364	0.0154	+/-0.00681	0.050	pCi/L			JXR5	11/29/17	1351	1719849	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	-0.01	+/-0.0158	0.0737	0.0301	+/-0.0158	0.050	pCi/L			JXR5	12/05/17	1352	1723433	2
Plutonium-239/240	U	3.33E-09	+/-0.0158	0.105	0.0459	+/-0.0158	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		1.19	+/-0.0553	0.126	0.0595	+/-0.0803	1.00	pCi/L			JXR5	11/29/17	1544	1719851	3
Uranium-235/236		0.134	+/-0.021	0.0544	0.023	+/-0.022	1.00	pCi/L							
Uranium-238		0.713	+/-0.0429	0.0737	0.0334	+/-0.0552	0.500	pCi/L							
Rad Gamma Spec Analysis															
<i>Gammaspac "As Received"</i>															
Cesium-137	U	-2.18	+/-1.03	2.88	1.19	+/-1.15	8.00	pCi/L			BSW1	11/29/17	0830	1718868	4
Cobalt-60	U	-0.775	+/-1.01	3.80	1.54	+/-1.03	8.00	pCi/L							
Neptunium-237	U	2.89	+/-1.90	7.20	3.28	+/-2.01		pCi/L							
Potassium-40	U	-26.3	+/-12.9	44.4	18.6	+/-14.3		pCi/L							
Sodium-22	U	1.45	+/-0.972	4.52	1.91	+/-1.03		pCi/L							
Rad Gas Flow Proportional Counting															
<i>GFPC, Sr90, liquid "As Received"</i>															
Strontium-90	U	-0.0736	+/-0.108	0.431	0.188	+/-0.108	0.500	pCi/L			LXB3	12/01/17	0825	1720592	5
<i>WSP-GrossA/B "As Received"</i>															
Beta		3.27	+/-0.925	2.71	1.21	+/-0.964	3.00	pCi/L			AXH4	11/29/17	1433	1720594	6
Alpha	U	2.50	+/-1.04	2.83	0.967	+/-1.07	3.00	pCi/L			AXH4	12/01/17	1134	1720594	7
Rad Liquid Scintillation Analysis															
<i>WSP-H-3 "As Received"</i>															
Tritium		264	+/-46.6	132	61.8	+/-53.4	200	pCi/L			BXM4	11/28/17	0726	1720283	8

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
8	EPA:906.0

Surrogate/Tracer	Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Americium-243 Tracer		Alphaspec Am241 Liquid "As Received"	1719849	79.1	(50%-105%)

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Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-148012

Sample ID: 437939012

Project: ESHL00114

Client ID: ARSL004

Report Date: December 9, 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				
Plutonium-242 Tracer	ISOPU "As Received"							1723433	65.2	(50%-105%)				
Uranium-232 Tracer	IsoU "As Received"							1719851	75.1	(50%-105%)				
Strontium Carrier	GFPC, Sr90, liquid "As Received"							1720592	81.5	(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

