

The order of this data package is as follows:

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

Comments:



**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**

EVENT ID: 11552

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

SAMPLE ID: CASA-18-147995

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/10/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1108		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-67		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:	↓		SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NA
↓	WSP-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:


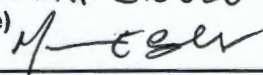
FIELD PARAMETERS:

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	_____

11/10/17



**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY****EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1**SAMPLE ID:** CASA-18-147995**WORK ORDER:****COLLECTED BY (PRINT):** M. Shendoy K. Tow

RELINQUISHED BY (Printed Name) Allizyn Stanfield (Signature) 	Date/Time 11/13/17 0745	RECEIVED BY MATT ENGLERT (Printed Name) (Signature) 	Date/Time 11-13-17 0745
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-18-148002

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/10/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1108		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-67		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:	↓	↓	SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / <u>NA</u>

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	500 ML POLY	1	HNO3	Y	NA
↓	WSP-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 COMMENTS: Sampled 40 ft. from running diesel generator

LOCATION COMMENTS: None

## FIELD PARAMETERS:

Sample Time	1108	HH:MM	Discharge Rate	4.00	Dissolved Oxygen	6.15
Groundwater Elevation	5889.39		Oxidation-Reduction Potential	47.5	Period Purge Volume	20.0
pH	8.30		Purge Volume	140.0	Specific Conductance	169.0
Temperature	19.7		Total Volume Pumped	236.0	Turbidity	0.31

**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**

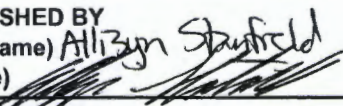
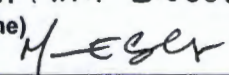
EVENT ID: 11552

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

SAMPLE ID: CASA-18-148002

WORK ORDER:

COLLECTED BY (PRINT): M. Shendo, K. Tow

RELINQUISHED BY (Printed Name) Allizon Stanford (Signature) 	Date/Time 11/13/17 0745	RECEIVED BY MATT ENGELBERT (Printed Name) (Signature) 	Date/Time 11-13-17 0745
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-18-148021

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/10/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1108		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	DC	
LOCATION ID:	R-67		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	FTB	
TOP DEPTH:	↓	↓	SAMPLE USAGE:	QC	↓
BOTTOM DEPTH:			EXCAVATED:		YES / NO / <u>NA</u>

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	1/2 11/10/17	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):

M. Shendys K. Tow

RELINQUISHED BY (Printed Name) <u>Allison Stanford</u> (Signature) <u>[Signature]</u>	Date/Time 11/13/17 0745	RECEIVED BY <u>MATT ENGLERT</u> (Printed Name) <u>M. Engler</u> (Signature)	Date/Time 11-13-17 0745
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**

EVENT ID: 11552

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

SAMPLE ID: CAMO-18-148054

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11/10/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1120		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	RSP	
LOCATION ID:	MCOI-5		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

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

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

11/10/2017



**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY****EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1**SAMPLE ID:** CAMO-18-148054**WORK ORDER:****COLLECTED BY (PRINT):** T. Bonham

<b>RELINQUISHED BY</b> (Printed Name) <i>Tanner Bonham</i> (Signature) <i>[Signature]</i>	<b>Date/Time</b> <i>11/13/2017</i> <i>0730</i>	<b>RECEIVED BY</b> <i>MATT ENGLERT</i> (Printed Name) (Signature) <i>M. Engler</i>	<b>Date/Time</b> <i>11-13-17</i> <i>0730</i>
<b>RELINQUISHED BY</b> (Printed Name) (Signature)	<b>Date/Time</b>	<b>RECEIVED BY</b> (Printed Name) (Signature)	<b>Date/Time</b>

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CAMO-18-148070

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11/10/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1120		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	RSP	
LOCATION ID:	MCOI-5		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / <input checked="" type="radio"/> NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	500 ML POLY	1	HNO3	Y	NA
	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-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		

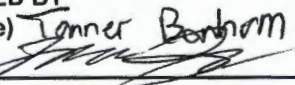
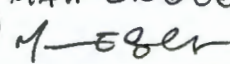
SAMPLE COMMENTS: NA

LOCATION COMMENTS: NA

## FIELD PARAMETERS:

Sample Time	1120	HH:MM	Discharge Rate	0.30	Dissolved Oxygen	6.31
Groundwater Elevation	6120.88		Oxidation-Reduction Potential	215.0	Period Purge Volume	NA
pH	8.80		Purge Volume	7.20	Specific Conductance	330.1
Temperature	12.6		Total Volume Pumped	15.6	Turbidity	1.01

**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY****EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)  
MY2018 Q1**SAMPLE ID:** CAMO-18-148070**WORK ORDER:****COLLECTED BY (PRINT):** T. Bonham

<b>RELINQUISHED BY</b> (Printed Name) Tanner Bonham (Signature) 	<b>Date/Time</b> <del>11/13/2017</del> 11/15/2017 0730	<b>RECEIVED BY</b> MATH ENGLERT (Printed Name) M. Engler (Signature) 	<b>Date/Time</b> 11-13-17 0730
<b>RELINQUISHED BY</b> (Printed Name) (Signature)	<b>Date/Time</b>	<b>RECEIVED BY</b> (Printed Name) (Signature)	<b>Date/Time</b>



**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**

EVENT ID: 11552

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

SAMPLE ID: CAMO-18-148093

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/10/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1120		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	PC	
LOCATION ID:	MCOI-5		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	FTB	
TOP DEPTH:			SAMPLE USAGE:	QC	
BOTTOM DEPTH:			EXCAVATED:		YES / <u>NO</u> / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	11/9/17	HCL	V	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): T. Barham

RELINQUISHED BY (Printed Name) <u>Tanner Barham</u> (Signature) <u>[Signature]</u>	Date/Time <u>11/10/2017</u> <u>0730</u>	RECEIVED BY <u>MATT ENGLERT</u> (Printed Name) (Signature) <u>M-ENGLERT</u>	Date/Time <u>11-13-17</u> <u>0730</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time



① Sampling Plan ID/Name: 11552COC: 2018-853

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

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

TEST – Field Screen			YES	NO
⑥ The sample has field screening measurements of alpha activity and beta activity?				<input checked="" type="checkbox"/>
Sample Activity (dpm/100cm <sup>2</sup> )	Shipment Activity (dpm*g/100cm <sup>2</sup> )	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		
⑧ Alpha ≥ 125	AND Alpha ≥ 1,250,000	AT other locations		
⑨ Beta ≥ 1,500	AND Beta ≥ 15,000,000	AT any location		
⑩ The sample Alpha ≥ 16,000,000 dpm*g/100cm <sup>2</sup> or Beta ≥ 160,000,000 dpm*g/100cm <sup>2</sup> . If YES – Do not ship.				
⑪ On the external surface of the sample container, alpha activity ≥ 24 dpm/cm <sup>2</sup> , beta activity ≥ 240 dpm/cm <sup>2</sup> , or surface activity ≥ 0.5 mR/hr. If YES – Do not ship.				
⑫ The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package – Limited Quantity of Material – UN2910, based on field screening measurements of alpha and beta activity.				

TEST - Location		YES	NO
⑬ Prior analytical measurements of radioactive isotopes are available?		<input checked="" type="checkbox"/>	
Sample Activity (pCi/g)	Shipment Activity (pCi)	YES	NO
• Am-241 ≥ 27 pCi/g	AND Am-241 ≥ 270,000 pCi Total		
• Cs-137 ≥ 270 pCi/g	AND Cs-137 ≥ 270,000 pCi Total		
• Pu-238 ≥ 27 pCi/g	AND Pu-238 ≥ 270,000 pCi Total		
• Pu-239/240 ≥ 27 pCi/g	AND Pu-239/240 ≥ 270,000 pCi Total		
• Th-228 ≥ 27 pCi/g	AND Th-228 ≥ 270,000 pCi Total		
• U-234 ≥ 270 pCi/g	AND U-234 ≥ 1,600,000,000 pCi Total		
• U-238 ≥ 270 pCi/g	AND U-238 ≥ unlimited		
• H-3 ≥ 27,000,000 pCi/g	AND H-3 ≥ 27,000,000,000 pCi Total		
⑮ Am-241, Pu-238, Pu-239/240, or Th-228 ≥ 27,000,000 pCi; or Cs-137 ≥ 270,000,000 pCi or U-234 ≥ 160,000,000 pCi; or H-3 ≥ 1 Ci. If YES – Do not ship.			
⑯ The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package – Limited Quantity of Material – UN2910, based on prior analytical measurements of radioactive isotopes.			

TEST – AK		YES	NO
⑰ The shippers documented knowledge of the sample positively identifies appropriate labeling.			<input checked="" type="checkbox"/>
Documented Field Team Member Statement		YES	NO
⑱ The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled <i>Radioactive Material, Excepted Package – Limited Quantity of Material – UN2910</i> , and the sample is submitted to ARS or RP for hazard classification analysis.			

⑲ These samples do not meet the criteria for classification in any hazard class according to regulation OSHA 29 CFR 1910.1200. The sample(s) contained in this shipment have been assigned a tentative proper DOT shipping name, hazard class, identification number, and packing group, based on the shipper's knowledge of the sample:

Hazard Assessment Completed By:	Date/Time
(Printed Name) Allison Stanfield	11/13/17
(Signature)	0745

Hazard Assessment Reviewed By:	Date/Time
(Printed Name) MAT ENGLERT	11-13-17
(Signature)	0745



① Sampling Plan ID/Name: 11552

COC: 2018-853

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

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

TEST – Field Screen			YES	NO
⑥ The sample has field screening measurements of alpha activity and beta activity?				<input checked="" type="checkbox"/>
Sample Activity (dpm/100cm <sup>2</sup> )	Shipment Activity (dpm*g/100cm <sup>2</sup> )	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		
⑧ Alpha ≥ 125	AND Alpha ≥ 1,250,000	AT other locations		
⑨ Beta ≥ 1,500	AND Beta ≥ 15,000,000	AT any location		
⑩ The sample Alpha ≥ 16,000,000 dpm*g/100cm <sup>2</sup> or Beta ≥ 160,000,000 dpm*g/100cm <sup>2</sup> . If YES – Do not ship.				
⑪ On the external surface of the sample container, alpha activity ≥ 24 dpm/cm <sup>2</sup> , beta activity ≥ 240 dpm/cm <sup>2</sup> , or surface activity ≥ 0.5 mR/hr. If YES – Do not ship.				
⑫ The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package – Limited Quantity of Material – UN2910, based on field screening measurements of alpha and beta activity.				

TEST - Location		YES	NO
⑬ Prior analytical measurements of radioactive isotopes are available?		<input checked="" type="checkbox"/>	
Sample Activity (pCi/g)	Shipment Activity (pCi)	YES	NO
• Am-241 ≥ 27 pCi/g	AND Am-241 ≥ 270,000 pCi Total		
• Cs-137 ≥ 270 pCi/g	AND Cs-137 ≥ 270,000 pCi Total		
• Pu-238 ≥ 27 pCi/g	AND Pu-238 ≥ 270,000 pCi Total		
• Pu-239/240 ≥ 27 pCi/g	AND Pu-239/240 ≥ 270,000 pCi Total		
• Th-228 ≥ 27 pCi/g	AND Th-228 ≥ 270,000 pCi Total		
• U-234 ≥ 270 pCi/g	AND U-234 ≥ 1,600,000,000 pCi Total		
• U-238 ≥ 270 pCi/g	AND U-238 ≥ unlimited		<input checked="" type="checkbox"/>
• H-3 ≥ 27,000,000 pCi/g	AND H-3 ≥ 27,000,000,000 pCi Total		
⑭ 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.			<input checked="" type="checkbox"/>
⑮ 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.			<input checked="" type="checkbox"/>

TEST – AK		YES	NO
⑰ The shippers documented knowledge of the sample positively identifies appropriate labeling.			<input checked="" type="checkbox"/>
Documented Field Team Member Statement		YES	NO
⑱ The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled <i>Radioactive Material, Excepted Package – Limited Quantity of Material – UN2910</i> , and the sample is submitted to ARS or RP for hazard classification analysis.			<input checked="" type="checkbox"/>

⑲ These samples do not meet the criteria for classification in any hazard class according to regulation OSHA 29 CFR 1910.1200. The sample(s) contained in this shipment have been assigned a tentative proper DOT shipping name, hazard class, identification number, and packing group, based on the shipper's knowledge of the sample:

Hazard Assessment Completed By:	Date/Time
(Printed Name) <u>Tanner Barkham</u>	<u>11/13/17</u>
(Signature) <u>[Signature]</u>	<u>0730</u>

Hazard Assessment Reviewed By:	Date/Time
(Printed Name) <u>MATT ENGLERT</u>	<u>11-13-17</u>
(Signature) <u>[Signature]</u>	<u>0730</u>



## DATA VALIDATION REPORT

Chain Of Custody No. 2018-853

### 1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
437794	EPA:120.1	2				
437794	EPA:150.1	2				
437794	EPA:160.1	2				
437794	EPA:170.0	4		2		
437794	EPA:245.2	4				
437794	EPA:300.0	2				
437794	EPA:310.1	2				
437794	EPA:335.4	2				
437794	EPA:350.1	2				
437794	EPA:351.2	2				
437794	EPA:353.2	2				
437794	EPA:365.4	2				
437794	EPA:900	2				
437794	EPA:901.1	2				
437794	EPA:905.0	2				
437794	EPA:906.0	2				
437794	HASL-300:AM-241	2				
437794	HASL-300:ISOPU	2				
437794	HASL-300:ISOU	2				
437794	SM:A2340B	2				
437794	SW-846:6010C	2				
437794	SW-846:6020	2				
437794	SW-846:6850	2				
437794	SW-846:8260B	2		2		
437794	SW-846:8270D	2				
437794	SW-846:9060	2				

## DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
437794	EPA:120.1	1719249	1719249	2										1				2			
437794	EPA:150.1	1718738	1718738	2										1				1			
437794	EPA:160.1	1718228	1718228	2					1					1				1			
437794	EPA:170.0	NA	NA	4		2															
437794	EPA:245.2	1722594	1722586	4					1	1				1				1			
437794	EPA:300.0	1719403	1719403	2					1					1				1			
437794	EPA:310.1	1718721	1718721	2						1				1				1			
437794	EPA:335.4	1718779	1718777	2					1	1				1				1			
437794	EPA:350.1	1718942	1718941	2					1	1				1				1			
437794	EPA:351.2	1718944	1718943	2					1	1				1				1			
437794	EPA:353.2	1718948	1718948	2					1					1				1			
437794	EPA:365.4	1718946	1718945	2					1	1				1				1			
437794	EPA:900	1720050	1720050	2					1	1	1			1				1			
437794	EPA:901.1	1718868	1718868	2					1					1				1			
437794	EPA:905.0	1720044	1720044	2					1	1				1				1			
437794	EPA:906.0	1719185	1719185	2					1	1				1				1			
437794	HASL-300:AM-241	1719849	1719849	2					1					1				1			
437794	HASL-300:ISOPU	1723433	1723433	2					1					1				1			
437794	HASL-300:ISOU	1719851	1719851	2					1					1				1			
437794	SM:A2340B	1725385	1725385	2																	
437794	SW-846:6010C	1718859	1718858	2					1	1				1				1			
437794	SW-846:6020	1718865	1718864	2					1	1				1				1			
437794	SW-846:6850	1720716	1720708	2					1	1	1			1							
437794	SW-846:8260B	1720561	1720561	2		2			2					4							
437794	SW-846:8270D	1718844	1718842	2					1	1	1			1							
437794	SW-846:9060	1717990	1717990	2					1					1				1			

### 2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
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## DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CAMO-18-148054	437794001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-18-147995	437794004	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203920717	LCS	0	0	1	0
EPA:120.1	GENERAL CHEMISTRY	WST05-18-148658	1203920719	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	WST05-18-148663	1203920718	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-148054	437794001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-148114	1203919487	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-18-147995	437794004	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203919485	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-18-148054	437794001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-18-147995	1203919676	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-18-147995	437794004	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203918126	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203918125	MB	1	0	0	0
EPA:170.0	VOC	CAMO-18-148054	437794001	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-148070	437794002	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-148093	437794003	FTB	1	0	0	0
EPA:170.0	VOC	CASA-18-147995	437794004	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148002	437794005	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148021	437794006	FTB	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148054	1203929068	DUP	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148054	1203929070	MS	0	0	1	0
EPA:245.2	INORGANIC	CAMO-18-148054	437794001	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-148070	437794002	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-147995	437794004	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-148002	437794005	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203929066	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203929065	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-18-148054	1203921022	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-18-148054	437794001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-18-147995	437794004	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203921021	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203921020	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-148054	437794001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-148114	1203919455	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-148114	1203919457	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-18-147995	437794004	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203919453	LCS	0	0	1	0
EPA:335.4	INORGANIC	CAMO-18-148070	1203919601	DUP	1	0	0	0
EPA:335.4	INORGANIC	CAMO-18-148070	1203919605	MS	0	0	1	0



## DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:335.4	INORGANIC	CAMO-18-148070	437794002	REG	1	0	0	0
EPA:335.4	INORGANIC	CASA-18-148002	437794005	REG	1	0	0	0
EPA:335.4	INORGANIC	LCS	1203919599	LCS	0	0	1	0
EPA:335.4	INORGANIC	MB	1203919598	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-18-148054	437794001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-18-147995	437794004	REG	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	CAMO-18-148070	437794002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-18-148002	437794005	REG	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	CAMO-18-148054	437794001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-18-147995	437794004	REG	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	CAMO-18-148054	437794001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-18-147995	437794004	REG	1	0	0	0
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-18-148070	437794002	REG	2	0	0	0
EPA:900	RAD	CAMO-18-148117	1203922640	DUP	2	0	0	0
EPA:900	RAD	CAMO-18-148117	1203922641	MS	0	0	2	0
EPA:900	RAD	CAMO-18-148117	1203922642	MSD	0	0	2	0
EPA:900	RAD	CASA-18-148002	437794005	REG	2	0	0	0
EPA:900	RAD	LCS	1203922643	LCS	0	0	2	0
EPA:900	RAD	MB	1203922639	MB	2	0	0	0
EPA:901.1	RAD	CAMO-18-148070	1203919783	DUP	5	0	0	0
EPA:901.1	RAD	CAMO-18-148070	437794002	REG	5	0	0	0
EPA:901.1	RAD	CASA-18-148002	437794005	REG	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-18-148070	437794002	REG	1	0	0	0

## DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:905.0	RAD	CAMO-18-148073	1203922620	DUP	1	0	0	0
EPA:905.0	RAD	CAMO-18-148073	1203922621	MS	0	0	1	0
EPA:905.0	RAD	CASA-18-148002	437794005	REG	1	0	0	0
EPA:905.0	RAD	LCS	1203922622	LCS	0	0	1	0
EPA:905.0	RAD	MB	1203922619	MB	1	0	0	0
EPA:906.0	RAD	CAMO-18-148070	437794002	REG	1	0	0	0
EPA:906.0	RAD	CASA-18-148002	437794005	REG	1	0	0	0
EPA:906.0	RAD	LCS	1203920576	LCS	0	0	1	0
EPA:906.0	RAD	MB	1203920573	MB	1	0	0	0
EPA:906.0	RAD	WST03-18-148752	1203920574	DUP	1	0	0	0
EPA:906.0	RAD	WST03-18-148752	1203920575	MS	0	0	1	0
HASL-300:AM-241	RAD	CAMO-18-148070	1203922091	DUP	1	0	0	0
HASL-300:AM-241	RAD	CAMO-18-148070	437794002	REG	1	0	0	0
HASL-300:AM-241	RAD	CASA-18-148002	437794005	REG	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	CAMO-18-148070	437794002	REG	2	0	0	0
HASL-300:ISOPU	RAD	CASA-18-148002	437794005	REG	2	0	0	0
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	CAMO-18-148070	437794002	REG	3	0	0	0
HASL-300:ISOU	RAD	CASA-18-148002	437794005	REG	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	CAMO-18-148054	437794001	REG	1	0	0	0
SM:A2340B	INORGANIC	CASA-18-147995	437794004	REG	1	0	0	0
SW-846:6010C	INORGANIC	CAMO-18-148054	1203919763	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-18-148054	1203919764	MS	0	0	17	0
SW-846:6010C	INORGANIC	CAMO-18-148054	437794001	REG	17	0	0	0
SW-846:6010C	INORGANIC	CASA-18-147995	437794004	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203919762	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203919761	MB	17	0	0	0
SW-846:6020	INORGANIC	CAMO-18-148054	1203919773	DUP	11	0	0	0
SW-846:6020	INORGANIC	CAMO-18-148054	1203919774	MS	0	0	11	0
SW-846:6020	INORGANIC	CAMO-18-148054	437794001	REG	11	0	0	0
SW-846:6020	INORGANIC	CASA-18-147995	437794004	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203919772	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203919771	MB	11	0	0	0

## DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-148054	437794001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-148057	1203924392	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-148057	1203924393	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-18-147995	437794004	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203924391	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203924390	MB	1	0	0	0
SW-846:8260B	VOC	CAMO-18-148070	437794002	REG	80	3	0	0
SW-846:8260B	VOC	CAMO-18-148093	437794003	FTB	80	3	0	0
SW-846:8260B	VOC	CASA-18-148002	437794005	REG	80	3	0	0
SW-846:8260B	VOC	CASA-18-148021	437794006	FTB	80	3	0	0
SW-846:8260B	VOC	LCS	1203925365	LCS	0	3	70	0
SW-846:8260B	VOC	LCS	1203925366	LCS	0	3	10	0
SW-846:8260B	VOC	LCS	1203925367	LCS	0	3	70	0
SW-846:8260B	VOC	LCS	1203925368	LCS	0	3	10	0
SW-846:8260B	VOC	MB	1203925363	MB	80	3	0	0
SW-846:8260B	VOC	MB	1203925364	MB	80	3	0	0
SW-846:8270D	SVOC	CAMO-18-148070	437794002	REG	80	6	0	0
SW-846:8270D	SVOC	CAMO-18-148073	1203919738	MS	0	6	76	0
SW-846:8270D	SVOC	CAMO-18-148073	1203919739	MSD	0	6	76	0
SW-846:8270D	SVOC	CASA-18-148002	437794005	REG	80	6	0	0
SW-846:8270D	SVOC	LCS	1203919737	LCS	0	6	76	0
SW-846:8270D	SVOC	MB	1203919736	MB	80	6	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-18-148070	437794002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-18-148071	1203920738	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-18-148002	437794005	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203920735	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203920734	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?



## DATA VALIDATION REPORT

Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name	Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
MB	1203919761	METHOD BLANK	SW-846:6010C	W	Sodium	153	J	ug/L	300
MB	1203919951	METHOD BLANK	EPA:351.2	W	Total Kjeldahl Nitrogen	0.0803	J	mg/L	0.100
CAMO-18-148093	437794003	TRIP BLANK	EPA:170.0	W	Temperature	2		Deg C	
CASA-18-148021	437794006	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
CAMO-18-148070	1203919951	METHOD BLANK	EPA:351.2	Total Kjeldahl Nitrogen	0.0803	mg/L	0.185		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?

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.

## DATA VALIDATION REPORT

10. Any Lab Duplicate RPDs outside the desired limits?

Field Sample ID	Lab Sample ID	LD Lab Sample ID	Analytical Method	Parameter Name	Sample Matrix	Lab Result	LD Lab Result	Lab Units	Detect Flag	LD Detect Flag	RPD	RPD Limit
CASA-18-147995	437794004	1203919676	EPA:160.1	Total Dissolved	W	127	117	mg/L	Y	Y	8.19	5
CAMO-18-148070	437794002	1203922097	HASL-300:ISOU	Uranium-234	W	0.132	0.219	pCi/L	Y	Y	50.1	20
CAMO-18-148070	437794002	1203922097	HASL-300:ISOU	Uranium-238	W	0.0784	0.111	pCi/L	Y	Y	34.8	20

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	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
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.0124	pCi/L	0.0124	pCi/L	0.0315	0.00587	W	11/10/2017		1719849	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	-0.654	pCi/L	-0.654	pCi/L	3.21	0.897	W	11/10/2017		1718868	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	0.0595	pCi/L	0.0595	pCi/L	4.47	1.08	W	11/10/2017		1718868	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	-0.0923	pCi/L	-0.0923	pCi/L	2.31	0.566	W	11/10/2017		1720050	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N	0.46	pCi/L	0.46	pCi/L	2.87	0.822	W	11/10/2017		1720050	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	-2.34	pCi/L	-2.34	pCi/L	7.09	2.01	W	11/10/2017		1718868	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	0.0381	pCi/L	0.0381	pCi/L	0.112	0.0633	W	11/10/2017		1723433	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	0.0228	pCi/L	0.0228	pCi/L	0.161	0.0314	W	11/10/2017		1723433	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	13.2	pCi/L	13.2	pCi/L	50.1	18.2	W	11/10/2017		1718868	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	-0.477	pCi/L	-0.477	pCi/L	4.04	1.07	W	11/10/2017		1718868	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	-0.26	pCi/L	-0.26	pCi/L	0.437	0.0967	W	11/10/2017		1720044	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	GENERAL CHEMISTRY	EPA:351.2	Total Kjeldahl Nitrogen		U	I4	N	0.185	mg/L	0.185	mg/L			W	11/10/2017		1718944	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	HASL-300:ISOU	Uranium-234		U	R10	Y	0.132	pCi/L	0.132	pCi/L	0.126	0.0243	W	11/10/2017		1719851	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	HASL-300:ISOU	Uranium-235/236	U	U	R5	N	0.0531	pCi/L	0.0531	pCi/L	0.0544	0.0168	W	11/10/2017		1719851	VAL	Y
MCOI-5	2018-853	CAMO-18-148070	REG	INIT	RAD	HASL-300:ISOU	Uranium-238		U	R10	Y	0.0784	pCi/L	0.0784	pCi/L	0.0737	0.0188	W	11/10/2017		1719851	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.018	pCi/L	0.018	pCi/L	0.0321	0.00674	W	11/10/2017		1719849	VAL	Y

## DATA VALIDATION REPORT

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Parameter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detect Flag	Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent	Analysis Lot ID	Validation Status Code	Use Flag
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	-1.29	pCi/L	-1.29	pCi/L	5.65	1.68	W	11/10/2017		1718868	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	0.36	pCi/L	0.36	pCi/L	5.30	1.23	W	11/10/2017		1718868	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	1.19	pCi/L	1.19	pCi/L	1.68	0.547	W	11/10/2017		1720050	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N	2.17	pCi/L	2.17	pCi/L	2.71	0.887	W	11/10/2017		1720050	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	3	pCi/L	3	pCi/L	10.4	2.77	W	11/10/2017		1718868	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	-0.0125	pCi/L	-0.0125	pCi/L	0.0919	0.0265	W	11/10/2017		1723433	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	-0.00000000	pCi/L	-0.000000002	pCi/L	0.131	0.0153	W	11/10/2017		1723433	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	-44.1	pCi/L	-44.1	pCi/L	83.2	22.0	W	11/10/2017		1718868	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	-2.5	pCi/L	-2.5	pCi/L	4.61	1.42	W	11/10/2017		1718868	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	-0.351	pCi/L	-0.351	pCi/L	0.453	0.119	W	11/10/2017		1720044	VAL	Y
R-67	2018-853	CASA-18-148002	REG	INIT	RAD	EPA:906.0	Tritium	U	U	R5	N	16.1	pCi/L	16.1	pCi/L	144	41.7	W	11/10/2017		1719185	VAL	Y

### Reason Code

### Description

I4	the sample result is =<5x the concentration of related analyte in the method blank.
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 qualfire. The analyte is detected in the sample.
R10	Associated duplicate sample has DER or RER> the analytical laboratory's acceptance limits.
R5	Analyte is not detected because the amount reported is less than the MDC.
U_LAB	The analytical laboratory qualified the analyte as not detected.

