

The order of this data package is as follows:

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

Comments:

[illegible]

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11552

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

SAMPLE ID: CASA-18-147992

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/6/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1117		MEDIA:	OK	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-36		FIELD PREP:	F	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

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

SAMPLE COMMENTS: sampled 30 ft from running diesel generator

LOCATION COMMENTS: None

FIELD PARAMETERS:

KT 11/6/17

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

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

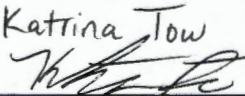
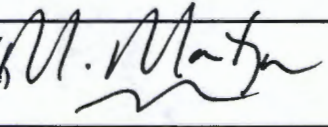
EVENT ID: 11552

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

SAMPLE ID: CASA-18-147992

WORK ORDER:

COLLECTED BY (PRINT): D. Hughes

RELINQUISHED BY (Printed Name) (Signature)	Katrina Tow 	Date/Time 11/6/17 1415	RECEIVED BY (Printed Name) (Signature)	M. Matin 	Date/Time 11/6/17 1415
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-18-147999

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11/6/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1117		MEDIA:	OK	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-36		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	500 ML POLY	1	HNO3	Y	NA
	WSP-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 30 ft from running diesel generator

LOCATION COMMENTS: None

FIELD PARAMETERS:

Sample Time	1117	HH:MM	Discharge Rate	3.52	Dissolved Oxygen	5.70
Groundwater Elevation	5837.90		Oxidation-Reduction Potential	147.7	Period Purge Volume	NA
pH	7.32		Purge Volume	126.72	Specific Conductance	191.3
Temperature	20.6		Total Volume Pumped	177.84	Turbidity	0.37

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CASA-18-147999**WORK ORDER:****COLLECTED BY (PRINT):** D. Hughes

RELINQUISHED BY (Printed Name) (Signature)	<i>Katrina Tow</i> <i>[Signature]</i>	Date/Time 11/6/17 1415	RECEIVED BY (Printed Name) (Signature)	<i>[Signature]</i> <i>[Signature]</i>	Date/Time 11/6/17 11415
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-18-148005

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/6/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1322		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-35a		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / <input checked="" type="radio"/> 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:

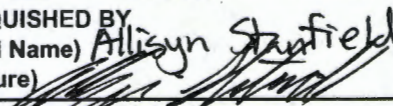
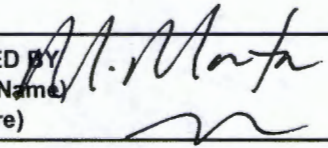
LOCATION COMMENTS:

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

11/6/17

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CASA-18-148005**WORK ORDER:****COLLECTED BY (PRINT):** D. Jaramillo, T. Vander Vis

RELINQUISHED BY (Printed Name) Allisyn Stayfield (Signature) 	Date/Time 11/6/17 1425	RECEIVED BY (Printed Name) M. Moya (Signature) 	Date/Time 11/6/17 1425
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-18-148006

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11/6/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1337		MEDIA:	OK	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-35b		FIELD PREP:	F	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

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

SAMPLE COMMENTS: None

LOCATION COMMENTS: None

FIELD PARAMETERS:

KT 11/6/17

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

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY


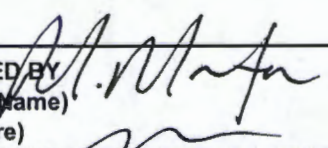
EVENT ID: 11552

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

SAMPLE ID: CASA-18-148006

WORK ORDER:

COLLECTED BY (PRINT): D. Hughes

RELINQUISHED BY (Printed Name) (Signature)	Katrina Tow 	Date/Time 11/6/17 1415	RECEIVED BY (Printed Name) (Signature)	 11/6/17 1415
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-18-148007

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	11/6/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1322		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-35a		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		

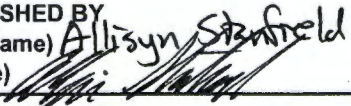
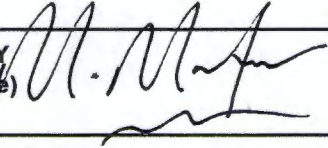

SAMPLE COMMENTS: Sampled 30ft from running diesel generator

LOCATION COMMENTS: Windy

FIELD PARAMETERS:

Sample Time	1322	HH:MM	Discharge Rate	3.79	Dissolved Oxygen	5.00
Groundwater Elevation	5821.96	5820.61	Oxidation-Reduction Potential	286.9	Period Purge Volume	18.95
pH	8.20		Purge Volume	799.69	Specific Conductance	242.6
Temperature	23.7		Total Volume Pumped		Turbidity	0.53

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CASA-18-148007**WORK ORDER:****COLLECTED BY (PRINT):** D. Jaramillo, T. Vander Vis

RELINQUISHED BY (Printed Name) Allisyn Stanfield (Signature) 	Date/Time 11/6/17 1425	RECEIVED BY (Printed Name) M. M.  (Signature) 	Date/Time 11/6/17 1425
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-18-148008

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/6/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1337		MEDIA:	OK	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-35b		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	500 ML POLY	1	HNO3	Y	NA
	WSP-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		

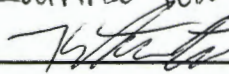
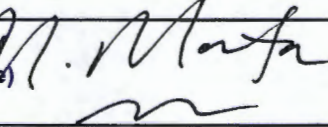
SAMPLE COMMENTS: sampled 30 ft from running diesel generator

LOCATION COMMENTS: None 10-15 mph winds while sampling
KT 11/6/17

FIELD PARAMETERS:

Sample Time	1337	HH:MM	Discharge Rate	3.12	Dissolved Oxygen	6.22
Groundwater Elevation	5832.19		Oxidation-Reduction Potential	129.2	Period Purge Volume	15.6
pH	7.55		Purge Volume	199.68	Specific Conductance	170.2
Temperature	21.5		Total Volume Pumped	268.32	Turbidity	0.28

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY**EVENT ID:** 11552**EVENT NAME:** Mortandad/Sandia (Cr Inv and MDA C)
MY2018 Q1**SAMPLE ID:** CASA-18-148008**WORK ORDER:****COLLECTED BY (PRINT):** D. Hughes

RELINQUISHED BY (Printed Name) (Signature)	Katrina Tow 	Date/Time 11/6/17 1415	RECEIVED BY (Printed Name) (Signature)	M. Manza 	Date/Time 11/6/17 1415
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-18-148017

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/6/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1322		MEDIA:	OK	1
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-35a		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	FTB	
TOP DEPTH:			SAMPLE USAGE:	QC	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	11617	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): D. Jaramillo, T. Vander Vis

RELINQUISHED BY (Printed Name) Allisyn Stenfield (Signature)	Date/Time 11/6/17 1425	RECEIVED BY (Printed Name) M. M. M. M. (Signature)	Date/Time 11/6/17 1425
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-18-148018

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/6/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1337		MEDIA:	OK	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-35b		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	FTB	
TOP DEPTH:			SAMPLE USAGE:	QC	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / <u>NA</u>

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	5 2 11/6/17	HCL	Y	NA

SAMPLE COMMENTS: None

LOCATION COMMENTS: None

FIELD PARAMETERS:

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

KT 11/6/17

COLLECTED BY (PRINT): D. Hughes

RELINQUISHED BY (Printed Name) (Signature)	Katrina Tow <i>[Signature]</i>	Date/Time 11/6/17 1415	RECEIVED BY (Printed Name) (Signature)	<i>[Signature]</i>	Date/Time 11/6/17 1418
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-18-148019

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	11/6/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1117		MEDIA:	OK	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-36		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	FTB	
TOP DEPTH:			SAMPLE USAGE:	QC	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B- VOA	40 ML SEPTUM AMBER GLASS	1 2 DJA	HCL	Y	NA

SAMPLE COMMENTS: None 11/6/17

LOCATION COMMENTS: None

FIELD PARAMETERS:

Sample Time _____ HH:MM _____ Discharge Rate _____ Dissolved Oxygen _____

Groundwater _____ Oxidation-Reduction _____ Period Purge _____

Elevation _____ Potential _____ Volume _____

pH _____ Purge Volume _____ Specific _____

Temperature _____ Total Volume _____ Conductance _____

Pumped _____ Turbidity _____

KT 11/6/17

COLLECTED BY (PRINT): D. Hughes

RELINQUISHED BY (Printed Name) (Signature)	Katrina Tow <i>[Signature]</i>	Date/Time 11/6/17 1415	RECEIVED BY (Printed Name) (Signature)	M. Manja <i>[Signature]</i>	Date/Time 11/6/17 1415
RELINQUISHED BY (Printed Name) (Signature)		Date/Time	RECEIVED BY (Printed Name) (Signature)		Date/Time

TEST - Explosives		YES	NO
Samples collected from a WFO area?			<input checked="" type="checkbox"/>
Field Test for Explosives Results		YES	NO
Spot test shows presence of explosives residues. If YES - Do not ship.			<input checked="" type="checkbox"/>

TEST - Chemical Preservation		YES	NO
Samples are chemically preserved?		<input checked="" type="checkbox"/>	
Field Team Member Statement		YES	NO
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
The sample has field screening measurements of alpha activity and beta activity?				<input checked="" type="checkbox"/>
Sample Activity (dpm/100cm ²)	Shipment Activity (dpm/g/100cm ²)	Sampled Location	YES	NO
Alpha detectable	Alpha >160,000	TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, TA-48, or TA-49		<input checked="" type="checkbox"/>
Alpha > 125	Alpha >1,250,000	other locations		
Beta > 1,500	Beta >15,000,000	any location		
The sample Alpha >16,000,000 dpm/g/100cm ² or Beta > 160,000,000 dpm/g/100cm ² . If YES - Do not ship.				
On the external surface of the sample container, alpha activity ≥ 24 dpm/cm ² , beta activity ≥ 240 dpm/cm ² , or surface activity ≥ 0.5 mR/hr. If YES - Do not ship.				
The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910, based on field screening measurements of alpha and beta activity.				

TEST - Location		YES	NO
Prior analytical measurements of radioactive isotopes are available?		<input checked="" type="checkbox"/>	
Sample Activity (pCi/g)	Shipment Activity (pCi)	YES	NO
<ul style="list-style-type: none"> Am-241 > 27 Cs-137 > 270 Pu-238 > 27 Pu-239/240 > 27 Th-228 > 27 U-234 > 270 U-238 > 270 H-3 > 27,000,000 	<ul style="list-style-type: none"> Am-241 > 270,000 Cs-137 > 270,000 Pu-238 > 270,000 Pu-239/240 > 270,000 Th-228 > 270,000 U-234 > 1,600,000,000 U-238 > unlimited H-3 > 27,000,000,000 		<input checked="" type="checkbox"/>
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"/>
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	NA
The shippers documented knowledge of the sample positively identifies appropriate labeling.				<input checked="" type="checkbox"/>
The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910, and the sample is submitted to ARS or RP for hazard classification analysis.				<input checked="" type="checkbox"/>

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

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

Hazard Assessment Completed By:	Date/Time
(Printed Name) Melissa Montoya	11/7/17
(Signature)	3a

Hazard Assessment Reviewed By:	Date/Time
(Printed Name) J. Sherwood	11/7/17
(Signature)	3pm

TEST - Explosives		YES	NO
Samples collected from a WFO area?			<input checked="" type="checkbox"/>
Field Test for Explosives Results		YES	NO
Spot test shows presence of explosives residues. If YES - Do not ship.			<input checked="" type="checkbox"/>

TEST - Chemical Preservation		YES	NO
Samples are chemically preserved?			<input checked="" type="checkbox"/>
Field Team Member Statement		YES	NO
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
The sample has field screening measurements of alpha activity and beta activity?				<input checked="" type="checkbox"/>
Sample Activity (dpm/100cm ²)	Shipment Activity (dpm/g/100cm ²)	Sampled Location	YES	NO
Alpha detectable	Alpha >160,000	TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, TA-48, or TA-49		<input checked="" type="checkbox"/>
Alpha > 125	Alpha >1,250,000	other locations		
Beta > 1,500	Beta >15,000,000	any location		
The sample Alpha >16,000,000 dpm/g/100cm ² or Beta > 160,000,000 dpm/g/100cm ² . If YES - Do not ship.				
On the external surface of the sample container, alpha activity ≥ 24 dpm/cm ² , beta activity ≥ 240 dpm/cm ² , or surface activity ≥ 0.5 mR/hr. If YES - Do not ship.				
The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910, based on field screening measurements of alpha and beta activity.				

TEST - Location		YES	NO
Prior analytical measurements of radioactive isotopes are available?		<input checked="" type="checkbox"/>	
Sample Activity (pCi/g)	Shipment Activity (pCi)	YES	NO
<ul style="list-style-type: none"> Am-241 > 27 Cs-137 > 270 Pu-238 > 27 Pu-239/240 > 27 Th-228 > 27 U-234 > 270 U-238 > 270 H-3 > 27,000,000 	<ul style="list-style-type: none"> Am-241 > 270,000 Cs-137 > 270,000 Pu-238 > 270,000 Pu-239/240 > 270,000 Th-228 > 270,000 U-234 > 1,600,000,000 U-238 > unlimited H-3 > 27,000,000,000 		<input checked="" type="checkbox"/>
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"/>
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	NA
The shippers documented knowledge of the sample positively identifies appropriate labeling.				<input checked="" type="checkbox"/>
The sample is tentatively identified as DOT Hazard Class 7 (Radioactive). The shipment is labeled Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910, and the sample is submitted to ARS or RP for hazard classification analysis.				<input checked="" type="checkbox"/>

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

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

Hazard Assessment Completed By:	Date/Time
(Printed Name) <i>Miss. Monty</i>	11/7/17
(Signature) <i>[Signature]</i>	3a

Hazard Assessment Reviewed By:	Date/Time
(Printed Name) <i>Sherrwood</i>	11/7/17
(Signature) <i>[Signature]</i>	3pm

DATA VALIDATION REPORT

Chain Of Custody No. 2018-739

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
437322	EPA:120.1	3				
437322	EPA:150.1	3				
437322	EPA:160.1	3				
437322	EPA:170.0	6		3		
437322	EPA:245.2	6				
437322	EPA:300.0	3				
437322	EPA:310.1	3				
437322	EPA:335.4	3				
437322	EPA:350.1	3				
437322	EPA:351.2	3				
437322	EPA:353.2	3				
437322	EPA:365.4	3				
437322	EPA:900	3				
437322	EPA:901.1	3				
437322	EPA:905.0	3				
437322	HASL-300:AM-241	3				
437322	HASL-300:ISOPU	3				
437322	HASL-300:ISOU	3				
437322	SM:A2340B	3				
437322	SW-846:6010C	3				
437322	SW-846:6020	3				
437322	SW-846:6850	3				
437322	SW-846:8260B	3		3		
437322	SW-846:8270D	3				
437322	SW-846:9060	3				

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
437322	EPA:120.1	1717162	1717162	3										1			1				
437322	EPA:150.1	1717129	1717129	3										1			1				
437322	EPA:160.1	1717342	1717342	3					1					1			1				
437322	EPA:170.0	NA	NA	6		3															
437322	EPA:245.2	1721699	1721691	6					1	1				1			1				
437322	EPA:300.0	1718519	1718519	3					1					1			1				
437322	EPA:310.1	1717125	1717125	3						1				1			1				
437322	EPA:335.4	1716988	1716987	3					1	1				1			1				
437322	EPA:350.1	1716959	1716958	3					1	1				1			1				
437322	EPA:351.2	1717811	1717809	3					1	1				1			1				
437322	EPA:353.2	1717193	1717193	3					1					1			1				
437322	EPA:365.4	1717814	1717812	3					1	1				1			1				
437322	EPA:900	1717573	1717573	3					1	1	1			1			1				
437322	EPA:901.1	1713592	1713592	3					1					1			1				
437322	EPA:905.0	1717217	1717217	3					1	1				1			1				
437322	HASL-300:AM-241	1718541	1718541	3					1					1			1				
437322	HASL-300:ISOPU	1718543	1718543	3					1					1			1				
437322	HASL-300:ISOU	1718546	1718546	3					1					1			1				
437322	SM:A2340B	1723726	1723726	3																	
437322	SW-846:6010C	1717104	1717102	3					1	1				1			1				
437322	SW-846:6020	1717109	1717107	3					1	1				1			1				
437322	SW-846:6850	1717124	1717121	3					1	1	1			1							
437322	SW-846:8260B	1718456	1718456	3		3			1					2							
437322	SW-846:8270D	1717963	1717962	3					1	1	1			1							
437322	SW-846:9060	1717030	1717030	3					1					1			1				