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 9, 2017

Page 1 of 6

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

Los Alamos, New Mexico

Contact: Ms. Nita Patel

Workorder: 437939

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	1719849										
QC1203922091	437794002	DUP									
Americium-241	U	0.0124	U	0.0159	pCi/L	0.11		(0-1)	JXR5	11/30/17	15:07
	Uncert:	+/-0.00587		+/-0.00991							
	TPU:	+/-0.0059		+/-0.00994							
**Americium-243 Tracer	2.62	2.45		1.87	pCi/L		71.5	(50%-105%)			
	Uncert:	+/-0.068		+/-0.0835							
	TPU:	+/-0.130		+/-0.147							
QC1203922092	LCS										
Americium-241	1.97			1.82	pCi/L		92.6	(80%-120%)	JXR5	11/29/17	13:51
	Uncert:			+/-0.057							
	TPU:			+/-0.099							
**Americium-243 Tracer	2.10			2.06	pCi/L		98.3	(50%-105%)			
	Uncert:			+/-0.0607							
	TPU:			+/-0.111							
QC1203922090	MB										
Americium-241			U	0.00141	pCi/L				JXR5	11/30/17	15:07
	Uncert:			+/-0.00424							
	TPU:			+/-0.00424							
**Americium-243 Tracer	2.10			1.99	pCi/L		94.7	(50%-105%)			
	Uncert:			+/-0.0541							
	TPU:			+/-0.104							
Batch	1719851										
QC1203922097	437794002	DUP									
Uranium-234		0.132		0.219	pCi/L	0.763		(0-1)	JXR5	11/29/17	15:46
	Uncert:	+/-0.0243		+/-0.0303							
	TPU:	+/-0.0251		+/-0.0324							
Uranium-235/236	U	0.0531	U	0.0222	pCi/L	0.486		(0-1)			
	Uncert:	+/-0.0168		+/-0.0147							
	TPU:	+/-0.017		+/-0.0148							
Uranium-238		0.0784		0.111	pCi/L	0.401		(0-1)			
	Uncert:	+/-0.0188		+/-0.0213							
	TPU:	+/-0.0191		+/-0.0221							
**Uranium-232 Tracer	2.62	1.96		1.84	pCi/L		70.1	(50%-105%)			
	Uncert:	+/-0.0835		+/-0.098							
	TPU:	+/-0.153		+/-0.170							
QC1203922098	LCS										
Uranium-234				2.61	pCi/L				JXR5	11/29/17	15:46
	Uncert:			+/-0.0782							
	TPU:			+/-0.153							
Uranium-235/236				0.242	pCi/L						
	Uncert:			+/-0.0267							
	TPU:			+/-0.0293							

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QC Summary

Workorder: 437939

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	1719851										
Uranium-238	2.70			2.78	pCi/L		103	(80%-120%)			
	Uncert:			+/-0.0805							
	TPU:			+/-0.161							
**Uranium-232 Tracer	2.09			1.58	pCi/L		75.6	(50%-105%)			
	Uncert:			+/-0.0707							
	TPU:			+/-0.127							
QC1203922096 MB											
Uranium-234			U	0.052	pCi/L				JXR5	11/29/17	15:46
	Uncert:			+/-0.013							
	TPU:			+/-0.0132							
Uranium-235/236			U	0.0214	pCi/L						
	Uncert:			+/-0.00927							
	TPU:			+/-0.00933							
Uranium-238			U	0.00866	pCi/L						
	Uncert:			+/-0.0081							
	TPU:			+/-0.00811							
**Uranium-232 Tracer	2.09			1.77	pCi/L		84.4	(50%-105%)			
	Uncert:			+/-0.0678							
	TPU:			+/-0.124							
Batch	1723433										
QC1203931266 438005005 DUP											
Plutonium-238		U	-0.0048	U	-0.0188	pCi/L	0.223	(0-1)	JXR5	12/05/17	13:52
	Uncert:		+/-0.0198		+/-0.0115						
	TPU:		+/-0.0198		+/-0.0115						
Plutonium-239/240		U	0.0048	U	1.56E-09	pCi/L	0.108	(0-1)			
	Uncert:		+/-0.0107		+/-0.0115						
	TPU:		+/-0.0107		+/-0.0115						
**Plutonium-242 Tracer	4.89		3.82		3.38	pCi/L		69.1	(50%-105%)		
	Uncert:		+/-0.154		+/-0.152						
	TPU:		+/-0.259		+/-0.255						
QC1203931267 LCS											
Plutonium-238				U	0.00714	pCi/L		(80%-120%)	JXR5	12/05/17	13:52
	Uncert:				+/-0.0079						
	TPU:				+/-0.0079						
Plutonium-239/240	1.98				1.90	pCi/L		95.9	(80%-120%)		
	Uncert:				+/-0.0675						
	TPU:				+/-0.108						
**Plutonium-242 Tracer	1.97				1.13	pCi/L		57.2	(50%-105%)		
	Uncert:				+/-0.0687						
	TPU:				+/-0.112						
QC1203931265 MB											
Plutonium-238				U	-0.008	pCi/L			JXR5	12/05/17	13:52
	Uncert:				+/-0.00566						
	TPU:				+/-0.00566						
Plutonium-239/240				U	0.002	pCi/L					
	Uncert:				+/-0.00346						