### 14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-18-148054	MCOI-5	REG	EPA:120.1	0	1
CAMO-18-148054	MCOI-5	REG	EPA:150.1	0	1
CAMO-18-148054	MCOI-5	REG	EPA:160.1	0	1
CAMO-18-148054	MCOI-5	REG	EPA:170.0	0	1
CAMO-18-148054	MCOI-5	REG	EPA:245.2	0	1
CAMO-18-148054	MCOI-5	REG	EPA:300.0	0	4

## DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-18-148054	MCOI-5	REG	EPA:310.1	0	2
CAMO-18-148054	MCOI-5	REG	EPA:350.1	0	1
CAMO-18-148054	MCOI-5	REG	EPA:353.2	0	1
CAMO-18-148054	MCOI-5	REG	EPA:365.4	0	1
CAMO-18-148054	MCOI-5	REG	SM:A2340B	0	1
CAMO-18-148054	MCOI-5	REG	SW-846:6010C	0	17
CAMO-18-148054	MCOI-5	REG	SW-846:6020	0	11
CAMO-18-148054	MCOI-5	REG	SW-846:6850	0	1
CAMO-18-148070	MCOI-5	REG	EPA:170.0	0	1
CAMO-18-148070	MCOI-5	REG	EPA:245.2	0	1
CAMO-18-148070	MCOI-5	REG	EPA:335.4	0	1
CAMO-18-148070	MCOI-5	REG	EPA:351.2	0	1
CAMO-18-148070	MCOI-5	REG	EPA:900	0	2
CAMO-18-148070	MCOI-5	REG	EPA:901.1	0	5
CAMO-18-148070	MCOI-5	REG	EPA:905.0	0	1
CAMO-18-148070	MCOI-5	REG	EPA:906.0	0	1
CAMO-18-148070	MCOI-5	REG	HASL-300:AM-241	0	1
CAMO-18-148070	MCOI-5	REG	HASL-300:ISOPU	0	2
CAMO-18-148070	MCOI-5	REG	HASL-300:ISOU	0	3
CAMO-18-148070	MCOI-5	REG	SW-846:8260B	0	80
CAMO-18-148070	MCOI-5	REG	SW-846:8270D	0	80
CAMO-18-148070	MCOI-5	REG	SW-846:9060	0	1
CAMO-18-148093	MCOI-5	FTB	EPA:170.0	0	1
CAMO-18-148093	MCOI-5	FTB	SW-846:8260B	0	80
CASA-18-147995	R-67	REG	EPA:120.1	0	1
CASA-18-147995	R-67	REG	EPA:150.1	0	1
CASA-18-147995	R-67	REG	EPA:160.1	0	1
CASA-18-147995	R-67	REG	EPA:170.0	0	1
CASA-18-147995	R-67	REG	EPA:245.2	0	1
CASA-18-147995	R-67	REG	EPA:300.0	0	4
CASA-18-147995	R-67	REG	EPA:310.1	0	2
CASA-18-147995	R-67	REG	EPA:350.1	0	1
CASA-18-147995	R-67	REG	EPA:353.2	0	1
CASA-18-147995	R-67	REG	EPA:365.4	0	1
CASA-18-147995	R-67	REG	SM:A2340B	0	1
CASA-18-147995	R-67	REG	SW-846:6010C	0	17
CASA-18-147995	R-67	REG	SW-846:6020	0	11



## DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-18-147995	R-67	REG	SW-846:6850	0	1
CASA-18-148002	R-67	REG	EPA:170.0	0	1
CASA-18-148002	R-67	REG	EPA:245.2	0	1
CASA-18-148002	R-67	REG	EPA:335.4	0	1
CASA-18-148002	R-67	REG	EPA:351.2	0	1
CASA-18-148002	R-67	REG	EPA:900	0	2
CASA-18-148002	R-67	REG	EPA:901.1	0	5
CASA-18-148002	R-67	REG	EPA:905.0	0	1
CASA-18-148002	R-67	REG	EPA:906.0	0	1
CASA-18-148002	R-67	REG	HASL-300:AM-241	0	1
CASA-18-148002	R-67	REG	HASL-300:ISOPU	0	2
CASA-18-148002	R-67	REG	HASL-300:ISOU	0	3
CASA-18-148002	R-67	REG	SW-846:8260B	0	80
CASA-18-148002	R-67	REG	SW-846:8270D	0	80
CASA-18-148002	R-67	REG	SW-846:9060	0	1
CASA-18-148021	R-67	FTB	EPA:170.0	0	1
CASA-18-148021	R-67	FTB	SW-846:8260B	0	80

December 08, 2017

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

Re: LANL- WQH Water Samples  
Work Order: 437794  
SDG: 2018-853

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on November 14, 2017, and analyzed for GC/MS Semivolatile, GC/MS Volatile, General Chemistry, Metals, Perchlorates by LCMSMS and Radiochemistry. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,



Valerie Davis  
Project Manager

Chain of Custody: 2018-853  
Enclosures



**ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)**  
**LANL- WQH Water Samples**  
**Work Order #: 437794**  
**SDG: 2018-853**

## Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	5
Data Review Qualifier Flag Definition Sheet.....	11
Volatile Analysis.....	14
Case Narrative.....	15
Sample Data Summary.....	20
Quality Control Summary.....	33
Quality Control Data.....	57
Semi-Volatile Analysis.....	88
Case Narrative.....	89
Sample Data Summary.....	95
Quality Control Summary.....	102
Quality Control Data.....	117
Perchlorates by LCMSMS Analysis.....	130
Case Narrative.....	131
Sample Data Summary.....	137
Quality Control Summary.....	140
Quality Control Data.....	143
Metals Analysis.....	149
Case Narrative.....	150



Sample Data Summary.....	156
Quality Control Summary.....	165
General Chem Analysis.....	179
Case Narrative.....	180
Sample Data Summary.....	207
Quality Control Summary.....	214
Radiological Analysis.....	221
Case Narrative.....	222
Sample Data Summary.....	238
Quality Control Summary.....	243

# Case Narrative

**Case Narrative for  
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)  
LANL- WQH Water Samples  
Workorder #: 437794  
SDG # : 2018-853**

**December 08, 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 14, 2017 for analysis. The samples were delivered with proper chain of custody documentation and signatures. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. Containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Shipping container temperatures were checked, documented, and within specifications. Shipping container temperature was within specification (0 - 6C). There are no additional comments concerning sample receipt.

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

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
437794001	CAMO-18-148054
437794002	CAMO-18-148070
437794003	CAMO-18-148093
437794004	CASA-18-147995
437794005	CASA-18-148002
437794006	CASA-18-148021

**Case Narrative**

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

**Data Package**

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

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

*Valerie Davis*

Valerie Davis  
Project Manager

**List of current GEL Certifications as of 08 December 2017**

<b>State</b>	<b>Certification</b>
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-24
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404



# **Chain of Custody and Supporting Documentation**



**SAMPLE RECEIPT & REVIEW FORM**

Client: <b>ESHL</b>		SDG/AR/COC/Work Order: <b>437794</b>	
Received By: <b>ZKW</b>		Date Received: <b>11/14/17</b>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <b>5908 1783 1857-3C</b> <b>5906 1783 1880-2C</b> <b>5908 1783 1890-2C</b> <b>5908 1783 1868-2C</b> <b>5908 1783 1905-3C</b> <b>5908 1783 1879-4C</b> <b>5906 1783 1824-14C(chem)</b> <b>5908 1783 1846-3C</b> <b>5908 1783 1835-18C(chem)</b>	
		*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
Suspected Hazard Information	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Shipped as a DOT Hazardous? <input checked="" type="checkbox"/> Hazard Class Shipped: _____ UN#: _____	
COC/Samples marked or classified as radioactive?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <b>0</b> CPM/mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice <input checked="" type="checkbox"/> Ice Packs <input type="checkbox"/> Dry ice <input checked="" type="checkbox"/> None <input type="checkbox"/> Other: <b>See TEMP: 4/100</b> *all temperatures are recorded in Celsius
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Temperature Device Serial #: IR3-16</b> Secondary Temperature Device Serial # (If Applicable):
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#:
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If Yes, Are Encores or Soil Kits present? Yes ___ No <input checked="" type="checkbox"/> (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes <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: <b>-093 rec'd w/ headspace</b>
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's affected: <b>see Below</b>
12 Are sample containers identifiable as GEL provided?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments (Use Continuation Form if needed):  
 \* We rec'd CAMO-18-148095 collected 11/9/17 @ 10:33 for 8260 not on any COC's  
 \* We rec'd the missing soils for WST A-17-148755 & -148753

PM (or PMA) review: Initials **[Signature]** Date **11.15.2017** Page **1** of **1**

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: 13NOV17  
ACTWGT: 65.0 LB MAN  
CAD: 0014176/CAFE2916

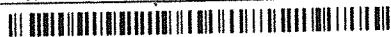
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TO VALERIE DAVIS  
GENERAL ENGINEERING LAB  
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 666-8171

REF: 21PD0ASRGW04BAGWEO



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Express



2 of 2

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0263

Mstr# 5908 1783 1879

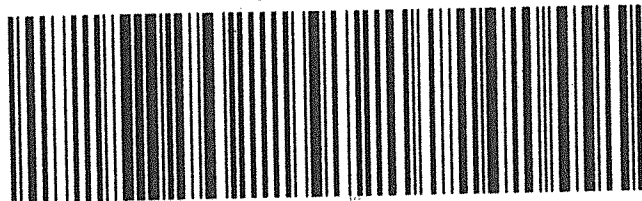
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SC-US CHS

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PRIORITY OVERNIGHT



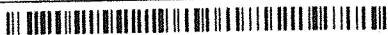
UNITED STATES US

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GENERAL ENGINEERING LAB  
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 666-8171

REF: 8V030AXFM101030100



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2 of 2

MPS# 5908 1783 1905

0263

Mstr# 5908 1783 1890

0201

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29407

SC-US CHS

TUE - 14 NOV 10:30/  
PRIORITY OVERNIGHT

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

LOS ALAMOS, NM 87545  
UNITED STATES US

SHIP DATE: 13NOV17  
ACTWGT: 49.0 LB MAN  
CAD: 0014176/CAFE2916

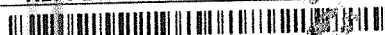
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2040 SAVAGE RD

CHARLESTON SC 29407

(843) 666-8171

REF: 21PD0ASRGW04BAGWEO



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3 of 3

MPS# 5908 1783 1868

0263

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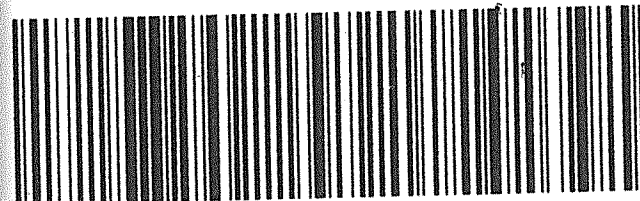
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X7 RBWA

29407

SC-US CH

TUE - 14 NOV 10:30/  
PRIORITY OVERNIGHT



LOS ALAMOS, NM 87545  
UNITED STATES US

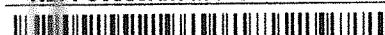
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TO VALERIE DAVIS  
GENERAL ENGINEERING LAB  
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 666-8171

REF: 8V030AXFM101030100



FedEx  
Express



1 of 2

TRK# 5908 1783 1890

0201

## MASTER ##

X7 RBWA

29407

SC-US CH

TUE - 14 NOV 10:30/  
PRIORITY OVERNIGHT

06/15 23

Part # 156148V-434 RIT2 06/15 23

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

SHIP DATE: 13NOV17  
ACTWGT: 55.0 LB MAN  
CAD: 0014176/CAFE2916

LOS ALAMOS, NM 87545  
UNITED STATES US

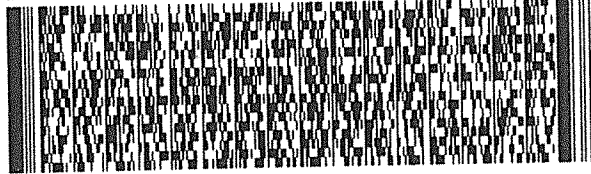
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TO **VALERIE DAVIS**  
**GENERAL ENGINEERING LAB**  
**2040 SAVAGE RD**

**CHARLESTON SC 29407**

(843) 566-8171

REF: 21PD0ASRGW04BAGWEO



1 of 3

TRK# 5908 1783 1846

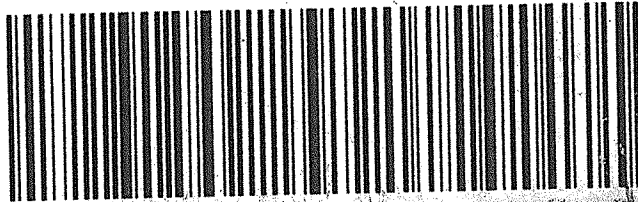
## MASTER ##

**X7 RBWA**

29407

SC-US CHS

**TUE - 14 NOV 10:30**  
**PRIORITY OVERNIGHT**



UNITED STATES US

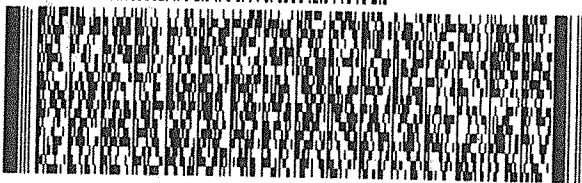
BILL SENDER

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

**CHARLESTON SC 29407**

(843) 566-8171

REF: 21PD0AWE991316W200



1 of 2

TRK# 5908 1783 1824

## MASTER ##

**X7 RBWA**

29407

SC-US CHS

**TUE - 14 NOV 10:30**  
**PRIORITY OVERNIGHT**

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

SHIP DATE: 13NOV17  
ACTWGT: 55.0 LB MAN  
CAD: 0014176/CAFE2916

LOS ALAMOS, NM 87545  
UNITED STATES US

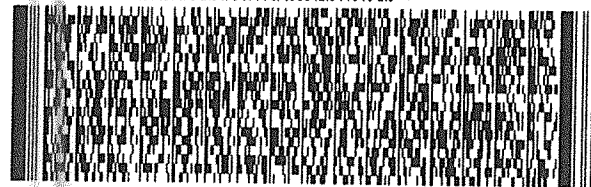
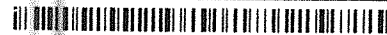
BILL SENDER

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

**CHARLESTON SC 29407**

(843) 566-8171

REF: 21PD0ASRGW04BAGWEO



2 of 3

MPS# 5908 1783 1857

Mstr# 5908 1783 1846

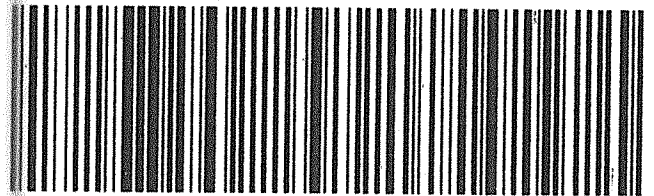
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**X7 RBWA**

29407

SC-US CHS

**TUE - 14 NOV 10:30**  
**PRIORITY OVERNIGHT**

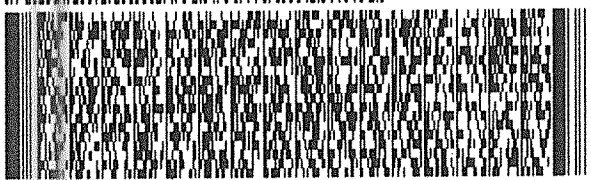


TO **VALERIE DAVIS**  
**GENERAL ENGINEERING LAB**  
**2040 SAVAGE RD**

**CHARLESTON SC 29407**

(843) 566-8171

REF: 21PD0ASRGW04BAGWEO



1 of 2

TRK# 5908 1783 1879

## MASTER ##

**X7 RBWA**

29407

SC-US CHS

**TUE - 14 NOV 10:30**  
**PRIORITY OVERNIGHT**

SHIP DATE: 13NOV17  
ACTWT: 57.0 LB MAN  
CAD: 0014176/CAFE2816

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

BILL SENDER

LOS ALAMOS, NM 87545  
UNITED STATES US

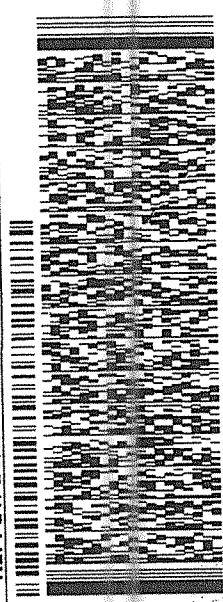
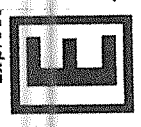
TO **VALERIE DAVIS**  
**GENERAL ENGINEERING LAB**  
**2040 SAVAGE RD**

**CHARLESTON SC 29407**

(843) 556-8171

REF: 21PD0AWE991316W200

**FedEx**  
Express



**TUE - 14 NOV 10:30/**  
**PRIORITY OVERNIGHT™**

2 of 2

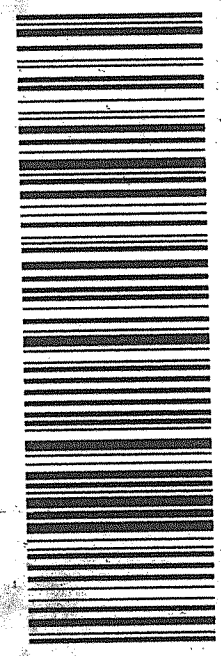
MPS# **5908 1783 1835**

0263

Mstr# 5908 1783 1824

**X7 RBWA**

**29407**  
**SC-US CHS**



Part # 156148V-434 RH206/15 88



# **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 #: 2018-853  
Work Order #: 437794**

**Method/Analysis Information**

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

Analytical Method: SW-846:8260B

Analytical Batch  
Number: 1720561

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794003	CAMO-18-148093
437794005	CASA-18-148002
437794006	CASA-18-148021
1203924019	437605002(WST05-18-148660) Post Spike (PS)
1203924020	437605002(WST05-18-148660) Post Spike (PS)
1203924021	437605002(WST05-18-148660) Post Spike Duplicate (PSD)
1203924022	437605002(WST05-18-148660) Post Spike Duplicate (PSD)
1203925363	Method Blank (MB)
1203925364	Method Blank (MB)
1203925365	Laboratory Control Sample (LCS)
1203925366	Laboratory Control Sample (LCS)
1203925367	Laboratory Control Sample (LCS)
1203925368	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 437605002 (WST05-18-148660) 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**

Samples 1203924019 (WST05-18-148660PS), 1203924020 (WST05-18-148660PS), 1203924021 (WST05-18-148660PSD) and 1203924022 (WST05-18-148660PSD) were diluted because target analyte concentrations exceeded the calibration range.

##### **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 437794002 (CAMO-18-148070), 437794003 (CAMO-18-148093), 437794005 (CASA-18-148002) and 437794006 (CASA-18-148021) in this delivery group/work order. Please note that non-requested calibrated analytes detected in a client sample may be reported on the Form 1/Certificate of Analysis as TICs. TIC data, if requested, were included on the Sample Data Summary (Form 1) and included with the sample raw data.

**Additional Comments**

Additional comments were not required for this SDG.

**Residual Chlorine**

Residual Chlorine was not detected in any of the samples in this SDG.

**Electronic Package Comment**

The following package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted: Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the reviewer name associated with the generation of the data and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**System Configuration**

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

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>	<b>P &amp; T Trap</b>
VOA1.I	Hewlett Packard 5973 GC/MS w/ OI 4560/Archon Autosampler	HP6890/HP5973	RTX-624	Restek, 60m x 0.25mm x 1.4um	Trap 10

**Certification Statement**

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

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

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

Client SDG: 2018-853 GEL Work Order: 437794

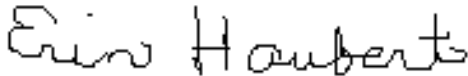
#### The Qualifiers in this report are defined as follows:

- \* 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: 08 DEC 2017

Title: Data Validator

# **Sample Data Summary**

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

Page 1 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 437794002

**Date Collected:** 11/10/2017 11:20  
**Date Received:** 11/14/2017 09:05

**Matrix:** W

**Client ID:** CAMO-18-148070  
**Batch ID:** 1720561  
**Run Date:** 11/21/2017 03:19  
**Prep Date:** 11/21/2017 03:19  
**Data File:** 112017V1\1J143.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**

Page 2 of 3

SDG Number: 2018-853

Lab Sample ID: 437794002

Date Collected: 11/10/2017 11:20

Date Received: 11/14/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1720561

Inst: VOA1.I

Dilution: 1

Run Date: 11/21/2017 03:19

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/21/2017 03:19

Data File: 112017V1\1J143.D

Column: DB-624

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

**Volatile  
Certificate of Analysis  
Sample Summary**

**SDG Number:** 2018-853  
**Lab Sample ID:** 437794002

**Date Collected:** 11/10/2017 11:20  
**Date Received:** 11/14/2017 09:05

**Matrix:** W

**Client ID:** CAMO-18-148070

**Client:** ARSL004

**Project:** ESHL00114

**Batch ID:** 1720561

**Method:** SW-846:8260B

**SOP Ref:** GL-OA-E-038

**Run Date:** 11/21/2017 03:19

**Inst:** VOA1.I

**Dilution:** 1

**Prep Date:** 11/21/2017 03:19

**Analyst:** PXY1

**Purge Vol:** 5 mL

**Data File:** 112017V1\1J143.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	45.2	50.0	ug/L 90	(71%-134%)
Bromofluorobenzene	60.4	50.0	ug/L 121	(70%-131%)
Toluene-d8	44.8	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:** 2018-853  
**Lab Sample ID:** 437794003

**Date Collected:** 11/10/2017 11:20  
**Date Received:** 11/14/2017 09:05

**Matrix:** W

**Client ID:** CAMO-18-148093  
**Batch ID:** 1720561  
**Run Date:** 11/21/2017 03:47  
**Prep Date:** 11/21/2017 03:47  
**Data File:** 112017V1\1J144.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**

Page 2 of 3

SDG Number: 2018-853

Lab Sample ID: 437794003

Date Collected: 11/10/2017 11:20

Date Received: 11/14/2017 09:05

Matrix: W

Client ID: CAMO-18-148093

Batch ID: 1720561

Run Date: 11/21/2017 03:47

Prep Date: 11/21/2017 03:47

Data File: 112017V1\1J144.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	J	0.320	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: 2018-853

Lab Sample ID: 437794003

Date Collected: 11/10/2017 11:20

Date Received: 11/14/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1720561

Inst: VOA1.I

Dilution: 1

Run Date: 11/21/2017 03:47

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/21/2017 03:47

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	46.2	50.0	ug/L 92	(71%-134%)
Bromofluorobenzene	61.7	50.0	ug/L 123	(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: 2018-853

Lab Sample ID: 437794005

Date Collected: 11/10/2017 11:08

Date Received: 11/14/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Inst: VOA1.I

Dilution: 1

Run Date: 11/21/2017 04:16

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/21/2017 04:16

Data File: 112017V1\1J145.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: 2018-853

Lab Sample ID: 437794005

Date Collected: 11/10/2017 11:08

Date Received: 11/14/2017 09:05

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1720561

Inst: VOA1.I

Dilution: 1

Run Date: 11/21/2017 04:16

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/21/2017 04:16

Data File: 112017V1\1J145.D

Column: DB-624

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



**Volatile  
Certificate of Analysis  
Sample Summary**

**SDG Number:** 2018-853  
**Lab Sample ID:** 437794005

**Date Collected:** 11/10/2017 11:08  
**Date Received:** 11/14/2017 09:05

**Matrix:** W

**Client ID:** CASA-18-148002

**Client:** ARSL004

**Project:** ESHL00114

**Batch ID:** 1720561

**Method:** SW-846:8260B

**SOP Ref:** GL-OA-E-038

**Run Date:** 11/21/2017 04:16

**Inst:** VOA1.I

**Dilution:** 1

**Prep Date:** 11/21/2017 04:16

**Analyst:** PXY1

**Purge Vol:** 5 mL

**Data File:** 112017V1\1J145.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	60.6	50.0	ug/L 121	(70%-131%)
Toluene-d8	45.4	50.0	ug/L 91	(74%-124%)

**Tentatively Identified Compound Summary**

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

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

Page 1 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 437794006

**Date Collected:** 11/10/2017 11:08  
**Date Received:** 11/14/2017 09:05

**Matrix:** W

**Client ID:** CASA-18-148021

**Client:** ARSL004

**Project:** ESHL00114

**Batch ID:** 1720561

**Method:** SW-846:8260B

**SOP Ref:** GL-OA-E-038

**Run Date:** 11/21/2017 04:45

**Inst:** VOA1.I

**Dilution:** 1

**Prep Date:** 11/21/2017 04:45

**Analyst:** PXY1

**Purge Vol:** 5 mL

**Data File:** 112017V1\1J146.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: 2018-853

Lab Sample ID: 437794006

Date Collected: 11/10/2017 11:08

Date Received: 11/14/2017 09:05

Matrix: W

Client ID: CASA-18-148021

Batch ID: 1720561

Run Date: 11/21/2017 04:45

Prep Date: 11/21/2017 04:45

Data File: 112017V1\1J146.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:** 2018-853  
**Lab Sample ID:** 437794006