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CASA-18-147992	437322007	REG	1	0	0	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CASA-18-148005	437322001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-18-148006	437322004	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CrIN6-18-148623	1203915372	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203915371	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CASA-18-147992	1203915279	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-18-147992	437322007	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-18-148005	437322001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-18-148006	437322004	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203915277	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CASA-18-147992	437322007	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-18-148005	437322001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-18-148006	437322004	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CrIN6-18-148629	1203915797	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203915795	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203915794	MB	1	0	0	0
EPA:170.0	VOC	CASA-18-147992	437322007	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-147999	437322008	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148005	437322001	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148006	437322004	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148007	437322002	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148008	437322005	REG	1	0	0	0
EPA:170.0	VOC	CASA-18-148017	437322003	FTB	1	0	0	0
EPA:170.0	VOC	CASA-18-148018	437322006	FTB	1	0	0	0
EPA:170.0	VOC	CASA-18-148019	437322009	FTB	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-147992	437322007	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-147999	437322008	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-148005	1203926924	DUP	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-148005	1203926925	MS	0	0	1	0
EPA:245.2	INORGANIC	CASA-18-148005	437322001	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-148006	437322004	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-148007	437322002	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-18-148008	437322005	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203926923	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203926922	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-18-148060	1203918855	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-18-147992	437322007	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-18-148005	437322001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-18-148006	437322004	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203918854	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203918853	MB	4	0	0	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:310.1	GENERAL CHEMISTRY	CASA-18-147992	1203915266	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-18-147992	1203915268	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-18-147992	437322007	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-18-148005	437322001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-18-148006	437322004	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203915264	LCS	0	0	1	0
EPA:335.4	INORGANIC	CASA-18-147999	437322008	REG	1	0	0	0
EPA:335.4	INORGANIC	CASA-18-148007	437322002	REG	1	0	0	0
EPA:335.4	INORGANIC	CASA-18-148008	437322005	REG	1	0	0	0
EPA:335.4	INORGANIC	LCS	1203914937	LCS	0	0	1	0
EPA:335.4	INORGANIC	MB	1203914936	MB	1	0	0	0
EPA:335.4	INORGANIC	WST03-18-148752	1203915928	DUP	1	0	0	0
EPA:335.4	INORGANIC	WST03-18-148752	1203915930	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CAPA-18-147556	1203914836	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAPA-18-147556	1203914837	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CASA-18-147992	437322007	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-18-148005	437322001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-18-148006	437322004	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203914835	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203914834	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-18-147999	437322008	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-18-148007	437322002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-18-148008	437322005	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CrIN6-18-148629	1203916956	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CrIN6-18-148629	1203916957	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203916955	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203916954	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-18-147992	437322007	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-18-148005	437322001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-18-148006	437322004	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203915477	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203915476	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	WST03-18-148752	1203915478	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-18-147992	437322007	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-18-148005	437322001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-18-148006	437322004	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CrIN6-18-148629	1203916966	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CrIN6-18-148629	1203916967	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203916965	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203916964	MB	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:900	RAD	CASA-18-147999	1203916324	DUP	2	0	0	0
EPA:900	RAD	CASA-18-147999	1203916325	MS	0	0	2	0
EPA:900	RAD	CASA-18-147999	1203916326	MSD	0	0	2	0
EPA:900	RAD	CASA-18-147999	437322008	REG	2	0	0	0
EPA:900	RAD	CASA-18-148007	437322002	REG	2	0	0	0
EPA:900	RAD	CASA-18-148008	437322005	REG	2	0	0	0
EPA:900	RAD	LCS	1203916327	LCS	0	0	2	0
EPA:900	RAD	MB	1203916323	MB	2	0	0	0
EPA:901.1	RAD	CAPA-18-147574	1203906423	DUP	5	0	0	0
EPA:901.1	RAD	CASA-18-147999	437322008	REG	5	0	0	0
EPA:901.1	RAD	CASA-18-148007	437322002	REG	5	0	0	0
EPA:901.1	RAD	CASA-18-148008	437322005	REG	5	0	0	0
EPA:901.1	RAD	LCS	1203906424	LCS	0	0	3	0
EPA:901.1	RAD	MB	1203906422	MB	5	0	0	0
EPA:905.0	RAD	CAPA-18-147593	1203915511	DUP	1	0	0	0
EPA:905.0	RAD	CAPA-18-147593	1203915512	MS	0	0	1	0
EPA:905.0	RAD	CASA-18-147999	437322008	REG	1	0	0	0
EPA:905.0	RAD	CASA-18-148007	437322002	REG	1	0	0	0
EPA:905.0	RAD	CASA-18-148008	437322005	REG	1	0	0	0
EPA:905.0	RAD	LCS	1203915513	LCS	0	0	1	0
EPA:905.0	RAD	MB	1203915510	MB	1	0	0	0
HASL-300:AM-241	RAD	CAMO-18-148111	1203918916	DUP	1	0	0	0
HASL-300:AM-241	RAD	CASA-18-147999	437322008	REG	1	0	0	0
HASL-300:AM-241	RAD	CASA-18-148007	437322002	REG	1	0	0	0
HASL-300:AM-241	RAD	CASA-18-148008	437322005	REG	1	0	0	0
HASL-300:AM-241	RAD	LCS	1203918917	LCS	0	0	1	0
HASL-300:AM-241	RAD	MB	1203918915	MB	1	0	0	0
HASL-300:ISOPU	RAD	CAMO-18-148111	1203918922	DUP	2	0	0	0
HASL-300:ISOPU	RAD	CASA-18-147999	437322008	REG	2	0	0	0
HASL-300:ISOPU	RAD	CASA-18-148007	437322002	REG	2	0	0	0
HASL-300:ISOPU	RAD	CASA-18-148008	437322005	REG	2	0	0	0
HASL-300:ISOPU	RAD	LCS	1203918923	LCS	0	0	1	0
HASL-300:ISOPU	RAD	MB	1203918921	MB	2	0	0	0
HASL-300:ISOU	RAD	CAMO-18-148111	1203918933	DUP	3	0	0	0
HASL-300:ISOU	RAD	CASA-18-147999	437322008	REG	3	0	0	0
HASL-300:ISOU	RAD	CASA-18-148007	437322002	REG	3	0	0	0
HASL-300:ISOU	RAD	CASA-18-148008	437322005	REG	3	0	0	0
HASL-300:ISOU	RAD	LCS	1203918934	LCS	0	0	1	0
HASL-300:ISOU	RAD	MB	1203918932	MB	3	0	0	0
SM:A2340B	INORGANIC	CASA-18-147992	437322007	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
SM:A2340B	INORGANIC	CASA-18-148005	437322001	REG	1	0	0	0
SM:A2340B	INORGANIC	CASA-18-148006	437322004	REG	1	0	0	0
SW-846:6010C	INORGANIC	CASA-18-147992	437322007	REG	17	0	0	0
SW-846:6010C	INORGANIC	CASA-18-148005	1203915216	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CASA-18-148005	1203915217	MS	0	0	17	0
SW-846:6010C	INORGANIC	CASA-18-148005	437322001	REG	17	0	0	0
SW-846:6010C	INORGANIC	CASA-18-148006	437322004	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203915215	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203915214	MB	17	0	0	0
SW-846:6020	INORGANIC	CASA-18-147992	437322007	REG	11	0	0	0
SW-846:6020	INORGANIC	CASA-18-148005	1203915226	DUP	11	0	0	0
SW-846:6020	INORGANIC	CASA-18-148005	1203915227	MS	0	0	11	0
SW-846:6020	INORGANIC	CASA-18-148005	437322001	REG	11	0	0	0
SW-846:6020	INORGANIC	CASA-18-148006	437322004	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203915225	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203915224	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-18-147992	437322007	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-18-148005	437322001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-18-148006	437322004	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CrIN6-18-148622	1203915261	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CrIN6-18-148622	1203915262	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203915260	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203915259	MB	1	0	0	0
SW-846:8260B	VOC	CASA-18-147999	437322008	REG	80	3	0	0
SW-846:8260B	VOC	CASA-18-148007	437322002	REG	80	3	0	0
SW-846:8260B	VOC	CASA-18-148008	437322005	REG	80	3	0	0
SW-846:8260B	VOC	CASA-18-148017	437322003	FTB	80	3	0	0
SW-846:8260B	VOC	CASA-18-148018	437322006	FTB	80	3	0	0
SW-846:8260B	VOC	CASA-18-148019	437322009	FTB	80	3	0	0
SW-846:8260B	VOC	LCS	1203918687	LCS	0	3	70	0
SW-846:8260B	VOC	LCS	1203918688	LCS	0	3	10	0
SW-846:8260B	VOC	MB	1203918686	MB	80	3	0	0
SW-846:8270D	SVOC	CASA-18-147999	1203917434	MS	0	6	76	0
SW-846:8270D	SVOC	CASA-18-147999	1203917435	MSD	0	6	76	0
SW-846:8270D	SVOC	CASA-18-147999	437322008	REG	80	6	0	0
SW-846:8270D	SVOC	CASA-18-148007	437322002	REG	80	6	0	0
SW-846:8270D	SVOC	CASA-18-148008	437322005	REG	80	6	0	0
SW-846:8270D	SVOC	LCS	1203917433	LCS	0	6	76	0
SW-846:8270D	SVOC	MB	1203917432	MB	80	6	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-18-147999	437322008	REG	1	0	0	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
SW-846:9060	GENERAL CHEMISTRY	CASA-18-148007	437322002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-18-148008	1203916273	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-18-148008	437322005	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203916272	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203916271	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name	Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
MB	1203915214	METHOD BLANK	SW-846:6010C	W	Potassium	125	J	ug/L	150
MB	1203915214	METHOD BLANK	SW-846:6010C	W	Strontium	1.29	J	ug/L	5.00
MB	1203915794	METHOD BLANK	EPA:160.1	W	Total Dissolved Solids	4.29	J	mg/L	14.3
MB	1203916964	METHOD BLANK	EPA:365.4	W	Total Phosphate as Phosphorus	0.0291	J	mg/L	0.050
CASA-18-148017	437322003	TRIP BLANK	EPA:170.0	W	Temperature	4		Deg C	
CASA-18-148018	437322006	TRIP BLANK	EPA:170.0	W	Temperature	4		Deg C	
CASA-18-148019	437322009	TRIP BLANK	EPA:170.0	W	Temperature	4		Deg C	

DATA VALIDATION REPORT

Field Sample ID	Blank Lab	Blank Type	Analytical Method	Parameter Name	Blank Lab Result	Blank Lab Units	Lab Result	Lab Qualifier	Lab Detection Limit	Detect Flag	Detect to Nondetect Factor	Detect to Estimated Factor	Use Factors
CASA-18-148005	1203916964	METHOD BLANK	EPA:365.4	Total Phosphate as Phosphorus	0.0291	mg/L	0.0322	J	0.050	Y	5	100	Y
CASA-18-148006	1203916964	METHOD BLANK	EPA:365.4	Total Phosphate as Phosphorus	0.0291	mg/L	0.0366	J	0.050	Y	5	100	Y
CASA-18-147992	1203916964	METHOD BLANK	EPA:365.4	Total Phosphate as Phosphorus	0.0291	mg/L	0.0348	J	0.050	Y	5	100	Y

6. Any surrogate recoveries outside the control limits?

No.

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

Field Sample ID	MS Lab Sample ID	MSD Lab Sample ID	Analytical Method	Parameter Name	Analysis Lot ID	Analysis Date	Sample Matrix	MS Spike Recovery	MSD Spike Recovery	MS Upper Limit	MS Lower Limit	MS Reject Limit	RPD	RPD Limit
CASA-18-147999	1203916325	1203916326	EPA:900	Gross alpha	1717573	11-13-2017	W	94.1	120	125	75	10	24	20
CASA-18-147999	1203916325	1203916326	EPA:900	Gross alpha	1717573	11-13-2017	W	94.1	120	125	75	10	24	20
CASA-18-148005	1203915217		SW-846:6010C	Silicon Dioxide	1717102	12-04-2017	W	73.1		125	75			
CASA-18-148005	1203915217		SW-846:6010C	Silicon Dioxide	1717102	12-04-2017	W	73.1		125	75			
CASA-18-147999	1203917434	1203917435	SW-846:8270D	Benzidine	1717962	11-13-2017	W	19	53	130	15		93	30
CASA-18-147999	1203917434	1203917435	SW-846:8270D	Pyridine	1717962	11-13-2017	W	38	62	93	24		49	30

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

DATA VALIDATION REPORT

LCS Lab Sample	LCSD Lab	Analytical Method	Parameter Name	Lab Lot ID	Analysis	Sample Matrix	LCS Spike Recovery	LCSD Spike Recovery	Upper Limit	Lower Limit	Upper Rejection Limit	Lower Rejection Limit	RPD	RPD Limit
1203918934		HASL-300:ISOU	Uranium-232	1718546	11-26-2017	W	43.6		105	50		10		
1203917433		SW-846:8270D	Dinitrophenol[2,4-]	1717962	11-13-2017	W	30		122	34				
1203917433		SW-846:8270D	Hexachlorocyclopentadiene	1717962	11-13-2017	W	32		89	34				

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

Field Sample ID	Lab Sample ID	LD Lab Sample ID	Analytical Method	Parameter Name	Sample Matrix	Lab Result	LD Lab Result	Lab Units	Detect Flag	LD Detect Flag	RPD	RPD Limit
CASA-18-148005	437322001	1203915226	SW-846:6020	Uranium	W	0.742	0.577	ug/L	Y	Y	25	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	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-36	2018-739	CASA-18-147992	REG	INIT	GENERAL CHEMISTRY	EPA:365.4	Total Phosphate as Phosphorus	J	U	I4	N	0.0348	mg/L	0.0348	mg/L			W	11/06/2017		1717814	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.0035	pCi/L	0.0035	pCi/L	0.0311	0.00743	W	11/06/2017		1718541	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	0.437	pCi/L	0.437	pCi/L	3.73	1.06	W	11/06/2017		1713592	VAL	Y

DATA VALIDATION REPORT

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Paramter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detect Flag	Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent	Analysis Lot ID	Validation Status Code	Use Flag
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	1.42	pCi/L	1.42	pCi/L	4.57	0.997	W	11/06/2017		1713592	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	SVOC	SW-846:8270D	Dinitrophenol[2,4-]	U	UJ	SV12a	N	5.00	ug/L	5.00	ug/L			W	11/06/2017		1717963	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	0.672	pCi/L	0.672	pCi/L	2.34	0.647	W	11/06/2017		1717573	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N	1.19	pCi/L	1.19	pCi/L	1.82	0.574	W	11/06/2017		1717573	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	SVOC	SW-846:8270D	Hexachlorocyclopentadiene	U	UJ	SV12a	N	3.00	ug/L	3.00	ug/L			W	11/06/2017		1717963	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	7.97	pCi/L	7.97	pCi/L	9.15	2.15	W	11/06/2017		1713592	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	-0.00155	pCi/L	-0.00155	pCi/L	0.030	0.010	W	11/06/2017		1718543	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	-0.0135	pCi/L	-0.0135	pCi/L	0.0434	0.0122	W	11/06/2017		1718543	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	-16.1	pCi/L	-16.1	pCi/L	52.6	14.1	W	11/06/2017		1713592	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	0.857	pCi/L	0.857	pCi/L	4.75	1.19	W	11/06/2017		1713592	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	0.374	pCi/L	0.374	pCi/L	0.470	0.150	W	11/06/2017		1717217	VAL	Y
R-36	2018-739	CASA-18-147999	REG	INIT	RAD	HASL-300:ISOU	Uranium-235/236	U	U	R5	N	0.0464	pCi/L	0.0464	pCi/L	0.0674	0.0155	W	11/06/2017		1718546	VAL	Y
R-35a	2018-739	CASA-18-148005	REG	INIT	INORGANIC	SW-846:6010C	Silicon Dioxide		J-	I6a	Y	78600	ug/L	78.6	mg/L			W	11/06/2017		1717104	VAL	Y
R-35a	2018-739	CASA-18-148005	REG	INIT	GENERAL CHEMISTRY	EPA:365.4	Total Phosphate as Phosphorus	J	U	I4	N	0.0322	mg/L	0.0322	mg/L			W	11/06/2017		1717814	VAL	Y
R-35b	2018-739	CASA-18-148006	REG	INIT	GENERAL CHEMISTRY	EPA:365.4	Total Phosphate as Phosphorus	J	U	I4	N	0.0366	mg/L	0.0366	mg/L			W	11/06/2017		1717814	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	0.00386	pCi/L	0.00386	pCi/L	0.0343	0.0061	W	11/06/2017		1718541	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	1.64	pCi/L	1.64	pCi/L	4.08	0.942	W	11/06/2017		1713592	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	0.433	pCi/L	0.433	pCi/L	3.79	0.852	W	11/06/2017		1713592	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	SVOC	SW-846:8270D	Dinitrophenol[2,4-]	U	UJ	SV12a	N	5.38	ug/L	5.38	ug/L			W	11/06/2017		1717963	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	-0.165	pCi/L	-0.165	pCi/L	2.86	0.664	W	11/06/2017		1717573	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	SVOC	SW-846:8270D	Hexachlorocyclopentadiene	U	UJ	SV12a	N	3.23	ug/L	3.23	ug/L			W	11/06/2017		1717963	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	2.14	pCi/L	2.14	pCi/L	7.02	1.89	W	11/06/2017		1713592	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	0.00251	pCi/L	0.00251	pCi/L	0.037	0.00973	W	11/06/2017		1718543	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	0.01	pCi/L	0.01	pCi/L	0.0529	0.0107	W	11/06/2017		1718543	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	-12.9	pCi/L	-12.9	pCi/L	48.8	11.4	W	11/06/2017		1713592	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	-2.46	pCi/L	-2.46	pCi/L	2.44	0.913	W	11/06/2017		1713592	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	-0.169	pCi/L	-0.169	pCi/L	0.466	0.108	W	11/06/2017		1717217	VAL	Y
R-35a	2018-739	CASA-18-148007	REG	INIT	RAD	HASL-300:ISOU	Uranium-235/236	U	U	R5	N	0.0321	pCi/L	0.0321	pCi/L	0.0559	0.0111	W	11/06/2017		1718546	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	VOC	SW-846:8260B	Acetone	J	U	V4	N	1.56	ug/L	1.56	ug/L			W	11/06/2017		1718456	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N	-0.0077	pCi/L	-0.0077	pCi/L	0.0343	0.00667	W	11/06/2017		1718541	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N	-1.44	pCi/L	-1.44	pCi/L	5.92	1.74	W	11/06/2017		1713592	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N	-2.65	pCi/L	-2.65	pCi/L	6.67	2.12	W	11/06/2017		1713592	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-35b	2018-739	CASA-18-148008	REG	INIT	SVOC	SW-846:8270D	Dinitrophenol[2,4-]	U	UJ	SV12a	N	5.21	ug/L	5.21	ug/L			W	11/06/2017		1717963	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N	1.08	pCi/L	1.08	pCi/L	2.09	0.647	W	11/06/2017		1717573	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N	1.07	pCi/L	1.07	pCi/L	2.88	0.857	W	11/06/2017		1717573	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	SVOC	SW-846:8270D	Hexachlorocyclopentadiene	U	UJ	SV12a	N	3.13	ug/L	3.13	ug/L			W	11/06/2017		1717963	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N	4.81	pCi/L	4.81	pCi/L	11.9	3.18	W	11/06/2017		1713592	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N	0.00997	pCi/L	0.00997	pCi/L	0.049	0.012	W	11/06/2017		1718543	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N	0	pCi/L	0	pCi/L	0.070	0.00814	W	11/06/2017		1718543	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N	28.9	pCi/L	28.9	pCi/L	91.7	22.5	W	11/06/2017		1713592	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N	0.0698	pCi/L	0.0698	pCi/L	6.87	1.73	W	11/06/2017		1713592	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N	-0.117	pCi/L	-0.117	pCi/L	0.478	0.114	W	11/06/2017		1717217	VAL	Y
R-35b	2018-739	CASA-18-148008	REG	INIT	RAD	HASL-300:ISOU	Uranium-235/236	U	U	R5	N	0.0353	pCi/L	0.0353	pCi/L	0.0614	0.0141	W	11/06/2017		1718546	VAL	Y

Reason Code

Description

I4	the sample result is =<5x the concentration of related analyte in the method blank.
I6a	The associated matrix spike recovery was below the lower acceptance limit (LAL) but >10%. Follow the external laboratory limits located within the associated data package.
J_LAB	The analytical laboratory qualified the detected result as estimated (J) because the result was less the PQL but greater than the MDL
NQ	The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualifire. The analyte is detected in the sample.
R5	Analyte is not detected because the amount reported is less than the MDC.
SV12a	The LCS percent recovery was < the LAL but >10%. Follow the external laboratory limits located within the associated data package.
U_LAB	The analytical laboratory qualified the analyte as not detected.
V4	The sample result is less than or equal to 5 times (10 times for acetone, methylene chloride, and 2-butanone) the concentration of the related analyte in the method blank, which indicates the reported detection is considered indistinguishable from contamination in the blank.