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QC Summary

Workorder: 437939

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	1723433										
**Plutonium-242 Tracer		TPU:		+/-0.00347							
	1.97			1.58	pCi/L		80	(50%-105%)			
		Uncert:		+/-0.0632							
		TPU:		+/-0.105							
Rad Gamma Spec											
Batch	1718868										
QC1203919783	437794002	DUP									
Cesium-137		U	-0.654	U	3.18	pCi/L	0.63		(0-1)	BSW1	11/29/1709:48
		Uncert:	+/-0.897		+/-2.00						
		TPU:	+/-0.910		+/-2.14						
Cobalt-60		U	0.0595	U	-1.66	pCi/L	0.298		(0-1)		
		Uncert:	+/-1.08		+/-1.76						
		TPU:	+/-1.08		+/-1.81						
Neptunium-237		U	-2.34	U	2.91	pCi/L	0.514		(0-1)		
		Uncert:	+/-2.01		+/-2.95						
		TPU:	+/-2.08		+/-3.03						
Potassium-40		U	13.2	U	-54.2	pCi/L	0.777		(0-1)		
		Uncert:	+/-18.2		+/-21.8						
		TPU:	+/-18.2		+/-25.2						
Sodium-22		U	-0.477	U	-0.193	pCi/L	0.0561		(0-1)		
		Uncert:	+/-1.07		+/-1.45						
		TPU:	+/-1.08		+/-1.45						
QC1203919784	LCS										
Americium-241		34300			34100	pCi/L	99.4	(80%-120%)	BSW1	11/29/1709:20	
		Uncert:			+/-968						
		TPU:			+/-3380						
Cesium-137		13000			13900	pCi/L	107	(80%-120%)			
		Uncert:			+/-177						
		TPU:			+/-927						
Cobalt-60		11200			11500	pCi/L	102	(80%-120%)			
		Uncert:			+/-175						
		TPU:			+/-515						
Neptunium-237				U	20.5	pCi/L					
		Uncert:			+/-61.6						
		TPU:			+/-61.8						
Potassium-40				U	-33.3	pCi/L					
		Uncert:			+/-98.0						
		TPU:			+/-98.3						
Sodium-22				U	-23.6	pCi/L					
		Uncert:			+/-17.4						
		TPU:			+/-18.2						
QC1203919782	MB										
Cesium-137				U	0.875	pCi/L			BSW1	11/29/1709:20	
		Uncert:			+/-1.65						
		TPU:			+/-1.65						
Cobalt-60				U	-1.12	pCi/L					

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QC Summary

Workorder: 437939

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Parname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	1718868										
Neptunium-237	Uncert:			+/-0.969							
	TPU:			+/-1.00							
			U	-1.46	pCi/L						
Potassium-40	Uncert:			+/-2.03							
	TPU:			+/-2.06							
			U	-31.4	pCi/L						
Sodium-22	Uncert:			+/-12.8							
	TPU:			+/-14.8							
			U	0.841	pCi/L						
	Uncert:			+/-0.615							
	TPU:			+/-0.646							
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							

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QC Summary

Workorder: 437939

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time	
Rad Gas Flow												
Batch	1720594											
Beta	47.3			52.3	pCi/L		110	(80%-120%)				
	Uncert:			+/-0.930								
	TPU:			+/-4.70								
QC1203924114	MB											
Alpha			U	-0.0732	pCi/L				AXH4	12/01/17	11:33	
	Uncert:			+/-0.0624								
	TPU:			+/-0.0624								
Beta			U	-0.0531	pCi/L					11/29/17	15:24	
	Uncert:			+/-0.117								
	TPU:			+/-0.117								
QC1203924116	438300002	MS										
Alpha	483	U	0.232	496	pCi/L		103	(75%-125%)	AXH4	12/01/17	11:33	
	Uncert:		+/-0.654	+/-23.4								
	TPU:		+/-0.654	+/-47.7								
Beta	1890	U	1.13	1960	pCi/L		104	(75%-125%)		11/29/17	15:24	
	Uncert:		+/-0.822	+/-35.2								
	TPU:		+/-0.828	+/-168								
QC1203924117	438300002	MSD										
Alpha	483	U	0.232	489	pCi/L	0.0347	101	(0-1)	AXH4	12/01/17	11:33	
	Uncert:		+/-0.654	+/-22.6								
	TPU:		+/-0.654	+/-46.8								
Beta	1890	U	1.13	2120	pCi/L	0.225	112	(0-1)		11/29/17	15:24	
	Uncert:		+/-0.822	+/-38.3								
	TPU:		+/-0.828	+/-183								
Rad Liquid Scintillation												
Batch	1720283											
QC1203923261	438210002	DUP										
Tritium			U	37.8	U	50.2	pCi/L	0.0747	(0-1)	BXM4	11/28/17	14:41
	Uncert:			+/-41.2		+/-41.5						
	TPU:			+/-41.3		+/-41.8						
QC1203923263	LCS											
Tritium	2180			2190	pCi/L		100	(80%-120%)	BXM4	11/28/17	16:11	
	Uncert:			+/-183								
	TPU:			+/-283								
QC1203923260	MB											
Tritium			U	5.69	pCi/L				BXM4	11/28/17	13:28	
	Uncert:			+/-39.3								
	TPU:			+/-39.3								
QC1203923262	438210002	MS										
Tritium	4370	U	37.8	3410	pCi/L		78	(75%-125%)	BXM4	11/28/17	15:53	
	Uncert:		+/-41.2	+/-317								
	TPU:		+/-41.3	+/-462								