**Date Collected:** 11/10/2017 11:08  
**Date Received:** 11/14/2017 09:05

**Matrix:** W

**Client ID:** CASA-18-148021

**Client:** ARSL004

**Project:** ESHL00114

**Batch ID:** 1720561

**Method:** SW-846:8260B

**SOP Ref:** GL-OA-E-038

**Run Date:** 11/21/2017 04:45

**Inst:** VOA1.I

**Dilution:** 1

**Prep Date:** 11/21/2017 04:45

**Analyst:** PXY1

**Purge Vol:** 5 mL

**Data File:** 112017V1\1J146.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	47.2	50.0	ug/L 94	(71%-134%)
Bromofluorobenzene	60.0	50.0	ug/L 120	(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		

# **Quality Control Summary**

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

Page 1 of 1

**SDG Number: 2018-853****Matrix Type: LIQUID**

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203925365	LCS for batch 1720561	88	90	107
1203925366	LCS for batch 1720561	87	88	109
1203925363	MB for batch 1720561	86	90	117
437794002	CAMO-18-148070	90	90	121
437794003	CAMO-18-148093	92	90	123
437794005	CASA-18-148002	92	91	121
437794006	CASA-18-148021	94	89	120
1203925367	LCS for batch 1720561	88	90	108
1203925368	LCS for batch 1720561	87	89	113
1203925364	MB for batch 1720561	89	91	119
1203924019	WST05-18-148660PS	87 D	88 D	106 D
1203924021	WST05-18-148660PSD	86 D	88 D	109 D
1203924020	WST05-18-148660PS	87 D	89 D	110 D
1203924022	WST05-18-148660PSD	85 D	89 D	112 D

**Surrogate****Acceptance Limits**

DCED4 = 1,2-Dichloroethane-d4

(71%-134%)

TOL = Toluene-d8

(74%-124%)

BFB = Bromofluorobenzene

(70%-131%)

\* Recovery outside Acceptance Limits

# Column to be used to flag recovery values

D Sample Diluted

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 1 of 8

SDG Number: 2018-853

Sample Type: Post Spike

Client ID: WST05-18-148660PS

Matrix: W

Lab Sample ID 1203924019

Instrument: VOA1.I

Analysis Date: 11/21/2017 16:55

Dilution: 20

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
79-01-6	PS Trichloroethylene	50.0	0.430	J 52.8	105	65-131
75-71-8	PS Dichlorodifluoromethane	50.0	0.00	U 48.3	97	33-164
74-87-3	PS Chloromethane	50.0	0.00	U 46.4	93	53-139
75-01-4	PS Vinyl chloride	50.0	0.00	U 48.4	97	58-140
74-83-9	PS Bromomethane	50.0	0.00	U 52.7	105	59-146
75-00-3	PS Chloroethane	50.0	0.00	U 44.7	89	65-129
75-69-4	PS Trichlorofluoromethane	50.0	0.00	U 51.6	103	65-141
60-29-7	PS Ethyl ether	50.0	0.00	U 46.2	92	69-127
75-35-4	PS 1,1-Dichloroethylene	50.0	0.00	U 52.8	106	59-130
75-09-2	PS Methylene chloride	50.0	0.00	U 49.4	99	62-123
1634-04-4	PS tert-Butyl methyl ether	50.0	0.00	U 49.1	98	69-132
156-60-5	PS trans-1,2-Dichloroethylene	50.0	0.00	U 53.4	107	65-127
75-34-3	PS 1,1-Dichloroethane	50.0	0.00	U 51.4	103	67-127
156-59-2	PS cis-1,2-Dichloroethylene	50.0	0.00	U 51.7	103	69-127
594-20-7	PS 2,2-Dichloropropane	50.0	0.00	U 54.5	109	66-137
74-97-5	PS Bromochloromethane	50.0	0.00	U 50.2	100	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 51.5	103	67-130
56-23-5	PS Carbon tetrachloride	50.0	0.00	U 56.9	114	66-143
107-06-2	PS 1,2-Dichloroethane	50.0	0.00	U 55.6	111	69-130
71-43-2	PS Benzene	50.0	0.00	U 48.1	96	66-125



Volatile  
Quality Control Summary  
Spike Recovery Report

Page 2 of 8

SDG Number: 2018-853

Sample Type: Post Spike

Client ID: WST05-18-148660PS

Matrix: W

Lab Sample ID 1203924019

Instrument: VOA1.I

Analysis Date: 11/21/2017 16:55

Dilution: 20

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
78-87-5	PS 1,2-Dichloropropane	50.0	0.00 U	49.8	100	67-127
74-95-3	PS Dibromomethane	50.0	0.00 U	52.6	105	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	50.4	101	70-134
10061-02-6	PS trans-1,3-Dichloropropylene	50.0	0.00 U	50.1	100	69-135
79-00-5	PS 1,1,2-Trichloroethane	50.0	0.00 U	46.4	93	66-125
142-28-9	PS 1,3-Dichloropropane	50.0	0.00 U	46.6	93	67-124
127-18-4	PS Tetrachloroethylene	50.0	0.00 U	45.2	90	60-130
124-48-1	PS Dibromochloromethane	50.0	0.00 U	50.4	101	68-143
106-93-4	PS 1,2-Dibromoethane	50.0	0.00 U	47.8	96	71-127
108-90-7	PS Chlorobenzene	50.0	0.00 U	44.0	88	64-124
100-41-4	PS Ethylbenzene	50.0	0.00 U	45.5	91	61-130
95-47-6	PS o-Xylene	50.0	0.00 U	45.9	92	62-131
100-42-5	PS Styrene	50.0	0.00 U	45.9	92	59-135
75-25-2	PS Bromoform	50.0	0.00 U	47.6	95	64-138
98-82-8	PS Isopropylbenzene	50.0	0.00 U	43.2	86	55-133
79-34-5	PS 1,1,2,2-Tetrachloroethane	50.0	0.00 U	42.8	86	62-129
96-18-4	PS 1,2,3-Trichloropropane	50.0	0.00 U	45.3	91	70-124
108-86-1	PS Bromobenzene	50.0	0.00 U	42.2	84	62-124
103-65-1	PS n-Propylbenzene	50.0	0.00 U	41.6	83	50-133
108-67-8	PS 1,3,5-Trimethylbenzene	50.0	0.00 U	42.6	85	53-135
95-49-8	PS 2-Chlorotoluene	50.0	0.00 U	40.9	82	56-128

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 3 of 8

SDG Number: 2018-853

Sample Type: Post Spike

Client ID: WST05-18-148660PS

Matrix: W

Lab Sample ID 1203924019

Instrument: VOA1.I

Analysis Date: 11/21/2017 16:55

Dilution: 20

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
106-43-4	PS 4-Chlorotoluene	50.0	0.00 U	41.0	82	53-130
98-06-6	PS tert-Butylbenzene	50.0	0.00 U	43.0	86	55-135
95-63-6	PS 1,2,4-Trimethylbenzene	50.0	0.00 U	42.3	85	53-132
135-98-8	PS sec-Butylbenzene	50.0	0.00 U	42.5	85	50-138
99-87-6	PS 4-Isopropyltoluene	50.0	0.00 U	43.4	87	49-138
541-73-1	PS 1,3-Dichlorobenzene	50.0	0.00 U	39.4	79	56-126
106-46-7	PS 1,4-Dichlorobenzene	50.0	0.00 U	40.3	81	55-125
104-51-8	PS n-Butylbenzene	50.0	0.00 U	42.6	85	43-142
96-12-8	PS 1,2-Dibromo-3-chloropropane	50.0	0.00 U	39.6	79	62-141
87-68-3	PS Hexachlorobutadiene	50.0	0.00 U	41.3	83	40-147
91-20-3	PS Naphthalene	50.0	0.00 U	42.9	86	62-134
87-61-6	PS 1,2,3-Trichlorobenzene	50.0	0.00 U	42.7	85	52-135
120-82-1	PS 1,2,4-Trichlorobenzene	50.0	0.00 U	45.7	91	50-133
630-20-6	PS 1,1,1,2-Tetrachloroethane	50.0	0.00 U	50.1	100	71-133
95-50-1	PS 1,2-Dichlorobenzene	50.0	0.00 U	41.4	83	60-125
108-88-3	PS Toluene	50.0	2.37	46.7	89	60-126
71-36-3	PS n-Butyl alcohol	5000	0.00 U	4810	96	60-140
179601-23-1	PS m,p-Xylenes	100	0.320 J	90.4	90	59-132
75-05-8	PS Acetonitrile	1250	0.00 U	1100	88	56-131
74-88-4	PS Iodomethane	250	0.00 U	244	98	66-133
75-15-0	PS Carbon disulfide	250	0.00 U	245	98	61-141
108-05-4	PS Vinyl acetate	250	0.00 U	234	94	48-133

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 4 of 8

SDG Number: 2018-853

Sample Type: Post Spike

Client ID: WST05-18-148660PS

Matrix: W

Lab Sample ID 1203924019

Instrument: VOA1.I

Analysis Date: 11/21/2017 16:55

Dilution: 20

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

CAS No		Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
108-10-1	PS	4-Methyl-2-pentanone	250	0.00 U	215	86	61-127
591-78-6	PS	2-Hexanone	250	0.00 U	167	67	33-138
67-64-1	PS	Acetone	250	12.8	116	41	25-155
78-93-3	PS	2-Butanone	250	307	411	41	25-143

**Volatile**  
**Quality Control Summary**  
**Spike Recovery Report**

Page 5 of 8

SDG Number: 2018-853

Sample Type: Post Spike Duplicate

Client ID: WST05-18-148660PSD

Matrix: W

Lab Sample ID 1203924021

Instrument: VOA1.I

Analysis Date: 11/21/2017 17:24

Dilution: 20

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	J	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
79-01-6	PSD Trichloroethylene	50.0	0.430	J	53.0	105	65-131	0	0-20
75-71-8	PSD Dichlorodifluoromethane	50.0	0.00	U	48.9	98	33-164	1	0-20
74-87-3	PSD Chloromethane	50.0	0.00	U	47.7	95	53-139	3	0-20
75-01-4	PSD Vinyl chloride	50.0	0.00	U	49.8	100	58-140	3	0-20
74-83-9	PSD Bromomethane	50.0	0.00	U	52.9	106	59-146	0	0-20
75-00-3	PSD Chloroethane	50.0	0.00	U	45.6	91	65-129	2	0-20
75-69-4	PSD Trichlorofluoromethane	50.0	0.00	U	51.7	103	65-141	0	0-20
60-29-7	PSD Ethyl ether	50.0	0.00	U	47.7	95	69-127	3	0-20
75-35-4	PSD 1,1-Dichloroethylene	50.0	0.00	U	52.0	104	59-130	2	0-20
75-09-2	PSD Methylene chloride	50.0	0.00	U	50.5	101	62-123	2	0-20
1634-04-4	PSD tert-Butyl methyl ether	50.0	0.00	U	51.8	104	69-132	5	0-20
156-60-5	PSD trans-1,2-Dichloroethylene	50.0	0.00	U	53.0	106	65-127	1	0-20
75-34-3	PSD 1,1-Dichloroethane	50.0	0.00	U	51.4	103	67-127	0	0-20
156-59-2	PSD cis-1,2-Dichloroethylene	50.0	0.00	U	51.5	103	69-127	0	0-20
594-20-7	PSD 2,2-Dichloropropane	50.0	0.00	U	52.9	106	66-137	3	0-20
74-97-5	PSD Bromochloromethane	50.0	0.00	U	50.5	101	71-130	1	0-20
67-66-3	PSD Chloroform	50.0	0.00	U	52.2	104	71-129	0	0-20
71-55-6	PSD 1,1,1-Trichloroethane	50.0	0.00	U	51.7	103	69-139	2	0-20
563-58-6	PSD 1,1-Dichloropropene	50.0	0.00	U	50.7	101	67-130	2	0-20
56-23-5	PSD Carbon tetrachloride	50.0	0.00	U	54.3	109	66-143	5	0-20
107-06-2	PSD 1,2-Dichloroethane	50.0	0.00	U	54.8	110	69-130	1	0-20
71-43-2	PSD Benzene	50.0	0.00	U	49.2	98	66-125	2	0-20

**Volatile**  
**Quality Control Summary**  
**Spike Recovery Report**

Page 6 of 8

SDG Number: 2018-853

Sample Type: Post Spike Duplicate

Client ID: WST05-18-148660PSD

Matrix: W

Lab Sample ID 1203924021

Instrument: VOA1.I

Analysis Date: 11/21/2017 17:24

Dilution: 20

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
78-87-5	PSD 1,2-Dichloropropane	50.0	0.00	U 50.1	100	67-127	1	0-20
74-95-3	PSD Dibromomethane	50.0	0.00	U 52.7	105	72-129	0	0-20
75-27-4	PSD Bromodichloromethane	50.0	0.00	U 54.0	108	70-138	0	0-20
10061-01-5	PSD cis-1,3-Dichloropropylene	50.0	0.00	U 51.9	104	70-134	3	0-20
10061-02-6	PSD trans-1,3-Dichloropropylene	50.0	0.00	U 50.9	102	69-135	2	0-20
79-00-5	PSD 1,1,2-Trichloroethane	50.0	0.00	U 47.4	95	66-125	2	0-20
142-28-9	PSD 1,3-Dichloropropane	50.0	0.00	U 46.7	93	67-124	0	0-20
127-18-4	PSD Tetrachloroethylene	50.0	0.00	U 46.2	92	60-130	2	0-20
124-48-1	PSD Dibromochloromethane	50.0	0.00	U 50.7	101	68-143	1	0-20
106-93-4	PSD 1,2-Dibromoethane	50.0	0.00	U 48.6	97	71-127	2	0-20
108-90-7	PSD Chlorobenzene	50.0	0.00	U 46.3	93	64-124	5	0-20
100-41-4	PSD Ethylbenzene	50.0	0.00	U 47.0	94	61-130	3	0-20
95-47-6	PSD o-Xylene	50.0	0.00	U 48.5	97	62-131	5	0-20
100-42-5	PSD Styrene	50.0	0.00	U 48.6	97	59-135	6	0-20
75-25-2	PSD Bromoform	50.0	0.00	U 50.0	100	64-138	5	0-20
98-82-8	PSD Isopropylbenzene	50.0	0.00	U 46.2	92	55-133	7	0-20
79-34-5	PSD 1,1,2,2-Tetrachloroethane	50.0	0.00	U 44.2	88	62-129	3	0-20
96-18-4	PSD 1,2,3-Trichloropropane	50.0	0.00	U 46.7	93	70-124	3	0-20
108-86-1	PSD Bromobenzene	50.0	0.00	U 45.9	92	62-124	8	0-20
103-65-1	PSD n-Propylbenzene	50.0	0.00	U 45.5	91	50-133	9	0-20
108-67-8	PSD 1,3,5-Trimethylbenzene	50.0	0.00	U 46.5	93	53-135	9	0-20
95-49-8	PSD 2-Chlorotoluene	50.0	0.00	U 45.3	91	56-128	10	0-20

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 7 of 8

SDG Number: 2018-853

Sample Type: Post Spike Duplicate

Client ID: WST05-18-148660PSD

Matrix: W

Lab Sample ID 1203924021

Instrument: VOA1.I

Analysis Date: 11/21/2017 17:24

Dilution: 20

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
106-43-4	PSD 4-Chlorotoluene	50.0	0.00 U	45.4	91	53-130	10	0-20
98-06-6	PSD tert-Butylbenzene	50.0	0.00 U	47.8	96	55-135	10	0-20
95-63-6	PSD 1,2,4-Trimethylbenzene	50.0	0.00 U	46.7	93	53-132	10	0-20
135-98-8	PSD sec-Butylbenzene	50.0	0.00 U	47.4	95	50-138	11	0-20
99-87-6	PSD 4-Isopropyltoluene	50.0	0.00 U	48.5	97	49-138	11	0-20
541-73-1	PSD 1,3-Dichlorobenzene	50.0	0.00 U	44.1	88	56-126	11	0-20
106-46-7	PSD 1,4-Dichlorobenzene	50.0	0.00 U	44.6	89	55-125	10	0-20
104-51-8	PSD n-Butylbenzene	50.0	0.00 U	47.8	96	43-142	11	0-20
96-12-8	PSD 1,2-Dibromo-3-chloropropane	50.0	0.00 U	42.9	86	62-141	8	0-20
87-68-3	PSD Hexachlorobutadiene	50.0	0.00 U	49.9	100	40-147	19	0-20
91-20-3	PSD Naphthalene	50.0	0.00 U	47.7	95	62-134	11	0-20
87-61-6	PSD 1,2,3-Trichlorobenzene	50.0	0.00 U	48.6	97	52-135	13	0-20
120-82-1	PSD 1,2,4-Trichlorobenzene	50.0	0.00 U	52.4	105	50-133	14	0-20
630-20-6	PSD 1,1,1,2-Tetrachloroethane	50.0	0.00 U	50.7	101	71-133	1	0-20
95-50-1	PSD 1,2-Dichlorobenzene	50.0	0.00 U	45.5	91	60-125	10	0-20
108-88-3	PSD Toluene	50.0	2.37	47.0	89	60-126	1	0-20
71-36-3	PSD n-Butyl alcohol	5000	0.00 U	5050	101	60-140	5	0-20
179601-23-1	PSD m,p-Xylenes	100	0.320 J	93.4	93	59-132	3	0-20
75-05-8	PSD Acetonitrile	1250	0.00 U	1130	90	56-131	3	0-20
74-88-4	PSD Iodomethane	250	0.00 U	244	98	66-133	0	0-20
75-15-0	PSD Carbon disulfide	250	0.00 U	241	96	61-141	2	0-20
108-05-4	PSD Vinyl acetate	250	0.00 U	237	95	48-133	1	0-20

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 8 of 8

SDG Number: 2018-853

Sample Type: Post Spike Duplicate

Client ID: WST05-18-148660PSD

Matrix: W

Lab Sample ID 1203924021

Instrument: VOA1.I

Analysis Date: 11/21/2017 17:24

Dilution: 20

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

			Amount Added	Sample Conc.	Spike Conc.	Recovery	Acceptance Limits	Acceptance RPD	Acceptance Limits
CAS No			ug/L	ug/L	ug/L	%		%	
108-10-1	PSD	4-Methyl-2-pentanone	250	0.00 U	214	86	61-127	0	0-20
591-78-6	PSD	2-Hexanone	250	0.00 U	167	67	33-138	0	0-20
67-64-1	PSD	Acetone	250	12.8	117	42	25-155	2	0-20
78-93-3	PSD	2-Butanone	250	307	411	42	25-143	0	0-20



## Volatile

Page 1 of 2

Quality Control Summary  
Spike Recovery Report

SDG Number: 2018-853

Sample Type: Post Spike

Client ID: WST05-18-148660PS

Matrix: W

Lab Sample ID 1203924020

Instrument: VOA1.I

Analysis Date: 11/21/2017 17:53

Dilution: 20

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
126-99-8	PS 2-Chloro-1,3-butadiene	50.0	0.00 U	44.6	89	63-146
107-02-8	PS Acrolein	250	0.00 U	215	86	49-141
76-13-1	PS Trichlorotrifluoroethane	250	0.00 U	228	91	57-149
107-05-1	PS Allyl chloride	250	0.00 U	222	89	54-128
107-13-1	PS Acrylonitrile	250	0.00 U	232	93	59-129
107-12-0	PS Propionitrile	250	0.00 U	229	92	58-131
126-98-7	PS Methacrylonitrile	250	0.00 U	232	93	59-134
80-62-6	PS Methyl methacrylate	250	0.00 U	237	95	62-135
97-63-2	PS Ethyl methacrylate	250	0.00 U	208	83	60-136
78-83-1	PS Isobutyl alcohol	2500	0.00 U	2560	102	60-143

## Volatile

Page 2 of 2

Quality Control Summary  
Spike Recovery Report

SDG Number: 2018-853

Sample Type: Post Spike Duplicate

Client ID: WST05-18-148660PSD

Matrix: W

Lab Sample ID 1203924022

Instrument: VOA1.I

Analysis Date: 11/21/2017 18:21

Dilution: 20

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	U	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
126-99-8	PSD 2-Chloro-1,3-butadiene	50.0	0.00	U	43.3	87	63-146	3	0-20
107-02-8	PSD Acrolein	250	0.00	U	205	82	49-141	5	0-20
76-13-1	PSD Trichlorotrifluoroethane	250	0.00	U	219	88	57-149	4	0-20
107-05-1	PSD Allyl chloride	250	0.00	U	215	86	54-128	3	0-20
107-13-1	PSD Acrylonitrile	250	0.00	U	221	89	59-129	5	0-20
107-12-0	PSD Propionitrile	250	0.00	U	212	85	58-131	8	0-20
126-98-7	PSD Methacrylonitrile	250	0.00	U	218	87	59-134	6	0-20
80-62-6	PSD Methyl methacrylate	250	0.00	U	224	90	62-135	6	0-20
97-63-2	PSD Ethyl methacrylate	250	0.00	U	204	82	60-136	2	0-20
78-83-1	PSD Isobutyl alcohol	2500	0.00	U	2360	95	60-143	8	0-20

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 1 of 4

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720561

Matrix: WATER

Lab Sample ID 1203925365

Instrument: VOA1.I

Analysis Date: 11/20/2017 20:09

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

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	94.1	94	71-127
75-05-8	LCS Acetonitrile	1250	0.0	1260	101	61-125
67-64-1	LCS Acetone	250	0.0	217	87	48-157
74-88-4	LCS Iodomethane	250	0.0	250	100	72-128
75-15-0	LCS Carbon disulfide	250	0.0	239	96	69-138
108-05-4	LCS Vinyl acetate	250	0.0	251	101	67-125
78-93-3	LCS 2-Butanone	250	0.0	229	92	55-138
108-10-1	LCS 4-Methyl-2-pentanone	250	0.0	231	93	66-124
591-78-6	LCS 2-Hexanone	250	0.0	213	85	56-140
75-71-8	LCS Dichlorodifluoromethane	50.0	0.0	49.0	98	40-160
74-87-3	LCS Chloromethane	50.0	0.0	51.4	103	58-135
75-01-4	LCS Vinyl chloride	50.0	0.0	48.5	97	65-137
74-83-9	LCS Bromomethane	50.0	0.0	53.1	106	63-137
75-00-3	LCS Chloroethane	50.0	0.0	46.6	93	69-129
75-69-4	LCS Trichlorofluoromethane	50.0	0.0	47.3	95	69-138
60-29-7	LCS Ethyl ether	50.0	0.0	54.1	108	72-125
75-35-4	LCS 1,1-Dichloroethylene	50.0	0.0	51.0	102	66-126
75-09-2	LCS Methylene chloride	50.0	0.0	53.6	107	68-119
1634-04-4	LCS tert-Butyl methyl ether	50.0	0.0	57.7	115	76-128
156-60-5	LCS trans-1,2-Dichloroethylene	50.0	0.0	51.9	104	71-124
75-34-3	LCS 1,1-Dichloroethane	50.0	0.0	52.6	105	73-123
156-59-2	LCS cis-1,2-Dichloroethylene	50.0	0.0	53.7	107	75-123

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 2 of 4

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720561

Matrix: WATER

Lab Sample ID 1203925365

Instrument: VOA1.I

Analysis Date: 11/20/2017 20:09

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

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	50.4	101	72-138
74-97-5	LCS Bromochloromethane	50.0	0.0	54.3	109	76-125
67-66-3	LCS Chloroform	50.0	0.0	51.9	104	76-123
71-55-6	LCS 1,1,1-Trichloroethane	50.0	0.0	49.9	100	74-136
563-58-6	LCS 1,1-Dichloropropene	50.0	0.0	49.3	99	72-129
56-23-5	LCS Carbon tetrachloride	50.0	0.0	51.0	102	72-140
107-06-2	LCS 1,2-Dichloroethane	50.0	0.0	55.8	112	74-122
71-43-2	LCS Benzene	50.0	0.0	49.7	99	72-121
79-01-6	LCS Trichloroethylene	50.0	0.0	52.7	105	74-125
78-87-5	LCS 1,2-Dichloropropane	50.0	0.0	52.5	105	73-121
74-95-3	LCS Dibromomethane	50.0	0.0	56.0	112	78-123
75-27-4	LCS Bromodichloromethane	50.0	0.0	56.0	112	77-131
10061-01-5	LCS cis-1,3-Dichloropropylene	50.0	0.0	56.1	112	78-131
108-88-3	LCS Toluene	50.0	0.0	46.5	93	71-121
10061-02-6	LCS trans-1,3-Dichloropropylene	50.0	0.0	54.7	109	78-131
79-00-5	LCS 1,1,2-Trichloroethane	50.0	0.0	50.9	102	74-118
142-28-9	LCS 1,3-Dichloropropane	50.0	0.0	50.9	102	74-118
127-18-4	LCS Tetrachloroethylene	50.0	0.0	45.1	90	69-129
124-48-1	LCS Dibromochloromethane	50.0	0.0	54.3	109	76-137
106-93-4	LCS 1,2-Dibromoethane	50.0	0.0	54.0	108	78-122
108-90-7	LCS Chlorobenzene	50.0	0.0	47.9	96	74-120
100-41-4	LCS Ethylbenzene	50.0	0.0	47.4	95	73-125

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 3 of 4

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720561

Matrix: WATER

Lab Sample ID 1203925365

Instrument: VOA1.I

Analysis Date: 11/20/2017 20:09

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

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	49.0	98	74-126
100-42-5	LCS Styrene	50.0	0.0	50.0	100	72-130
75-25-2	LCS Bromoform	50.0	0.0	54.2	108	72-136
98-82-8	LCS Isopropylbenzene	50.0	0.0	45.5	91	70-130
79-34-5	LCS 1,1,2,2-Tetrachloroethane	50.0	0.0	48.2	96	70-126
96-18-4	LCS 1,2,3-Trichloropropane	50.0	0.0	50.5	101	74-122
108-86-1	LCS Bromobenzene	50.0	0.0	47.2	94	74-120
103-65-1	LCS n-Propylbenzene	50.0	0.0	44.1	88	67-128
108-67-8	LCS 1,3,5-Trimethylbenzene	50.0	0.0	46.4	93	70-129
95-49-8	LCS 2-Chlorotoluene	50.0	0.0	46.1	92	71-124
106-43-4	LCS 4-Chlorotoluene	50.0	0.0	45.6	91	69-125
98-06-6	LCS tert-Butylbenzene	50.0	0.0	47.9	96	72-130
95-63-6	LCS 1,2,4-Trimethylbenzene	50.0	0.0	46.8	94	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	44.4	89	72-121
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	44.9	90	71-120
104-51-8	LCS n-Butylbenzene	50.0	0.0	46.7	93	68-134
96-12-8	LCS 1,2-Dibromo-3-chloropropane	50.0	0.0	49.0	98	68-141
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	49.9	100	72-136
91-20-3	LCS Naphthalene	50.0	0.0	52.9	106	72-132
87-61-6	LCS 1,2,3-Trichlorobenzene	50.0	0.0	51.9	104	70-130