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-18-147992	R-36	REG	EPA:120.1	0	1
CASA-18-147992	R-36	REG	EPA:150.1	0	1
CASA-18-147992	R-36	REG	EPA:160.1	0	1

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Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-18-147992	R-36	REG	EPA:170.0	0	1
CASA-18-147992	R-36	REG	EPA:245.2	0	1
CASA-18-147992	R-36	REG	EPA:300.0	0	4
CASA-18-147992	R-36	REG	EPA:310.1	0	2
CASA-18-147992	R-36	REG	EPA:350.1	0	1
CASA-18-147992	R-36	REG	EPA:353.2	0	1
CASA-18-147992	R-36	REG	EPA:365.4	0	1
CASA-18-147992	R-36	REG	SM:A2340B	0	1
CASA-18-147992	R-36	REG	SW-846:6010C	0	17
CASA-18-147992	R-36	REG	SW-846:6020	0	11
CASA-18-147992	R-36	REG	SW-846:6850	0	1
CASA-18-147999	R-36	REG	EPA:170.0	0	1
CASA-18-147999	R-36	REG	EPA:245.2	0	1
CASA-18-147999	R-36	REG	EPA:335.4	0	1
CASA-18-147999	R-36	REG	EPA:351.2	0	1
CASA-18-147999	R-36	REG	EPA:900	0	2
CASA-18-147999	R-36	REG	EPA:901.1	0	5
CASA-18-147999	R-36	REG	EPA:905.0	0	1
CASA-18-147999	R-36	REG	HASL-300:AM-241	0	1
CASA-18-147999	R-36	REG	HASL-300:ISOPU	0	2
CASA-18-147999	R-36	REG	HASL-300:ISOU	0	3
CASA-18-147999	R-36	REG	SW-846:8260B	0	80
CASA-18-147999	R-36	REG	SW-846:8270D	0	80
CASA-18-147999	R-36	REG	SW-846:9060	0	1
CASA-18-148005	R-35a	REG	EPA:120.1	0	1
CASA-18-148005	R-35a	REG	EPA:150.1	0	1
CASA-18-148005	R-35a	REG	EPA:160.1	0	1
CASA-18-148005	R-35a	REG	EPA:170.0	0	1
CASA-18-148005	R-35a	REG	EPA:245.2	0	1
CASA-18-148005	R-35a	REG	EPA:300.0	0	4
CASA-18-148005	R-35a	REG	EPA:310.1	0	2
CASA-18-148005	R-35a	REG	EPA:350.1	0	1
CASA-18-148005	R-35a	REG	EPA:353.2	0	1
CASA-18-148005	R-35a	REG	EPA:365.4	0	1
CASA-18-148005	R-35a	REG	SM:A2340B	0	1
CASA-18-148005	R-35a	REG	SW-846:6010C	0	17
CASA-18-148005	R-35a	REG	SW-846:6020	0	11

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Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-18-148005	R-35a	REG	SW-846:6850	0	1
CASA-18-148006	R-35b	REG	EPA:120.1	0	1
CASA-18-148006	R-35b	REG	EPA:150.1	0	1
CASA-18-148006	R-35b	REG	EPA:160.1	0	1
CASA-18-148006	R-35b	REG	EPA:170.0	0	1
CASA-18-148006	R-35b	REG	EPA:245.2	0	1
CASA-18-148006	R-35b	REG	EPA:300.0	0	4
CASA-18-148006	R-35b	REG	EPA:310.1	0	2
CASA-18-148006	R-35b	REG	EPA:350.1	0	1
CASA-18-148006	R-35b	REG	EPA:353.2	0	1
CASA-18-148006	R-35b	REG	EPA:365.4	0	1
CASA-18-148006	R-35b	REG	SM:A2340B	0	1
CASA-18-148006	R-35b	REG	SW-846:6010C	0	17
CASA-18-148006	R-35b	REG	SW-846:6020	0	11
CASA-18-148006	R-35b	REG	SW-846:6850	0	1
CASA-18-148007	R-35a	REG	EPA:170.0	0	1
CASA-18-148007	R-35a	REG	EPA:245.2	0	1
CASA-18-148007	R-35a	REG	EPA:335.4	0	1
CASA-18-148007	R-35a	REG	EPA:351.2	0	1
CASA-18-148007	R-35a	REG	EPA:900	0	2
CASA-18-148007	R-35a	REG	EPA:901.1	0	5
CASA-18-148007	R-35a	REG	EPA:905.0	0	1
CASA-18-148007	R-35a	REG	HASL-300:AM-241	0	1
CASA-18-148007	R-35a	REG	HASL-300:ISOPU	0	2
CASA-18-148007	R-35a	REG	HASL-300:ISOU	0	3
CASA-18-148007	R-35a	REG	SW-846:8260B	0	80
CASA-18-148007	R-35a	REG	SW-846:8270D	0	80
CASA-18-148007	R-35a	REG	SW-846:9060	0	1
CASA-18-148008	R-35b	REG	EPA:170.0	0	1
CASA-18-148008	R-35b	REG	EPA:245.2	0	1
CASA-18-148008	R-35b	REG	EPA:335.4	0	1
CASA-18-148008	R-35b	REG	EPA:351.2	0	1
CASA-18-148008	R-35b	REG	EPA:900	0	2
CASA-18-148008	R-35b	REG	EPA:901.1	0	5
CASA-18-148008	R-35b	REG	EPA:905.0	0	1
CASA-18-148008	R-35b	REG	HASL-300:AM-241	0	1
CASA-18-148008	R-35b	REG	HASL-300:ISOPU	0	2

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-18-148008	R-35b	REG	HASL-300:ISOU	0	3
CASA-18-148008	R-35b	REG	SW-846:8260B	0	80
CASA-18-148008	R-35b	REG	SW-846:8270D	0	80
CASA-18-148008	R-35b	REG	SW-846:9060	0	1
CASA-18-148017	R-35a	FTB	EPA:170.0	0	1
CASA-18-148017	R-35a	FTB	SW-846:8260B	0	80
CASA-18-148018	R-35b	FTB	EPA:170.0	0	1
CASA-18-148018	R-35b	FTB	SW-846:8260B	0	80
CASA-18-148019	R-36	FTB	EPA:170.0	0	1
CASA-18-148019	R-36	FTB	SW-846:8260B	0	80



December 06, 2017

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

Re: LANL- WQH Water Samples
Work Order: 437322
SDG: 2018-739

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on November 08, 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: 2018-739
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 437322
SDG: 2018-739

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 437322
SDG # : 2018-739**

December 06, 2017

Laboratory Identification:

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

Summary

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

Sample Identification The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
437322001	CASA-18-148005
437322002	CASA-18-148007
437322003	CASA-18-148017
437322004	CASA-18-148006
437322005	CASA-18-148008
437322006	CASA-18-148018
437322007	CASA-18-147992
437322008	CASA-18-147999
437322009	CASA-18-148019

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.

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

Valerie Davis
Project Manager

List of current GEL Certifications as of 05 December 2017

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

Chain of Custody and Supporting Documentation



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ESHU</u>		SDG/AR/COC/Work Order: <u>437322</u>	
Received By: <u>ZKW/KH</u>		Date Received: <u>11/8/17</u>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <u>5908 1783 1375-180 (rchem)</u> <u>5908 1783 1397-40</u> <u>5908 1783 1364-112 (rchem)</u> <u>5908 1783 1423-50</u> <u>5908 1783 1412-50</u> <u>5908 1783 1467-50</u> <u>5908 1783 1401-42</u> <u>5908 1783 1386-40</u> <u>5908 1783 1353-180 rchem</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
Shipped as a DOT Hazardous?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____	
COC/Samples marked or classified as radioactive?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> <u>CPM</u> / mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____	

Sample Receipt Criteria	Yes	NA	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: <u>See TEMP: Above</u> *all temperatures are recorded in Celsius
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR3-16</u> 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) <u>Vial for -1447463 red broken, transferred to new vial</u>
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: <u>WST sampler not preserved</u> 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 <input type="checkbox"/> No <input checked="" type="checkbox"/> (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> (If unknown, select No) VOA vials free of headspace? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Sample ID's and containers affected: <u>Both vials for -75.2 and one for -019 rec'd w/ headspace</u>
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: _____
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: <u>See Below</u>
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments (Use Continuation Form if needed):
We rec'd 8260 Vials for -144744, -144751, -144760, -144748, -144763.
We did not receive -144746, -144752, -144761, -144749, or -144764

PM (or PMA) review: Initials KHDate 11/9/17Page 1 of 1

GL-CHL-SR-001 Rev 5

KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 07NOV17
ACTWGT: 26.0 LB MAN
CAD: 0014176/CAFE2916

BILL SENDER

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

LOS ALAMOS, NM 87545
UNITED STATES US

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ACTWGT: 55.0 LB M
CAD: 0014176/CAFE2

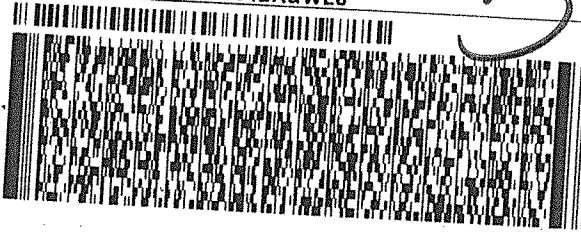
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TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 566-8171

REF: 21PD0ASRGW04BAGWE0



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KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 07NOV17
ACTWGT: 46.0 LB MAN
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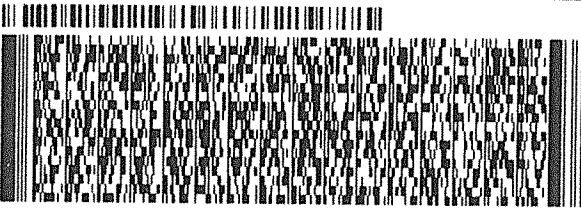
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KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545
UNITED STATES US

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ACTWGT: 23.0 LB MAN
CAD: 0014176/CAFE2916

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KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545
UNITED STATES US

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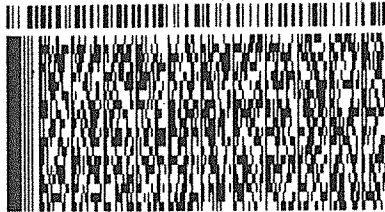
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TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

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KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545
UNITED STATES US

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

LOS ALAMOS, NM 87545
UNITED STATES US

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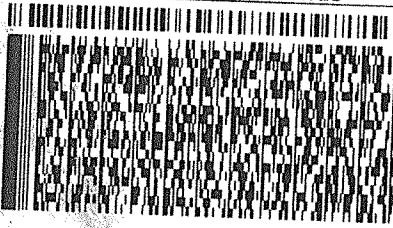
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GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

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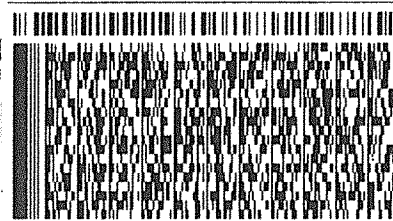


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GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

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0263
Mstr# 5908 1783 1353

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SC-US C



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

SHIP DATE: 07NOV17
ACTWGT: 46.0 LB MAN
CAD: 0014176/CAFE2916

BILL SENDER

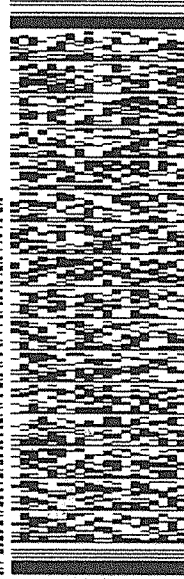
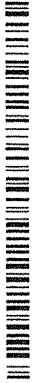
TO **VALERIE DAVIS**
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

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(843) 556-8171

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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 #: 2018-739
Work Order #: 437322**

Method/Analysis Information

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

Analytical Method: SW-846:8260B

Analytical Batch Number: 1718456

Sample Analysis

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

Sample ID	Client ID
437322002	CASA-18-148007
437322003	CASA-18-148017
437322005	CASA-18-148008
437322006	CASA-18-148018
437322008	CASA-18-147999
437322009	CASA-18-148019
1203918686	Method Blank (MB)
1203918687	Laboratory Control Sample (LCS)
1203918688	Laboratory Control Sample (LCS)
1203918689	437322002(CASA-18-148007) Post Spike (PS)
1203918690	437322002(CASA-18-148007) Post Spike (PS)
1203918691	437322002(CASA-18-148007) Post Spike Duplicate (PSD)
1203918692	437322002(CASA-18-148007) Post Spike Duplicate (PSD)

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 blank 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 437322002 (CASA-18-148007) was designated for spike analysis.

Matrix Spike/Matrix Spike Duplicate Recovery Statement

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

Relative Percent Difference (RPD) Statement

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

Internal Standard (ISTD) Acceptance

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

Technical Information

Holding Time Specifications

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

Sample Preservation and Integrity

All samples met the sample preservation and integrity requirements.

Sample Dilutions/Methanol Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Manual Integrations

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

TIC Comment

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

Additional Comments

Additional comments were not required for this SDG.

Residual Chlorine

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

Electronic Package Comment

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

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description	P & T Trap
VOA4.I	Hewlett Packard 6890/5973 GC/MS w/ OI 4560/Archon Autosampler	HP6890/HP5973	DB-624	J&W, 60m x 0.25mm x 1.4um	Trap 10

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2018-739 GEL Work Order: 437322

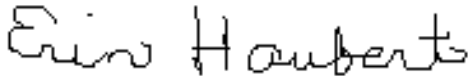
The Qualifiers in this report are defined as follows:

- * 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: 03 DEC 2017

Title: Data Validator

Sample Data Summary

Volatile
Certificate of Analysis
Sample Summary

SDG Number: 2018-739
Lab Sample ID: 437322002

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148007

Client: ARSL004

Project: ESHL00114

Batch ID: 1718456

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Run Date: 11/13/2017 23:57

Inst: VOA4.I

Dilution: 1

Prep Date: 11/13/2017 23:57

Analyst: VXY1

Purge Vol: 5 mL

Data File: 111317V4\41133.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: 2018-739
Lab Sample ID: 437322002

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148007

Client: ARSL004

Project: ESHL00114

Batch ID: 1718456

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Run Date: 11/13/2017 23:57

Inst: VOA4.I

Dilution: 1

Prep Date: 11/13/2017 23:57

Analyst: VXY1

Purge Vol: 5 mL

Data File: 111317V4\41133.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: 2018-739
Lab Sample ID: 437322002

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148007

Client: ARSL004

Project: ESHL00114

Batch ID: 1718456

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Run Date: 11/13/2017 23:57

Inst: VOA4.I

Dilution: 1

Prep Date: 11/13/2017 23:57

Analyst: VXY1

Purge Vol: 5 mL

Data File: 111317V4\41133.D

Column: DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	52.7	50.0	ug/L 105	(71%-134%)
Bromofluorobenzene	50.7	50.0	ug/L 101	(70%-131%)
Toluene-d8	48.9	50.0	ug/L 98	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown siloxane	12.107	8.63	ug/L	0	J
	unknown siloxane	14.491	50	ug/L	0	J
	unknown siloxane	16.442	15.2	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-739

Lab Sample ID: 437322003

Date Collected: 11/06/2017 13:22

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1718456

Inst: VOA4.I

Dilution: 1

Run Date: 11/13/2017 22:00

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 11/13/2017 22:00

Data File: 111317V4\41129.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: 2018-739

Lab Sample ID: 437322003

Date Collected: 11/06/2017 13:22

Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148017

Batch ID: 1718456

Run Date: 11/13/2017 22:00

Prep Date: 11/13/2017 22:00

Data File: 111317V4\41129.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA4.I

Analyst: VXY1

Project: ESHL00114

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Column: DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
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: 2018-739

Lab Sample ID: 437322003

Date Collected: 11/06/2017 13:22

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1718456

Inst: VOA4.I

Dilution: 1

Run Date: 11/13/2017 22:00

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 11/13/2017 22:00

Data File: 111317V4\41129.D

Column: DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	50.6	50.0	ug/L 101	(71%-134%)
Bromofluorobenzene	50.0	50.0	ug/L 100	(70%-131%)
Toluene-d8	48.7	50.0	ug/L 97	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown hydrocarbon	4.27	27.7	ug/L	0	J
	unknown siloxane	14.491	6.11	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-739

Lab Sample ID: 437322005

Date Collected: 11/06/2017 13:37

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1718456

Inst: VOA4.I

Dilution: 1

Run Date: 11/14/2017 00:27

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 11/14/2017 00:27

Data File: 111317V4\41134.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	J	1.56	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: 2018-739

Lab Sample ID: 437322005

Date Collected: 11/06/2017 13:37

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1718456

Inst: VOA4.I

Dilution: 1

Run Date: 11/14/2017 00:27

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 11/14/2017 00:27

Data File: 111317V4\41134.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: 2018-739

Lab Sample ID: 437322005

Date Collected: 11/06/2017 13:37

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1718456

Inst: VOA4.I

Dilution: 1

Run Date: 11/14/2017 00:27

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 11/14/2017 00:27

Data File: 111317V4\41134.D

Column: DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	50.7	50.0	ug/L 101	(71%-134%)
Bromofluorobenzene	50.8	50.0	ug/L 102	(70%-131%)
Toluene-d8	48.6	50.0	ug/L 97	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown hydrocarbon	4.277	33.6	ug/L	0	J
	unknown siloxane	14.491	16.2	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-739

Lab Sample ID: 437322006

Date Collected: 11/06/2017 13:37

Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148018

Batch ID: 1718456

Run Date: 11/13/2017 22:29

Prep Date: 11/13/2017 22:29

Data File: 111317V4\41130.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA4.I

Analyst: VXY1

Project: ESHL00114

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Column: DB-624

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

Volatile
Certificate of Analysis
Sample Summary

SDG Number: 2018-739

Lab Sample ID: 437322006

Date Collected: 11/06/2017 13:37

Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148018

Batch ID: 1718456

Run Date: 11/13/2017 22:29

Prep Date: 11/13/2017 22:29

Data File: 111317V4\41130.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA4.I