Notes:

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

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QC Summary

Workorder: 437939

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



January 23, 2018

gel.com

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

Re: LANL- WQH Water Samples
Work Order: 441471
SDG: 2018-888-1

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on November 15, 2017, and analyzed for 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,

B Luthman
Brielle Luthman for
Valerie Davis
Project Manager

Chain of Custody: 2018-888
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 441471
SDG: 2018-888-1

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 441471
SDG # : 2018-888-1**

January 23, 2018

Laboratory Identification:

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

Summary

Sample receipt The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on November 15, 2017 for analysis. The sample was 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 temperature was 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 sample:

<u>Laboratory ID</u>	<u>Client ID</u>
441471001	CASA-18-148003

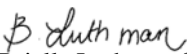
Case Narrative

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: 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.


Brielle Luthman for
Valerie Davis
Project Manager

List of current GEL Certifications as of 23 January 2018

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	LA180011
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	SC000122017-25
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Chain of Custody and Supporting Documentation



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ESHL</u>		SDG/AR/COC/Work Order: <u>437939</u>	
Received By: <u>ZKW</u>		Date Received: <u>11/15/17</u>	
Carrier and Tracking Number		Circle Applicable: <u>5908</u> FedEx Express <u>1783</u> 1949-152 (Graham) <u>5908</u> 1783 1993-22 <u>5908</u> 1783 1971-22 <u>5908</u> 1783 1960-32 <u>5908</u> 1783 1950-32	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
Shipped as a DOT Hazardous?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____	
COC/Samples marked or classified as radioactive?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> <u>CPM</u> <u>d/mR/hr</u> Classified as: Rad 1 Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: Wet Ice <input checked="" type="checkbox"/> 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"/>			Temperature Device Serial #: <u>IR3-16</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" 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 <input checked="" type="checkbox"/> No _____ N/A _____ (If unknown, select No) VOA vials free of headspace? Yes _____ No <input checked="" type="checkbox"/> N/A _____ Sample ID's and containers affected: <u>Both Vials for 148003 rec'd w/headspace</u>
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected: _____
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected: _____
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>			
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials

JB

Date

11.16.2017

Page

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GL-CHL-SR-001 Rev 5

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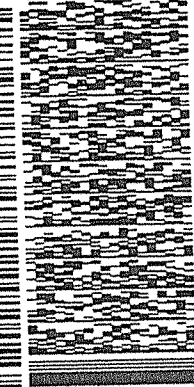
ORIGIN ID: SAFA (505) 665-9966
KEITH GREENE
LOS ALAMOS NATL LAB
TA00 BLDG 1237 DPU 03
LOS ALAMOS, NM 87545
UNITED STATES US

BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(943) 566-8171
REF: 21PD0AWE991316W200