## Volatile

Page 4 of 4

Quality Control Summary  
Spike Recovery Report

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720561

Matrix: WATER

Lab Sample ID 1203925365

Instrument: VOA1.I

Analysis Date: 11/20/2017 20:09

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

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	53.5	107	71-129
630-20-6	LCS 1,1,1,2-Tetrachloroethane	50.0	0.0	53.1	106	79-127
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	46.9	94	74-120
71-36-3	LCS n-Butyl alcohol	5000	0.0	5670	113	63-138

Volatile  
Quality Control Summary  
Spike Recovery Report

Page 1 of 1

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720561

Matrix: WATER

Lab Sample ID 1203925366

Instrument: VOA1.I

Analysis Date: 11/20/2017 21:06

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

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	209	84	60-140
76-13-1	LCS Trichlorotrifluoroethane	250	0.0	203	81	61-148
107-05-1	LCS Allyl chloride	250	0.0	222	89	59-125
107-13-1	LCS Acrylonitrile	250	0.0	230	92	65-122
107-12-0	LCS Propionitrile	250	0.0	221	89	64-124
126-98-7	LCS Methacrylonitrile	250	0.0	228	91	64-126
80-62-6	LCS Methyl methacrylate	250	0.0	235	94	69-127
97-63-2	LCS Ethyl methacrylate	250	0.0	208	83	66-130
78-83-1	LCS Isobutyl alcohol	2500	0.0	2350	94	65-135
126-99-8	LCS 2-Chloro-1,3-butadiene	50.0	0.0	42.1	84	66-147



Volatile  
Quality Control Summary  
Spike Recovery Report

Page 1 of 4

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720561

Matrix: WATER

Lab Sample ID 1203925367

Instrument: VOA1.I

Analysis Date: 11/21/2017 09:43

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

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: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720561

Matrix: WATER

Lab Sample ID 1203925367

Instrument: VOA1.I

Analysis Date: 11/21/2017 09:43

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

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: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720561

Matrix: WATER

Lab Sample ID 1203925367

Instrument: VOA1.I

Analysis Date: 11/21/2017 09:43

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

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

Page 4 of 4

Quality Control Summary  
Spike Recovery Report

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720561

Matrix: WATER

Lab Sample ID 1203925367

Instrument: VOA1.I

Analysis Date: 11/21/2017 09:43

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

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  
Quality Control Summary  
Spike Recovery Report

Page 1 of 1

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1720561

Matrix: WATER

Lab Sample ID 1203925368

Instrument: VOA1.I

Analysis Date: 11/21/2017 10:40

Dilution: 1

Analyst: PXY1

Purge Vol: 5 mL

Batch ID: 1720561

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

## Method Blank Summary

Page 1 of 1

SDG Number:	2018-853	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1720561	Instrument ID:	VOA1.I	Data File:	112017V1\1J131A.D
Lab Sample ID:	1203925363	Prep Date:	11/20/2017 21:35	Analyzed:	11/20/17 21:35
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 1720561	1203925365	112017V1\1J128A.D	11/20/17	2009
02 LCS for batch 1720561	1203925366	112017V1\1J130A.D	11/20/17	2106
03 CAMO-18-148070	437794002	112017V1\1J143.D	11/21/17	0319
04 CAMO-18-148093	437794003	112017V1\1J144.D	11/21/17	0347
05 CASA-18-148002	437794005	112017V1\1J145.D	11/21/17	0416
06 CASA-18-148021	437794006	112017V1\1J146.D	11/21/17	0445

## Method Blank Summary

Page 1 of 1

SDG Number:	2018-853	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1720561	Instrument ID:	VOA1.I	Data File:	112117V1\1J206A.D
Lab Sample ID:	1203925364	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
08 LCS for batch 1720561	1203925367	112117V1\1J203A.D	11/21/17	0943
09 LCS for batch 1720561	1203925368	112117V1\1J205A.D	11/21/17	1040
10 WST05-18-148660PS	1203924019	112117V1\1J218.D	11/21/17	1655
11 WST05-18-148660PSD	1203924021	112117V1\1J219.D	11/21/17	1724
12 WST05-18-148660PS	1203924020	112117V1\1J220.D	11/21/17	1753
13 WST05-18-148660PSD	1203924022	112117V1\1J221.D	11/21/17	1821



# Quality Control Data

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

Page 1 of 3

<b>SDG Number:</b> 2018-853	<b>Date Collected:</b> 11/08/2017 09:40	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203924019	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> QC for batch 1720561	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> WST05-18-148660PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720561	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 20
<b>Run Date:</b> 11/21/2017 16:55	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/21/2017 16:55		
<b>Data File:</b> 112117V1\1J218.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		1000	ug/L	6.00	20.0
71-55-6	1,1,1-Trichloroethane		1050	ug/L	6.00	20.0
79-34-5	1,1,2,2-Tetrachloroethane		857	ug/L	6.00	20.0
79-00-5	1,1,2-Trichloroethane		929	ug/L	6.00	20.0
75-34-3	1,1-Dichloroethane		1030	ug/L	6.00	20.0
75-35-4	1,1-Dichloroethylene		1060	ug/L	6.00	20.0
563-58-6	1,1-Dichloropropene		1030	ug/L	6.00	20.0
87-61-6	1,2,3-Trichlorobenzene		854	ug/L	6.00	20.0
96-18-4	1,2,3-Trichloropropane		905	ug/L	6.00	20.0
120-82-1	1,2,4-Trichlorobenzene		913	ug/L	6.00	20.0
95-63-6	1,2,4-Trimethylbenzene		846	ug/L	6.00	20.0
96-12-8	1,2-Dibromo-3-chloropropane		791	ug/L	10.0	20.0
106-93-4	1,2-Dibromoethane		957	ug/L	6.00	20.0
95-50-1	1,2-Dichlorobenzene		827	ug/L	6.00	20.0
107-06-2	1,2-Dichloroethane		1110	ug/L	6.00	20.0
78-87-5	1,2-Dichloropropane		995	ug/L	6.00	20.0
108-67-8	1,3,5-Trimethylbenzene		852	ug/L	6.00	20.0
541-73-1	1,3-Dichlorobenzene		788	ug/L	6.00	20.0
142-28-9	1,3-Dichloropropane		933	ug/L	6.00	20.0
106-46-7	1,4-Dichlorobenzene		806	ug/L	6.00	20.0
594-20-7	2,2-Dichloropropane		1090	ug/L	6.00	20.0
78-93-3	2-Butanone		8220	ug/L	30.0	100
126-99-8	2-Chloro-1,3-butadiene	U	6.00	ug/L	6.00	20.0
95-49-8	2-Chlorotoluene		817	ug/L	6.00	20.0
591-78-6	2-Hexanone		3330	ug/L	30.0	100
106-43-4	4-Chlorotoluene		820	ug/L	6.00	20.0
99-87-6	4-Isopropyltoluene		867	ug/L	6.00	20.0
108-10-1	4-Methyl-2-pentanone		4300	ug/L	30.0	100
67-64-1	Acetone		2310	ug/L	30.0	200
75-05-8	Acetonitrile		21900	ug/L	160	500
107-02-8	Acrolein	U	30.0	ug/L	30.0	100
107-13-1	Acrylonitrile	U	30.0	ug/L	30.0	100
107-05-1	Allyl chloride	U	30.0	ug/L	30.0	100
71-43-2	Benzene		961	ug/L	6.00	20.0
108-86-1	Bromobenzene		843	ug/L	6.00	20.0
74-97-5	Bromochloromethane		1000	ug/L	6.00	20.0
75-27-4	Bromodichloromethane		1080	ug/L	6.00	20.0
75-25-2	Bromoform		951	ug/L	6.00	20.0

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

<b>SDG Number:</b> 2018-853	<b>Date Collected:</b> 11/08/2017 09:40	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203924019	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> QC for batch 1720561	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> WST05-18-148660PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720561	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 20
<b>Run Date:</b> 11/21/2017 16:55	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/21/2017 16:55		
<b>Data File:</b> 112117V1\1J218.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		1050	ug/L	6.00	20.0
75-15-0	Carbon disulfide		4910	ug/L	30.0	100
56-23-5	Carbon tetrachloride		1140	ug/L	6.00	20.0
108-90-7	Chlorobenzene		881	ug/L	6.00	20.0
75-00-3	Chloroethane		894	ug/L	6.00	20.0
67-66-3	Chloroform		1050	ug/L	6.00	20.0
74-87-3	Chloromethane		928	ug/L	6.00	20.0
124-48-1	Dibromochloromethane		1010	ug/L	6.00	20.0
74-95-3	Dibromomethane		1050	ug/L	6.00	20.0
75-71-8	Dichlorodifluoromethane		967	ug/L	6.00	20.0
60-29-7	Ethyl ether		924	ug/L	6.00	20.0
97-63-2	Ethyl methacrylate	U	30.0	ug/L	30.0	100
100-41-4	Ethylbenzene		911	ug/L	6.00	20.0
87-68-3	Hexachlorobutadiene		827	ug/L	6.00	20.0
74-88-4	Iodomethane		4890	ug/L	30.0	100
78-83-1	Isobutyl alcohol	U	300	ug/L	300	1000
98-82-8	Isopropylbenzene		864	ug/L	6.00	20.0
126-98-7	Methacrylonitrile	U	30.0	ug/L	30.0	100
80-62-6	Methyl methacrylate	U	30.0	ug/L	30.0	100
75-09-2	Methylene chloride		988	ug/L	20.0	200
91-20-3	Naphthalene		857	ug/L	6.00	20.0
107-12-0	Propionitrile	U	30.0	ug/L	30.0	100
100-42-5	Styrene		919	ug/L	6.00	20.0
127-18-4	Tetrachloroethylene		905	ug/L	6.00	20.0
108-88-3	Toluene		933	ug/L	6.00	20.0
79-01-6	Trichloroethylene		1060	ug/L	6.00	20.0
75-69-4	Trichlorofluoromethane		1030	ug/L	6.00	20.0
76-13-1	Trichlorotrifluoroethane	U	40.0	ug/L	40.0	100
108-05-4	Vinyl acetate		4680	ug/L	30.0	100
75-01-4	Vinyl chloride		969	ug/L	6.00	20.0
156-59-2	cis-1,2-Dichloroethylene		1030	ug/L	6.00	20.0
10061-01-5	cis-1,3-Dichloropropylene		1010	ug/L	6.00	20.0
179601-23-1	m,p-Xylenes		1810	ug/L	6.00	40.0
71-36-3	n-Butyl alcohol		96200	ug/L	300	1000
104-51-8	n-Butylbenzene		853	ug/L	6.00	20.0
103-65-1	n-Propylbenzene		832	ug/L	6.00	20.0
95-47-6	o-Xylene		919	ug/L	6.00	20.0
135-98-8	sec-Butylbenzene		850	ug/L	6.00	20.0

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b>	<b>2018-853</b>	<b>Date Collected:</b>	<b>11/08/2017 09:40</b>	<b>Matrix:</b>	<b>W</b>
<b>Lab Sample ID:</b>	<b>1203924019</b>	<b>Date Received:</b>	<b>11/10/2017 08:55</b>		
<b>Client Sample:</b>	<b>QC for batch 1720561</b>	<b>Client:</b>	<b>ARSL004</b>	<b>Project:</b>	<b>QC</b>
<b>Client ID:</b>	<b>WST05-18-148660PS</b>	<b>Method:</b>	<b>SW-846:8260B</b>	<b>SOP Ref:</b>	<b>GL-OA-E-038</b>
<b>Batch ID:</b>	<b>1720561</b>	<b>Inst:</b>	<b>VOA1.I</b>	<b>Dilution:</b>	<b>20</b>
<b>Run Date:</b>	<b>11/21/2017 16:55</b>	<b>Analyst:</b>	<b>PXY1</b>	<b>Purge Vol:</b>	<b>5 mL</b>
<b>Prep Date:</b>	<b>11/21/2017 16:55</b>				
<b>Data File:</b>	<b>112117V1\1J218.D</b>	<b>Column:</b>	<b>DB-624</b>		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		982	ug/L	6.00	20.0
98-06-6	tert-Butylbenzene		860	ug/L	6.00	20.0
156-60-5	trans-1,2-Dichloroethylene		1070	ug/L	6.00	20.0
10061-02-6	trans-1,3-Dichloropropylene		1000	ug/L	6.00	20.0

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	43.5	50.0	ug/L	87	(71%-134%)
Bromofluorobenzene	53.1	50.0	ug/L	106	(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:** 2018-853  
**Lab Sample ID:** 1203924020  
**Client Sample:** QC for batch 1720561  
**Client ID:** WST05-18-148660PS  
**Batch ID:** 1720561  
**Run Date:** 11/21/2017 17:53  
**Prep Date:** 11/21/2017 17:53  
**Data File:** 112117V1\1J220.D

**Date Collected:** 11/08/2017 09:40  
**Date Received:** 11/10/2017 08:55  
**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:** 20  
**Purge Vol:** 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	6.00	ug/L	6.00	20.0
71-55-6	1,1,1-Trichloroethane	U	6.00	ug/L	6.00	20.0
79-34-5	1,1,2,2-Tetrachloroethane	U	6.00	ug/L	6.00	20.0
79-00-5	1,1,2-Trichloroethane	U	6.00	ug/L	6.00	20.0
75-34-3	1,1-Dichloroethane	U	6.00	ug/L	6.00	20.0
75-35-4	1,1-Dichloroethylene	U	6.00	ug/L	6.00	20.0
563-58-6	1,1-Dichloropropene	U	6.00	ug/L	6.00	20.0
87-61-6	1,2,3-Trichlorobenzene	U	6.00	ug/L	6.00	20.0
96-18-4	1,2,3-Trichloropropane	U	6.00	ug/L	6.00	20.0
120-82-1	1,2,4-Trichlorobenzene	U	6.00	ug/L	6.00	20.0
95-63-6	1,2,4-Trimethylbenzene	U	6.00	ug/L	6.00	20.0
96-12-8	1,2-Dibromo-3-chloropropane	U	10.0	ug/L	10.0	20.0
106-93-4	1,2-Dibromoethane	U	6.00	ug/L	6.00	20.0
95-50-1	1,2-Dichlorobenzene	U	6.00	ug/L	6.00	20.0
107-06-2	1,2-Dichloroethane	U	6.00	ug/L	6.00	20.0
78-87-5	1,2-Dichloropropane	U	6.00	ug/L	6.00	20.0
108-67-8	1,3,5-Trimethylbenzene	U	6.00	ug/L	6.00	20.0
541-73-1	1,3-Dichlorobenzene	U	6.00	ug/L	6.00	20.0
142-28-9	1,3-Dichloropropane	U	6.00	ug/L	6.00	20.0
106-46-7	1,4-Dichlorobenzene	U	6.00	ug/L	6.00	20.0
594-20-7	2,2-Dichloropropane	U	6.00	ug/L	6.00	20.0
78-93-3	2-Butanone	U	30.0	ug/L	30.0	100
126-99-8	2-Chloro-1,3-butadiene		892	ug/L	6.00	20.0
95-49-8	2-Chlorotoluene	U	6.00	ug/L	6.00	20.0
591-78-6	2-Hexanone	U	30.0	ug/L	30.0	100
106-43-4	4-Chlorotoluene	U	6.00	ug/L	6.00	20.0
99-87-6	4-Isopropyltoluene	U	6.00	ug/L	6.00	20.0
108-10-1	4-Methyl-2-pentanone	U	30.0	ug/L	30.0	100
67-64-1	Acetone	U	30.0	ug/L	30.0	200
75-05-8	Acetonitrile	U	160	ug/L	160	500
107-02-8	Acrolein		4300	ug/L	30.0	100
107-13-1	Acrylonitrile		4640	ug/L	30.0	100
107-05-1	Allyl chloride		4450	ug/L	30.0	100
71-43-2	Benzene	U	6.00	ug/L	6.00	20.0
108-86-1	Bromobenzene	U	6.00	ug/L	6.00	20.0
74-97-5	Bromochloromethane	U	6.00	ug/L	6.00	20.0
75-27-4	Bromodichloromethane	U	6.00	ug/L	6.00	20.0
75-25-2	Bromoform	U	6.00	ug/L	6.00	20.0

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

<b>SDG Number:</b> 2018-853	<b>Date Collected:</b> 11/08/2017 09:40	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203924020	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> QC for batch 1720561	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> WST05-18-148660PS	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720561	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 20
<b>Run Date:</b> 11/21/2017 17:53	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/21/2017 17:53		
<b>Data File:</b> 112117V1\1J220.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	6.00	ug/L	6.00	20.0
75-15-0	Carbon disulfide	U	30.0	ug/L	30.0	100
56-23-5	Carbon tetrachloride	U	6.00	ug/L	6.00	20.0
108-90-7	Chlorobenzene	U	6.00	ug/L	6.00	20.0
75-00-3	Chloroethane	U	6.00	ug/L	6.00	20.0
67-66-3	Chloroform	U	6.00	ug/L	6.00	20.0
74-87-3	Chloromethane	U	6.00	ug/L	6.00	20.0
124-48-1	Dibromochloromethane	U	6.00	ug/L	6.00	20.0
74-95-3	Dibromomethane	U	6.00	ug/L	6.00	20.0
75-71-8	Dichlorodifluoromethane	U	6.00	ug/L	6.00	20.0
60-29-7	Ethyl ether	U	6.00	ug/L	6.00	20.0
97-63-2	Ethyl methacrylate		4150	ug/L	30.0	100
100-41-4	Ethylbenzene	U	6.00	ug/L	6.00	20.0
87-68-3	Hexachlorobutadiene	U	6.00	ug/L	6.00	20.0
74-88-4	Iodomethane	U	30.0	ug/L	30.0	100
78-83-1	Isobutyl alcohol		51200	ug/L	300	1000
98-82-8	Isopropylbenzene	U	6.00	ug/L	6.00	20.0
126-98-7	Methacrylonitrile		4640	ug/L	30.0	100
80-62-6	Methyl methacrylate		4740	ug/L	30.0	100
75-09-2	Methylene chloride	U	20.0	ug/L	20.0	200
91-20-3	Naphthalene	U	6.00	ug/L	6.00	20.0
107-12-0	Propionitrile		4580	ug/L	30.0	100
100-42-5	Styrene	U	6.00	ug/L	6.00	20.0
127-18-4	Tetrachloroethylene	U	6.00	ug/L	6.00	20.0
108-88-3	Toluene	U	6.00	ug/L	6.00	20.0
79-01-6	Trichloroethylene	U	6.00	ug/L	6.00	20.0
75-69-4	Trichlorofluoromethane	U	6.00	ug/L	6.00	20.0
76-13-1	Trichlorotrifluoroethane		4560	ug/L	40.0	100
108-05-4	Vinyl acetate	U	30.0	ug/L	30.0	100
75-01-4	Vinyl chloride	U	6.00	ug/L	6.00	20.0
156-59-2	cis-1,2-Dichloroethylene	U	6.00	ug/L	6.00	20.0
10061-01-5	cis-1,3-Dichloropropylene	U	6.00	ug/L	6.00	20.0
179601-23-1	m,p-Xylenes	U	6.00	ug/L	6.00	40.0
71-36-3	n-Butyl alcohol	U	300	ug/L	300	1000
104-51-8	n-Butylbenzene	U	6.00	ug/L	6.00	20.0
103-65-1	n-Propylbenzene	U	6.00	ug/L	6.00	20.0
95-47-6	o-Xylene	U	6.00	ug/L	6.00	20.0
135-98-8	sec-Butylbenzene	U	6.00	ug/L	6.00	20.0

**Volatile  
Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b>	2018-853	<b>Date Collected:</b>	11/08/2017 09:40	<b>Matrix:</b>	W
<b>Lab Sample ID:</b>	1203924020	<b>Date Received:</b>	11/10/2017 08:55		
<b>Client Sample:</b>	QC for batch 1720561	<b>Client:</b>	ARSL004	<b>Project:</b>	QC
<b>Client ID:</b>	WST05-18-148660PS	<b>Method:</b>	SW-846:8260B	<b>SOP Ref:</b>	GL-OA-E-038
<b>Batch ID:</b>	1720561	<b>Inst:</b>	VOA1.I	<b>Dilution:</b>	20
<b>Run Date:</b>	11/21/2017 17:53	<b>Analyst:</b>	PXY1	<b>Purge Vol:</b>	5 mL
<b>Prep Date:</b>	11/21/2017 17:53				
<b>Data File:</b>	112117V1\1J220.D	<b>Column:</b>	DB-624		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether	U	6.00	ug/L	6.00	20.0
98-06-6	tert-Butylbenzene	U	6.00	ug/L	6.00	20.0
156-60-5	trans-1,2-Dichloroethylene	U	6.00	ug/L	6.00	20.0
10061-02-6	trans-1,3-Dichloropropylene	U	6.00	ug/L	6.00	20.0

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	43.4	50.0	ug/L 87	(71%-134%)
Bromofluorobenzene	55.1	50.0	ug/L 110	(70%-131%)
Toluene-d8	44.4	50.0	ug/L 89	(74%-124%)

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

Page 1 of 3

<b>SDG Number:</b> 2018-853	<b>Date Collected:</b> 11/08/2017 09:40	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203924021	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> QC for batch 1720561	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> WST05-18-148660PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720561	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 20
<b>Run Date:</b> 11/21/2017 17:24	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/21/2017 17:24		
<b>Data File:</b> 112117V1\1J219.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		1010	ug/L	6.00	20.0
71-55-6	1,1,1-Trichloroethane		1030	ug/L	6.00	20.0
79-34-5	1,1,2,2-Tetrachloroethane		883	ug/L	6.00	20.0
79-00-5	1,1,2-Trichloroethane		948	ug/L	6.00	20.0
75-34-3	1,1-Dichloroethane		1030	ug/L	6.00	20.0
75-35-4	1,1-Dichloroethylene		1040	ug/L	6.00	20.0
563-58-6	1,1-Dichloropropene		1010	ug/L	6.00	20.0
87-61-6	1,2,3-Trichlorobenzene		971	ug/L	6.00	20.0
96-18-4	1,2,3-Trichloropropane		934	ug/L	6.00	20.0
120-82-1	1,2,4-Trichlorobenzene		1050	ug/L	6.00	20.0
95-63-6	1,2,4-Trimethylbenzene		935	ug/L	6.00	20.0
96-12-8	1,2-Dibromo-3-chloropropane		857	ug/L	10.0	20.0
106-93-4	1,2-Dibromoethane		972	ug/L	6.00	20.0
95-50-1	1,2-Dichlorobenzene		910	ug/L	6.00	20.0
107-06-2	1,2-Dichloroethane		1100	ug/L	6.00	20.0
78-87-5	1,2-Dichloropropane		1000	ug/L	6.00	20.0
108-67-8	1,3,5-Trimethylbenzene		931	ug/L	6.00	20.0
541-73-1	1,3-Dichlorobenzene		881	ug/L	6.00	20.0
142-28-9	1,3-Dichloropropane		933	ug/L	6.00	20.0
106-46-7	1,4-Dichlorobenzene		892	ug/L	6.00	20.0
594-20-7	2,2-Dichloropropane		1060	ug/L	6.00	20.0
78-93-3	2-Butanone		8230	ug/L	30.0	100
126-99-8	2-Chloro-1,3-butadiene	U	6.00	ug/L	6.00	20.0
95-49-8	2-Chlorotoluene		907	ug/L	6.00	20.0
591-78-6	2-Hexanone		3340	ug/L	30.0	100
106-43-4	4-Chlorotoluene		909	ug/L	6.00	20.0
99-87-6	4-Isopropyltoluene		970	ug/L	6.00	20.0
108-10-1	4-Methyl-2-pentanone		4290	ug/L	30.0	100
67-64-1	Acetone		2350	ug/L	30.0	200
75-05-8	Acetonitrile		22600	ug/L	160	500
107-02-8	Acrolein	U	30.0	ug/L	30.0	100
107-13-1	Acrylonitrile	U	30.0	ug/L	30.0	100
107-05-1	Allyl chloride	U	30.0	ug/L	30.0	100
71-43-2	Benzene		984	ug/L	6.00	20.0
108-86-1	Bromobenzene		918	ug/L	6.00	20.0
74-97-5	Bromochloromethane		1010	ug/L	6.00	20.0
75-27-4	Bromodichloromethane		1080	ug/L	6.00	20.0
75-25-2	Bromoform		999	ug/L	6.00	20.0



**Volatile**  
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**Sample Summary**

<b>SDG Number:</b> 2018-853	<b>Date Collected:</b> 11/08/2017 09:40	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203924021	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> QC for batch 1720561	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> WST05-18-148660PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720561	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 20
<b>Run Date:</b> 11/21/2017 17:24	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/21/2017 17:24		
<b>Data File:</b> 112117V1\1J219.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		1060	ug/L	6.00	20.0
75-15-0	Carbon disulfide		4820	ug/L	30.0	100
56-23-5	Carbon tetrachloride		1090	ug/L	6.00	20.0
108-90-7	Chlorobenzene		926	ug/L	6.00	20.0
75-00-3	Chloroethane		913	ug/L	6.00	20.0
67-66-3	Chloroform		1040	ug/L	6.00	20.0
74-87-3	Chloromethane		953	ug/L	6.00	20.0
124-48-1	Dibromochloromethane		1010	ug/L	6.00	20.0
74-95-3	Dibromomethane		1050	ug/L	6.00	20.0
75-71-8	Dichlorodifluoromethane		977	ug/L	6.00	20.0
60-29-7	Ethyl ether		954	ug/L	6.00	20.0
97-63-2	Ethyl methacrylate	U	30.0	ug/L	30.0	100
100-41-4	Ethylbenzene		941	ug/L	6.00	20.0
87-68-3	Hexachlorobutadiene		999	ug/L	6.00	20.0
74-88-4	Iodomethane		4890	ug/L	30.0	100
78-83-1	Isobutyl alcohol	U	300	ug/L	300	1000
98-82-8	Isopropylbenzene		924	ug/L	6.00	20.0
126-98-7	Methacrylonitrile	U	30.0	ug/L	30.0	100
80-62-6	Methyl methacrylate	U	30.0	ug/L	30.0	100
75-09-2	Methylene chloride		1010	ug/L	20.0	200
91-20-3	Naphthalene		954	ug/L	6.00	20.0
107-12-0	Propionitrile	U	30.0	ug/L	30.0	100
100-42-5	Styrene		971	ug/L	6.00	20.0
127-18-4	Tetrachloroethylene		925	ug/L	6.00	20.0
108-88-3	Toluene		940	ug/L	6.00	20.0
79-01-6	Trichloroethylene		1060	ug/L	6.00	20.0
75-69-4	Trichlorofluoromethane		1030	ug/L	6.00	20.0
76-13-1	Trichlorotrifluoroethane	U	40.0	ug/L	40.0	100
108-05-4	Vinyl acetate		4740	ug/L	30.0	100
75-01-4	Vinyl chloride		997	ug/L	6.00	20.0
156-59-2	cis-1,2-Dichloroethylene		1030	ug/L	6.00	20.0
10061-01-5	cis-1,3-Dichloropropylene		1040	ug/L	6.00	20.0
179601-23-1	m,p-Xylenes		1870	ug/L	6.00	40.0
71-36-3	n-Butyl alcohol		101000	ug/L	300	1000
104-51-8	n-Butylbenzene		957	ug/L	6.00	20.0
103-65-1	n-Propylbenzene		909	ug/L	6.00	20.0
95-47-6	o-Xylene		969	ug/L	6.00	20.0
135-98-8	sec-Butylbenzene		947	ug/L	6.00	20.0