Analyst: VXY1

Project: ESHL00114

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

Column: DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
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: 2018-739

Lab Sample ID: 437322006

Date Collected: 11/06/2017 13:37

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1718456

Inst: VOA4.I

Dilution: 1

Run Date: 11/13/2017 22:29

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 11/13/2017 22:29

Column: DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	50.9	50.0	ug/L 102	(71%-134%)
Bromofluorobenzene	51.1	50.0	ug/L 102	(70%-131%)
Toluene-d8	48.7	50.0	ug/L 97	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown hydrocarbon	4.269	30.3	ug/L	0	J
	unknown siloxane	12.107	12.4	ug/L	0	J
	unknown siloxane	14.491	41.8	ug/L	0	J
	unknown siloxane	16.442	13.2	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-739

Lab Sample ID: 437322008

Date Collected: 11/06/2017 11:17

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1718456

Inst: VOA4.I

Dilution: 1

Run Date: 11/14/2017 00:56

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 11/14/2017 00:56

Data File: 111317V4\41135.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: 2018-739

Lab Sample ID: 437322008

Date Collected: 11/06/2017 11:17

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1718456

Inst: VOA4.I

Dilution: 1

Run Date: 11/14/2017 00:56

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 11/14/2017 00:56

Data File: 111317V4\41135.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: 2018-739

Lab Sample ID: 437322008

Date Collected: 11/06/2017 11:17

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1718456

Inst: VOA4.I

Dilution: 1

Run Date: 11/14/2017 00:56

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 11/14/2017 00:56

Data File: 111317V4\41135.D

Column: DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	52.3	50.0	ug/L 105	(71%-134%)
Bromofluorobenzene	50.9	50.0	ug/L 102	(70%-131%)
Toluene-d8	49.1	50.0	ug/L 98	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown hydrocarbon	4.278	35.4	ug/L	0	J
	unknown siloxane	12.107	12.1	ug/L	0	J
	unknown siloxane	14.491	32.4	ug/L	0	J
	unknown siloxane	16.442	9.53	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-739
Lab Sample ID: 437322009

Date Collected: 11/06/2017 11:17
Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148019
Batch ID: 1718456
Run Date: 11/13/2017 22:58
Prep Date: 11/13/2017 22:58
Data File: 111317V4\41131.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA4.I
Analyst: VXY1

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

Column: DB-624

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

Volatile
Certificate of Analysis
Sample Summary

Page 2 of 3

SDG Number: 2018-739

Lab Sample ID: 437322009

Date Collected: 11/06/2017 11:17

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Batch ID: 1718456

Inst: VOA4.I

Dilution: 1

Run Date: 11/13/2017 22:58

Analyst: VXY1

Purge Vol: 5 mL

Prep Date: 11/13/2017 22:58

Data File: 111317V4\41131.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: 2018-739
Lab Sample ID: 437322009

Date Collected: 11/06/2017 11:17
Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148019

Client: ARSL004

Project: ESHL00114

Batch ID: 1718456

Method: SW-846:8260B

SOP Ref: GL-OA-E-038

Run Date: 11/13/2017 22:58

Inst: VOA4.I

Dilution: 1

Prep Date: 11/13/2017 22:58

Analyst: VXY1

Purge Vol: 5 mL

Data File: 111317V4\41131.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	55.0	50.0	ug/L 110	(71%-134%)
Bromofluorobenzene	51.0	50.0	ug/L 102	(70%-131%)
Toluene-d8	49.1	50.0	ug/L 98	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown hydrocarbon	4.199	7	ug/L	0	J
	unknown siloxane	14.485	17.7	ug/L	0	J
	unknown siloxane	16.442	5.52	ug/L	0	J

Quality Control Summary

Volatile
Surrogate Recovery Report

Page 1 of 1

SDG Number: 2018-739**Matrix Type: LIQUID**

Sample ID	Client ID	DCED4 %REC	TOL %REC	BFB %REC
1203918687	LCS for batch 1718456	102	99	103
1203918688	LCS for batch 1718456	103	97	99
1203918686	MB for batch 1718456	104	100	104
437322003	CASA-18-148017	101	97	100
437322006	CASA-18-148018	102	97	102
437322009	CASA-18-148019	110	98	102
437322002	CASA-18-148007	105	98	101
437322005	CASA-18-148008	101	97	102
437322008	CASA-18-147999	105	98	102
1203918689	CASA-18-148007PS	108	99	104
1203918691	CASA-18-148007PSD	104	99	102
1203918690	CASA-18-148007PS	104	100	101
1203918692	CASA-18-148007PSD	104	99	102

Surrogate**Acceptance Limits**

DCED4 = 1,2-Dichloroethane-d4

(71%-134%)

TOL = Toluene-d8

(74%-124%)

BFB = Bromofluorobenzene

(70%-131%)

* Recovery outside Acceptance Limits

Column to be used to flag recovery values

D Sample Diluted

Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 4

SDG Number: 2018-739

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718456

Matrix: WATER

Lab Sample ID 1203918687

Instrument: VOA4.I

Analysis Date: 11/13/2017 20:03

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

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	89.2	89	71-127
75-05-8	LCS Acetonitrile	1250	0.0	1080	87	61-125
67-64-1	LCS Acetone	250	0.0	202	81	48-157
74-88-4	LCS Iodomethane	250	0.0	234	94	72-128
75-15-0	LCS Carbon disulfide	250	0.0	229	91	69-138
108-05-4	LCS Vinyl acetate	250	0.0	216	86	67-125
78-93-3	LCS 2-Butanone	250	0.0	204	82	55-138
108-10-1	LCS 4-Methyl-2-pentanone	250	0.0	208	83	66-124
591-78-6	LCS 2-Hexanone	250	0.0	189	76	56-140
75-71-8	LCS Dichlorodifluoromethane	50.0	0.0	44.2	88	40-160
74-87-3	LCS Chloromethane	50.0	0.0	38.3	77	58-135
75-01-4	LCS Vinyl chloride	50.0	0.0	39.3	79	65-137
74-83-9	LCS Bromomethane	50.0	0.0	47.1	94	63-137
75-00-3	LCS Chloroethane	50.0	0.0	45.1	90	69-129
75-69-4	LCS Trichlorofluoromethane	50.0	0.0	45.5	91	69-138
60-29-7	LCS Ethyl ether	50.0	0.0	46.7	93	72-125
75-35-4	LCS 1,1-Dichloroethylene	50.0	0.0	47.4	95	66-126
75-09-2	LCS Methylene chloride	50.0	0.0	50.3	101	68-119
1634-04-4	LCS tert-Butyl methyl ether	50.0	0.0	47.7	95	76-128
156-60-5	LCS trans-1,2-Dichloroethylene	50.0	0.0	49.2	98	71-124
75-34-3	LCS 1,1-Dichloroethane	50.0	0.0	48.6	97	73-123
156-59-2	LCS cis-1,2-Dichloroethylene	50.0	0.0	48.7	97	75-123

Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 4

SDG Number: 2018-739

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718456

Matrix: WATER

Lab Sample ID 1203918687

Instrument: VOA4.I

Analysis Date: 11/13/2017 20:03

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

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	46.9	94	72-138
74-97-5	LCS Bromochloromethane	50.0	0.0	49.5	99	76-125
67-66-3	LCS Chloroform	50.0	0.0	48.7	97	76-123
71-55-6	LCS 1,1,1-Trichloroethane	50.0	0.0	47.7	95	74-136
563-58-6	LCS 1,1-Dichloropropene	50.0	0.0	45.8	92	72-129
56-23-5	LCS Carbon tetrachloride	50.0	0.0	47.9	96	72-140
107-06-2	LCS 1,2-Dichloroethane	50.0	0.0	49.6	99	74-122
71-43-2	LCS Benzene	50.0	0.0	46.3	93	72-121
79-01-6	LCS Trichloroethylene	50.0	0.0	49.4	99	74-125
78-87-5	LCS 1,2-Dichloropropane	50.0	0.0	46.7	93	73-121
74-95-3	LCS Dibromomethane	50.0	0.0	48.3	97	78-123
75-27-4	LCS Bromodichloromethane	50.0	0.0	49.4	99	77-131
10061-01-5	LCS cis-1,3-Dichloropropylene	50.0	0.0	46.6	93	78-131
108-88-3	LCS Toluene	50.0	0.0	45.9	92	71-121
10061-02-6	LCS trans-1,3-Dichloropropylene	50.0	0.0	47.1	94	78-131
79-00-5	LCS 1,1,2-Trichloroethane	50.0	0.0	47.2	94	74-118
142-28-9	LCS 1,3-Dichloropropane	50.0	0.0	46.1	92	74-118
127-18-4	LCS Tetrachloroethylene	50.0	0.0	45.8	92	69-129
124-48-1	LCS Dibromochloromethane	50.0	0.0	50.0	100	76-137
106-93-4	LCS 1,2-Dibromoethane	50.0	0.0	49.6	99	78-122
108-90-7	LCS Chlorobenzene	50.0	0.0	46.8	94	74-120
100-41-4	LCS Ethylbenzene	50.0	0.0	45.6	91	73-125

Volatile
Quality Control Summary
Spike Recovery Report

Page 3 of 4

SDG Number: 2018-739

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718456

Matrix: WATER

Lab Sample ID 1203918687

Instrument: VOA4.I

Analysis Date: 11/13/2017 20:03

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

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	44.9	90	74-126
100-42-5	LCS Styrene	50.0	0.0	45.5	91	72-130
75-25-2	LCS Bromoform	50.0	0.0	51.3	103	72-136
98-82-8	LCS Isopropylbenzene	50.0	0.0	46.1	92	70-130
79-34-5	LCS 1,1,2,2-Tetrachloroethane	50.0	0.0	47.4	95	70-126
96-18-4	LCS 1,2,3-Trichloropropane	50.0	0.0	48.1	96	74-122
108-86-1	LCS Bromobenzene	50.0	0.0	48.6	97	74-120
103-65-1	LCS n-Propylbenzene	50.0	0.0	45.1	90	67-128
108-67-8	LCS 1,3,5-Trimethylbenzene	50.0	0.0	46.2	92	70-129
95-49-8	LCS 2-Chlorotoluene	50.0	0.0	46.0	92	71-124
106-43-4	LCS 4-Chlorotoluene	50.0	0.0	46.2	92	69-125
98-06-6	LCS tert-Butylbenzene	50.0	0.0	45.8	92	72-130
95-63-6	LCS 1,2,4-Trimethylbenzene	50.0	0.0	46.2	92	70-126
135-98-8	LCS sec-Butylbenzene	50.0	0.0	46.5	93	70-131
99-87-6	LCS 4-Isopropyltoluene	50.0	0.0	46.0	92	71-131
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	44.8	90	72-121
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	46.4	93	71-120
104-51-8	LCS n-Butylbenzene	50.0	0.0	44.9	90	68-134
96-12-8	LCS 1,2-Dibromo-3-chloropropane	50.0	0.0	49.2	98	68-141
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	46.4	93	72-136
91-20-3	LCS Naphthalene	50.0	0.0	47.1	94	72-132
87-61-6	LCS 1,2,3-Trichlorobenzene	50.0	0.0	48.1	96	70-130

Volatile

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Quality Control Summary
Spike Recovery Report

SDG Number: 2018-739

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718456

Matrix: WATER

Lab Sample ID 1203918687

Instrument: VOA4.I

Analysis Date: 11/13/2017 20:03

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

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	46.7	93	71-129
630-20-6	LCS 1,1,1,2-Tetrachloroethane	50.0	0.0	48.9	98	79-127
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	46.6	93	74-120
71-36-3	LCS n-Butyl alcohol	5000	0.0	4640	93	63-138

Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 1

SDG Number: 2018-739

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1718456

Matrix: WATER

Lab Sample ID 1203918688

Instrument: VOA4.I

Analysis Date: 11/13/2017 21:01

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

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	226	90	60-140
76-13-1	LCS	Trichlorotrifluoroethane	250	0.0	247	99	61-148
107-05-1	LCS	Allyl chloride	250	0.0	237	95	59-125
107-13-1	LCS	Acrylonitrile	250	0.0	232	93	65-122
107-12-0	LCS	Propionitrile	250	0.0	225	90	64-124
126-98-7	LCS	Methacrylonitrile	250	0.0	224	90	64-126
80-62-6	LCS	Methyl methacrylate	250	0.0	223	89	69-127
97-63-2	LCS	Ethyl methacrylate	250	0.0	218	87	66-130
78-83-1	LCS	Isobutyl alcohol	2500	0.0	2200	88	65-135
126-99-8	LCS	2-Chloro-1,3-butadiene	50.0	0.0	45.6	91	66-147

Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 8

SDG Number: 2018-739

Sample Type: Post Spike

Client ID: CASA-18-148007PS

Matrix: W

Lab Sample ID 1203918689

Instrument: VOA4.I

Analysis Date: 11/14/2017 03:22

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
179601-23-1	PS m,p-Xylenes	100	0.00 U	97.4	97	59-132
75-05-8	PS Acetonitrile	1250	0.00 U	1340	107	56-131
67-64-1	PS Acetone	250	0.00 U	127	51	25-155
74-88-4	PS Iodomethane	250	0.00 U	269	108	66-133
75-15-0	PS Carbon disulfide	250	0.00 U	270	108	61-141
108-05-4	PS Vinyl acetate	250	0.00 U	204	82	48-133
78-93-3	PS 2-Butanone	250	0.00 U	174	70	25-143
108-10-1	PS 4-Methyl-2-pentanone	250	0.00 U	246	99	61-127
591-78-6	PS 2-Hexanone	250	0.00 U	190	76	33-138
75-71-8	PS Dichlorodifluoromethane	50.0	0.00 U	50.7	101	33-164
74-87-3	PS Chloromethane	50.0	0.00 U	40.3	81	53-139
75-01-4	PS Vinyl chloride	50.0	0.00 U	41.1	82	58-140
74-83-9	PS Bromomethane	50.0	0.00 U	51.4	103	59-146
75-00-3	PS Chloroethane	50.0	0.00 U	49.3	99	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	49.5	99	69-127
75-35-4	PS 1,1-Dichloroethylene	50.0	0.00 U	57.6	115	59-130
75-09-2	PS Methylene chloride	50.0	0.00 U	58.6	117	62-123
1634-04-4	PS tert-Butyl methyl ether	50.0	0.00 U	54.3	109	69-132
156-60-5	PS trans-1,2-Dichloroethylene	50.0	0.00 U	56.6	113	65-127
75-34-3	PS 1,1-Dichloroethane	50.0	0.00 U	56.4	113	67-127
156-59-2	PS cis-1,2-Dichloroethylene	50.0	0.00 U	55.7	111	69-127

Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 8

SDG Number: 2018-739

Sample Type: Post Spike

Client ID: CASA-18-148007PS

Matrix: W

Lab Sample ID 1203918689

Instrument: VOA4.I

Analysis Date: 11/14/2017 03:22

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
594-20-7	PS 2,2-Dichloropropane	50.0	0.00 U	52.3	105	66-137
74-97-5	PS Bromochloromethane	50.0	0.00 U	56.0	112	71-130
67-66-3	PS Chloroform	50.0	0.00 U	56.3	113	71-129
71-55-6	PS 1,1,1-Trichloroethane	50.0	0.00 U	57.0	114	69-139
563-58-6	PS 1,1-Dichloropropene	50.0	0.00 U	53.4	107	67-130
56-23-5	PS Carbon tetrachloride	50.0	0.00 U	57.1	114	66-143
107-06-2	PS 1,2-Dichloroethane	50.0	0.00 U	57.7	115	69-130
71-43-2	PS Benzene	50.0	0.00 U	52.9	106	66-125
79-01-6	PS Trichloroethylene	50.0	0.00 U	55.6	111	65-131
78-87-5	PS 1,2-Dichloropropane	50.0	0.00 U	53.2	106	67-127
74-95-3	PS Dibromomethane	50.0	0.00 U	55.4	111	72-129
75-27-4	PS Bromodichloromethane	50.0	0.00 U	56.6	113	70-138
10061-01-5	PS cis-1,3-Dichloropropylene	50.0	0.00 U	51.3	103	70-134
108-88-3	PS Toluene	50.0	0.00 U	51.5	103	60-126
10061-02-6	PS trans-1,3-Dichloropropylene	50.0	0.00 U	51.8	104	69-135
79-00-5	PS 1,1,2-Trichloroethane	50.0	0.00 U	53.9	108	66-125
142-28-9	PS 1,3-Dichloropropane	50.0	0.00 U	53.0	106	67-124
127-18-4	PS Tetrachloroethylene	50.0	0.00 U	51.4	103	60-130
124-48-1	PS Dibromochloromethane	50.0	0.00 U	57.3	115	68-143
106-93-4	PS 1,2-Dibromoethane	50.0	0.00 U	57.2	114	71-127
108-90-7	PS Chlorobenzene	50.0	0.00 U	51.5	103	64-124
100-41-4	PS Ethylbenzene	50.0	0.00 U	50.1	100	61-130

Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Post Spike

Client ID: CASA-18-148007PS

Matrix: W

Lab Sample ID 1203918689

Instrument: VOA4.I

Analysis Date: 11/14/2017 03:22

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
95-47-6	PS o-Xylene	50.0	0.00 U	49.5	99	62-131
100-42-5	PS Styrene	50.0	0.00 U	49.2	98	59-135
75-25-2	PS Bromoform	50.0	0.00 U	57.9	116	64-138
98-82-8	PS Isopropylbenzene	50.0	0.00 U	50.0	100	55-133
79-34-5	PS 1,1,2,2-Tetrachloroethane	50.0	0.00 U	55.6	111	62-129
96-18-4	PS 1,2,3-Trichloropropane	50.0	0.00 U	55.3	111	70-124
108-86-1	PS Bromobenzene	50.0	0.00 U	51.4	103	62-124
103-65-1	PS n-Propylbenzene	50.0	0.00 U	48.0	96	50-133
108-67-8	PS 1,3,5-Trimethylbenzene	50.0	0.00 U	48.7	97	53-135
95-49-8	PS 2-Chlorotoluene	50.0	0.00 U	48.6	97	56-128
106-43-4	PS 4-Chlorotoluene	50.0	0.00 U	48.5	97	53-130
98-06-6	PS tert-Butylbenzene	50.0	0.00 U	49.6	99	55-135
95-63-6	PS 1,2,4-Trimethylbenzene	50.0	0.00 U	48.6	97	53-132
135-98-8	PS sec-Butylbenzene	50.0	0.00 U	49.4	99	50-138
99-87-6	PS 4-Isopropyltoluene	50.0	0.00 U	47.7	95	49-138
541-73-1	PS 1,3-Dichlorobenzene	50.0	0.00 U	48.0	96	56-126
106-46-7	PS 1,4-Dichlorobenzene	50.0	0.00 U	47.7	95	55-125
104-51-8	PS n-Butylbenzene	50.0	0.00 U	45.5	91	43-142
96-12-8	PS 1,2-Dibromo-3-chloropropane	50.0	0.00 U	59.3	119	62-141
87-68-3	PS Hexachlorobutadiene	50.0	0.00 U	44.7	89	40-147
91-20-3	PS Naphthalene	50.0	0.00 U	51.6	103	62-134
87-61-6	PS 1,2,3-Trichlorobenzene	50.0	0.00 U	47.5	95	52-135

Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Post Spike

Client ID: CASA-18-148007PS

Matrix: W

Lab Sample ID 1203918689

Instrument: VOA4.I

Analysis Date: 11/14/2017 03:22

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

CAS No		Parmname	Amount Added ug/L	Sample Conc. ug/L		Spike Conc. ug/L	Recovery %	Acceptance Limits
120-82-1	PS	1,2,4-Trichlorobenzene	50.0	0.00	U	44.7	89	50-133
630-20-6	PS	1,1,1,2-Tetrachloroethane	50.0	0.00	U	54.9	110	71-133
95-50-1	PS	1,2-Dichlorobenzene	50.0	0.00	U	49.1	98	60-125
71-36-3	PS	n-Butyl alcohol	5000	0.00	U	5720	114	60-140

Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Post Spike Duplicate

Client ID: CASA-18-148007PSD

Matrix: W

Lab Sample ID 1203918691

Instrument: VOA4.I

Analysis Date: 11/14/2017 03:52

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
179601-23-1	PSD m,p-Xylenes	100	0.00 U	90.3	90	59-132	8	0-20
75-05-8	PSD Acetonitrile	1250	0.00 U	1190	95	56-131	11	0-20
67-64-1	PSD Acetone	250	0.00 U	114	46	25-155	11	0-20
74-88-4	PSD Iodomethane	250	0.00 U	261	104	66-133	3	0-20
75-15-0	PSD Carbon disulfide	250	0.00 U	256	102	61-141	6	0-20
108-05-4	PSD Vinyl acetate	250	0.00 U	189	76	48-133	8	0-20
78-93-3	PSD 2-Butanone	250	0.00 U	153	61	25-143	13	0-20
108-10-1	PSD 4-Methyl-2-pentanone	250	0.00 U	222	89	61-127	10	0-20
591-78-6	PSD 2-Hexanone	250	0.00 U	166	66	33-138	14	0-20
75-71-8	PSD Dichlorodifluoromethane	50.0	0.00 U	46.2	92	33-164	9	0-20
74-87-3	PSD Chloromethane	50.0	0.00 U	38.9	78	53-139	3	0-20
75-01-4	PSD Vinyl chloride	50.0	0.00 U	38.8	78	58-140	6	0-20
74-83-9	PSD Bromomethane	50.0	0.00 U	51.0	102	59-146	1	0-20
75-00-3	PSD Chloroethane	50.0	0.00 U	47.5	95	65-129	4	0-20
75-69-4	PSD Trichlorofluoromethane	50.0	0.00 U	47.6	95	65-141	8	0-20
60-29-7	PSD Ethyl ether	50.0	0.00 U	47.7	95	69-127	4	0-20
75-35-4	PSD 1,1-Dichloroethylene	50.0	0.00 U	54.2	108	59-130	6	0-20
75-09-2	PSD Methylene chloride	50.0	0.00 U	56.0	112	62-123	5	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	54.0	108	65-127	5	0-20
75-34-3	PSD 1,1-Dichloroethane	50.0	0.00 U	53.8	108	67-127	5	0-20
156-59-2	PSD cis-1,2-Dichloroethylene	50.0	0.00 U	53.7	107	69-127	4	0-20

Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Post Spike Duplicate

Client ID: CASA-18-148007PSD

Matrix: W

Lab Sample ID 1203918691

Instrument: VOA4.I

Analysis Date: 11/14/2017 03:52

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
594-20-7	PSD 2,2-Dichloropropane	50.0	0.00 U	50.1	100	66-137	4	0-20
74-97-5	PSD Bromochloromethane	50.0	0.00 U	52.8	106	71-130	6	0-20
67-66-3	PSD Chloroform	50.0	0.00 U	53.9	108	71-129	4	0-20
71-55-6	PSD 1,1,1-Trichloroethane	50.0	0.00 U	52.9	106	69-139	7	0-20
563-58-6	PSD 1,1-Dichloropropene	50.0	0.00 U	49.5	99	67-130	8	0-20
56-23-5	PSD Carbon tetrachloride	50.0	0.00 U	53.4	107	66-143	7	0-20
107-06-2	PSD 1,2-Dichloroethane	50.0	0.00 U	54.7	109	69-130	5	0-20
71-43-2	PSD Benzene	50.0	0.00 U	50.3	101	66-125	5	0-20
79-01-6	PSD Trichloroethylene	50.0	0.00 U	52.5	105	65-131	6	0-20
78-87-5	PSD 1,2-Dichloropropane	50.0	0.00 U	50.7	101	67-127	5	0-20
74-95-3	PSD Dibromomethane	50.0	0.00 U	51.2	102	72-129	8	0-20
75-27-4	PSD Bromodichloromethane	50.0	0.00 U	53.6	107	70-138	5	0-20
10061-01-5	PSD cis-1,3-Dichloropropylene	50.0	0.00 U	48.3	97	70-134	6	0-20
108-88-3	PSD Toluene	50.0	0.00 U	48.3	97	60-126	6	0-20
10061-02-6	PSD trans-1,3-Dichloropropylene	50.0	0.00 U	48.5	97	69-135	7	0-20
79-00-5	PSD 1,1,2-Trichloroethane	50.0	0.00 U	50.9	102	66-125	6	0-20
142-28-9	PSD 1,3-Dichloropropane	50.0	0.00 U	49.6	99	67-124	7	0-20
127-18-4	PSD Tetrachloroethylene	50.0	0.00 U	48.3	97	60-130	6	0-20
124-48-1	PSD Dibromochloromethane	50.0	0.00 U	53.9	108	68-143	6	0-20
106-93-4	PSD 1,2-Dibromoethane	50.0	0.00 U	53.4	107	71-127	7	0-20
108-90-7	PSD Chlorobenzene	50.0	0.00 U	48.4	97	64-124	6	0-20
100-41-4	PSD Ethylbenzene	50.0	0.00 U	46.4	93	61-130	8	0-20

Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Post Spike Duplicate

Client ID: CASA-18-148007PSD

Matrix: W

Lab Sample ID 1203918691

Instrument: VOA4.I

Analysis Date: 11/14/2017 03:52

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
95-47-6	PSD o-Xylene	50.0	0.00 U	45.9	92	62-131	8	0-20
100-42-5	PSD Styrene	50.0	0.00 U	45.9	92	59-135	7	0-20
75-25-2	PSD Bromoform	50.0	0.00 U	54.2	108	64-138	7	0-20
98-82-8	PSD Isopropylbenzene	50.0	0.00 U	46.4	93	55-133	7	0-20
79-34-5	PSD 1,1,2,2-Tetrachloroethane	50.0	0.00 U	51.5	103	62-129	8	0-20
96-18-4	PSD 1,2,3-Trichloropropane	50.0	0.00 U	51.2	102	70-124	8	0-20
108-86-1	PSD Bromobenzene	50.0	0.00 U	49.3	99	62-124	4	0-20
103-65-1	PSD n-Propylbenzene	50.0	0.00 U	43.8	88	50-133	9	0-20
108-67-8	PSD 1,3,5-Trimethylbenzene	50.0	0.00 U	45.0	90	53-135	8	0-20
95-49-8	PSD 2-Chlorotoluene	50.0	0.00 U	45.5	91	56-128	7	0-20
106-43-4	PSD 4-Chlorotoluene	50.0	0.00 U	45.4	91	53-130	7	0-20
98-06-6	PSD tert-Butylbenzene	50.0	0.00 U	45.3	91	55-135	9	0-20
95-63-6	PSD 1,2,4-Trimethylbenzene	50.0	0.00 U	45.0	90	53-132	8	0-20
135-98-8	PSD sec-Butylbenzene	50.0	0.00 U	45.3	91	50-138	9	0-20
99-87-6	PSD 4-Isopropyltoluene	50.0	0.00 U	43.5	87	49-138	9	0-20
541-73-1	PSD 1,3-Dichlorobenzene	50.0	0.00 U	43.7	87	56-126	9	0-20
106-46-7	PSD 1,4-Dichlorobenzene	50.0	0.00 U	44.8	90	55-125	6	0-20
104-51-8	PSD n-Butylbenzene	50.0	0.00 U	41.3	83	43-142	10	0-20
96-12-8	PSD 1,2-Dibromo-3-chloropropane	50.0	0.00 U	52.0	104	62-141	13	0-20
87-68-3	PSD Hexachlorobutadiene	50.0	0.00 U	40.8	82	40-147	9	0-20
91-20-3	PSD Naphthalene	50.0	0.00 U	47.7	95	62-134	8	0-20
87-61-6	PSD 1,2,3-Trichlorobenzene	50.0	0.00 U	45.4	91	52-135	5	0-20

Volatile

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Quality Control Summary
Spike Recovery Report

SDG Number: 2018-739

Sample Type: Post Spike Duplicate

Client ID: CASA-18-148007PSD

Matrix: W

Lab Sample ID 1203918691

Instrument: VOA4.I

Analysis Date: 11/14/2017 03:52

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
120-82-1	PSD 1,2,4-Trichlorobenzene	50.0	0.00 U	42.7	85	50-133	5	0-20
630-20-6	PSD 1,1,1,2-Tetrachloroethane	50.0	0.00 U	52.3	105	71-133	5	0-20
95-50-1	PSD 1,2-Dichlorobenzene	50.0	0.00 U	46.3	93	60-125	6	0-20
71-36-3	PSD n-Butyl alcohol	5000	0.00 U	5090	102	60-140	11	0-20

Volatile
Quality Control Summary
Spike Recovery Report

Page 1 of 2

SDG Number: 2018-739

Sample Type: Post Spike

Client ID: CASA-18-148007PS

Matrix: W

Lab Sample ID 1203918690

Instrument: VOA4.I

Analysis Date: 11/14/2017 04:21

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

CAS No		Parmname	Amount Added ug/L	Sample Conc. ug/L		Spike Conc. ug/L	Recovery %	Acceptance Limits
107-02-8	PS	Acrolein	250	0.00	U	204	81	49-141
76-13-1	PS	Trichlorotrifluoroethane	250	0.00	U	256	103	57-149
107-05-1	PS	Allyl chloride	250	0.00	U	237	95	54-128
107-13-1	PS	Acrylonitrile	250	0.00	U	225	90	59-129
107-12-0	PS	Propionitrile	250	0.00	U	217	87	58-131
126-98-7	PS	Methacrylonitrile	250	0.00	U	220	88	59-134
80-62-6	PS	Methyl methacrylate	250	0.00	U	218	87	62-135
97-63-2	PS	Ethyl methacrylate	250	0.00	U	209	84	60-136
78-83-1	PS	Isobutyl alcohol	2500	0.00	U	2070	83	60-143
126-99-8	PS	2-Chloro-1,3-butadiene	50.0	0.00	U	45.8	92	63-146

Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 2

SDG Number: 2018-739

Sample Type: Post Spike Duplicate

Client ID: CASA-18-148007PSD

Matrix: W

Lab Sample ID 1203918692

Instrument: VOA4.I

Analysis Date: 11/14/2017 04:50

Dilution: 1

Analyst: VXY1

Purge Vol: 5 mL

Batch ID: 1718456

CAS No		Parmname	Amount Added ug/L	Sample Conc. ug/L		Spike Conc. ug/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
107-02-8	PSD	Acrolein	250	0.00	U	203	81	49-141	0	0-20
76-13-1	PSD	Trichlorotrifluoroethane	250	0.00	U	262	105	57-149	2	0-20
107-05-1	PSD	Allyl chloride	250	0.00	U	243	97	54-128	3	0-20
107-13-1	PSD	Acrylonitrile	250	0.00	U	224	89	59-129	1	0-20
107-12-0	PSD	Propionitrile	250	0.00	U	215	86	58-131	1	0-20
126-98-7	PSD	Methacrylonitrile	250	0.00	U	221	88	59-134	0	0-20
80-62-6	PSD	Methyl methacrylate	250	0.00	U	221	88	62-135	1	0-20
97-63-2	PSD	Ethyl methacrylate	250	0.00	U	210	84	60-136	0	0-20
78-83-1	PSD	Isobutyl alcohol	2500	0.00	U	2050	82	60-143	1	0-20
126-99-8	PSD	2-Chloro-1,3-butadiene	50.0	0.00	U	47.1	94	63-146	3	0-20

Method Blank Summary

Page 1 of 1

SDG Number:	2018-739	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1718456	Instrument ID:	VOA4.I	Data File:	111317V4\4I128.D
Lab Sample ID:	1203918686	Prep Date:	11/13/2017 21:31	Analyzed:	11/13/17 21:31
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 1718456	1203918687	111317V4\4I125A.D	11/13/17	2003
02 LCS for batch 1718456	1203918688	111317V4\4I127A.D	11/13/17	2101
03 CASA-18-148017	437322003	111317V4\4I129.D	11/13/17	2200
04 CASA-18-148018	437322006	111317V4\4I130.D	11/13/17	2229
05 CASA-18-148019	437322009	111317V4\4I131.D	11/13/17	2258
06 CASA-18-148007	437322002	111317V4\4I133.D	11/13/17	2357
07 CASA-18-148008	437322005	111317V4\4I134.D	11/14/17	0027
08 CASA-18-147999	437322008	111317V4\4I135.D	11/14/17	0056
09 CASA-18-148007PS	1203918689	111317V4\4I140.D	11/14/17	0322
10 CASA-18-148007PSD	1203918691	111317V4\4I141.D	11/14/17	0352
11 CASA-18-148007PS	1203918690	111317V4\4I142.D	11/14/17	0421
12 CASA-18-148007PSD	1203918692	111317V4\4I143.D	11/14/17	0450

Quality Control Data

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-739

Lab Sample ID: 1203918686

Client Sample: QC for batch 1718456

Client ID: MB for batch 1718456

Batch ID: 1718456

Run Date: 11/13/2017 21:31

Prep Date: 11/13/2017 21:31

Data File: 111317V4\41128.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA4.I

Analyst: VXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene	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: 2018-739
Lab Sample ID: 1203918686
Client Sample: QC for batch 1718456
Client ID: MB for batch 1718456
Batch ID: 1718456
Run Date: 11/13/2017 21:31
Prep Date: 11/13/2017 21:31
Data File: 111317V4\41128.D

Client: ARSL004
Method: SW-846:8260B
Inst: VOA4.I
Analyst: VXY1

Column: DB-624

Matrix: WATER

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

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

**Volatile
Certificate of Analysis
Sample Summary**

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SDG Number: 2018-739	Matrix: WATER
Lab Sample ID: 1203918686	
Client Sample: QC for batch 1718456	Client: ARSL004
Client ID: MB for batch 1718456	Method: SW-846:8260B
Batch ID: 1718456	Project: QC
Run Date: 11/13/2017 21:31	SOP Ref: GL-OA-E-038
Prep Date: 11/13/2017 21:31	Dilution: 1
Data File: 111317V4\41128.D	Purge Vol: 5 mL
	Column: DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	51.9	50.0	ug/L 104	(71%-134%)
Bromofluorobenzene	52.0	50.0	ug/L 104	(70%-131%)
Toluene-d8	50.0	50.0	ug/L 100	(74%-124%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown hydrocarbon	4.27	13.9	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-739

Lab Sample ID: 1203918687

Client Sample: QC for batch 1718456

Client ID: LCS for batch 1718456

Batch ID: 1718456

Run Date: 11/13/2017 20:03

Prep Date: 11/13/2017 20:03

Data File: 111317V4\41125A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA4.I

Analyst: VXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		48.9	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		47.7	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		47.4	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		47.2	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		48.6	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		47.4	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		45.8	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		48.1	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		48.1	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		46.7	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		46.2	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		49.2	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		49.6	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		46.6	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		49.6	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		46.7	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		46.2	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		44.8	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		46.1	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		46.4	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		46.9	ug/L	0.300	1.00
78-93-3	2-Butanone		204	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		46.0	ug/L	0.300	1.00
591-78-6	2-Hexanone		189	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		46.2	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		46.0	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		208	ug/L	1.50	5.00
67-64-1	Acetone		202	ug/L	1.50	10.0
75-05-8	Acetonitrile		1080	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene		46.3	ug/L	0.300	1.00
108-86-1	Bromobenzene		48.6	ug/L	0.300	1.00
74-97-5	Bromochloromethane		49.5	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		49.4	ug/L	0.300	1.00
75-25-2	Bromoform		51.3	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

Page 2 of 3

SDG Number: 2018-739

Lab Sample ID: 1203918687

Client Sample: QC for batch 1718456

Client ID: LCS for batch 1718456

Batch ID: 1718456

Run Date: 11/13/2017 20:03

Prep Date: 11/13/2017 20:03

Data File: 111317V4\41125A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA4.I

Analyst: VXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		47.1	ug/L	0.300	1.00
75-15-0	Carbon disulfide		229	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		47.9	ug/L	0.300	1.00
108-90-7	Chlorobenzene		46.8	ug/L	0.300	1.00
75-00-3	Chloroethane		45.1	ug/L	0.300	1.00
67-66-3	Chloroform		48.7	ug/L	0.300	1.00
74-87-3	Chloromethane		38.3	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		50.0	ug/L	0.300	1.00
74-95-3	Dibromomethane		48.3	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		44.2	ug/L	0.300	1.00
60-29-7	Ethyl ether		46.7	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		45.6	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		46.4	ug/L	0.300	1.00
74-88-4	Iodomethane		234	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		46.1	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride		50.3	ug/L	1.00	10.0
91-20-3	Naphthalene		47.1	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		45.5	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		45.8	ug/L	0.300	1.00
108-88-3	Toluene		45.9	ug/L	0.300	1.00
79-01-6	Trichloroethylene		49.4	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		45.5	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		216	ug/L	1.50	5.00
75-01-4	Vinyl chloride		39.3	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		48.7	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		46.6	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		89.2	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		4640	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		44.9	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		45.1	ug/L	0.300	1.00
95-47-6	o-Xylene		44.9	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		46.5	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