FedEx Express

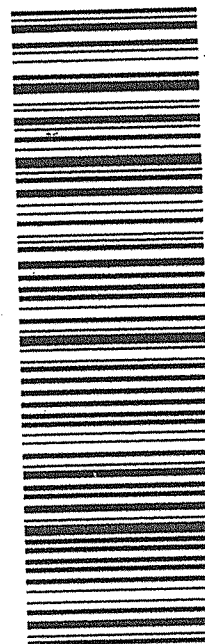


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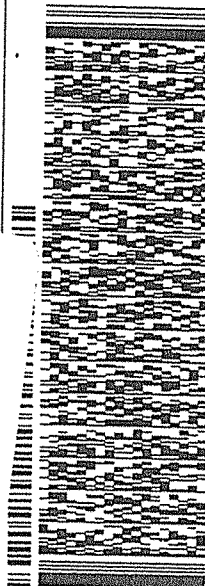
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ORIGIN ID: SAFA (505) 665-9966
KEITH GREENE
LOS ALAMOS NATL LAB
TA00 BLDG 1237 DPU 03
LOS ALAMOS, NM 87545
UNITED STATES US

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TO VALERIE DAVIS
GENERAL ENGINEERING LAB

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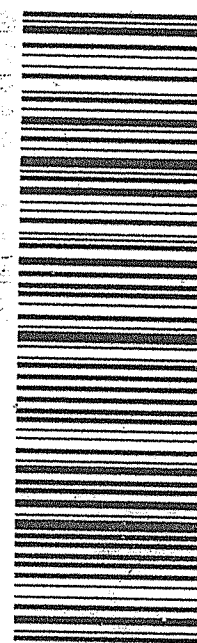


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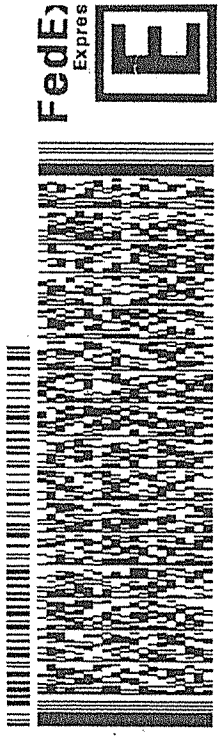
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LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03
LOS ALAMOS, NM 87545
UNITED STATES US

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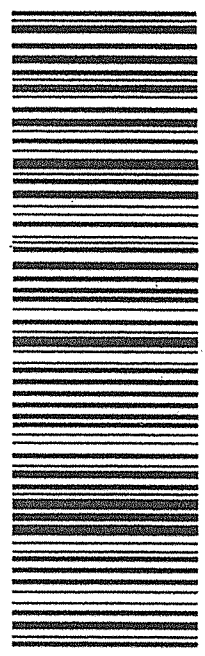
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2040 SAVAGE RD

CHARLESTON SC 29407

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REF: 21PD0ASRGW04BAGWE0



2 of 3
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PRIORITY OVERNIGHT
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Mstr# 5908 1783 1949
X7 RBWA
29407
SC-US CHS



Part # 156140V-434 RIT2 06/15 88

SHIP DATE: 14NOV17
ACTGHT: 40.0 LB MAN
CAD: 0014176/CAFE2916

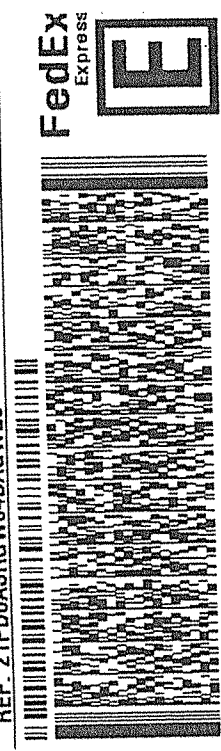
ORIGIN ID: SAFA (505) 865-9966
KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03
LOS ALAMOS, NM 87545
UNITED STATES US

BILL SENDER

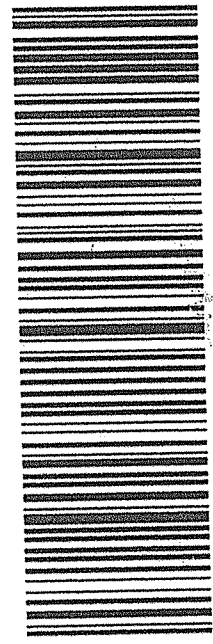
TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171
REF: 21PD0ASRGW04BAGWE0



1 of 3
WED - 15 NOV 10:30
PRIORITY OVERNIGHT
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29407
SC-US CHS



Part # 156140V-434 RIT2 06/15 88

Data Review Qualifier Flag Definition Sheet

Data Review Qualifier Definitions

Qualifier	Explanation
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*	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.