**Volatile**  
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**Sample Summary**

Page 3 of 3

<b>SDG Number:</b>	<b>2018-853</b>	<b>Date Collected:</b>	<b>11/08/2017 09:40</b>	<b>Matrix:</b>	<b>W</b>
<b>Lab Sample ID:</b>	<b>1203924021</b>	<b>Date Received:</b>	<b>11/10/2017 08:55</b>		
<b>Client Sample:</b>	<b>QC for batch 1720561</b>	<b>Client:</b>	<b>ARSL004</b>	<b>Project:</b>	<b>QC</b>
<b>Client ID:</b>	<b>WST05-18-148660PSD</b>	<b>Method:</b>	<b>SW-846:8260B</b>	<b>SOP Ref:</b>	<b>GL-OA-E-038</b>
<b>Batch ID:</b>	<b>1720561</b>	<b>Inst:</b>	<b>VOA1.I</b>	<b>Dilution:</b>	<b>20</b>
<b>Run Date:</b>	<b>11/21/2017 17:24</b>	<b>Analyst:</b>	<b>PXY1</b>	<b>Purge Vol:</b>	<b>5 mL</b>
<b>Prep Date:</b>	<b>11/21/2017 17:24</b>				
<b>Data File:</b>	<b>112117V1\1J219.D</b>	<b>Column:</b>	<b>DB-624</b>		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		1040	ug/L	6.00	20.0
98-06-6	tert-Butylbenzene		956	ug/L	6.00	20.0
156-60-5	trans-1,2-Dichloroethylene		1060	ug/L	6.00	20.0
10061-02-6	trans-1,3-Dichloropropylene		1020	ug/L	6.00	20.0

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	42.8	50.0	ug/L	86	(71%-134%)
Bromofluorobenzene	54.3	50.0	ug/L	109	(70%-131%)
Toluene-d8	43.9	50.0	ug/L	88	(74%-124%)

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

<b>SDG Number:</b> 2018-853	<b>Date Collected:</b> 11/08/2017 09:40	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203924022	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> QC for batch 1720561	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> WST05-18-148660PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720561	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 20
<b>Run Date:</b> 11/21/2017 18:21	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/21/2017 18:21		
<b>Data File:</b> 112117V1\1J221.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	6.00	ug/L	6.00	20.0
71-55-6	1,1,1-Trichloroethane	U	6.00	ug/L	6.00	20.0
79-34-5	1,1,2,2-Tetrachloroethane	U	6.00	ug/L	6.00	20.0
79-00-5	1,1,2-Trichloroethane	U	6.00	ug/L	6.00	20.0
75-34-3	1,1-Dichloroethane	U	6.00	ug/L	6.00	20.0
75-35-4	1,1-Dichloroethylene	U	6.00	ug/L	6.00	20.0
563-58-6	1,1-Dichloropropene	U	6.00	ug/L	6.00	20.0
87-61-6	1,2,3-Trichlorobenzene	U	6.00	ug/L	6.00	20.0
96-18-4	1,2,3-Trichloropropane	U	6.00	ug/L	6.00	20.0
120-82-1	1,2,4-Trichlorobenzene	U	6.00	ug/L	6.00	20.0
95-63-6	1,2,4-Trimethylbenzene	U	6.00	ug/L	6.00	20.0
96-12-8	1,2-Dibromo-3-chloropropane	U	10.0	ug/L	10.0	20.0
106-93-4	1,2-Dibromoethane	U	6.00	ug/L	6.00	20.0
95-50-1	1,2-Dichlorobenzene	U	6.00	ug/L	6.00	20.0
107-06-2	1,2-Dichloroethane	U	6.00	ug/L	6.00	20.0
78-87-5	1,2-Dichloropropane	U	6.00	ug/L	6.00	20.0
108-67-8	1,3,5-Trimethylbenzene	U	6.00	ug/L	6.00	20.0
541-73-1	1,3-Dichlorobenzene	U	6.00	ug/L	6.00	20.0
142-28-9	1,3-Dichloropropane	U	6.00	ug/L	6.00	20.0
106-46-7	1,4-Dichlorobenzene	U	6.00	ug/L	6.00	20.0
594-20-7	2,2-Dichloropropane	U	6.00	ug/L	6.00	20.0
78-93-3	2-Butanone	U	30.0	ug/L	30.0	100
126-99-8	2-Chloro-1,3-butadiene		865	ug/L	6.00	20.0
95-49-8	2-Chlorotoluene	U	6.00	ug/L	6.00	20.0
591-78-6	2-Hexanone	U	30.0	ug/L	30.0	100
106-43-4	4-Chlorotoluene	U	6.00	ug/L	6.00	20.0
99-87-6	4-Isopropyltoluene	U	6.00	ug/L	6.00	20.0
108-10-1	4-Methyl-2-pentanone	U	30.0	ug/L	30.0	100
67-64-1	Acetone	U	30.0	ug/L	30.0	200
75-05-8	Acetonitrile	U	160	ug/L	160	500
107-02-8	Acrolein		4090	ug/L	30.0	100
107-13-1	Acrylonitrile		4430	ug/L	30.0	100
107-05-1	Allyl chloride		4300	ug/L	30.0	100
71-43-2	Benzene	U	6.00	ug/L	6.00	20.0
108-86-1	Bromobenzene	U	6.00	ug/L	6.00	20.0
74-97-5	Bromochloromethane	U	6.00	ug/L	6.00	20.0
75-27-4	Bromodichloromethane	U	6.00	ug/L	6.00	20.0
75-25-2	Bromoform	U	6.00	ug/L	6.00	20.0

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

<b>SDG Number:</b> 2018-853	<b>Date Collected:</b> 11/08/2017 09:40	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203924022	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> QC for batch 1720561	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> WST05-18-148660PSD	<b>Method:</b> SW-846:8260B	<b>SOP Ref:</b> GL-OA-E-038
<b>Batch ID:</b> 1720561	<b>Inst:</b> VOA1.I	<b>Dilution:</b> 20
<b>Run Date:</b> 11/21/2017 18:21	<b>Analyst:</b> PXY1	<b>Purge Vol:</b> 5 mL
<b>Prep Date:</b> 11/21/2017 18:21		
<b>Data File:</b> 112117V1\1J221.D	<b>Column:</b> DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	6.00	ug/L	6.00	20.0
75-15-0	Carbon disulfide	U	30.0	ug/L	30.0	100
56-23-5	Carbon tetrachloride	U	6.00	ug/L	6.00	20.0
108-90-7	Chlorobenzene	U	6.00	ug/L	6.00	20.0
75-00-3	Chloroethane	U	6.00	ug/L	6.00	20.0
67-66-3	Chloroform	U	6.00	ug/L	6.00	20.0
74-87-3	Chloromethane	U	6.00	ug/L	6.00	20.0
124-48-1	Dibromochloromethane	U	6.00	ug/L	6.00	20.0
74-95-3	Dibromomethane	U	6.00	ug/L	6.00	20.0
75-71-8	Dichlorodifluoromethane	U	6.00	ug/L	6.00	20.0
60-29-7	Ethyl ether	U	6.00	ug/L	6.00	20.0
97-63-2	Ethyl methacrylate		4080	ug/L	30.0	100
100-41-4	Ethylbenzene	U	6.00	ug/L	6.00	20.0
87-68-3	Hexachlorobutadiene	U	6.00	ug/L	6.00	20.0
74-88-4	Iodomethane	U	30.0	ug/L	30.0	100
78-83-1	Isobutyl alcohol		47300	ug/L	300	1000
98-82-8	Isopropylbenzene	U	6.00	ug/L	6.00	20.0
126-98-7	Methacrylonitrile		4360	ug/L	30.0	100
80-62-6	Methyl methacrylate		4480	ug/L	30.0	100
75-09-2	Methylene chloride	U	20.0	ug/L	20.0	200
91-20-3	Naphthalene	U	6.00	ug/L	6.00	20.0
107-12-0	Propionitrile		4240	ug/L	30.0	100
100-42-5	Styrene	U	6.00	ug/L	6.00	20.0
127-18-4	Tetrachloroethylene	U	6.00	ug/L	6.00	20.0
108-88-3	Toluene	U	6.00	ug/L	6.00	20.0
79-01-6	Trichloroethylene	U	6.00	ug/L	6.00	20.0
75-69-4	Trichlorofluoromethane	U	6.00	ug/L	6.00	20.0
76-13-1	Trichlorotrifluoroethane		4380	ug/L	40.0	100
108-05-4	Vinyl acetate	U	30.0	ug/L	30.0	100
75-01-4	Vinyl chloride	U	6.00	ug/L	6.00	20.0
156-59-2	cis-1,2-Dichloroethylene	U	6.00	ug/L	6.00	20.0
10061-01-5	cis-1,3-Dichloropropylene	U	6.00	ug/L	6.00	20.0
179601-23-1	m,p-Xylenes	U	6.00	ug/L	6.00	40.0
71-36-3	n-Butyl alcohol	U	300	ug/L	300	1000
104-51-8	n-Butylbenzene	U	6.00	ug/L	6.00	20.0
103-65-1	n-Propylbenzene	U	6.00	ug/L	6.00	20.0
95-47-6	o-Xylene	U	6.00	ug/L	6.00	20.0
135-98-8	sec-Butylbenzene	U	6.00	ug/L	6.00	20.0

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

Page 3 of 3

<b>SDG Number:</b>	2018-853	<b>Date Collected:</b>	11/08/2017 09:40	<b>Matrix:</b>	W
<b>Lab Sample ID:</b>	1203924022	<b>Date Received:</b>	11/10/2017 08:55		
<b>Client Sample:</b>	QC for batch 1720561	<b>Client:</b>	ARSL004	<b>Project:</b>	QC
<b>Client ID:</b>	WST05-18-148660PSD	<b>Method:</b>	SW-846:8260B	<b>SOP Ref:</b>	GL-OA-E-038
<b>Batch ID:</b>	1720561	<b>Inst:</b>	VOA1.I	<b>Dilution:</b>	20
<b>Run Date:</b>	11/21/2017 18:21	<b>Analyst:</b>	PXY1	<b>Purge Vol:</b>	5 mL
<b>Prep Date:</b>	11/21/2017 18:21				
<b>Data File:</b>	112117V1\1J221.D	<b>Column:</b>	DB-624		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether	U	6.00	ug/L	6.00	20.0
98-06-6	tert-Butylbenzene	U	6.00	ug/L	6.00	20.0
156-60-5	trans-1,2-Dichloroethylene	U	6.00	ug/L	6.00	20.0
10061-02-6	trans-1,3-Dichloropropylene	U	6.00	ug/L	6.00	20.0

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	44.6	50.0	ug/L 89	(74%-124%)

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

Page 1 of 3

SDG Number: 2018-853

Matrix: WATER

Lab Sample ID: 1203925363

Client Sample: QC for batch 1720561

Client: ARSL004

Project: QC

Client ID: MB for batch 1720561

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1720561

Inst: VOA1.I

Dilution: 1

Run Date: 11/20/2017 21:35

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/20/2017 21:35

Data File: 112017V1\1J131A.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: 2018-853

Lab Sample ID: 1203925363

Client Sample: QC for batch 1720561

Client ID: MB for batch 1720561

Batch ID: 1720561

Run Date: 11/20/2017 21:35

Prep Date: 11/20/2017 21:35

Data File: 112017V1\1J131A.D

Matrix: WATER

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Column: DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
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

Page 3 of 3

SDG Number:	2018-853	Matrix:	WATER
Lab Sample ID:	1203925363		
Client Sample:	QC for batch 1720561	Client:	ARSL004
Client ID:	MB for batch 1720561	Method:	SW-846:8260B
Batch ID:	1720561	Inst:	VOA1.I
Run Date:	11/20/2017 21:35	Analyst:	PXY1
Prep Date:	11/20/2017 21:35		
Data File:	112017V1\1J131A.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	43.2	50.0	ug/L 86	(71%-134%)
Bromofluorobenzene	58.4	50.0	ug/L 117	(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: 2018-853

Matrix: WATER

Lab Sample ID: 1203925364

Client Sample: QC for batch 1720561

Client: ARSL004

Project: QC

Client ID: MB for batch 1720561

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1720561

Inst: VOA1.I

Dilution: 1

Run Date: 11/21/2017 11:09

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/21/2017 11:09

Column: DB-624

Data File: 112117V1\1J206A.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**

Page 2 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 1203925364  
**Client Sample:** QC for batch 1720561  
**Client ID:** MB for batch 1720561  
**Batch ID:** 1720561  
**Run Date:** 11/21/2017 11:09  
**Prep Date:** 11/21/2017 11:09  
**Data File:** 112117V1\1J206A.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

Page 3 of 3

SDG Number: 2018-853

Lab Sample ID: 1203925364

Client Sample: QC for batch 1720561

Client ID: MB for batch 1720561

Batch ID: 1720561

Run Date: 11/21/2017 11:09

Prep Date: 11/21/2017 11:09

Data File: 112117V1\1J206A.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: 2018-853

Lab Sample ID: 1203925365

Client Sample: QC for batch 1720561

Client ID: LCS for batch 1720561

Batch ID: 1720561

Run Date: 11/20/2017 20:09

Prep Date: 11/20/2017 20:09

Data File: 112017V1\1J128A.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		53.1	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		49.9	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		48.2	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		50.9	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		52.6	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		51.0	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		49.3	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		51.9	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		50.5	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		53.5	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		46.8	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		49.0	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		54.0	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		46.9	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		55.8	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		52.5	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		46.4	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		44.4	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		50.9	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		44.9	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		50.4	ug/L	0.300	1.00
78-93-3	2-Butanone		229	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		46.1	ug/L	0.300	1.00
591-78-6	2-Hexanone		213	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		45.6	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		231	ug/L	1.50	5.00
67-64-1	Acetone		217	ug/L	1.50	10.0
75-05-8	Acetonitrile		1260	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene		49.7	ug/L	0.300	1.00
108-86-1	Bromobenzene		47.2	ug/L	0.300	1.00
74-97-5	Bromochloromethane		54.3	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		56.0	ug/L	0.300	1.00
75-25-2	Bromoform		54.2	ug/L	0.300	1.00

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

Page 2 of 3

SDG Number: 2018-853

Lab Sample ID: 1203925365

Client Sample: QC for batch 1720561

Client ID: LCS for batch 1720561

Batch ID: 1720561

Run Date: 11/20/2017 20:09

Prep Date: 11/20/2017 20:09

Data File: 112017V1\1J128A.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
74-83-9	Bromomethane		53.1	ug/L	0.300	1.00
75-15-0	Carbon disulfide		239	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		51.0	ug/L	0.300	1.00
108-90-7	Chlorobenzene		47.9	ug/L	0.300	1.00
75-00-3	Chloroethane		46.6	ug/L	0.300	1.00
67-66-3	Chloroform		51.9	ug/L	0.300	1.00
74-87-3	Chloromethane		51.4	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		54.3	ug/L	0.300	1.00
74-95-3	Dibromomethane		56.0	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		49.0	ug/L	0.300	1.00
60-29-7	Ethyl ether		54.1	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		47.4	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		49.9	ug/L	0.300	1.00
74-88-4	Iodomethane		250	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		45.5	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride		53.6	ug/L	1.00	10.0
91-20-3	Naphthalene		52.9	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		50.0	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		45.1	ug/L	0.300	1.00
108-88-3	Toluene		46.5	ug/L	0.300	1.00
79-01-6	Trichloroethylene		52.7	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		47.3	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		251	ug/L	1.50	5.00
75-01-4	Vinyl chloride		48.5	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		53.7	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		56.1	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		94.1	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5670	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		46.7	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		44.1	ug/L	0.300	1.00
95-47-6	o-Xylene		49.0	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

Page 3 of 3

SDG Number:	2018-853	Matrix:	WATER
Lab Sample ID:	1203925365		
Client Sample:	QC for batch 1720561	Client:	ARSL004
Client ID:	LCS for batch 1720561	Method:	SW-846:8260B
Batch ID:	1720561	Inst:	VOA1.I
Run Date:	11/20/2017 20:09	Analyst:	PXY1
Prep Date:	11/20/2017 20:09		
Data File:	112017V1\1J128A.D	Column:	DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		57.7	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		47.9	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		51.9	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		54.7	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	53.5	50.0	ug/L	107	(70%-131%)
Toluene-d8	45.0	50.0	ug/L	90	(74%-124%)

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

Page 1 of 3

SDG Number: 2018-853

Lab Sample ID: 1203925366

Client Sample: QC for batch 1720561

Client ID: LCS for batch 1720561

Batch ID: 1720561

Run Date: 11/20/2017 21:06

Prep Date: 11/20/2017 21:06

Data File: 112017V1\1J130A.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		42.1	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein		209	ug/L	1.50	5.00
107-13-1	Acrylonitrile		230	ug/L	1.50	5.00
107-05-1	Allyl chloride		222	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: 2018-853

Lab Sample ID: 1203925366

Client Sample: QC for batch 1720561

Client ID: LCS for batch 1720561

Batch ID: 1720561

Run Date: 11/20/2017 21:06

Prep Date: 11/20/2017 21:06

Data File: 112017V1\1J130A.D

Matrix: WATER

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Column: DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
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		2350	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		228	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		235	ug/L	1.50	5.00
75-09-2	Methylene chloride	U	1.00	ug/L	1.00	10.0
91-20-3	Naphthalene	U	0.300	ug/L	0.300	1.00
107-12-0	Propionitrile		221	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		203	ug/L	2.00	5.00
108-05-4	Vinyl acetate	U	1.50	ug/L	1.50	5.00
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	0.300	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol	U	15.0	ug/L	15.0	50.0
104-51-8	n-Butylbenzene	U	0.300	ug/L	0.300	1.00
103-65-1	n-Propylbenzene	U	0.300	ug/L	0.300	1.00
95-47-6	o-Xylene	U	0.300	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene	U	0.300	ug/L	0.300	1.00



**Volatile  
Certificate of Analysis  
Sample Summary**

Page 3 of 3

<b>SDG Number:</b>	2018-853	<b>Matrix:</b>	WATER
<b>Lab Sample ID:</b>	1203925366		
<b>Client Sample:</b>	QC for batch 1720561	<b>Client:</b>	ARSL004
<b>Client ID:</b>	LCS for batch 1720561	<b>Method:</b>	SW-846:8260B
<b>Batch ID:</b>	1720561	<b>Inst:</b>	VOA1.I
<b>Run Date:</b>	11/20/2017 21:06	<b>Analyst:</b>	PXY1
<b>Prep Date:</b>	11/20/2017 21:06		
<b>Data File:</b>	112017V1\1J130A.D	<b>Column:</b>	DB-624
		<b>Project:</b>	QC
		<b>SOP Ref:</b>	GL-OA-E-038
		<b>Dilution:</b>	1
		<b>Purge Vol:</b>	5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether	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	43.5	50.0	ug/L	87	(71%-134%)
Bromofluorobenzene	54.7	50.0	ug/L	109	(70%-131%)
Toluene-d8	44.2	50.0	ug/L	88	(74%-124%)

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

Page 1 of 3

SDG Number: 2018-853

Matrix: WATER

Lab Sample ID: 1203925367

Client Sample: QC for batch 1720561

Client: ARSL004

Project: QC

Client ID: LCS for batch 1720561

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1720561

Inst: VOA1.I

Dilution: 1

Run Date: 11/21/2017 09:43

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/21/2017 09:43

Column: DB-624

Data File: 112117V1\1J203A.D

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**

Page 2 of 3

SDG Number: 2018-853

Matrix: WATER

Lab Sample ID: 1203925367

Client Sample: QC for batch 1720561

Client: ARSL004

Project: QC

Client ID: LCS for batch 1720561

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1720561

Inst: VOA1.I

Dilution: 1

Run Date: 11/21/2017 09:43

Analyst: PXY1

Purge Vol: 5 mL

Prep Date: 11/21/2017 09:43

Column: DB-624

Data File: 112117V1\1J203A.D

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**

Page 3 of 3

<b>SDG Number:</b>	2018-853	<b>Matrix:</b>	WATER
<b>Lab Sample ID:</b>	1203925367		
<b>Client Sample:</b>	QC for batch 1720561	<b>Client:</b>	ARSL004
<b>Client ID:</b>	LCS for batch 1720561	<b>Method:</b>	SW-846:8260B
<b>Batch ID:</b>	1720561	<b>Inst:</b>	VOA1.I
<b>Run Date:</b>	11/21/2017 09:43	<b>Analyst:</b>	PXY1
<b>Prep Date:</b>	11/21/2017 09:43	<b>Purge Vol:</b>	5 mL
<b>Data File:</b>	112117V1\1J203A.D	<b>Column:</b>	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**

Page 1 of 3

SDG Number: 2018-853

Lab Sample ID: 1203925368

Client Sample: QC for batch 1720561

Client ID: LCS for batch 1720561

Batch ID: 1720561

Run Date: 11/21/2017 10:40

Prep Date: 11/21/2017 10:40

Data File: 112117V1\1J205A.D

Matrix: WATER

Client: ARSL004

Method: SW-846:8260B

Inst: VOA1.I

Analyst: PXY1

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Column: DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
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

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

Page 2 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 1203925368  
**Client Sample:** QC for batch 1720561  
**Client ID:** LCS for batch 1720561  
**Batch ID:** 1720561  
**Run Date:** 11/21/2017 10:40  
**Prep Date:** 11/21/2017 10:40  
**Data File:** 112117V1\1J205A.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  
Certificate of Analysis  
Sample Summary

Page 3 of 3

SDG Number:	2018-853	Matrix:	WATER
Lab Sample ID:	1203925368		
Client Sample:	QC for batch 1720561	Client:	ARSL004
Client ID:	LCS for batch 1720561	Method:	SW-846:8260B
Batch ID:	1720561	Inst:	VOA1.I
Run Date:	11/21/2017 10:40	Analyst:	PXY1
Prep Date:	11/21/2017 10:40		
Data File:	112117V1\1J205A.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	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%)

# **Semi-Volatile Analysis**



# Case Narrative

**GC/MS Semivolatile  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2018-853  
Work Order #: 437794**

**Method/Analysis Information**

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

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
1203919736	Method Blank (MB)
1203919737	Laboratory Control Sample (LCS)
1203919738	437632003(CAMO-18-148073) Matrix Spike (MS)
1203919739	437632003(CAMO-18-148073) Matrix Spike Duplicate (MSD)

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

**Preparation/Analytical Method Verification**

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-009 REV# 39.

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

**Calibration Information**

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

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

**Initial Calibration**

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

**CCV Requirements**

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

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

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

**Surrogate Recoveries**

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

**Laboratory Control Sample Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

**QC Sample Designation**

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

**Spike Recovery Statement**

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

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

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

**Internal Standard (ISTD) Acceptance**

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

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

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

**Preparation/Analytical Method Verification**

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

**Sample Dilutions**

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

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

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

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

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

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

**TIC Comment**

Tentatively identified compounds (TIC) were requested for samples 437794002 (CAMO-18-148070) and 437794005 (CASA-18-148002) in this SDG in this batch.