Page 3 of 3

SDG Number:	2018-739	Matrix:	WATER
Lab Sample ID:	1203918687		
Client Sample:	QC for batch 1718456	Client:	ARSL004
Client ID:	LCS for batch 1718456	Method:	SW-846:8260B
Batch ID:	1718456	Inst:	VOA4.I
Run Date:	11/13/2017 20:03	Analyst:	VXY1
Prep Date:	11/13/2017 20:03		
Data File:	111317V4\41125A.D	Column:	DB-624

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		47.7	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		45.8	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		49.2	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		47.1	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	50.9	50.0	ug/L	102	(71%-134%)
Bromofluorobenzene	51.3	50.0	ug/L	103	(70%-131%)
Toluene-d8	49.4	50.0	ug/L	99	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-739

Lab Sample ID: 1203918688

Client Sample: QC for batch 1718456

Client ID: LCS for batch 1718456

Batch ID: 1718456

Run Date: 11/13/2017 21:01

Prep Date: 11/13/2017 21:01

Data File: 111317V4\41127A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA4.I

Analyst: VXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene		45.6	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein		226	ug/L	1.50	5.00
107-13-1	Acrylonitrile		232	ug/L	1.50	5.00
107-05-1	Allyl chloride		237	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-739

Lab Sample ID: 1203918688

Client Sample: QC for batch 1718456

Client ID: LCS for batch 1718456

Batch ID: 1718456

Run Date: 11/13/2017 21:01

Prep Date: 11/13/2017 21:01

Data File: 111317V4\41127A.D

Client: ARSL004

Method: SW-846:8260B

Inst: VOA4.I

Analyst: VXY1

Column: DB-624

Matrix: WATER

Project: QC

SOP Ref: GL-OA-E-038

Dilution: 1

Purge Vol: 5 mL

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	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		218	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		2200	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		224	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		223	ug/L	1.50	5.00
75-09-2	Methylene chloride	U	1.00	ug/L	1.00	10.0
91-20-3	Naphthalene	U	0.300	ug/L	0.300	1.00
107-12-0	Propionitrile		225	ug/L	1.50	5.00
100-42-5	Styrene	U	0.300	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	0.300	ug/L	0.300	1.00
108-88-3	Toluene	U	0.300	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	0.300	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	0.300	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane		247	ug/L	2.00	5.00
108-05-4	Vinyl acetate	U	1.50	ug/L	1.50	5.00
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	0.300	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol	U	15.0	ug/L	15.0	50.0
104-51-8	n-Butylbenzene	U	0.300	ug/L	0.300	1.00
103-65-1	n-Propylbenzene	U	0.300	ug/L	0.300	1.00
95-47-6	o-Xylene	U	0.300	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene	U	0.300	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

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SDG Number:	2018-739	Matrix:	WATER
Lab Sample ID:	1203918688		
Client Sample:	QC for batch 1718456	Client:	ARSL004
Client ID:	LCS for batch 1718456	Method:	SW-846:8260B
Batch ID:	1718456	Inst:	VOA4.I
Run Date:	11/13/2017 21:01	Analyst:	VXY1
Prep Date:	11/13/2017 21:01		
Data File:	111317V4\41127A.D	Column:	DB-624

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	51.3	50.0	ug/L	103 (71%-134%)
Bromofluorobenzene	49.7	50.0	ug/L	99 (70%-131%)
Toluene-d8	48.6	50.0	ug/L	97 (74%-124%)

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-739
Lab Sample ID: 1203918689
Client Sample: QC for batch 1718456
Client ID: CASA-18-148007PS
Batch ID: 1718456
Run Date: 11/14/2017 03:22
Prep Date: 11/14/2017 03:22
Data File: 111317V4\41140.D

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA4.I
Analyst: VXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		54.9	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		57.0	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		55.6	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		53.9	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		56.4	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		57.6	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		53.4	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		47.5	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		55.3	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		44.7	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		48.6	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		59.3	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		57.2	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		49.1	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		57.7	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		53.2	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		48.7	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		48.0	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		53.0	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		47.7	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		52.3	ug/L	0.300	1.00
78-93-3	2-Butanone		174	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		48.6	ug/L	0.300	1.00
591-78-6	2-Hexanone		190	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		48.5	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		47.7	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		246	ug/L	1.50	5.00
67-64-1	Acetone		127	ug/L	1.50	10.0
75-05-8	Acetonitrile		1340	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		51.4	ug/L	0.300	1.00
74-97-5	Bromochloromethane		56.0	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		56.6	ug/L	0.300	1.00
75-25-2	Bromoform		57.9	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

SDG Number: 2018-739
Lab Sample ID: 1203918689
Client Sample: QC for batch 1718456
Client ID: CASA-18-148007PS
Batch ID: 1718456
Run Date: 11/14/2017 03:22
Prep Date: 11/14/2017 03:22
Data File: 111317V4\41140.D

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA4.I
Analyst: VXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		51.4	ug/L	0.300	1.00
75-15-0	Carbon disulfide		270	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		57.1	ug/L	0.300	1.00
108-90-7	Chlorobenzene		51.5	ug/L	0.300	1.00
75-00-3	Chloroethane		49.3	ug/L	0.300	1.00
67-66-3	Chloroform		56.3	ug/L	0.300	1.00
74-87-3	Chloromethane		40.3	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		57.3	ug/L	0.300	1.00
74-95-3	Dibromomethane		55.4	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		50.7	ug/L	0.300	1.00
60-29-7	Ethyl ether		49.5	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		50.1	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		44.7	ug/L	0.300	1.00
74-88-4	Iodomethane		269	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		50.0	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride		58.6	ug/L	1.00	10.0
91-20-3	Naphthalene		51.6	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		49.2	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		51.4	ug/L	0.300	1.00
108-88-3	Toluene		51.5	ug/L	0.300	1.00
79-01-6	Trichloroethylene		55.6	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		51.6	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		204	ug/L	1.50	5.00
75-01-4	Vinyl chloride		41.1	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene		55.7	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene		51.3	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		97.4	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5720	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		45.5	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		48.0	ug/L	0.300	1.00
95-47-6	o-Xylene		49.5	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		49.4	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

SDG Number: 2018-739	Date Collected: 11/06/2017 13:22	Matrix: W
Lab Sample ID: 1203918689	Date Received: 11/08/2017 09:00	
Client Sample: QC for batch 1718456	Client: ARSL004	Project: QC
Client ID: CASA-18-148007PS	Method: SW-846:8260B	SOP Ref: GL-OA-E-038
Batch ID: 1718456	Inst: VOA4.I	Dilution: 1
Run Date: 11/14/2017 03:22	Analyst: VXY1	Purge Vol: 5 mL
Prep Date: 11/14/2017 03:22		
Data File: 111317V4\41140.D	Column: DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		54.3	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		49.6	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		56.6	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		51.8	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	54.0	50.0	ug/L	108	(71%-134%)
Bromofluorobenzene	51.8	50.0	ug/L	104	(70%-131%)
Toluene-d8	49.5	50.0	ug/L	99	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

SDG Number: 2018-739
Lab Sample ID: 1203918690
Client Sample: QC for batch 1718456
Client ID: CASA-18-148007PS
Batch ID: 1718456
Run Date: 11/14/2017 04:21
Prep Date: 11/14/2017 04:21
Data File: 111317V4\41142.D

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA4.I
Analyst: VXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene		45.8	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene	U	0.300	ug/L	0.300	1.00
591-78-6	2-Hexanone	U	1.50	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene	U	0.300	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene	U	0.300	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone	U	1.50	ug/L	1.50	5.00
67-64-1	Acetone	U	1.50	ug/L	1.50	10.0
75-05-8	Acetonitrile	U	8.00	ug/L	8.00	25.0
107-02-8	Acrolein		204	ug/L	1.50	5.00
107-13-1	Acrylonitrile		225	ug/L	1.50	5.00
107-05-1	Allyl chloride		237	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: 2018-739
Lab Sample ID: 1203918690
Client Sample: QC for batch 1718456
Client ID: CASA-18-148007PS
Batch ID: 1718456
Run Date: 11/14/2017 04:21
Prep Date: 11/14/2017 04:21
Data File: 111317V4\41142.D

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA4.I
Analyst: VXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	0.300	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	1.50	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	1.00
75-00-3	Chloroethane	U	0.300	ug/L	0.300	1.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	1.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	0.300	ug/L	0.300	1.00
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	1.00
60-29-7	Ethyl ether	U	0.300	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate		209	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		2070	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		218	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		256	ug/L	2.00	5.00
108-05-4	Vinyl acetate	U	1.50	ug/L	1.50	5.00
75-01-4	Vinyl chloride	U	0.300	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	0.300	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	0.300	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	0.300	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol	U	15.0	ug/L	15.0	50.0
104-51-8	n-Butylbenzene	U	0.300	ug/L	0.300	1.00
103-65-1	n-Propylbenzene	U	0.300	ug/L	0.300	1.00
95-47-6	o-Xylene	U	0.300	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene	U	0.300	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	2018-739	Date Collected:	11/06/2017 13:22	Matrix:	W
Lab Sample ID:	1203918690	Date Received:	11/08/2017 09:00		
Client Sample:	QC for batch 1718456	Client:	ARSL004	Project:	QC
Client ID:	CASA-18-148007PS	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1718456	Inst:	VOA4.I	Dilution:	1
Run Date:	11/14/2017 04:21	Analyst:	VXY1	Purge Vol:	5 mL
Prep Date:	11/14/2017 04:21				
Data File:	111317V4\41142.D	Column:	DB-624		

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

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	52.1	50.0	ug/L 104	(71%-134%)
Bromofluorobenzene	50.6	50.0	ug/L 101	(70%-131%)
Toluene-d8	49.9	50.0	ug/L 100	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

Page 1 of 3

SDG Number: 2018-739
Lab Sample ID: 1203918691
Client Sample: QC for batch 1718456
Client ID: CASA-18-148007PSD
Batch ID: 1718456
Run Date: 11/14/2017 03:52
Prep Date: 11/14/2017 03:52
Data File: 111317V4\41141.D

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA4.I
Analyst: VXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane		52.3	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane		52.9	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane		51.5	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane		50.9	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane		53.8	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene		54.2	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene		49.5	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene		45.4	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane		51.2	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene		42.7	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene		45.0	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane		52.0	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane		53.4	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene		46.3	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane		54.7	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane		50.7	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene		45.0	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene		43.7	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane		49.6	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene		44.8	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane		50.1	ug/L	0.300	1.00
78-93-3	2-Butanone		153	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene	U	0.300	ug/L	0.300	1.00
95-49-8	2-Chlorotoluene		45.5	ug/L	0.300	1.00
591-78-6	2-Hexanone		166	ug/L	1.50	5.00
106-43-4	4-Chlorotoluene		45.4	ug/L	0.300	1.00
99-87-6	4-Isopropyltoluene		43.5	ug/L	0.300	1.00
108-10-1	4-Methyl-2-pentanone		222	ug/L	1.50	5.00
67-64-1	Acetone		114	ug/L	1.50	10.0
75-05-8	Acetonitrile		1190	ug/L	8.00	25.0
107-02-8	Acrolein	U	1.50	ug/L	1.50	5.00
107-13-1	Acrylonitrile	U	1.50	ug/L	1.50	5.00
107-05-1	Allyl chloride	U	1.50	ug/L	1.50	5.00
71-43-2	Benzene		50.3	ug/L	0.300	1.00
108-86-1	Bromobenzene		49.3	ug/L	0.300	1.00
74-97-5	Bromochloromethane		52.8	ug/L	0.300	1.00
75-27-4	Bromodichloromethane		53.6	ug/L	0.300	1.00
75-25-2	Bromoform		54.2	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

SDG Number: 2018-739	Date Collected: 11/06/2017 13:22	Matrix: W
Lab Sample ID: 1203918691	Date Received: 11/08/2017 09:00	
Client Sample: QC for batch 1718456	Client: ARSL004	Project: QC
Client ID: CASA-18-148007PSD	Method: SW-846:8260B	SOP Ref: GL-OA-E-038
Batch ID: 1718456	Inst: VOA4.I	Dilution: 1
Run Date: 11/14/2017 03:52	Analyst: VXY1	Purge Vol: 5 mL
Prep Date: 11/14/2017 03:52		
Data File: 111317V4\41141.D	Column: DB-624	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane		51.0	ug/L	0.300	1.00
75-15-0	Carbon disulfide		256	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride		53.4	ug/L	0.300	1.00
108-90-7	Chlorobenzene		48.4	ug/L	0.300	1.00
75-00-3	Chloroethane		47.5	ug/L	0.300	1.00
67-66-3	Chloroform		53.9	ug/L	0.300	1.00
74-87-3	Chloromethane		38.9	ug/L	0.300	1.00
124-48-1	Dibromochloromethane		53.9	ug/L	0.300	1.00
74-95-3	Dibromomethane		51.2	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane		46.2	ug/L	0.300	1.00
60-29-7	Ethyl ether		47.7	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate	U	1.50	ug/L	1.50	5.00
100-41-4	Ethylbenzene		46.4	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene		40.8	ug/L	0.300	1.00
74-88-4	Iodomethane		261	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol	U	15.0	ug/L	15.0	50.0
98-82-8	Isopropylbenzene		46.4	ug/L	0.300	1.00
126-98-7	Methacrylonitrile	U	1.50	ug/L	1.50	5.00
80-62-6	Methyl methacrylate	U	1.50	ug/L	1.50	5.00
75-09-2	Methylene chloride		56.0	ug/L	1.00	10.0
91-20-3	Naphthalene		47.7	ug/L	0.300	1.00
107-12-0	Propionitrile	U	1.50	ug/L	1.50	5.00
100-42-5	Styrene		45.9	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene		48.3	ug/L	0.300	1.00
108-88-3	Toluene		48.3	ug/L	0.300	1.00
79-01-6	Trichloroethylene		52.5	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane		47.6	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	2.00	ug/L	2.00	5.00
108-05-4	Vinyl acetate		189	ug/L	1.50	5.00
75-01-4	Vinyl chloride		38.8	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		48.3	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes		90.3	ug/L	0.300	2.00
71-36-3	n-Butyl alcohol		5090	ug/L	15.0	50.0
104-51-8	n-Butylbenzene		41.3	ug/L	0.300	1.00
103-65-1	n-Propylbenzene		43.8	ug/L	0.300	1.00
95-47-6	o-Xylene		45.9	ug/L	0.300	1.00
135-98-8	sec-Butylbenzene		45.3	ug/L	0.300	1.00

Volatile
Certificate of Analysis
Sample Summary

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SDG Number:	2018-739	Date Collected:	11/06/2017 13:22	Matrix:	W
Lab Sample ID:	1203918691	Date Received:	11/08/2017 09:00		
Client Sample:	QC for batch 1718456	Client:	ARSL004	Project:	QC
Client ID:	CASA-18-148007PSD	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1718456	Inst:	VOA4.I	Dilution:	1
Run Date:	11/14/2017 03:52	Analyst:	VXY1	Purge Vol:	5 mL
Prep Date:	11/14/2017 03:52				
Data File:	111317V4\41141.D	Column:	DB-624		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
1634-04-4	tert-Butyl methyl ether		51.8	ug/L	0.300	1.00
98-06-6	tert-Butylbenzene		45.3	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene		54.0	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene		48.5	ug/L	0.300	1.00

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	51.9	50.0	ug/L	104	(71%-134%)
Bromofluorobenzene	51.0	50.0	ug/L	102	(70%-131%)
Toluene-d8	49.3	50.0	ug/L	99	(74%-124%)

Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-739
Lab Sample ID: 1203918692
Client Sample: QC for batch 1718456
Client ID: CASA-18-148007PSD
Batch ID: 1718456
Run Date: 11/14/2017 04:50
Prep Date: 11/14/2017 04:50
Data File: 111317V4\41143.D

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW-846:8260B
Inst: VOA4.I
Analyst: VXY1

Column: DB-624

Matrix: W

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
630-20-6	1,1,1,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
71-55-6	1,1,1-Trichloroethane	U	0.300	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	0.300	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	0.300	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	0.300	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	0.300	ug/L	0.300	1.00
563-58-6	1,1-Dichloropropene	U	0.300	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
96-18-4	1,2,3-Trichloropropane	U	0.300	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	0.300	ug/L	0.300	1.00
95-63-6	1,2,4-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	0.500	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	0.300	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	0.300	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
108-67-8	1,3,5-Trimethylbenzene	U	0.300	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
142-28-9	1,3-Dichloropropane	U	0.300	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	0.300	ug/L	0.300	1.00
594-20-7	2,2-Dichloropropane	U	0.300	ug/L	0.300	1.00
78-93-3	2-Butanone	U	1.50	ug/L	1.50	5.00
126-99-8	2-Chloro-1,3-butadiene		47.1	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		203	ug/L	1.50	5.00
107-13-1	Acrylonitrile		224	ug/L	1.50	5.00
107-05-1	Allyl chloride		243	ug/L	1.50	5.00
71-43-2	Benzene	U	0.300	ug/L	0.300	1.00
108-86-1	Bromobenzene	U	0.300	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	0.300	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	0.300	ug/L	0.300	1.00
75-25-2	Bromoform	U	0.300	ug/L	0.300	1.00