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-888-1
Work Order #: 441471**

Method/Analysis Information

Product: GrossA
Analytical Method: EPA 900.0/SW846 9310
Analytical Batch Number: 1731351

Sample ID	Client ID
441471001	CASA-18-148003
1203951649	Method Blank (MB)
1203951653	Laboratory Control Sample (LCS)
1203951650	441471001(CASA-18-148003) Sample Duplicate (DUP)
1203951651	441471001(CASA-18-148003) Matrix Spike (MS)
1203951652	441471001(CASA-18-148003) Matrix Spike Duplicate (MSD)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV# 19.

Calibration Information:

Calibration Information

All initial and continuing calibration requirements have been met. The initial Calibration was performed in December 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 1203951649 (MB) and 1203951653 (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: 441471001 (CASA-18-148003). The QC was from ARSL work order 441471.

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

Sample result 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.

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

Sample 437939003 was relogged as sample 441471001 for Gross Alpha reanalysis. The sample was reanalyzed using the same bottle that was used for the initial reported analysis. The reanalysis result of 45.7970 pCi/L correlates with the initial reported result of 49.9756 pCi/L with a relative percent difference of 8.7%. The

reanalysis batch was run with a duplicate and the duplicate result of 48.8088 pCi/L correlates with the initial reported result with a relative percent difference of 2.4%. All nitric preserved containers of this sample were observed prior to reporting reanalysis. It was noted that the Gross Alpha container does contain visible sediment that was included with the aliquot when the sample was shaken prior to use. The first reanalysis was performed using the Hg container. The Gross Alpha result using the bottle labeled for the Hg analysis did not correlate with the Gross Alpha result. This bottle did not contain any sediment, which may attribute to the difference. Reporting reanalysis result under work order 441471. 441471001 (CASA-18-148003).

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

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Qualifier Definition Report for

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

Client SDG: 2018-888-1 GEL Work Order: 441471

The Qualifiers in this report are defined as follows:

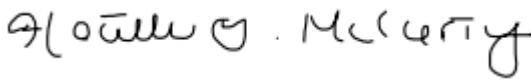
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

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: 23 JAN 2018

Title: Analyst II

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Report Date: January 23, 2018

Client Sample ID: CASA-18-148003
Sample ID: 441471001
Matrix: W
Collect Date: 13-NOV-17
Receive Date: 15-NOV-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
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Rad Gas Flow Proportional Counting

GrossA "As Received"

Alpha		45.8	+/-2.47	4.75	2.24	+/-4.60	3.00	pCi/L			AXH4	01/18/18	1331	1731351	1
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The following Analytical Methods were performed

Method	Description
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1	EPA 900.0/SW846 9310
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Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
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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

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QC Summary

Report Date: January 23, 2018

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

Los Alamos, New Mexico

Contact: Ms. Nita Patel

Workorder: 441471

Parmname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Gas Flow										
Batch	1731351									
QC1203951650	441471001	DUP								
Alpha		45.8	48.8	pCi/L	0.161		(0-1)	AXH4	01/18/1813:31	
		Uncert:	+/-2.47	+/-2.49						
		TPU:	+/-4.60	+/-4.78						
QC1203951653	LCS									
Alpha	12.1		12.4	pCi/L		102	(80%-120%)	AXH4	01/18/1813:34	
		Uncert:	+/-0.578							
		TPU:	+/-1.20							
QC1203951649	MB									
Alpha		U	-0.00497	pCi/L				AXH4	01/18/1813:31	
		Uncert:	+/-0.0318							
		TPU:	+/-0.0318							
QC1203951651	441471001	MS								
Alpha	1210	45.8	1420	pCi/L		114	(75%-125%)	AXH4	01/18/1813:34	
		Uncert:	+/-2.47	+/-68.8						
		TPU:	+/-4.60	+/-140						
QC1203951652	441471001	MSD								
Alpha	1210	45.8	1410	pCi/L	0.0261	113	(0-1)	AXH4	01/18/1813:34	
		Uncert:	+/-2.47	+/-69.4						
		TPU:	+/-4.60	+/-137						

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	REMP 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

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QC Summary

Workorder: 441471

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Parmname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.									
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.