**Additional Comments**

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

**Electronic Package Comment**

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

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

**System Configuration**

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

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

**Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the

requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

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

Client SDG: 2018-853 GEL Work Order: 437794

#### 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: 08 DEC 2017

Title: Data Validator

# **Sample Data Summary**

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

Page 1 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 437794002

**Date Collected:** 11/10/2017 11:20

**Matrix:** W

**Date Received:** 11/14/2017 09:05

**Client:** ARSL004

**Project:** ESHL00114

**Method:** SW846 3510C/8270D

**SOP Ref:** GL-OA-E-009

**Inst:** MSD2.I

**Dilution:** 1

**Batch ID:** 1718844

**Run Date:** 11/16/2017 02:46

**Analyst:** AGS1

**Inj. Vol:** 1 uL

**Prep Date:** 11/15/2017 09:15

**Aliquot:** 900 mL

**Final Volume:** 1 mL

**Data File:** s111517.B\s2k1521.D

**Column:** DB-5ms

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene	U	3.33	ug/L	3.33	11.1
120-82-1	1,2,4-Trichlorobenzene	U	3.33	ug/L	3.33	11.1
95-50-1	1,2-Dichlorobenzene	U	3.33	ug/L	3.33	11.1
122-66-7	Azobenzene	U	3.33	ug/L	3.33	11.1
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.33	ug/L	3.33	11.1
106-46-7	1,4-Dichlorobenzene	U	3.33	ug/L	3.33	11.1
123-91-1	1,4-Dioxane		17.8	ug/L	3.33	11.1
90-12-0	1-Methylnaphthalene	U	0.333	ug/L	0.333	1.11
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.33	ug/L	3.33	11.1
95-95-4	2,4,5-Trichlorophenol	U	3.33	ug/L	3.33	11.1
88-06-2	2,4,6-Trichlorophenol	U	3.33	ug/L	3.33	11.1
120-83-2	2,4-Dichlorophenol	U	3.33	ug/L	3.33	11.1
105-67-9	2,4-Dimethylphenol	U	3.33	ug/L	3.33	11.1
51-28-5	2,4-Dinitrophenol	U	5.56	ug/L	5.56	22.2
121-14-2	2,4-Dinitrotoluene	U	3.33	ug/L	3.33	11.1
606-20-2	2,6-Dinitrotoluene	U	3.33	ug/L	3.33	11.1
91-58-7	2-Chloronaphthalene	U	0.456	ug/L	0.456	1.11
95-57-8	2-Chlorophenol	U	3.33	ug/L	3.33	11.1
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.33	ug/L	3.33	11.1
91-57-6	2-Methylnaphthalene	U	0.333	ug/L	0.333	1.11
88-75-5	2-Nitrophenol	U	3.33	ug/L	3.33	11.1
91-94-1	3,3'-Dichlorobenzidine	U	3.33	ug/L	3.33	11.1
101-55-3	4-Bromophenylphenylether	U	3.33	ug/L	3.33	11.1
59-50-7	Parachlorometa cresol	U	3.33	ug/L	3.33	11.1
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.67	ug/L	3.67	11.1
7005-72-3	4-Chlorophenylphenylether	U	3.33	ug/L	3.33	11.1
100-02-7	4-Nitrophenol	U	3.33	ug/L	3.33	11.1
83-32-9	Acenaphthene	U	0.333	ug/L	0.333	1.11
208-96-8	Acenaphthylene	U	0.333	ug/L	0.333	1.11
62-53-3	Aniline	U	4.67	ug/L	4.67	11.1
120-12-7	Anthracene	U	0.333	ug/L	0.333	1.11
1912-24-9	Atrazine	U	3.33	ug/L	3.33	11.1
92-87-5	Benzidine	U	4.33	ug/L	4.33	11.1
56-55-3	Benzo(a)anthracene	U	0.333	ug/L	0.333	1.11
50-32-8	Benzo(a)pyrene	U	0.333	ug/L	0.333	1.11
205-99-2	Benzo(b)fluoranthene	U	0.333	ug/L	0.333	1.11
191-24-2	Benzo(ghi)perylene	U	0.333	ug/L	0.333	1.11



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

Page 2 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 437794002

**Date Collected:** 11/10/2017 11:20  
**Date Received:** 11/14/2017 09:05

**Matrix:** W

**Client ID:** CAMO-18-148070  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 02:46  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1521.D

**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 900 mL  
**Column:** DB-5ms

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

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

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

Page 3 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 437794002

**Date Collected:** 11/10/2017 11:20

**Matrix:** W

**Date Received:** 11/14/2017 09:05

**Client:** ARSL004

**Project:** ESHL00114

**Method:** SW846 3510C/8270D

**SOP Ref:** GL-OA-E-009

**Inst:** MSD2.I

**Dilution:** 1

**Client ID:** CAMO-18-148070

**Analyst:** AGS1

**Inj. Vol:** 1 uL

**Batch ID:** 1718844

**Aliquot:** 900 mL

**Final Volume:** 1 mL

**Run Date:** 11/16/2017 02:46

**Column:** DB-5ms

**Prep Date:** 11/15/2017 09:15

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
2,4,6-Tribromophenol	68.6	111	ug/L	62 (32%-124%)
2-Fluorobiphenyl	28.7	55.6	ug/L	52 (32%-112%)
2-Fluorophenol	42.2	111	ug/L	38 (15%-88%)
Nitrobenzene-d5	30.1	55.6	ug/L	54 (36%-115%)
Phenol-d5	23.3	111	ug/L	21 (15%-91%)
p-Terphenyl-d14	44.9	55.6	ug/L	81 (36%-121%)

**Tentatively Identified Compound Summary**

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

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

Page 1 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 437794005

**Date Collected:** 11/10/2017 11:08  
**Date Received:** 11/14/2017 09:05

**Matrix:** W

**Client ID:** CASA-18-148002  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 03:15  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1522.D

**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 940 mL  
**Column:** DB-5ms

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene	U	3.19	ug/L	3.19	10.6
120-82-1	1,2,4-Trichlorobenzene	U	3.19	ug/L	3.19	10.6
95-50-1	1,2-Dichlorobenzene	U	3.19	ug/L	3.19	10.6
122-66-7	Azobenzene	U	3.19	ug/L	3.19	10.6
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.19	ug/L	3.19	10.6
106-46-7	1,4-Dichlorobenzene	U	3.19	ug/L	3.19	10.6
123-91-1	1,4-Dioxane	U	3.19	ug/L	3.19	10.6
90-12-0	1-Methylnaphthalene	U	0.319	ug/L	0.319	1.06
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.19	ug/L	3.19	10.6
95-95-4	2,4,5-Trichlorophenol	U	3.19	ug/L	3.19	10.6
88-06-2	2,4,6-Trichlorophenol	U	3.19	ug/L	3.19	10.6
120-83-2	2,4-Dichlorophenol	U	3.19	ug/L	3.19	10.6
105-67-9	2,4-Dimethylphenol	U	3.19	ug/L	3.19	10.6
51-28-5	2,4-Dinitrophenol	U	5.32	ug/L	5.32	21.3
121-14-2	2,4-Dinitrotoluene	U	3.19	ug/L	3.19	10.6
606-20-2	2,6-Dinitrotoluene	U	3.19	ug/L	3.19	10.6
91-58-7	2-Chloronaphthalene	U	0.436	ug/L	0.436	1.06
95-57-8	2-Chlorophenol	U	3.19	ug/L	3.19	10.6
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.19	ug/L	3.19	10.6
91-57-6	2-Methylnaphthalene	U	0.319	ug/L	0.319	1.06
88-75-5	2-Nitrophenol	U	3.19	ug/L	3.19	10.6
91-94-1	3,3'-Dichlorobenzidine	U	3.19	ug/L	3.19	10.6
101-55-3	4-Bromophenylphenylether	U	3.19	ug/L	3.19	10.6
59-50-7	Parachlorometa cresol	U	3.19	ug/L	3.19	10.6
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.51	ug/L	3.51	10.6
7005-72-3	4-Chlorophenylphenylether	U	3.19	ug/L	3.19	10.6
100-02-7	4-Nitrophenol	U	3.19	ug/L	3.19	10.6
83-32-9	Acenaphthene	U	0.319	ug/L	0.319	1.06
208-96-8	Acenaphthylene	U	0.319	ug/L	0.319	1.06
62-53-3	Aniline	U	4.47	ug/L	4.47	10.6
120-12-7	Anthracene	U	0.319	ug/L	0.319	1.06
1912-24-9	Atrazine	U	3.19	ug/L	3.19	10.6
92-87-5	Benzidine	U	4.15	ug/L	4.15	10.6
56-55-3	Benzo(a)anthracene	U	0.319	ug/L	0.319	1.06
50-32-8	Benzo(a)pyrene	U	0.319	ug/L	0.319	1.06
205-99-2	Benzo(b)fluoranthene	U	0.319	ug/L	0.319	1.06
191-24-2	Benzo(ghi)perylene	U	0.319	ug/L	0.319	1.06

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

Page 2 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 437794005

**Date Collected:** 11/10/2017 11:08  
**Date Received:** 11/14/2017 09:05

**Matrix:** W

**Client ID:** CASA-18-148002  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 03:15  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1522.D

**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 940 mL  
**Column:** DB-5ms

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene	U	0.319	ug/L	0.319	1.06
65-85-0	Benzoic acid	U	6.38	ug/L	6.38	21.3
100-51-6	Benzyl alcohol	U	3.19	ug/L	3.19	10.6
85-68-7	Butylbenzylphthalate	U	3.19	ug/L	3.19	10.6
218-01-9	Chrysene	U	0.319	ug/L	0.319	1.06
84-74-2	Di-n-butylphthalate	U	3.19	ug/L	3.19	10.6
117-84-0	Di-n-octylphthalate	U	3.19	ug/L	3.19	10.6
53-70-3	Dibenzo(a,h)anthracene	U	0.319	ug/L	0.319	1.06
132-64-9	Dibenzofuran	U	3.19	ug/L	3.19	10.6
84-66-2	Diethylphthalate	U	3.19	ug/L	3.19	10.6
131-11-3	Dimethylphthalate	U	3.19	ug/L	3.19	10.6
88-85-7	Dinoseb	U	3.19	ug/L	3.19	10.6
122-39-4	Diphenylamine	U	3.19	ug/L	3.19	10.6
206-44-0	Fluoranthene	U	0.319	ug/L	0.319	1.06
86-73-7	Fluorene	U	0.319	ug/L	0.319	1.06
118-74-1	Hexachlorobenzene	U	3.19	ug/L	3.19	10.6
87-68-3	Hexachlorobutadiene	U	3.19	ug/L	3.19	10.6
77-47-4	Hexachlorocyclopentadiene	U	3.19	ug/L	3.19	10.6
67-72-1	Hexachloroethane	U	3.19	ug/L	3.19	10.6
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.319	ug/L	0.319	1.06
78-59-1	Isophorone	U	3.72	ug/L	3.72	10.6
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.19	ug/L	3.19	10.6
924-16-3	N-Nitrosodi-n-butylamine	U	3.19	ug/L	3.19	10.6
55-18-5	N-Nitrosodiethylamine	U	3.19	ug/L	3.19	10.6
621-64-7	N-Nitrosodi-n-propylamine	U	3.19	ug/L	3.19	10.6
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.19	ug/L	3.19	10.6
91-20-3	Naphthalene	U	0.319	ug/L	0.319	1.06
98-95-3	Nitrobenzene	U	3.19	ug/L	3.19	10.6
608-93-5	Pentachlorobenzene	U	3.19	ug/L	3.19	10.6
87-86-5	Pentachlorophenol	U	3.19	ug/L	3.19	10.6
85-01-8	Phenanthrene	U	0.319	ug/L	0.319	1.06
108-95-2	Phenol	U	3.19	ug/L	3.19	10.6
129-00-0	Pyrene	U	0.319	ug/L	0.319	1.06
110-86-1	Pyridine	U	3.19	ug/L	3.19	10.6
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.19	ug/L	3.19	10.6
111-91-1	bis(2-Chloroethoxy)methane	U	3.19	ug/L	3.19	10.6
111-44-4	bis(2-Chloroethyl) ether	U	3.19	ug/L	3.19	10.6
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.19	ug/L	3.19	10.6

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

Page 3 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 437794005  
  
**Client ID:** CASA-18-148002  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 03:15  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1522.D

**Date Collected:** 11/10/2017 11:08  
**Date Received:** 11/14/2017 09:05  
**Client:** ARSL004  
**Method:** SW846 3510C/8270D  
**Inst:** MSD2.I  
**Analyst:** AGS1  
**Aliquot:** 940 mL  
**Column:** DB-5ms  
  
**Matrix:** W  
  
**Project:** ESHL00114  
**SOP Ref:** GL-OA-E-009  
**Dilution:** 1  
**Inj. Vol:** 1 uL  
**Final Volume:** 1 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols	U	3.94	ug/L	3.94	10.6
99-09-2	3-Nitroaniline	U	3.19	ug/L	3.19	10.6
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol	U	3.19	ug/L	3.19	10.6
88-74-4	2-Nitroaniline	U	3.19	ug/L	3.19	10.6
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline	U	3.19	ug/L	3.19	10.6
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	79.4	106	ug/L	75	(32%-124%)
2-Fluorobiphenyl	35.1	53.2	ug/L	66	(32%-112%)
2-Fluorophenol	42.9	106	ug/L	40	(15%-88%)
Nitrobenzene-d5	33.8	53.2	ug/L	63	(36%-115%)
Phenol-d5	23.3	106	ug/L	22	(15%-91%)
p-Terphenyl-d14	49.5	53.2	ug/L	93	(36%-121%)

**Tentatively Identified Compound Summary**

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
000056-23-5	Carbon Tetrachloride	2.249	4.37	ug/L	90	NJ

# **Quality Control Summary**

Semi-Volatile  
Surrogate Recovery Report

Page 1 of 1

SDG Number: 2018-853

Matrix Type: LIQUID

Sample ID	Client ID	2FP %REC	PHL %REC	NBZ %REC	FBP %REC	TBP %REC	TPH %REC
1203919736	MB for batch 1718842	39	21	54	47	63	79
1203919737	LCS for batch 1718842	46	36	64	62	75	81
1203919738	CAMO-18-148073MS	64	47	74	70	88	95
1203919739	CAMO-18-148073MSD	55	40	66	64	82	89
437794002	CAMO-18-148070	38	21	54	52	62	81
437794005	CASA-18-148002	40	22	63	66	75	93

## 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: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718842

Matrix: WATER

Lab Sample ID 1203919737

Instrument: MSD2.I

Analysis Date: 11/15/2017 20:33

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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



Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 2 of 4

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718842

Matrix: WATER

Lab Sample ID 1203919737

Instrument: MSD2.I

Analysis Date: 11/15/2017 20:33

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 3 of 4

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718842

Matrix: WATER

Lab Sample ID 1203919737

Instrument: MSD2.I

Analysis Date: 11/15/2017 20:33

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 4 of 4

SDG Number: 2018-853

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718842

Matrix: WATER

Lab Sample ID 1203919737

Instrument: MSD2.I

Analysis Date: 11/15/2017 20:33

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 1 of 8

SDG Number: 2018-853

Sample Type: Matrix Spike

Client ID: CAMO-18-148073MS

Matrix: W

Lab Sample ID 1203919738

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:22

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 2 of 8

SDG Number: 2018-853

Sample Type: Matrix Spike

Client ID: CAMO-18-148073MS

Matrix: W

Lab Sample ID 1203919738

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:22

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 3 of 8

SDG Number: 2018-853

Sample Type: Matrix Spike

Client ID: CAMO-18-148073MS

Matrix: W

Lab Sample ID 1203919738

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:22

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 4 of 8

SDG Number: 2018-853

Client ID: CAMO-18-148073MS

Lab Sample ID 1203919738

Instrument: MSD2.I

Analyst: AGS1

Inj. Vol: 1 uL

Sample Type: Matrix Spike

Matrix: W

Analysis Date: 11/16/2017 00:22

Dilution: 1

Prep Batch ID:1718842

Batch ID: 1718844

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

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 5 of 8

SDG Number: 2018-853

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148073MSD

Matrix: W

Lab Sample ID 1203919739

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:50

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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



Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 6 of 8

SDG Number: 2018-853

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148073MSD

Matrix: W

Lab Sample ID 1203919739

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:50

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 7 of 8

SDG Number: 2018-853

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148073MSD

Matrix: W

Lab Sample ID 1203919739

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:50

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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

Semi-Volatile  
Quality Control Summary  
Spike Recovery Report

Page 8 of 8

SDG Number: 2018-853

Sample Type: Matrix Spike Duplicate

Client ID: CAMO-18-148073MSD

Matrix: W

Lab Sample ID 1203919739

Instrument: MSD2.I

Analysis Date: 11/16/2017 00:50

Dilution: 1

Analyst: AGS1

Prep Batch ID: 1718842

Inj. Vol: 1 uL

Batch ID: 1718844

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

## Method Blank Summary

Page 1 of 1

SDG Number:	2018-853	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1718842	Instrument ID:	MSD2.I	Data File:	s111517.B\s2k1507.D
Lab Sample ID:	1203919736	Prep Date:	11/15/2017 09:15	Analyzed:	11/15/17 20:04
Column:	DB-5ms				

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

Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01 LCS for batch 1718842	1203919737	s111517.B\s2k1508.D	11/15/17	2033
02 CAMO-18-148073MS	1203919738	s111517.B\s2k1516.D	11/16/17	0022
03 CAMO-18-148073MSD	1203919739	s111517.B\s2k1517.D	11/16/17	0050
04 CAMO-18-148070	437794002	s111517.B\s2k1521.D	11/16/17	0246
05 CASA-18-148002	437794005	s111517.B\s2k1522.D	11/16/17	0315

# Quality Control Data

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

Page 1 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 1203919736  
**Client Sample:** QC for batch 1718842  
**Client ID:** MB for batch 1718842  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 20:04  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1507.D

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

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

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

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

Page 2 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 1203919736  
**Client Sample:** QC for batch 1718842  
**Client ID:** MB for batch 1718842  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 20:04  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1507.D

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

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

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

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

Page 3 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 1203919736  
**Client Sample:** QC for batch 1718842  
**Client ID:** MB for batch 1718842  
**Batch ID:** 1718844  
**Run Date:** 11/15/2017 20:04  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1507.D

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

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

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

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

**Tentatively Identified Compound Summary**

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



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

Page 1 of 3

SDG Number: 2018-853

Lab Sample ID: 1203919737

Client Sample: QC for batch 1718842

Client ID: LCS for batch 1718842

Batch ID: 1718844

Run Date: 11/15/2017 20:33

Prep Date: 11/15/2017 09:15

Data File: s111517.B\s2k1508.D

Matrix: WATER

Client: ARSL004

Method: SW846 3510C/8270D

Inst: MSD2.I

Analyst: AGS1

Aliquot: 1000 mL

Column: DB-5ms

Project: QC

SOP Ref: GL-OA-E-009

Dilution: 1

Inj. Vol: 1 uL

Final Volume: 1 mL

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

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

Page 2 of 3

SDG Number: 2018-853

Lab Sample ID: 1203919737

Client Sample: QC for batch 1718842

Client ID: LCS for batch 1718842

Batch ID: 1718844

Run Date: 11/15/2017 20:33

Prep Date: 11/15/2017 09:15

Data File: s111517.B\s2k1508.D

Matrix: WATER

Client: ARSL004

Method: SW846 3510C/8270D

Inst: MSD2.I

Analyst: AGS1

Aliquot: 1000 mL

Column: DB-5ms

Project: QC

SOP Ref: GL-OA-E-009

Dilution: 1

Inj. Vol: 1 uL

Final Volume: 1 mL

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

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

Page 3 of 3

SDG Number: 2018-853

Lab Sample ID: 1203919737

Client Sample: QC for batch 1718842

Client ID: LCS for batch 1718842

Batch ID: 1718844

Run Date: 11/15/2017 20:33

Prep Date: 11/15/2017 09:15

Data File: s111517.B\s2k1508.D

Matrix: WATER

Client: ARSL004

Method: SW846 3510C/8270D

Inst: MSD2.I

Analyst: AGS1

Aliquot: 1000 mL

Column: DB-5ms

Project: QC

SOP Ref: GL-OA-E-009

Dilution: 1

Inj. Vol: 1 uL

Final Volume: 1 mL

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

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

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

Page 1 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 1203919738  
**Client Sample:** QC for batch 1718842  
**Client ID:** CAMO-18-148073MS  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 00:22  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1516.D

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

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

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

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

Page 2 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 1203919738  
**Client Sample:** QC for batch 1718842  
**Client ID:** CAMO-18-148073MS  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 00:22  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1516.D

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

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

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

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

Page 3 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 1203919738  
**Client Sample:** QC for batch 1718842  
**Client ID:** CAMO-18-148073MS  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 00:22  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1516.D

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

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

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

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

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

Page 1 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 1203919739  
**Client Sample:** QC for batch 1718842  
**Client ID:** CAMO-18-148073MSD  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 00:50  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1517.D

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

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

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

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

Page 2 of 3

**SDG Number:** 2018-853  
**Lab Sample ID:** 1203919739  
**Client Sample:** QC for batch 1718842  
**Client ID:** CAMO-18-148073MSD  
**Batch ID:** 1718844  
**Run Date:** 11/16/2017 00:50  
**Prep Date:** 11/15/2017 09:15  
**Data File:** s111517.B\s2k1517.D

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

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

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



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

Page 3 of 3

<b>SDG Number:</b> 2018-853	<b>Date Collected:</b> 11/08/2017 12:58	<b>Matrix:</b> W
<b>Lab Sample ID:</b> 1203919739	<b>Date Received:</b> 11/10/2017 08:55	
<b>Client Sample:</b> QC for batch 1718842	<b>Client:</b> ARSL004	<b>Project:</b> QC
<b>Client ID:</b> CAMO-18-148073MSD	<b>Method:</b> SW846 3510C/8270D	<b>SOP Ref:</b> GL-OA-E-009
<b>Batch ID:</b> 1718844	<b>Inst:</b> MSD2.I	<b>Dilution:</b> 1
<b>Run Date:</b> 11/16/2017 00:50	<b>Analyst:</b> AGS1	<b>Inj. Vol:</b> 1 uL
<b>Prep Date:</b> 11/15/2017 09:15	<b>Aliquot:</b> 460 mL	<b>Final Volume:</b> 1 mL
<b>Data File:</b> s111517.B\s2k1517.D	<b>Column:</b> DB-5ms	

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

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

# **Perchlorates by LCMSMS Analysis**

# Case Narrative

**Perchlorates by LCMSMS  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2018-853  
Work Order #: 437794**

**Method/Analysis Information**

<b>Procedure:</b>	<b>Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)</b>
Analytical Method:	SW-846:6850
Prep Method:	SW-846:6850
Analytical Batch Number:	1720716
Prep Batch Number:	1720708

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
437794001	437794001 (CAMO-18-148054)
437794004	437794004 (CASA-18-147995)
1203924394	Interference Check Sample (ICS)
1203924390	Method Blank (MB)
1203924391	Laboratory Control Sample (LCS)
1203924392	437632001(CAMO-18-148057) Matrix Spike (MS)
1203924393	437632001(CAMO-18-148057) Matrix Spike Duplicate (MSD)

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

**Preparation/Analytical Method Verification**

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-067 REV# 14.

## **Calibration Information**

### **Initial Calibration**

All initial calibration requirements have been met for this SDG. Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

### **ICV Requirements**

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

### **CCB Requirements**

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

### **CCV Requirements**

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

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

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

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

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

The MB analyzed with this SDG met the acceptance criteria.

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

The LCS spike recoveries met the acceptance limits.

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

The ICS spike recoveries met the acceptance criteria.

### **QC Sample Designation**

Client sample 437632001 (CAMO-18-148057) was chosen for matrix spike and matrix spike duplicate analysis.

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

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

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

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

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

### **Internal Standard Area Acceptance**

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

### **Retention Time**

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard. The presence of Perchlorate

was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by DOD QSM 5.0, has been used. In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

### **Technical Information**

#### **Holding Time Specifications**

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

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

All procedures were performed as stated in the SOP.

#### **Sample Dilutions**

Sample 437794001 (CAMO-18-148054) was diluted to bring the over range concentration within the calibration range.

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

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

### **Miscellaneous Information**

#### **Manual Integrations**

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

#### **Method Comments**

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

#### **Additional Comments**

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

#### **Perchlorate Isotope Ratio**

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

### **System Configuration**

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

#### **Electronic Packaging Comment**

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

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

### **Chromatographic Columns**

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

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

Dionex: IonPac AG-16 2 x 50 mm.

### **Certification Statement**

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

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

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

Client SDG: 2018-853 GEL Work Order: 437794

#### 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: 08 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: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-148054Date Received: 14-NOV-17GEL Job No (SDG): 2018-853GEL Sample ID: 437794001Date Filtered: 20-NOV-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	10	40	202	ug/L		200	28-NOV-17 02:25	per1127036a
	Perchlorate Isotope Ratio			3.1			200	28-NOV-17 02:25	per1127036a
14797-73-0	Perchlorate-101	10	40	204	ug/L		200	28-NOV-17 02:25	per1127036a
	Perchlorate-O(18)			82.2	ug/L		200	28-NOV-17 02:25	per1127036a

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

\*Concentration =

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

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-18-147995Date Received: 14-NOV-17GEL Job No (SDG): 2018-853GEL Sample ID: 437794004Date Filtered: 20-NOV-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.317	ug/L		1	28-NOV-17 02:37	per1127037a
	Perchlorate Isotope Ratio			3			1	28-NOV-17 02:37	per1127037a
14797-73-0	Perchlorate-101	.05	.2	0.330	ug/L		1	28-NOV-17 02:37	per1127037a
	Perchlorate-O(18)			0.439	ug/L		1	28-NOV-17 02:37	per1127037a

^ 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):** 2018-853

**Extract Batch Code:** 1720708

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

**Matrix:** WATER

**Sample ID:** 1203924391

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

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

### Perchlorate Spike/Spike Duplicate Summary

**Lab Name:** General Engineering Laboratories

**Lab Code:** GEL

**GEL Job No (SDG):** 2018-853

**Extract Batch Code:** 1720708

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

**GEL MS/PS ID:** 1203924392

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

**GEL MSD/PSD ID:** 1203924393

**QC Type:** MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	0.396	ug/L	0.547	75	.523	64 *	4	30	75 - 125
Perchlorate Isotope Ratio	0	3.00		3.01		3.04		1		-
Perchlorate-101	0.200	0.413	ug/L	0.568	78	.538	62 *	5	30	75 - 125
Perchlorate-O(18)	0	0.496	ug/L	0.483		.514		6		-

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

# Quality Control Data

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: EPA 6850 ModifiedMatrix: WATERExtraction Batch ID: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 20-NOV-17GEL Job No (SDG): 2018-853GEL Sample ID: 1203924390Date Filtered: 20-NOV-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.050	ug/L	U	1	27-NOV-17 23:50	per1127023a
	Perchlorate Isotope Ratio						1	27-NOV-17 23:50	per1127023a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	27-NOV-17 23:50	per1127023a
	Perchlorate-O(18)			0.503	ug/L		1	27-NOV-17 23:50	per1127023a

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

\*Concentration =

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



## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: EPA 6850 ModifiedMatrix: WATERExtraction Batch ID: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 20-NOV-17GEL Job No (SDG): 2018-853GEL Sample ID: 1203924391Date Filtered: 20-NOV-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.184	ug/L	J	1	28-NOV-17 00:02	per1127024a
	Perchlorate Isotope Ratio			2.87			1	28-NOV-17 00:02	per1127024a
14797-73-0	Perchlorate-101	.05	.2	0.200	ug/L		1	28-NOV-17 00:02	per1127024a
	Perchlorate-O(18)			0.498	ug/L		1	28-NOV-17 00:02	per1127024a

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

\*Concentration =

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

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2018-853GEL Sample ID: 1203924394Date Filtered: 20-NOV-17Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L		1	28-NOV-17 00:14	per1127025a
	Perchlorate Isotope Ratio			3.06			1	28-NOV-17 00:14	per1127025a
14797-73-0	Perchlorate-101	.05	.2	0.204	ug/L		1	28-NOV-17 00:14	per1127025a
	Perchlorate-O(18)			0.513	ug/L		1	28-NOV-17 00:14	per1127025a

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

\*Concentration =

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

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-148057MSDate Received: 10-NOV-17GEL Job No (SDG): 2018-853GEL Sample ID: 1203924392Date Filtered: 20-NOV-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.547	ug/L		1	28-NOV-17 01:01	per1127029a
	Perchlorate Isotope Ratio			3.01			1	28-NOV-17 01:01	per1127029a
14797-73-0	Perchlorate-101	.05	.2	0.568	ug/L		1	28-NOV-17 01:01	per1127029a
	Perchlorate-O(18)			0.483	ug/L		1	28-NOV-17 01:01	per1127029a

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

\*Concentration =

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

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1720708Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-148057MSDDate Received: 10-NOV-17GEL Job No (SDG): 2018-853GEL Sample ID: 1203924393Date Filtered: 20-NOV-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.523	ug/L		1	28-NOV-17 01:13	per1127030a
	Perchlorate Isotope Ratio			3.04			1	28-NOV-17 01:13	per1127030a
14797-73-0	Perchlorate-101	.05	.2	0.538	ug/L		1	28-NOV-17 01:13	per1127030a
	Perchlorate-O(18)			0.514	ug/L		1	28-NOV-17 01:13	per1127030a

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

\*Concentration =

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

# **Metals Analysis**

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**ARS International, LLC (ARSL)**  
**SDG #: 2018-853**  
**Work Order #: 437794**

<b>Sample ID</b>	<b>Client ID</b>
437794001	CAMO-18-148054
437794002	CAMO-18-148070
437794004	CASA-18-147995
437794005	CASA-18-148002
1203919761	Method Blank (MB) <b>ICP</b>
1203919762	Laboratory Control Sample (LCS)
1203919765	437794001(CAMO-18-148054L) Serial Dilution (SD)
1203919763	437794001(CAMO-18-148054D) Sample Duplicate (DUP)
1203919764	437794001(CAMO-18-148054S) Matrix Spike (MS)
1203919771	Method Blank (MB) <b>ICP-MS</b>
1203919772	Laboratory Control Sample (LCS)
1203919775	437794001(CAMO-18-148054L) Serial Dilution (SD)
1203919773	437794001(CAMO-18-148054D) Sample Duplicate (DUP)
1203919774	437794001(CAMO-18-148054S) Matrix Spike (MS)
1203929065	Method Blank (MB) <b>CVAA</b>
1203929066	Laboratory Control Sample (LCS)
1203929072	437794001(CAMO-18-148054L) Serial Dilution (SD)
1203929068	437794001(CAMO-18-148054D) Sample Duplicate (DUP)
1203929070	437794001(CAMO-18-148054S) Matrix Spike (MS)

**Sample Analysis**

Samples 437794001,002,004 and 005 in this SDG were analyzed for metals and mercury on an "as received" basis.