**Volatile
Certificate of Analysis
Sample Summary**

SDG Number:	2018-739	Date Collected:	11/06/2017 13:22	Matrix:	W
Lab Sample ID:	1203918692	Date Received:	11/08/2017 09:00		
Client Sample:	QC for batch 1718456	Client:	ARSL004	Project:	QC
Client ID:	CASA-18-148007PSD	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1718456	Inst:	VOA4.I	Dilution:	1
Run Date:	11/14/2017 04:50	Analyst:	VXY1	Purge Vol:	5 mL
Prep Date:	11/14/2017 04:50				
Data File:	111317V4\41143.D	Column:	DB-624		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
74-83-9	Bromomethane	U	0.300	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	1.50	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	0.300	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	0.300	ug/L	0.300	1.00
75-00-3	Chloroethane	U	0.300	ug/L	0.300	1.00
67-66-3	Chloroform	U	0.300	ug/L	0.300	1.00
74-87-3	Chloromethane	U	0.300	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	0.300	ug/L	0.300	1.00
74-95-3	Dibromomethane	U	0.300	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	0.300	ug/L	0.300	1.00
60-29-7	Ethyl ether	U	0.300	ug/L	0.300	1.00
97-63-2	Ethyl methacrylate		210	ug/L	1.50	5.00
100-41-4	Ethylbenzene	U	0.300	ug/L	0.300	1.00
87-68-3	Hexachlorobutadiene	U	0.300	ug/L	0.300	1.00
74-88-4	Iodomethane	U	1.50	ug/L	1.50	5.00
78-83-1	Isobutyl alcohol		2050	ug/L	15.0	50.0
98-82-8	Isopropylbenzene	U	0.300	ug/L	0.300	1.00
126-98-7	Methacrylonitrile		221	ug/L	1.50	5.00
80-62-6	Methyl methacrylate		221	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		215	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		262	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:	2018-739	Date Collected:	11/06/2017 13:22	Matrix:	W
Lab Sample ID:	1203918692	Date Received:	11/08/2017 09:00		
Client Sample:	QC for batch 1718456	Client:	ARSL004	Project:	QC
Client ID:	CASA-18-148007PSD	Method:	SW-846:8260B	SOP Ref:	GL-OA-E-038
Batch ID:	1718456	Inst:	VOA4.I	Dilution:	1
Run Date:	11/14/2017 04:50	Analyst:	VXY1	Purge Vol:	5 mL
Prep Date:	11/14/2017 04:50				
Data File:	111317V4\41143.D	Column:	DB-624		

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

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
1,2-Dichloroethane-d4	52.0	50.0	ug/L	104	(71%-134%)
Bromofluorobenzene	51.2	50.0	ug/L	102	(70%-131%)
Toluene-d8	49.5	50.0	ug/L	99	(74%-124%)

Semi-Volatile Analysis

Case Narrative

**GC/MS Semivolatile
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-739
Work Order #: 437322**

Method/Analysis Information

Procedure:	Analysis of Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry
Analytical Method:	SW846 3510C/8270D
Prep Method:	SW846 3510C
Analytical Batch Number:	1717963
Prep Batch Number:	1717962

Sample Analysis

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

Sample ID	Client ID
437322002	CASA-18-148007
437322005	CASA-18-148008
437322008	CASA-18-147999
1203917432	Method Blank (MB)
1203917433	Laboratory Control Sample (LCS)
1203917434	437322008(CASA-18-147999) Matrix Spike (MS)
1203917435	437322008(CASA-18-147999) Matrix Spike Duplicate (MSD)

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

Preparation/Analytical Method Verification

SOP Reference

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

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

Calibration Information

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

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

Initial Calibration

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

CCV Requirements

All Calibration Verification Standards (CCV) did not meet the acceptance criteria as outlined in Method 8270D for samples and the associated QC. However, the method allows for a designated number of outliers dependent on the requested analyte list. This SDG satisfied the 8270D outlier acceptance criteria. If required, a CRDL was analyzed after the CCVs to demonstrate that there is adequate sensitivity to detect the failed compounds at the applicable lower quantitation limit.

Quality Control (QC) Information

Method Blank (MB) Statement

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

Surrogate Recoveries

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

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS and/or LCSD (See Below) did not meet spike recovery acceptance criteria. The failures are known to be poor responding analytes as stated per the Method. This may account for the low recoveries and the data were reported.

Sample	Analyte	Value
1203917433 (LCS)	2, 4-Dinitrophenol	30* (34%-122%)
	Hexachlorocyclopentadiene	32* (34%-89%)

QC Sample Designation

Sample 437322008 (CASA-18-147999) was selected for analysis as the matrix spike and matrix spike duplicate.

Spike Recovery Statement

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

MS/MSD Relative Percent Difference (RPD) Statement

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

Sample	Analyte	Value
--------	---------	-------

1203917434MS and 1203917435MSD (CASA-18-147999)	Benzidine	RPD 93* (0%-30%)
	Pyridine	RPD 49* (0%-30%)

Internal Standard (ISTD) Acceptance

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

Technical Information:

Holding Time Specifications

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

Preparation/Analytical Method Verification

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

Sample Dilutions

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

Sample Re-extraction/Re-analysis

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

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

TIC Comment

Tentatively identified compounds (TIC) were requested for samples 437322002 (CASA-18-148007), 437322005 (CASA-18-148008) and 437322008 (CASA-18-147999) 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
MSD5.I	Agilent 6890/5973 GC/MS w/ 7683 Autosampler	HP6890/HP5973	DB-5MS	25m x 0.2mm, 0.33um (5% Phenylmethylpolysiloxane)

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2018-739 GEL Work Order: 437322

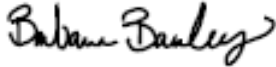
The Qualifiers in this report are defined as follows:

- * 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: Barbara Bailey

Date: 29 NOV 2017

Title: Data Validator

Sample Data Summary

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

Page 1 of 3

SDG Number: 2018-739
Lab Sample ID: 437322002

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148007
Batch ID: 1717963
Run Date: 11/13/2017 16:46
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1314.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 930 mL
Column: DB-5ms

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene	U	3.23	ug/L	3.23	10.8
120-82-1	1,2,4-Trichlorobenzene	U	3.23	ug/L	3.23	10.8
95-50-1	1,2-Dichlorobenzene	U	3.23	ug/L	3.23	10.8
122-66-7	Azobenzene	U	3.23	ug/L	3.23	10.8
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.23	ug/L	3.23	10.8
106-46-7	1,4-Dichlorobenzene	U	3.23	ug/L	3.23	10.8
123-91-1	1,4-Dioxane	U	3.23	ug/L	3.23	10.8
90-12-0	1-Methylnaphthalene	U	0.323	ug/L	0.323	1.08
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.23	ug/L	3.23	10.8
95-95-4	2,4,5-Trichlorophenol	U	3.23	ug/L	3.23	10.8
88-06-2	2,4,6-Trichlorophenol	U	3.23	ug/L	3.23	10.8
120-83-2	2,4-Dichlorophenol	U	3.23	ug/L	3.23	10.8
105-67-9	2,4-Dimethylphenol	U	3.23	ug/L	3.23	10.8
51-28-5	2,4-Dinitrophenol	U	5.38	ug/L	5.38	21.5
121-14-2	2,4-Dinitrotoluene	U	3.23	ug/L	3.23	10.8
606-20-2	2,6-Dinitrotoluene	U	3.23	ug/L	3.23	10.8
91-58-7	2-Chloronaphthalene	U	0.441	ug/L	0.441	1.08
95-57-8	2-Chlorophenol	U	3.23	ug/L	3.23	10.8
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.23	ug/L	3.23	10.8
91-57-6	2-Methylnaphthalene	U	0.323	ug/L	0.323	1.08
88-75-5	2-Nitrophenol	U	3.23	ug/L	3.23	10.8
91-94-1	3,3'-Dichlorobenzidine	U	3.23	ug/L	3.23	10.8
101-55-3	4-Bromophenylphenylether	U	3.23	ug/L	3.23	10.8
59-50-7	Parachlorometa cresol	U	3.23	ug/L	3.23	10.8
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.55	ug/L	3.55	10.8
7005-72-3	4-Chlorophenylphenylether	U	3.23	ug/L	3.23	10.8
100-02-7	4-Nitrophenol	U	3.23	ug/L	3.23	10.8
83-32-9	Acenaphthene	U	0.323	ug/L	0.323	1.08
208-96-8	Acenaphthylene	U	0.323	ug/L	0.323	1.08
62-53-3	Aniline	U	4.52	ug/L	4.52	10.8
120-12-7	Anthracene	U	0.323	ug/L	0.323	1.08
1912-24-9	Atrazine	U	3.23	ug/L	3.23	10.8
92-87-5	Benzidine	U	4.19	ug/L	4.19	10.8
56-55-3	Benzo(a)anthracene	U	0.323	ug/L	0.323	1.08
50-32-8	Benzo(a)pyrene	U	0.323	ug/L	0.323	1.08
205-99-2	Benzo(b)fluoranthene	U	0.323	ug/L	0.323	1.08
191-24-2	Benzo(ghi)perylene	U	0.323	ug/L	0.323	1.08

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

Page 2 of 3

SDG Number: 2018-739
Lab Sample ID: 437322002

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148007
Batch ID: 1717963
Run Date: 11/13/2017 16:46
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1314.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 930 mL
Column: DB-5ms

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene	U	0.323	ug/L	0.323	1.08
65-85-0	Benzoic acid	U	6.45	ug/L	6.45	21.5
100-51-6	Benzyl alcohol	U	3.23	ug/L	3.23	10.8
85-68-7	Butylbenzylphthalate	U	3.23	ug/L	3.23	10.8
218-01-9	Chrysene	U	0.323	ug/L	0.323	1.08
84-74-2	Di-n-butylphthalate	U	3.23	ug/L	3.23	10.8
117-84-0	Di-n-octylphthalate	U	3.23	ug/L	3.23	10.8
53-70-3	Dibenzo(a,h)anthracene	U	0.323	ug/L	0.323	1.08
132-64-9	Dibenzofuran	U	3.23	ug/L	3.23	10.8
84-66-2	Diethylphthalate	U	3.23	ug/L	3.23	10.8
131-11-3	Dimethylphthalate	U	3.23	ug/L	3.23	10.8
88-85-7	Dinoseb	U	3.23	ug/L	3.23	10.8
122-39-4	Diphenylamine	U	3.23	ug/L	3.23	10.8
206-44-0	Fluoranthene	U	0.323	ug/L	0.323	1.08
86-73-7	Fluorene	U	0.323	ug/L	0.323	1.08
118-74-1	Hexachlorobenzene	U	3.23	ug/L	3.23	10.8
87-68-3	Hexachlorobutadiene	U	3.23	ug/L	3.23	10.8
77-47-4	Hexachlorocyclopentadiene	U	3.23	ug/L	3.23	10.8
67-72-1	Hexachloroethane	U	3.23	ug/L	3.23	10.8
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.323	ug/L	0.323	1.08
78-59-1	Isophorone	U	3.76	ug/L	3.76	10.8
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.23	ug/L	3.23	10.8
924-16-3	N-Nitrosodi-n-butylamine	U	3.23	ug/L	3.23	10.8
55-18-5	N-Nitrosodiethylamine	U	3.23	ug/L	3.23	10.8
621-64-7	N-Nitrosodi-n-propylamine	U	3.23	ug/L	3.23	10.8
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.23	ug/L	3.23	10.8
91-20-3	Naphthalene	U	0.323	ug/L	0.323	1.08
98-95-3	Nitrobenzene	U	3.23	ug/L	3.23	10.8
608-93-5	Pentachlorobenzene	U	3.23	ug/L	3.23	10.8
87-86-5	Pentachlorophenol	U	3.23	ug/L	3.23	10.8
85-01-8	Phenanthrene	U	0.323	ug/L	0.323	1.08
108-95-2	Phenol	U	3.23	ug/L	3.23	10.8
129-00-0	Pyrene	U	0.323	ug/L	0.323	1.08
110-86-1	Pyridine	U	3.23	ug/L	3.23	10.8
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.23	ug/L	3.23	10.8
111-91-1	bis(2-Chloroethoxy)methane	U	3.23	ug/L	3.23	10.8
111-44-4	bis(2-Chloroethyl) ether	U	3.23	ug/L	3.23	10.8
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.23	ug/L	3.23	10.8

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

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SDG Number: 2018-739
Lab Sample ID: 437322002

Date Collected: 11/06/2017 13:22
Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148007

Client: ARSL004

Project: ESHL00114

Batch ID: 1717963

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Run Date: 11/13/2017 16:46

Inst: MSD5.I

Dilution: 1

Prep Date: 11/13/2017 05:43

Analyst: JMB3

Inj. Vol: 1 uL

Data File: s111317.B\s5k1314.D

Aliquot: 930 mL

Final Volume: 1 mL

Column: DB-5ms

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols	U	3.98	ug/L	3.98	10.8
99-09-2	3-Nitroaniline	U	3.23	ug/L	3.23	10.8
95-48-7	<i>m</i> -Nitroaniline o-Cresol	U	3.23	ug/L	3.23	10.8
88-74-4	2-Nitroaniline	U	3.23	ug/L	3.23	10.8
100-01-6	<i>o</i> -Nitroaniline 4-Nitroaniline <i>p</i> -Nitroaniline	U	3.23	ug/L	3.23	10.8

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
2,4,6-Tribromophenol	59.0	108	ug/L	55 (32%-124%)
2-Fluorobiphenyl	34.2	53.8	ug/L	64 (32%-112%)
2-Fluorophenol	50.5	108	ug/L	47 (15%-88%)
Nitrobenzene-d5	38.3	53.8	ug/L	71 (36%-115%)
Phenol-d5	36.7	108	ug/L	34 (15%-91%)
p-Terphenyl-d14	43.9	53.8	ug/L	82 (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: 2018-739

Lab Sample ID: 437322005

Date Collected: 11/06/2017 13:37

Date Received: 11/08/2017 09:00

Matrix: W

Client ID: CASA-18-148008

Batch ID: 1717963

Run Date: 11/13/2017 17:17

Prep Date: 11/13/2017 05:43

Data File: s111317.B\s5k1315.D

Client: ARSL004

Method: SW846 3510C/8270D

Inst: MSD5.I

Analyst: JMB3

Aliquot: 960 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	3.13	ug/L	3.13	10.4
120-82-1	1,2,4-Trichlorobenzene	U	3.13	ug/L	3.13	10.4
95-50-1	1,2-Dichlorobenzene	U	3.13	ug/L	3.13	10.4
122-66-7	Azobenzene	U	3.13	ug/L	3.13	10.4
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene	U	3.13	ug/L	3.13	10.4
106-46-7	1,4-Dichlorobenzene	U	3.13	ug/L	3.13	10.4
123-91-1	1,4-Dioxane	U	3.13	ug/L	3.13	10.4
90-12-0	1-Methylnaphthalene	U	0.313	ug/L	0.313	1.04
58-90-2	2,3,4,6-Tetrachlorophenol	U	3.13	ug/L	3.13	10.4
95-95-4	2,4,5-Trichlorophenol	U	3.13	ug/L	3.13	10.4
88-06-2	2,4,6-Trichlorophenol	U	3.13	ug/L	3.13	10.4
120-83-2	2,4-Dichlorophenol	U	3.13	ug/L	3.13	10.4
105-67-9	2,4-Dimethylphenol	U	3.13	ug/L	3.13	10.4
51-28-5	2,4-Dinitrophenol	U	5.21	ug/L	5.21	20.8
121-14-2	2,4-Dinitrotoluene	U	3.13	ug/L	3.13	10.4
606-20-2	2,6-Dinitrotoluene	U	3.13	ug/L	3.13	10.4
91-58-7	2-Chloronaphthalene	U	0.427	ug/L	0.427	1.04
95-57-8	2-Chlorophenol	U	3.13	ug/L	3.13	10.4
534-52-1	2-Methyl-4,6-dinitrophenol	U	3.13	ug/L	3.13	10.4
91-57-6	2-Methylnaphthalene	U	0.313	ug/L	0.313	1.04
88-75-5	2-Nitrophenol	U	3.13	ug/L	3.13	10.4
91-94-1	3,3'-Dichlorobenzidine	U	3.13	ug/L	3.13	10.4
101-55-3	4-Bromophenylphenylether	U	3.13	ug/L	3.13	10.4
59-50-7	Parachlorometa cresol	U	3.13	ug/L	3.13	10.4
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline	U	3.44	ug/L	3.44	10.4
7005-72-3	4-Chlorophenylphenylether	U	3.13	ug/L	3.13	10.4
100-02-7	4-Nitrophenol	U	3.13	ug/L	3.13	10.4
83-32-9	Acenaphthene	U	0.313	ug/L	0.313	1.04
208-96-8	Acenaphthylene	U	0.313	ug/L	0.313	1.04
62-53-3	Aniline	U	4.38	ug/L	4.38	10.4
120-12-7	Anthracene	U	0.313	ug/L	0.313	1.04
1912-24-9	Atrazine	U	3.13	ug/L	3.13	10.4
92-87-5	Benzidine	U	4.06	ug/L	4.06	10.4
56-55-3	Benzo(a)anthracene	U	0.313	ug/L	0.313	1.04
50-32-8	Benzo(a)pyrene	U	0.313	ug/L	0.313	1.04
205-99-2	Benzo(b)fluoranthene	U	0.313	ug/L	0.313	1.04
191-24-2	Benzo(ghi)perylene	U	0.313	ug/L	0.313	1.04

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

Page 2 of 3

SDG Number: 2018-739

Lab Sample ID: 437322005

Date Collected: 11/06/2017 13:37

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Inst: MSD5.I

Dilution: 1

Batch ID: 1717963

Run Date: 11/13/2017 17:17

Analyst: JMB3

Inj. Vol: 1 uL

Prep Date: 11/13/2017 05:43

Aliquot: 960 mL

Final Volume: 1 mL

Data File: s111317.B\s5k1315.D

Column: DB-5ms

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene	U	0.313	ug/L	0.313	1.04
65-85-0	Benzoic acid	U	6.25	ug/L	6.25	20.8
100-51-6	Benzyl alcohol	U	3.13	ug/L	3.13	10.4
85-68-7	Butylbenzylphthalate	U	3.13	ug/L	3.13	10.4
218-01-9	Chrysene	U	0.313	ug/L	0.313	1.04
84-74-2	Di-n-butylphthalate	U	3.13	ug/L	3.13	10.4
117-84-0	Di-n-octylphthalate	U	3.13	ug/L	3.13	10.4
53-70-3	Dibenzo(a,h)anthracene	U	0.313	ug/L	0.313	1.04
132-64-9	Dibenzofuran	U	3.13	ug/L	3.13	10.4
84-66-2	Diethylphthalate	U	3.13	ug/L	3.13	10.4
131-11-3	Dimethylphthalate	U	3.13	ug/L	3.13	10.4
88-85-7	Dinoseb	U	3.13	ug/L	3.13	10.4
122-39-4	Diphenylamine	U	3.13	ug/L	3.13	10.4
206-44-0	Fluoranthene	U	0.313	ug/L	0.313	1.04
86-73-7	Fluorene	U	0.313	ug/L	0.313	1.04
118-74-1	Hexachlorobenzene	U	3.13	ug/L	3.13	10.4
87-68-3	Hexachlorobutadiene	U	3.13	ug/L	3.13	10.4
77-47-4	Hexachlorocyclopentadiene	U	3.13	ug/L	3.13	10.4
67-72-1	Hexachloroethane	U	3.13	ug/L	3.13	10.4
193-39-5	Indeno(1,2,3-cd)pyrene	U	0.313	ug/L	0.313	1.04
78-59-1	Isophorone	U	3.65	ug/L	3.65	10.4
62-75-9	N-Methyl-N-nitrosomethylamine	U	3.13	ug/L	3.13	10.4
924-16-3	N-Nitrosodi-n-butylamine	U	3.13	ug/L	3.13	10.4
55-18-5	N-Nitrosodiethylamine	U	3.13	ug/L	3.13	10.4
621-64-7	N-Nitrosodi-n-propylamine	U	3.13	ug/L	3.13	10.4
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine	U	3.13	ug/L	3.13	10.4
91-20-3	Naphthalene	U	0.313	ug/L	0.313	1.04
98-95-3	Nitrobenzene	U	3.13	ug/L	3.13	10.4
608-93-5	Pentachlorobenzene	U	3.13	ug/L	3.13	10.4
87-86-5	Pentachlorophenol	U	3.13	ug/L	3.13	10.4
85-01-8	Phenanthrene	U	0.313	ug/L	0.313	1.04
108-95-2	Phenol	U	3.13	ug/L	3.13	10.4
129-00-0	Pyrene	U	0.313	ug/L	0.313	1.04
110-86-1	Pyridine	U	3.13	ug/L	3.13	10.4
108-60-1	bis(2-Chloro-1-methylethyl)ether	U	3.13	ug/L	3.13	10.4
111-91-1	bis(2-Chloroethoxy)methane	U	3.13	ug/L	3.13	10.4
111-44-4	bis(2-Chloroethyl) ether	U	3.13	ug/L	3.13	10.4
117-81-7	bis(2-Ethylhexyl)phthalate	U	3.13	ug/L	3.13	10.4