**Method/Analysis Information**

<b>Analytical Batch:</b>	1718859, 1718865, 1722594 and 1725385
<b>Prep Batch :</b>	1718858, 1718864 and 1722586
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 30, GL-MA-E-006 REV# 14, GL-MA-E-014 REV# 32, GL-MA-E-010 REV# 36 and GL-GC-E-107 REV# 10
<b>Analytical Method:</b>	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.2 1974 and SM:A2340B
<b>Prep Method :</b>	SW846 3005A and EPA 245.1/245.2 Prep

**Preparation/Analytical Method Verification**

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

## **System Configuration**

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

The Metals analysis-ICP was performed on a P E 5300 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 sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 437794001 (CAMO-18-148054) and 437794004 (CASA-18-147995)-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: 437794001 (CAMO-18-148054)-ICP, ICP-MS and CVAA.

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

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



control acceptance criteria for percent recoveries for all applicable analytes.

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

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

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

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

#### **Technical Information**

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

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

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

All procedures were performed as stated in the SOP.

##### **Sample Dilutions**

The samples in this SDG did not require dilutions.

##### **Preparation Information**

The samples in this SDG were not diluted and were prepared according to the cited SOP.

#### **Miscellaneous Information**

##### **Electronic Packaging Comment**

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

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

##### **Additional Comments**

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

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

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

#### **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the

requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

## **GEL LABORATORIES LLC**

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

### **Qualifier Definition Report for**

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

Client SDG: 2018-853 GEL Work Order: 437794

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

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

#### **Review/Validation**

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

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

**Signature:**



**Name: Nik-Cole Elmore**

**Date: 11 DEC 2017**

**Title: Data Validator**

# **Sample Data Summary**

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

**SDG No:** 2018-853**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437794001**BASIS:** As Received**DATE COLLECTED** 10-NOV-17**CLIENT ID:** CAMO-18-148054**LEVEL:** Low**DATE RECEIVED** 14-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	12/01/17 11:03	120117W3-4	1722594

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

SDG No: 2018-853

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 437794001

BASIS: As Received

DATE COLLECTED 10-NOV-17

CLIENT ID: CAMO-18-148054

LEVEL: Low

DATE RECEIVED 14-NOV-17

MATRIX: W

%SOLIDS: 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	68	ug/L	U	68	200	200	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7440-38-2	Arsenic	2.14	ug/L	J	2	5	5	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7440-39-3	Barium	27.9	ug/L		1	5	5	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7440-42-8	Boron	21.7	ug/L	J	15	50	50	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7440-70-2	Calcium	36000	ug/L		50	200	200	1	P	HSC	12/11/17 09:26	121117A-2	1718859
7440-47-3	Chromium	6.2	ug/L	J	3	10	10	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	12/11/17 09:26	121117A-2	1718859
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7439-95-4	Magnesium	6770	ug/L		110	300	300	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7439-98-7	Molybdenum	0.914	ug/L		0.2	0.5	0.5	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7440-02-0	Nickel	1.42	ug/L	J	0.6	2	2	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7440-09-7	Potassium	655	ug/L		50	150	150	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7631-86-9	Silica	63200	ug/L		53	213	213	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7440-23-5	Sodium	15900	ug/L		100	300	300	1	P	HSC	12/11/17 09:26	121117A-2	1718859
7440-24-6	Strontium	160	ug/L		1	5	5	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7440-31-5	Tin	3.87	ug/L	J	2.5	10	10	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7440-61-1	Uranium	0.145	ug/L	J	0.067	0.2	0.2	1	MS	BAJ	11/30/17 19:36	171130-3	1718865
7440-62-2	Vanadium	1.51	ug/L	J	1	5	5	1	P	HSC	12/07/17 16:45	120717A-1	1718859
7440-66-6	Zinc	5.93	ug/L	J	3.3	10	10	1	P	HSC	12/11/17 09:26	121117A-2	1718859

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

**SDG No:** 2018-853**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 437794001**BASIS:** As Received**DATE COLLECTED** 10-NOV-17**CLIENT ID:** CAMO-18-148054**LEVEL:** Low**DATE RECEIVED** 14-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	118	mg/L		0.453	1.24	1.24	1		TXT1	12/11/17 12:59		1725385

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1718859	1718858	SW846 3005A	50	mL	50	mL	11/14/17	JXM8
1718865	1718864	SW846 3005A	50	mL	50	mL	11/14/17	JXM8
1722594	1722586	EPA 245.1/245.2 Prep	20	mL	20	mL	11/30/17	AXS5

**\*Analytical Methods:**

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

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

**SDG No:** 2018-853**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437794002**BASIS:** As Received**DATE COLLECTED** 10-NOV-17**CLIENT ID:** CAMO-18-148070**LEVEL:** Low**DATE RECEIVED** 14-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	12/01/17 11:15	120117W3-4	1722594

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1722594	1722586	EPA 245.1/245.2 Prep	20	mL	20	mL	11/30/17	AXS5

**\*Analytical Methods:**

AV      EPA 245.2 1974



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

**SDG No:** 2018-853**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437794004**BASIS:** As Received**DATE COLLECTED** 10-NOV-17**CLIENT ID:** CASA-18-147995**LEVEL:** Low**DATE RECEIVED** 14-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	12/01/17 11:20	120117W3-4	1722594

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

SDG No: 2018-853

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 437794004

BASIS: As Received

DATE COLLECTED 10-NOV-17

CLIENT ID: CASA-18-147995

LEVEL: Low

DATE RECEIVED 14-NOV-17

MATRIX: W

%SOLIDS: 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	68	ug/L	U	68	200	200	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7440-38-2	Arsenic	2.05	ug/L	J	2	5	5	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7440-39-3	Barium	20.4	ug/L		1	5	5	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7440-70-2	Calcium	15500	ug/L		50	200	200	1	P	HSC	12/11/17 09:48	121117A-2	1718859
7440-47-3	Chromium	8.4	ug/L	J	3	10	10	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	12/11/17 09:48	121117A-2	1718859
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7439-95-4	Magnesium	5690	ug/L		110	300	300	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7439-98-7	Molybdenum	0.889	ug/L		0.2	0.5	0.5	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7440-02-0	Nickel	0.951	ug/L	J	0.6	2	2	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7440-09-7	Potassium	1830	ug/L		50	150	150	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7631-86-9	Silica	68100	ug/L		53	213	213	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7440-23-5	Sodium	11300	ug/L		100	300	300	1	P	HSC	12/11/17 09:48	121117A-2	1718859
7440-24-6	Strontium	83.9	ug/L		1	5	5	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7440-61-1	Uranium	1.09	ug/L		0.067	0.2	0.2	1	MS	BAJ	11/30/17 20:03	171130-3	1718865
7440-62-2	Vanadium	5.36	ug/L		1	5	5	1	P	HSC	12/07/17 17:07	120717A-1	1718859
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	12/11/17 09:48	121117A-2	1718859

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

**SDG No:** 2018-853**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 437794004**BASIS:** As Received**DATE COLLECTED** 10-NOV-17**CLIENT ID:** CASA-18-147995**LEVEL:** Low**DATE RECEIVED** 14-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	62.2	mg/L		0.453	1.24	1.24	1		TXT1	12/11/17 12:59		1725385

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1718859	1718858	SW846 3005A	50	mL	50	mL	11/14/17	JXM8
1718865	1718864	SW846 3005A	50	mL	50	mL	11/14/17	JXM8
1722594	1722586	EPA 245.1/245.2 Prep	20	mL	20	mL	11/30/17	AXS5

**\*Analytical Methods:**

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

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

**SDG No:** 2018-853**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437794005**BASIS:** As Received**DATE COLLECTED** 10-NOV-17**CLIENT ID:** CASA-18-148002**LEVEL:** Low**DATE RECEIVED** 14-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	12/01/17 11:22	120117W3-4	1722594

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1722594	1722586	EPA 245.1/245.2 Prep	20	mL	20	mL	11/30/17	AXS5

**\*Analytical Methods:**

AV      EPA 245.2 1974

# **Quality Control Summary**

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

**SDG NO.** 2018-853  
**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>
1203919761	Aluminum	68	ug/L	+/-200	U	P	68	200
	Barium	1	ug/L	+/-5	U	P	1	5
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Calcium	50	ug/L	+/-200	U	P	50	200
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Copper	3	ug/L	+/-10	U	P	3	10
	Iron	30	ug/L	+/-100	U	P	30	100
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Manganese	2	ug/L	+/-10	U	P	2	10
	Potassium	50	ug/L	+/-150	U	P	50	150
	Silica	53	ug/L	+/-213	U	P	53	213
	Sodium	153	ug/L	+/-300	J	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
1203919771	Antimony	1.2	ug/L	+/-3	J	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
1203929065	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. 2018-853

Client ID: CAMO-18-148054S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 437794001

Spike ID: 1203919764

<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	4830		68	U	5000	96.4		P
Barium	ug/L	75-125	511		27.9		500	96.6		P
Beryllium	ug/L	75-125	492		1	U	500	98.3		P
Boron	ug/L	75-125	531		21.7	J	500	102		P
Calcium	ug/L		40400		36000		5000	88.2	N/A	P
Cobalt	ug/L	75-125	486		1	U	500	97.2		P
Copper	ug/L	75-125	499		3	U	500	99.4		P
Iron	ug/L	75-125	4810		30	U	5000	95.8		P
Magnesium	ug/L	75-125	11600		6770		5000	97.4		P
Manganese	ug/L	75-125	488		2	U	500	97.5		P
Potassium	ug/L	75-125	5540		655		5000	97.6		P
Silica	ug/L		73100		63200		10700	92.3	N/A	P
Sodium	ug/L	75-125	20500		15900		5000	93.3		P
Strontium	ug/L	75-125	637		160		500	95.5		P
Tin	ug/L	75-125	500		3.87	J	500	99.2		P
Vanadium	ug/L	75-125	498		1.51	J	500	99.3		P
Zinc	ug/L	75-125	450		5.93	J	500	88.9		P

## \*Analytical Methods:

P SW846 3005A/6010C

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2018-853 Client ID CAMO-18-148054S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 437794001 Spike ID: 1203919774

<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	49.7		1	U	50	98.5		MS
Arsenic	ug/L	75-125	54.8		2.14	J	50	105		MS
Cadmium	ug/L	75-125	49.8		0.3	U	50	99.6		MS
Chromium	ug/L	75-125	56		6.2	J	50	99.7		MS
Lead	ug/L	75-125	47.5		0.5	U	50	95		MS
Molybdenum	ug/L	75-125	50.4		0.914		50	98.9		MS
Nickel	ug/L	75-125	51.9		1.42	J	50	101		MS
Selenium	ug/L	75-125	53.6		2	U	50	106		MS
Silver	ug/L	75-125	49.5		0.3	U	50	98.8		MS
Thallium	ug/L	75-125	47.1		0.6	U	50	94.1		MS
Uranium	ug/L	75-125	46.1		0.145	J	50	92		MS

## \*Analytical Methods:

MS SW846 3005A/6020A



## METALS

-5a-

## Matrix Spike Summary

**SDG NO.** 2018-853 **Client ID:** CAMO-18-148054S**Contract:** ESHL00114 **Level:** Low**Matrix:** WATER **% Solids:****Sample ID:** 437794001 **Spike ID:** 1203929070

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Mercury	ug/L	75-125	2		0.067	U	2	100		AV

## \*Analytical Methods:

AV EPA 245.1/245.2

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

SDG No.: 2018-853

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-18-148054D

Matrix: WATER

Level: Low

Sample ID: 437794001

Duplicate ID: 1203919763

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		68 U		68 U				P
Barium	ug/L	+/-20%	27.9		26.7		4.22		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	21.7 J		20.8 J		3.92		P
Calcium	ug/L	+/-20%	36000		34600		3.97		P
Cobalt	ug/L		1 U		1 U				P
Copper	ug/L		3 U		3 U				P
Iron	ug/L		30 U		30 U				P
Magnesium	ug/L	+/-20%	6770		6450		4.86		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-150	655		632		3.49		P
Silica	ug/L	+/-20%	63200		60800		4.02		P
Sodium	ug/L	+/-20%	15900		15300		3.78		P
Strontium	ug/L	+/-20%	160		155		3.22		P
Tin	ug/L	+/-10	3.87 J		2.53 J		41.9		P
Vanadium	ug/L	+/-5	1.51 J		1.48 J		1.5		P
Zinc	ug/L		5.93 J		3.3 U		200		P

\*Analytical Methods:

P SW846 3005A/6010C

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

SDG No.: 2018-853

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-18-148054D

Matrix: WATER

Level: Low

Sample ID: 437794001

Duplicate ID: 1203919773

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	+/-5	2.14 J		2.08 J		2.9		MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-10	6.2 J		6.19 J		.258		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	0.914		0.893		2.32		MS
Nickel	ug/L	+/-2	1.42 J		1.54 J		7.63		MS
Selenium	ug/L		2 U		2 U				MS
Silver	ug/L		0.3 U		0.3 U				MS
Thallium	ug/L		0.6 U		0.6 U				MS
Uranium	ug/L	+/- .2	0.145 J		0.151 J		4.05		MS

\*Analytical Methods:

MS SW846 3005A/6020A

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

**SDG No.:** 2018–853**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CAMO–18–148054D**Matrix:** WATER**Level:** Low**Sample ID:** 437794001**Duplicate ID:** 1203929068**Percent Solids for Dup:** N/A

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

\*Analytical Methods:

AV EPA 245.1/245.2

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2018-853

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>
1203919762								
	Aluminum	ug/L	5000	4960		99.2	80-120	P
	Barium	ug/L	500	496		99.2	80-120	P
	Beryllium	ug/L	500	497		99.3	80-120	P
	Boron	ug/L	500	508		102	80-120	P
	Calcium	ug/L	5000	4840		96.9	80-120	P
	Cobalt	ug/L	500	506		101	80-120	P
	Copper	ug/L	500	499		99.8	80-120	P
	Iron	ug/L	5000	4800		96	80-120	P
	Magnesium	ug/L	5000	5150		103	80-120	P
	Manganese	ug/L	500	502		100	80-120	P
	Potassium	ug/L	5000	4980		99.6	80-120	P
	Silica	ug/L	10700	10100		94.5	80-120	P
	Sodium	ug/L	5000	4550		91	80-120	P
	Strontium	ug/L	500	483		96.7	80-120	P
	Tin	ug/L	500	497		99.4	80-120	P
	Vanadium	ug/L	500	498		99.5	80-120	P
	Zinc	ug/L	500	465		93.1	80-120	P

## \*Analytical Methods:

P SW846 3005A/6010C

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2018-853

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>
1203919772								
	Antimony	ug/L	50	51.6		103	80-120	MS
	Arsenic	ug/L	50	51.8		104	80-120	MS
	Cadmium	ug/L	50	50.7		101	80-120	MS
	Chromium	ug/L	50	49.8		99.5	80-120	MS
	Lead	ug/L	50	49.6		99.2	80-120	MS
	Molybdenum	ug/L	50	51.7		103	80-120	MS
	Nickel	ug/L	50	49.3		98.6	80-120	MS
	Selenium	ug/L	50	51.3		103	80-120	MS
	Silver	ug/L	50	53		106	80-120	MS
	Thallium	ug/L	50	48.4		96.9	80-120	MS
	Uranium	ug/L	50	48.5		97.1	80-120	MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2018-853

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>
1203929066	Mercury	ug/L	2	2.01		101	85-115	AV

## \*Analytical Methods:

AV EPA 245.1/245.2

## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 2018-853

Client ID: CAMO-18-148054L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 437794001

Serial Dilution ID: 1203919765

<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	27.9		28.9		3.769			P
Beryllium	1	U	5	U				P
Boron	21.7	J	75	U	19.531			P
Calcium	36000		37100		3.223		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	6770		6840		.933		10	P
Manganese	2	U	10	U				P
Potassium	655		685	J	4.577			P
Silica	63200		63900		1.094		10	P
Sodium	15900		17200		8.695		10	P
Strontium	160		164		2.744		10	P
Tin	3.87	J	12.5	U	21.878			P
Vanadium	1.51	J	5	U	26.926			P
Zinc	5.93	J	39.8	J	570.657			P

## \*Analytical Methods:

P SW846 3005A/6010C



## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 2018-853

Client ID: CAMO-18-148054L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 437794001

Serial Dilution ID: 1203919775

<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	2.14	J	10	U	85.54			MS
Cadmium	.3	U	1.5	U				MS
Chromium	6.2	J	15	U	3.079			MS
Lead	.5	U	2.5	U				MS
Molybdenum	.914		1	U	5.58			MS
Nickel	1.42	J	3	U	16.222			MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.145	J	.335	U	51.724			MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-9-

## Serial Dilution Sample Summary

**SDG NO.** 2018-853 **Client ID:** CAMO-18-148054L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 437794001 **Serial Dilution ID:** 1203929072

<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 #: 2018-853  
Work Order #: 437794**

**Method/Analysis Information**

**Product:** Carbon and Total Organic

**Analytical Batch:** 1717990

**Method:** SW 9060 Total Organic Carbon

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
1203920734	Method Blank (MB)
1203920735	Laboratory Control Sample (LCS)
1203920738	437822002(CAMO-18-148071) Sample Duplicate (DUP)
1203920741	437822002(CAMO-18-148071) Post Spike (PS)

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

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-093 REV# 15.

**Preparation/Analytical Method Verification**

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

**Calibration Information**

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

**Initial Calibration**

All initial calibration requirements have been met for this SDG.

**Continuing Calibration Blanks**

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

**Calibration Verification Information (CCV)**

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

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

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

The MB analyzed with this SDG met the acceptance criteria.

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

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

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

Sample 437822002 (CAMO-18-148071) was selected for QC analysis.

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

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

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

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

### **Technical Information**

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

#### **Holding Times**

All samples in this SDG met the specified holding time.

#### **Sample Preservation/Integrity**

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

#### **Sample Dilutions**

The samples in this SDG did not require dilutions.

#### **Sample Re-analysis**

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

### **Miscellaneous Information**

#### **Additional Comments**

Additional comments were not required for this SDG.

#### **Electronic Packaging Comment**

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

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

### Method/Analysis Information

<b>Product:</b>	<b>Cyanide and Total</b>		
<b>Analytical Batch:</b>	1718779	<b>Method:</b>	WSP-CN(T)
<b>Prep Batch :</b>	1718777	<b>Method:</b>	EPA 335.4

### Sample Analysis

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

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
1203919598	Method Blank (MB)
1203919599	Laboratory Control Sample (LCS)
1203919601	437794002(CAMO-18-148070) Sample Duplicate (DUP)
1203919605	437794002(CAMO-18-148070) Matrix Spike (MS)

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

### **SOP Reference**

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

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

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

### Calibration Information

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Continuing Calibration Blanks**

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

### **Calibration Verification Information (CCV)**

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

### **Y Intercept Rule**

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

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

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

The MB analyzed with this SDG met the acceptance criteria.

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

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

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

Sample 437794002 (CAMO-18-148070) 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**

Sample1203919599 (LCS) was re-analyzed due to instrument failure. The results from the reanalysis are reported.

### **Miscellaneous Information**

#### **Additional Comments**

Additional comments were not required for this SDG.

#### **Electronic Packaging Comment**

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

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



### **Method/Analysis Information**

**Product:** Ion Chromatography  
**Analytical Batch:** 1719403      **Method:** WSP-ANIONS

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
437794001	CAMO-18-148054
437794004	CASA-18-147995
1203921020	Method Blank (MB)
1203921021	Laboratory Control Sample (LCS)
1203921022	437794001(CAMO-18-148054) Sample Duplicate (DUP)
1203921023	437794001(CAMO-18-148054) Post Spike (PS)

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

### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-086 REV# 25.

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

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

### **Calibration Information**

The Ion Chromatography analysis was performed on a Dionex ICS-5000 Ion Chromatograph.

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Continuing Calibration Blanks**

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

### **Calibration Verification Information (CCV)**

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

### **Y Intercept Rule**

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

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

**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample Duplicate (LCSD)**

An LCSD was not used in place of matrix QC.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Sample 437794001 (CAMO-18-148054) 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 1203921022 (CAMO-18-148054DUP), 1203921023 (CAMO-18-148054PS) and 437794001 (CAMO-18-148054) 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	<b>437794</b>
	<b>001</b>
Chloride	2X
Sulfate	2X

**Sample Re-analysis**

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

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

Samples 1203921022 (CAMO-18-148054DUP), 1203921023 (CAMO-18-148054PS), 437794001 (CAMO-18-148054) and 437794004 (CASA-18-147995) 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:

<b>Sample ID</b>	<b>Client ID</b>
437794001	CAMO-18-148054
437794004	CASA-18-147995
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:

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### Method/Analysis Information

<b>Product:</b>	<b>Total Kjeldahl Nitrogen</b>		
<b>Analytical Batch:</b>	1718944	<b>Method:</b>	TKN
<b>Prep Batch :</b>	1718943	<b>Method:</b>	EPA 351.2 Prep

### Sample Analysis

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

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
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**

Samples 1203919952 (LCS) and 437794005 (CASA-18-148002) were re-analyzed due to instrument failure. The results from the reanalysis are reported. Samples 1203919953 (WST35-18-148795DUP), 1203919954 (WST35-18-148795MS) and 437794005 (CASA-18-148002) were re-analyzed due to CCV failure. The reanalysis data with passing instrument QC was reported.

**Miscellaneous Information****Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:  
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and

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



### Method/Analysis Information

**Product:** Nitrate Nitrite by Cadmium Reduction

**Analytical Batch:** 1718948

**Method:** NO3NO2

### Sample Analysis

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

<b>Sample ID</b>	<b>Client ID</b>
437794001	CAMO-18-148054
437794004	CASA-18-147995
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 sample 437794001 (CAMO-18-148054) was diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	<b>437794</b>
	<b>001</b>
Nitrogen, Nitrate/Nitrite	50X

##### **Sample Re-analysis**

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

#### **Miscellaneous Information**

##### **Additional Comments**

Additional comments were not required for this SDG.

##### **Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In

an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

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

### Method/Analysis Information

<b>Product:</b>	<b>Total Phosphorus</b>		
<b>Analytical Batch:</b>	1718946	<b>Method:</b>	PO4
<b>Prep Batch :</b>	1718945	<b>Method:</b>	EPA 365.4 Prep

### Sample Analysis

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

<b>Sample ID</b>	<b>Client ID</b>
437794001	CAMO-18-148054
437794004	CASA-18-147995
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:

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### **Method/Analysis Information**

**Product:** Solids and Total Dissolved

**Analytical Batch:** 1718228

**Method:** TDS

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
437794001	CAMO-18-148054
437794004	CASA-18-147995
1203918125	Method Blank (MB)
1203918126	Laboratory Control Sample (LCS)
1203919676	437794004(CASA-18-147995) 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 437794004 (CASA-18-147995) was selected for QC analysis.

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

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

Analyte	Sample	Value
Total Dissolved Solids	1203919676 (CASA-18-147995DUP)	8.19* (0%-5%)

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

**Miscellaneous Information****Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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### Method/Analysis Information

**Product:** Specific Conductivity

**Analytical Batch:** 1719249

**Method:** EPA120.1 Specific Conductivity

### Sample Analysis

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

<b>Sample ID</b>	<b>Client ID</b>
437794001	CAMO-18-148054
437794004	CASA-18-147995
1203920717	Laboratory Control Sample (LCS)
1203920718	437595001(WST05-18-148663) Sample Duplicate (DUP)
1203920719	437605001(WST05-18-148658) Sample Duplicate (DUP)

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

### **SOP Reference**

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

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

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

### Calibration Information

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Initial Standardization**

The titrant was properly standardized

### Quality Control (QC) Information

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

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

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

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



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

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

**Miscellaneous Information****Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

### **Method/Analysis Information**

**Product:** pH  
**Analytical Batch:** 1718738 **Method:** PH

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
437794001	CAMO-18-148054
437794004	CASA-18-147995
1203919485	Laboratory Control Sample (LCS)
1203919487	437508001(CAMO-18-148114) Sample Duplicate (DUP)

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

### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-008 REV# 22.

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

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Initial Standardization**

The titrant was properly standardized

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

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

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

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

Sample 437508001 (CAMO-18-148114) was selected for QC analysis.

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

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

**Technical Information**

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

**Holding Times**

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

Sample	Analyte	Value
1203919487 (CAMO-18-148114DUP)	pH	Received 09-NOV-17, out of holding 07-NOV-17
437794001 (CAMO-18-148054)	pH	Received 14-NOV-17, out of holding 10-NOV-17
437794004 (CASA-18-147995)	pH	Received 14-NOV-17, out of holding 10-NOV-17

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

**Miscellaneous Information****Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

### **Method/Analysis Information**

**Product:** Alkalinity

**Analytical Batch:** 1718721      **Method:** EPA 310.1 Total Alkalinity

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
437794001	CAMO-18-148054
437794004	CASA-18-147995
1203919453	Laboratory Control Sample (LCS)
1203919455	437508001(CAMO-18-148114) Sample Duplicate (DUP)
1203919457	437508001(CAMO-18-148114) Matrix Spike (MS)

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

### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-033 REV# 13.

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

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Initial Standardization**

The titrant was properly standardized

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

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

An LCSD was not used in place of matrix QC.

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

The LCS spike recovery met the acceptance limits.

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

Sample 437508001 (CAMO-18-148114) was selected for QC analysis.

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

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

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

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

**Miscellaneous Information****Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

**Certification Statement**

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

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

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

Client SDG: 2018-853 GEL Work Order: 437794

#### 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: 05 DEC 2017

Title: Team Leader

# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: December 8, 2017

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

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

Client SDG: 2018-853

Client Sample ID: CAMO-18-148054  
Sample ID: 437794001  
Matrix: W  
Collect Date: 10-NOV-17 11:20  
Receive Date: 14-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		0.234	0.067	0.200	mg/L		1	MXL2	11/16/17	0427	1719403	1
Fluoride		0.114	0.033	0.100	mg/L		1					
Chloride		14.6	0.134	0.400	mg/L		2	MXL2	11/16/17	1833	1719403	2
Sulfate		31.0	0.266	0.800	mg/L		2					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	J	0.0216	0.017	0.050	mg/L	1.00	1	KLP1	11/16/17	1406	1718942	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		15.0	0.850	2.50	mg/L		50	KLP1	11/16/17	1342	1718948	4
PO4 "As Received"												
Phosphorus, Total as P		0.0841	0.020	0.050	mg/L	1.00	1	KLP1	11/16/17	1555	1718946	5
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		267	3.40	14.3	mg/L			KLP1	11/15/17	1350	1718228	6
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		55.8	1.45	4.00	mg/L			RXB5	11/18/17	1622	1718721	7
Carbonate alkalinity (CaCO3)		8.06	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		352	1.00	1.00	umhos/cm		1	VH1	11/21/17	1320	1719249	8
PH "As Received"												
pH at Temp 15.4C	H	8.69	0.010	0.100	SU		1	RXB5	11/18/17	1620	1718738	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



# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: December 8, 2017

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

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

Client SDG: 2018-853

Client Sample ID: CAMO-18-148054  
Sample ID: 437794001

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

# 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: 2018-853

Client Sample ID: CAMO-18-148070  
Sample ID: 437794002  
Matrix: W  
Collect Date: 10-NOV-17 11:20  
Receive Date: 14-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	0.509	0.330	1.00	mg/L		1	TSM	11/18/17	0335	1717990	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	J	3.81	1.67	5.00	ug/L	1.00	1	AXH3	11/15/17	0803	1718779	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl		0.185	0.033	0.100	mg/L	1.00	1	KLP1	11/16/17	1156	1718944	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/15/17	0704	1718777
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

# 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: 2018-853

Client Sample ID: CASA-18-147995  
Sample ID: 437794004  
Matrix: W  
Collect Date: 10-NOV-17 11:08  
Receive Date: 14-NOV-17  
Collector: Client

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide	U	ND	0.067	0.200	mg/L		1	MXL2	11/16/17	0554	1719403	1
Chloride		2.19	0.067	0.200	mg/L		1					
Fluoride	J	0.078	0.033	0.100	mg/L		1					
Sulfate		3.19	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	J	0.0238	0.017	0.050	mg/L	1.00	1	KLP1	11/16/17	1407	1718942	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		0.362	0.017	0.050	mg/L		1	KLP1	11/16/17	1343	1718948	3
PO4 "As Received"												
Phosphorus, Total as P		0.0899	0.020	0.050	mg/L	1.00	1	KLP1	11/16/17	1556	1718946	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		127	3.40	14.3	mg/L			KLP1	11/15/17	1350	1718228	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		84.7	1.45	4.00	mg/L			RXB5	11/18/17	1622	1718721	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		180	1.00	1.00	umhos/cm		1	VH1	11/21/17	1320	1719249	7
PH "As Received"												
pH at Temp 16.3C	H	8.29	0.010	0.100	SU		1	RXB5	11/18/17	1623	1718738	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	11/16/17	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: 2018-853

Client Sample ID: CASA-18-147995  
Sample ID: 437794004

Project: ESHL00114  
Client ID: ARSL004

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

### Notes:

#### Column headers are defined as follows:

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

# GEL LABORATORIES LLC

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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: 2018-853

Client Sample ID: CASA-18-148002  
Sample ID: 437794005  
Matrix: W  
Collect Date: 10-NOV-17 11:08  
Receive Date: 14-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	0.515	0.330	1.00	mg/L		1	TSM	11/18/17	0422	1717990	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	11/15/17	0806	1718779	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	11/16/17	1234	1718944	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/15/17	0704	1718777
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 6

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

Contact: Ms. Nita Patel

Workorder: 437794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Carbon Analysis</b>											
Batch	1717990										
QC1203920738	437822002	DUP									
Total Organic Carbon Average		J	0.959	1.02	mg/L	5.77	^	(+/-1.00)	TSM	11/18/17	06:19
QC1203920735	LCS										
Total Organic Carbon Average	10.0			10.5	mg/L			105	(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			105	(75%-125%)	11/18/17	07:06
<b>Flow Injection Analysis</b>											
Batch	1718779										
QC1203919601	437794002	DUP									
Cyanide, Total		J	3.81	J	4.10	ug/L	7.33	^	(+/-5.00)	AXH3	11/15/17 08:04
QC1203919599	LCS										
Cyanide, Total	50.0			52.7	ug/L			105	(90%-110%)	11/15/17	08:16
QC1203919598	MB										
Cyanide, Total			U	ND	ug/L					11/15/17	07:48
QC1203919605	437794002	MS									
Cyanide, Total	100	J	3.81	114	ug/L			110	(90%-110%)	11/15/17	08:05
<b>Ion Chromatography</b>											
Batch	1719403										
QC1203921022	437794001	DUP									
Bromide			0.234	0.238	mg/L	1.82	^	(+/-0.200)	MXL2	11/16/17	04:56

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## QC Summary

Workorder: 437794

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1719403										
Chloride		14.6		14.5	mg/L	0.207		(0%-20%)	MXL2	11/16/17	19:02
Fluoride		0.114		0.116	mg/L	1.3	^	(+/-0.100)		11/16/17	04:56
Sulfate		31.0		30.9	mg/L	0.393		(0%-20%)		11/16/17	19:02
QC1203921021 LCS											
Bromide	1.25			1.32	mg/L		105	(80%-120%)		11/16/17	03:58
Chloride	5.00			4.66	mg/L		93.2	(80%-120%)			
Fluoride	2.50			2.47	mg/L		98.6	(80%-120%)			
Sulfate	10.0			9.70	mg/L		97	(80%-120%)			
QC1203921020 MB											
Bromide			U	ND	mg/L					11/16/17	03:30
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203921023 437794001 PS											
Bromide	1.25	0.234		1.47	mg/L		98.7	(75%-125%)		11/16/17	05:25
Chloride	5.00	7.29		12.9	mg/L		112	(75%-125%)		11/16/17	19:31
Fluoride	2.50	0.114		2.55	mg/L		97.5	(75%-125%)		11/16/17	05:25
Sulfate	10.0	15.5		26.3	mg/L		108	(75%-125%)		11/16/17	19:31



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## QC Summary

Workorder: 437794

Page 3 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Nutrient Analysis</b>											
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
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

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## QC Summary

Workorder: 437794

Page 4 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Nutrient Analysis</b>											
Batch	1718946										
QC1203919962	437828001	MS									
Phosphorus, Total as P	1.00	0.130		1.17	mg/L		104	(63%-139%)	KLP1	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
QC1203919972	437828001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.916		1.83	mg/L		91.4	(90%-110%)		11/16/17	14:09
<b>Solids Analysis</b>											
Batch	1718228										
QC1203919676	437794004	DUP									
Total Dissolved Solids		127		117	mg/L	8.19*		(0%-5%)	KLP1	11/15/17	13:50
QC1203918126	LCS										
Total Dissolved Solids	300			289	mg/L		96.2	(95%-105%)		11/15/17	13:50
QC1203918125	MB										
Total Dissolved Solids			U	ND	mg/L					11/15/17	13:50
<b>Titration and Ion Analysis</b>											
Batch	1718721										
QC1203919455	437508001	DUP									
Alkalinity, Total as CaCO3		59.3		57.7	mg/L	2.76		(0%-20%)	RXB5	11/18/17	15:55
Carbonate alkalinity (CaCO3)	U	ND	U	ND	mg/L	N/A					

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## QC Summary

Workorder: 437794

Page 5 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Titration and Ion Analysis</b>											
Batch	1718721										
QC1203919453	LCS										
Alkalinity, Total as CaCO3	100			108	mg/L		108	(90%-110%)	RXB5	11/18/17	15:11
QC1203919457	437508001	MS									
Alkalinity, Total as CaCO3	100	59.3		165	mg/L		106	(80%-120%)		11/18/17	15:56
Batch	1718738										
QC1203919487	437508001	DUP									
pH		H	7.87	H	7.89	SU	0.254	(0%-5%)	RXB5	11/18/17	15:53
QC1203919485	LCS										
pH	7.00			6.99	SU		99.9	(99%-101%)		11/18/17	15:49
Batch	1719249										
QC1203920718	437595001	DUP									
Conductivity			195		195	umhos/cm	0.103	(0%-10%)	VH1	11/21/17	13:16
QC1203920719	437605001	DUP									
Conductivity			176		177	umhos/cm	0.509	(0%-10%)		11/21/17	13:17
QC1203920717	LCS										
Conductivity	1410			1400	umhos/cm		99.3	(95%-105%)		11/21/17	13:14

- Notes:**
- < Result is less than value reported
  - > Result is greater than value reported
  - B The target analyte was detected in the associated blank.
  - E General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
  - H Analytical holding time was exceeded
  - J Value is estimated
  - N/A RPD or %Recovery limits do not apply.
  - N1 See case narrative
  - ND Analyte concentration is not detected above the detection limit
  - NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

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## QC Summary

Workorder: 437794

Page 6 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.										
R	Per section 9.3.4.1 of Method 1664 Revision B, due to matrix spike recovery issues, this result may not be reported or used for regulatory compliance purposes.										
R	Sample results are rejected										
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.										
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Z	Paint Filter Test--Particulates passed through the filter, however no free liquids were observed.										
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.										
d	5-day BOD--The 2:1 depletion requirement was not met for this sample										
e	5-day BOD--Test replicates show more than 30% difference between high and low values. The data is qualified per the method and can be used for reporting purposes										
h	Preparation or preservation holding time was exceeded										

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

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

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

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

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

# **Radiological Analysis**

# Case Narrative

**Radiochemistry  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2018-853  
Work Order #: 437794**

**Method/Analysis Information**

**Product:** Alphaspec Am241 Liquid

Analytical Method: HASL-300:AM-241

Analytical Batch Number: 1719849

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
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 reprep 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

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
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.

<b>Sample</b>	<b>Analyte</b>	<b>Value</b>
1203922096 (MB)	Uranium-233/234 and Uranium-235/236	Blank result > 1.65 CSU

**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

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
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
437794002 (CAMO-18-148070)	Plutonium-238	Result 0.0381 < MDA 0.112 > RDL 0.05 pCi/L
	Plutonium-239/240	Result 0.0228 < MDA 0.161 > RDL 0.05 pCi/L
437794005 (CASA-18-148002)	Plutonium-238	Result -0.0125 < MDA 0.0919 > RDL 0.05 pCi/L
	Plutonium-239/240	Result -0.00000000208 < MDA 0.131 > 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 reprepared due to low carrier/tracer yield. The re-analysis is being reported.

##### **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**

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

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
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, 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**

<b>Product:</b>	<b>GFPC, Sr90, liquid</b>
Analytical Method:	EPA:905.0
Analytical Batch Number:	1720044

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
1203922619	Method Blank (MB)
1203922622	Laboratory Control Sample (LCS)
1203922620	437632002(CAMO-18-148073) Sample Duplicate (DUP)
1203922621	437632002(CAMO-18-148073) Matrix Spike (MS)

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

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-004 REV# 19.

#### **Calibration Information:**

##### **Calibration Information**

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

##### **Standards Information**

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

##### **Sample Geometry**

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

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

##### **Blank Information**

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

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

The Method Blank (MB) met acceptance criteria.

##### **CSU**

The blank result is less than 1.65 times the CSU.

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

The blank result is less than the decision level.

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

All yields met the required acceptance limits.

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

The LCS spike recoveries met the acceptance limits.

##### **Designated QC**

The following sample was used for QC: 437632002 (CAMO-18-148073). The QC was from ARSL work order 437632.

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

The MS spike recoveries met acceptance limits.

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

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

**RDL Met**

The method RDL has been met.

**Technical Information:**

**Holding Time**

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

**Negative > 3 sigma TPU**

Samples results are not more negative than three sigma TPU.

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

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

**Recounts**

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**

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

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

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

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
1203922639	Method Blank (MB)
1203922643	Laboratory Control Sample (LCS)
1203922640	437508002(CAMO-18-148117) Sample Duplicate (DUP)
1203922641	437508002(CAMO-18-148117) Matrix Spike (MS)
1203922642	437508002(CAMO-18-148117) Matrix Spike Duplicate (MSD)



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

#### **SOP Reference**

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

#### **Calibration Information:**

##### **Calibration Information**

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

##### **Standards Information**

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

##### **Sample Geometry**

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

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

##### **Blank Information**

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

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

The Method Blank (MB) met acceptance criteria.

##### **CSU**

The blank result is less than 1.65 times the CSU.

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

The blank result is less than the decision level.

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

The LCS spike recoveries met the acceptance limits.

##### **Designated QC**

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

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

The MS spike recoveries met acceptance limits.

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

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

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

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

##### **RDL Met**

The method RDL has been met.

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

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

**Negative > 3 sigma TPU**

Samples results are not more negative than three sigma TPU.

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

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

**Gross Alpha/Beta Preparation Information**

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

**Recounts**

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

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

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

**Additional Comments**

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

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** WSP-H-3  
**Analytical Method:** EPA:906.0  
**Analytical Batch Number:** 1719185

<b>Sample ID</b>	<b>Client ID</b>
437794002	CAMO-18-148070
437794005	CASA-18-148002
1203920573	Method Blank (MB)
1203920576	Laboratory Control Sample (LCS)
1203920574	437314001(WST03-18-148752) 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-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: 437314001 (WST03-18-148752). The QC was from ARSL work order 437314.

**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 437794002 (CAMO-18-148070) 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, 1203920575 (WST03-18-148752MS), 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.

## 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: 2018-853 GEL Work Order: 437794

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

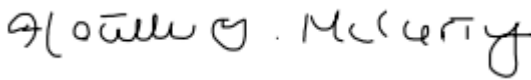
- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

**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:** 08 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 8, 2017

Client Sample ID: CAMO-18-148070  
Sample ID: 437794002  
Matrix: W  
Collect Date: 10-NOV-17  
Receive Date: 14-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	0.0124	+/-0.00587	0.0315	0.0134	+/-0.0059	0.050	pCi/L			JXR5	11/29/17	1351	1719849	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	0.0381	+/-0.0633	0.112	0.0458	+/-0.0633	0.050	pCi/L			JXR5	12/05/17	1352	1723433	2
Plutonium-239/240	U	0.0228	+/-0.0314	0.161	0.070	+/-0.0314	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		0.132	+/-0.0243	0.126	0.0595	+/-0.0251	1.00	pCi/L			JXR5	11/29/17	1544	1719851	3
Uranium-235/236	U	0.0531	+/-0.0168	0.0544	0.023	+/-0.017	1.00	pCi/L							
Uranium-238		0.0784	+/-0.0188	0.0737	0.0334	+/-0.0191	0.500	pCi/L							

### Rad Gamma Spec Analysis

*Gammasespec "As Received"*

Cesium-137	U	-0.654	+/-0.897	3.21	1.32	+/-0.910	8.00	pCi/L			BSW1	11/29/17	0744	1718868	4
Cobalt-60	U	0.0595	+/-1.08	4.47	1.81	+/-1.08	8.00	pCi/L							
Neptunium-237	U	-2.34	+/-2.01	7.09	3.17	+/-2.08		pCi/L							
Potassium-40	U	13.2	+/-18.2	50.1	20.8	+/-18.2		pCi/L							
Sodium-22	U	-0.477	+/-1.07	4.04	1.60	+/-1.08		pCi/L							

### Rad Gas Flow Proportional Counting

*GFPC, Sr90, liquid "As Received"*

Strontium-90	U	-0.26	+/-0.0967	0.437	0.193	+/-0.0967	0.500	pCi/L			LXB3	11/29/17	0742	1720044	5
<i>WSP-GrossA/B "As Received"</i>															
Beta	U	0.460	+/-0.822	2.87	1.31	+/-0.823	3.00	pCi/L			AXH4	11/28/17	1339	1720050	6
Alpha	U	-0.0923	+/-0.566	2.31	0.950	+/-0.567	3.00	pCi/L			AXH4	11/29/17	1142	1720050	7

### Rad Liquid Scintillation Analysis

*WSP-H-3 "As Received"*

Tritium		4500	+/-122	142	66.6	+/-460	200	pCi/L			BXM4	11/24/17	2047	1719185	8
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### 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
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# GEL LABORATORIES LLC

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## Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Client Sample ID: CAMO-18-148070

Sample ID: 437794002

Project: ESHL00114

Client ID: ARSL004

Report Date: December 8, 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				
Americium-243 Tracer	Alphaspec Am241 Liquid "As Received"							1719849	93.5	(50%-105%)				
Plutonium-242 Tracer	ISOPU "As Received"							1723433	52.4	(50%-105%)				
Uranium-232 Tracer	IsoU "As Received"							1719851	74.7	(50%-105%)				
Strontium Carrier	GFPC, Sr90, liquid "As Received"							1720044	84.1	(50%-105%)				

### Notes:

The MDC is a sample specific MDC.

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

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty



# GEL LABORATORIES LLC

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

## Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-148002

Sample ID: 437794005

Matrix: W

Collect Date: 10-NOV-17

Receive Date: 14-NOV-17

Collector: Client

Report Date: December 8, 2017

Project: ESHL00114

Client ID: ARSL004

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
<b>Rad Alpha Spec Analysis</b>															
<i>Alphaspec Am241 Liquid "As Received"</i>															
Americium-241	U	0.018	+/-0.00674	0.0321	0.0136	+/-0.00678	0.050	pCi/L			JXR5	11/29/17	1351	1719849	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	-0.0125	+/-0.0265	0.0919	0.0375	+/-0.0265	0.050	pCi/L			JXR5	12/05/17	1352	1723433	2
Plutonium-239/240	U	-2.08E-09	+/-0.0153	0.131	0.0573	+/-0.0153	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		1.04	+/-0.0501	0.117	0.0554	+/-0.0707	1.00	pCi/L			JXR5	11/29/17	1544	1719851	3
Uranium-235/236		0.113	+/-0.0195	0.0507	0.0214	+/-0.0203	1.00	pCi/L							
Uranium-238		0.351	+/-0.0311	0.0686	0.0311	+/-0.0354	0.500	pCi/L							
<b>Rad Gamma Spec Analysis</b>															
<i>Gammaspac "As Received"</i>															
Cesium-137	U	-1.29	+/-1.68	5.65	2.47	+/-1.71	8.00	pCi/L			BSW1	11/29/17	0744	1718868	4
Cobalt-60	U	0.360	+/-1.23	5.30	2.10	+/-1.23	8.00	pCi/L							
Neptunium-237	U	3.00	+/-2.77	10.4	4.80	+/-2.86		pCi/L							
Potassium-40	U	-44.1	+/-22.0	83.2	36.1	+/-24.3		pCi/L							
Sodium-22	U	-2.5	+/-1.42	4.61	1.77	+/-1.54		pCi/L							
<b>Rad Gas Flow Proportional Counting</b>															
<i>GFPC, Sr90, liquid "As Received"</i>															
Strontium-90	U	-0.351	+/-0.119	0.453	0.214	+/-0.119	0.500	pCi/L			LXB3	11/29/17	0740	1720044	5
<i>WSP-GrossA/B "As Received"</i>															
Beta	U	2.17	+/-0.887	2.71	1.20	+/-0.912	3.00	pCi/L			AXH4	11/28/17	1344	1720050	6
Alpha	U	1.19	+/-0.547	1.68	0.677	+/-0.556	3.00	pCi/L			AXH4	11/29/17	1142	1720050	7
<b>Rad Liquid Scintillation Analysis</b>															
<i>WSP-H-3 "As Received"</i>															
Tritium	U	16.1	+/-41.7	144	67.6	+/-41.7	200	pCi/L			BXM4	11/24/17	2200	1719185	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	95.9	(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-18-148002

Sample ID: 437794005

Project: ESHL00114

Client ID: ARSL004

Report Date: December 8, 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	69.2	(50%-105%)				
Uranium-232 Tracer	IsoU "As Received"							1719851	68.9	(50%-105%)				
Strontium Carrier	GFPC, Sr90, liquid "As Received"							1720044	98.1	(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

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## QC Summary

Report Date: December 8, 2017

Page 1 of 6

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

Los Alamos, New Mexico

Contact: Ms. Nita Patel

Workorder: 437794

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Alpha Spec</b>											
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: 437794

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Alpha Spec</b>											
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: 437794

Page 3 of 6

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	11/29/17	09:48
	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	11/29/17	09:20
	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	11/29/17	09:20
	Uncert:			+/-1.65							
	TPU:			+/-1.65							
Cobalt-60			U	-1.12	pCi/L						

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## QC Summary

Workorder: 437794

Page 4 of 6

Parmname	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	1720044										
QC1203922620	437632002	DUP									
Strontium-90		U	-0.0581	U	0.0685	pCi/L	0.252	(0-1)	LXB3	11/29/17	08:46
		Uncert:	+/-0.123		+/-0.128						
		TPU:	+/-0.123		+/-0.128						
**Strontium Carrier	7.85	7.30		5.70	mg		72.6	(50%-105%)			
QC1203922622	LCS										
Strontium-90	23.7			27.2	pCi/L		115	(80%-120%)	LXB3	11/29/17	08:46
		Uncert:		+/-0.765							
		TPU:		+/-2.39							
**Strontium Carrier	7.85			5.50	mg		70.1	(50%-105%)			
QC1203922619	MB										
Strontium-90			U	-0.172	pCi/L				LXB3	11/29/17	08:45
		Uncert:		+/-0.0647							
		TPU:		+/-0.0647							
**Strontium Carrier	7.85			6.90	mg		87.9	(50%-105%)			
QC1203922621	437632002	MS									
Strontium-90	474	U	-0.0581	451	pCi/L		95.1	(75%-125%)	LXB3	11/29/17	08:45
		Uncert:	+/-0.123	+/-12.4							
		TPU:	+/-0.123	+/-39.3							
**Strontium Carrier	7.85	7.30		6.90	mg		87.9	(50%-105%)			
Batch	1720050										
QC1203922640	437508002	DUP									
Alpha		U	0.372	U	0.551	pCi/L	0.0795	(0-1)	AXH4	11/29/17	11:44
		Uncert:	+/-0.611		+/-0.511						
		TPU:	+/-0.612		+/-0.514						
Beta			1.86	U	2.24	pCi/L	0.124	(0-1)		11/28/17	13:44
		Uncert:	+/-0.620		+/-0.846						
		TPU:	+/-0.640		+/-0.868						
QC1203922643	LCS										
Alpha	12.1			13.7	pCi/L		113	(80%-120%)	AXH4	11/29/17	11:37
		Uncert:		+/-0.705							
		TPU:		+/-1.35							

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## QC Summary

Workorder: 437794

Page 5 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Gas Flow</b>											
Batch	1720050										
Beta	47.4			46.9	pCi/L		99	(80%-120%)			
	Uncert:			+/-0.856							
	TPU:			+/-4.03							
QC1203922639 MB											
Alpha			U	-0.192	pCi/L				AXH4	11/29/17	11:42
	Uncert:			+/-0.0655							
	TPU:			+/-0.0655							
Beta			U	-0.198	pCi/L					11/28/17	13:44
	Uncert:			+/-0.0776							
	TPU:			+/-0.0776							
QC1203922641 437508002 MS											
Alpha	483 U	0.372		529	pCi/L		109	(75%-125%)	AXH4	11/29/17	16:48
	Uncert:	+/-0.611		+/-26.7							
	TPU:	+/-0.612		+/-60.1							
Beta	1890	1.86		1860	pCi/L		98.3	(75%-125%)		11/28/17	13:44
	Uncert:	+/-0.620		+/-35.1							
	TPU:	+/-0.640		+/-164							
QC1203922642 437508002 MSD											
Alpha	483 U	0.372		545	pCi/L	0.0692	113	(0-1)	AXH4	11/29/17	11:37
	Uncert:	+/-0.611		+/-26.9							
	TPU:	+/-0.612		+/-53.9							
Beta	1890	1.86		1930	pCi/L	0.095	102	(0-1)		11/28/17	13:56
	Uncert:	+/-0.620		+/-34.3							
	TPU:	+/-0.640		+/-164							
<b>Rad Liquid Scintillation</b>											
Batch	1719185										
QC1203920574 437314001 DUP											
Tritium		U	-33.9 U	-48.6	pCi/L	0.0933		(0-1)	BXM4	11/25/17	02:50
	Uncert:		+/-40.5	+/-38.4							
	TPU:		+/-40.5	+/-38.4							
QC1203920576 LCS											
Tritium	2180			2000	pCi/L		91.6	(80%-120%)	BXM4	11/25/17	04:21
	Uncert:			+/-181							
	TPU:			+/-268							
QC1203920573 MB											
Tritium			U	-6.14	pCi/L				BXM4	11/25/17	01:37
	Uncert:			+/-40.9							
	TPU:			+/-40.9							
QC1203920575 437314001 MS											
Tritium	4380 U	-33.9		4490	pCi/L		102	(75%-125%)	BXM4	11/25/17	04:03
	Uncert:	+/-40.5		+/-381							
	TPU:	+/-40.5		+/-584							

### Notes:

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



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## QC Summary

Workorder: 437794

Page 6 of 6

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.