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

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SDG Number: 2018-739

Lab Sample ID: 437322005

Date Collected: 11/06/2017 13:37

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Inst: MSD5.I

Dilution: 1

Batch ID: 1717963

Run Date: 11/13/2017 17:17

Analyst: JMB3

Inj. Vol: 1 uL

Prep Date: 11/13/2017 05:43

Aliquot: 960 mL

Final Volume: 1 mL

Data File: s111317.B\s5k1315.D

Column: DB-5ms

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols	U	3.85	ug/L	3.85	10.4
99-09-2	3-Nitroaniline	U	3.13	ug/L	3.13	10.4
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol	U	3.13	ug/L	3.13	10.4
88-74-4	2-Nitroaniline	U	3.13	ug/L	3.13	10.4
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline	U	3.13	ug/L	3.13	10.4
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	56.7	104	ug/L	54	(32%-124%)
2-Fluorobiphenyl	30.6	52.1	ug/L	59	(32%-112%)
2-Fluorophenol	44.5	104	ug/L	43	(15%-88%)
Nitrobenzene-d5	32.6	52.1	ug/L	63	(36%-115%)
Phenol-d5	31.9	104	ug/L	31	(15%-91%)
p-Terphenyl-d14	39.8	52.1	ug/L	76	(36%-121%)

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
000080-05-7	Phenol, 4,4'-(1-methylethylidene)b	13.454	4.59	ug/L	98	NJ
	unknown	22.916	7.32	ug/L	0	J

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

Page 1 of 3

SDG Number: 2018-739

Lab Sample ID: 437322008

Date Collected: 11/06/2017 11:17

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Inst: MSD5.I

Dilution: 1

Batch ID: 1717963

Run Date: 11/13/2017 17:47

Analyst: JMB3

Inj. Vol: 1 uL

Prep Date: 11/13/2017 05:43

Aliquot: 1000 mL

Final Volume: 1 mL

Data File: s111317.B\s5k1316.D

Column: DB-5ms

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
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	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
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	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: 2018-739

Lab Sample ID: 437322008

Date Collected: 11/06/2017 11:17

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Inst: MSD5.I

Dilution: 1

Batch ID: 1717963

Run Date: 11/13/2017 17:47

Analyst: JMB3

Inj. Vol: 1 uL

Prep Date: 11/13/2017 05:43

Aliquot: 1000 mL

Final Volume: 1 mL

Data File: s111317.B\s5k1316.D

Column: DB-5ms

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: 2018-739

Lab Sample ID: 437322008

Date Collected: 11/06/2017 11:17

Date Received: 11/08/2017 09:00

Matrix: W

Client: ARSL004

Project: ESHL00114

Method: SW846 3510C/8270D

SOP Ref: GL-OA-E-009

Inst: MSD5.I

Dilution: 1

Batch ID: 1717963

Run Date: 11/13/2017 17:47

Analyst: JMB3

Inj. Vol: 1 uL

Prep Date: 11/13/2017 05:43

Aliquot: 1000 mL

Final Volume: 1 mL

Data File: s111317.B\s5k1316.D

Column: DB-5ms

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

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	44.4	100	ug/L	44	(32%-124%)
2-Fluorobiphenyl	22.5	50.0	ug/L	45	(32%-112%)
2-Fluorophenol	37.0	100	ug/L	37	(15%-88%)
Nitrobenzene-d5	27.1	50.0	ug/L	54	(36%-115%)
Phenol-d5	26.2	100	ug/L	26	(15%-91%)
p-Terphenyl-d14	33.0	50.0	ug/L	66	(36%-121%)

Tentatively Identified Compound Summary

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

Quality Control Summary

Semi-Volatile
Surrogate Recovery Report

Page 1 of 1

SDG Number: 2018-739

Matrix Type: LIQUID

Sample ID	Client ID	2FP %REC	PHL %REC	NBZ %REC	FBP %REC	TBP %REC	TPH %REC
1203917432	MB for batch 1717962	40	28	56	35	50	73
1203917433	LCS for batch 1717962	50	33	71	66	76	88
437322002	CASA-18-148007	47	34	71	64	55	82
437322005	CASA-18-148008	43	31	63	59	54	76
437322008	CASA-18-147999	37	26	54	45	44	66
1203917434	CASA-18-147999MS	63	53	71	69	71	87
1203917435	CASA-18-147999MSD	63	52	69	67	68	81

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: 2018-739

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1717962

Matrix: WATER

Lab Sample ID 1203917433

Instrument: MSD5.I

Analysis Date: 11/13/2017 15:14

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

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	27.2	54	30-88
110-86-1	LCS Pyridine	50.0	0.0	21.3	43	27-89
62-53-3	LCS Aniline	50.0	0.0	42.5	85	49-112
108-95-2	LCS Phenol	50.0	0.0	17.7	35	16-82
111-44-4	LCS bis(2-Chloroethyl) ether	50.0	0.0	41.3	83	51-111
95-57-8	LCS 2-Chlorophenol	50.0	0.0	38.4	77	49-105
541-73-1	LCS 1,3-Dichlorobenzene	50.0	0.0	29.9	60	37-95
106-46-7	LCS 1,4-Dichlorobenzene	50.0	0.0	29.7	59	38-96
95-50-1	LCS 1,2-Dichlorobenzene	50.0	0.0	30.7	61	39-97
108-60-1	LCS bis(2-Chloro-1-methylethyl)ether	50.0	0.0	34.5	69	44-123
100-51-6	LCS Benzyl alcohol	50.0	0.0	41.1	82	44-102
95-48-7	LCS o-Cresol	50.0	0.0	37.2	74	41-101
65794-96-9	LCS m,p-Cresols	50.0	0.0	35.7	71	43-102
621-64-7	LCS N-Nitrosodi--n-propylamine <i>N-Nitrosodipropylamine</i>	50.0	0.0	33.8	68	54-115
67-72-1	LCS Hexachloroethane	50.0	0.0	28.5	57	36-96
98-95-3	LCS Nitrobenzene	50.0	0.0	36.1	72	53-115
78-59-1	LCS Isophorone	50.0	0.0	39.0	78	56-117
88-75-5	LCS 2-Nitrophenol	50.0	0.0	39.4	79	51-113
105-67-9	LCS 2,4-Dimethylphenol	50.0	0.0	37.3	75	51-104
111-91-1	LCS bis(2-Chloroethoxy)methane	50.0	0.0	41.8	84	55-114
120-83-2	LCS 2,4-Dichlorophenol	50.0	0.0	40.3	81	53-109
65-85-0	LCS Benzoic acid	100	0.0	35.2	35	21-74

Semi-Volatile
Quality Control Summary
Spike Recovery Report

Page 2 of 4

SDG Number: 2018-739

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1717962

Matrix: WATER

Lab Sample ID 1203917433

Instrument: MSD5.I

Analysis Date: 11/13/2017 15:14

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

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	57.0	114	65-136
87-68-3	LCS Hexachlorobutadiene	50.0	0.0	24.9	50	35-98
59-50-7	LCS Parachlorometa cresol 4-Chloro-3-methylphenol	50.0	0.0	44.5	89	55-115
91-57-6	LCS 2-Methylnaphthalene	50.0	0.0	30.6	61	42-103
91-20-3	LCS Naphthalene	50.0	0.0	31.3	63	44-102
90-12-0	LCS 1-Methylnaphthalene	50.0	0.0	31.5	63	45-108
77-47-4	LCS Hexachlorocyclopentadiene	50.0	0.0	15.8	32 *	34-89
88-06-2	LCS 2,4,6-Trichlorophenol	50.0	0.0	36.8	74	55-120
95-95-4	LCS 2,4,5-Trichlorophenol	50.0	0.0	40.9	82	55-116
91-58-7	LCS 2-Chloronaphthalene	50.0	0.0	30.0	60	44-107
88-74-4	LCS 2-Nitroaniline o-Nitroaniline	50.0	0.0	41.8	84	53-121
99-09-2	LCS 3-Nitroaniline m-Nitroaniline	50.0	0.0	64.2	128	61-139
131-11-3	LCS Dimethylphthalate	50.0	0.0	46.1	92	60-122
606-20-2	LCS 2,6-Dinitrotoluene	50.0	0.0	46.5	93	59-122
121-14-2	LCS 2,4-Dinitrotoluene	50.0	0.0	47.5	95	57-124
208-96-8	LCS Acenaphthylene	50.0	0.0	35.4	71	50-113
83-32-9	LCS Acenaphthene	50.0	0.0	36.1	72	49-112
51-28-5	LCS 2,4-Dinitrophenol	50.0	0.0	15.2	30 *	34-122
132-64-9	LCS Dibenzofuran	50.0	0.0	35.6	71	50-111
58-90-2	LCS 2,3,4,6-Tetrachlorophenol	50.0	0.0	39.3	79	54-122
84-66-2	LCS Diethylphthalate	50.0	0.0	44.8	90	57-122
100-02-7	LCS 4-Nitrophenol	50.0	0.0	18.3	37	15-137

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1717962

Matrix: WATER

Lab Sample ID 1203917433

Instrument: MSD5.I

Analysis Date: 11/13/2017 15:14

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

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	35.6	71	52-114
7005-72-3	LCS 4-Chlorophenylphenylether	50.0	0.0	37.7	75	52-121
100-01-6	LCS 4-Nitroaniline	50.0	0.0	54.3	109	44-137
534-52-1	LCS 2-Methyl-4,6-dinitrophenol	50.0	0.0	26.3	53	45-124
122-39-4	LCS Diphenylamine	50.0	0.0	37.6	75	55-113
122-66-7	LCS Azobenzene	50.0	0.0	35.8	72	53-115
101-55-3	LCS 4-Bromophenylphenylether	50.0	0.0	37.4	75	54-116
118-74-1	LCS Hexachlorobenzene	50.0	0.0	37.6	75	54-115
87-86-5	LCS Pentachlorophenol	50.0	0.0	24.0	48	41-116
85-01-8	LCS Phenanthrene	50.0	0.0	40.8	82	55-110
120-12-7	LCS Anthracene	50.0	0.0	41.2	82	56-112
84-74-2	LCS Di-n-butylphthalate	50.0	0.0	42.8	86	57-123
206-44-0	LCS Fluoranthene	50.0	0.0	44.0	88	54-118
129-00-0	LCS Pyrene	50.0	0.0	42.1	84	49-121
85-68-7	LCS Butylbenzylphthalate	50.0	0.0	44.0	88	52-125
117-81-7	LCS bis(2-Ethylhexyl)phthalate	50.0	0.0	43.5	87	52-125
56-55-3	LCS Benzo(a)anthracene	50.0	0.0	46.8	94	57-112
218-01-9	LCS Chrysene	50.0	0.0	47.1	94	58-117
117-84-0	LCS Di-n-octylphthalate	50.0	0.0	43.3	87	50-129
205-99-2	LCS Benzo(b)fluoranthene	50.0	0.0	45.8	92	41-118
207-08-9	LCS Benzo(k)fluoranthene	50.0	0.0	44.8	90	42-121
50-32-8	LCS Benzo(a)pyrene	50.0	0.0	46.1	92	40-118

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Laboratory Control Sample

Client ID: LCS for batch 1717962

Matrix: WATER

Lab Sample ID 1203917433

Instrument: MSD5.I

Analysis Date: 11/13/2017 15:14

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

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	45.9	92	34-125
53-70-3	LCS Dibenzo(a,h)anthracene	50.0	0.0	47.7	95	38-129
191-24-2	LCS Benzo(ghi)perylene	50.0	0.0	42.9	86	33-131
123-91-1	LCS 1,4-Dioxane	50.0	0.0	28.6	57	38-78
930-55-2	LCS N-Nitrosopyrrolidine	50.0	0.0	49.4	99	54-113
95-94-3	LCS 1,2,4,5-Tetrachlorobenzene	50.0	0.0	29.1	58	44-102
1912-24-9	LCS Atrazine	50.0	0.0	48.7	97	60-131
92-87-5	LCS Benzidine	100	0.0	40.0	40	20-144
91-94-1	LCS 3,3'-Dichlorobenzidine	50.0	0.0	45.1	90	43-127
120-82-1	LCS 1,2,4-Trichlorobenzene	50.0	0.0	30.1	60	39-99

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Matrix Spike

Client ID: CASA-18-147999MS

Matrix: W

Lab Sample ID 1203917434

Instrument: MSD5.I

Analysis Date: 11/13/2017 18:18

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

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	122	0.00 U	82.6	68	25-106
110-86-1	MS Pyridine	122	0.00 U	45.9	38	24-93
62-53-3	MS Aniline	122	0.00 U	96.8	79	37-113
108-95-2	MS Phenol	122	0.00 U	68.3	56	23-82
111-44-4	MS bis(2-Chloroethyl) ether	122	0.00 U	96.5	79	39-114
95-57-8	MS 2-Chlorophenol	122	0.00 U	91.1	75	37-108
541-73-1	MS 1,3-Dichlorobenzene	122	0.00 U	74.9	61	27-97
106-46-7	MS 1,4-Dichlorobenzene	122	0.00 U	73.1	60	28-97
95-50-1	MS 1,2-Dichlorobenzene	122	0.00 U	75.6	62	28-99
108-60-1	MS bis(2-Chloro-1-methylethyl)ether	122	0.00 U	84.6	69	32-127
100-51-6	MS Benzyl alcohol	122	0.00 U	105	86	37-116
95-48-7	MS o-Cresol	122	0.00 U	98.1	80	34-109
65794-96-9	MS m,p-Cresols	122	0.00 U	98.5	81	36-120
621-64-7	MS N-Nitrosodi--n-propylamine <i>N-Nitrosodipropylamine</i>	122	0.00 U	79.3	65	42-118
67-72-1	MS Hexachloroethane	122	0.00 U	72.1	59	29-94
98-95-3	MS Nitrobenzene	122	0.00 U	86.3	71	38-123
78-59-1	MS Isophorone	122	0.00 U	94.2	77	43-120
88-75-5	MS 2-Nitrophenol	122	0.00 U	95.9	79	39-115
105-67-9	MS 2,4-Dimethylphenol	122	0.00 U	88.0	72	39-107
111-91-1	MS bis(2-Chloroethoxy)methane	122	0.00 U	99.5	82	42-118
120-83-2	MS 2,4-Dichlorophenol	122	0.00 U	93.0	76	40-111
65-85-0	MS Benzoic acid	244	0.00 U	141	58	17-95

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Matrix Spike

Client ID: CASA-18-147999MS

Matrix: W

Lab Sample ID 1203917434

Instrument: MSD5.I

Analysis Date: 11/13/2017 18:18

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
106-47-8	MS 4-Chloroaniline	122	0.00 U	133	109	44-138
87-68-3	MS Hexachlorobutadiene	122	0.00 U	63.4	52	26-98
59-50-7	MS Parachlorometa cresol 4-Chloro-3-methylphenol	122	0.00 U	107	88	41-122
91-57-6	MS 2-Methylnaphthalene	122	0.00 U	76.1	62	29-109
91-20-3	MS Naphthalene	122	0.00 U	78.2	64	31-108
90-12-0	MS 1-Methylnaphthalene	122	0.00 U	79.8	65	33-112
77-47-4	MS Hexachlorocyclopentadiene	122	0.00 U	35.8	29	26-79
88-06-2	MS 2,4,6-Trichlorophenol	122	0.00 U	86.4	71	39-124
95-95-4	MS 2,4,5-Trichlorophenol	122	0.00 U	97.2	80	42-120
91-58-7	MS 2-Chloronaphthalene	122	0.00 U	74.9	61	29-113
88-74-4	MS 2-Nitroaniline o-Nitroaniline	122	0.00 U	96.4	79	41-121
99-09-2	MS 3-Nitroaniline m-Nitroaniline	122	0.00 U	141	116	42-144
131-11-3	MS Dimethylphthalate	122	0.00 U	108	88	45-128
606-20-2	MS 2,6-Dinitrotoluene	122	0.00 U	110	90	46-124
121-14-2	MS 2,4-Dinitrotoluene	122	0.00 U	110	90	45-125
208-96-8	MS Acenaphthylene	122	0.00 U	88.4	72	35-120
83-32-9	MS Acenaphthene	122	0.00 U	92.1	76	35-117
51-28-5	MS 2,4-Dinitrophenol	122	0.00 U	35.4	29	27-122
132-64-9	MS Dibenzofuran	122	0.00 U	90.0	74	38-113
58-90-2	MS 2,3,4,6-Tetrachlorophenol	122	0.00 U	93.2	76	40-128
84-66-2	MS Diethylphthalate	122	0.00 U	102	84	43-127
100-02-7	MS 4-Nitrophenol	122	0.00 U	75.6	62	17-85

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Matrix Spike

Client ID: CASA-18-147999MS

Matrix: W

Lab Sample ID 1203917434

Instrument: MSD5.I

Analysis Date: 11/13/2017 18:18

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

CAS No	Parmname	Amount Added ug/L	Sample Conc. ug/L	Spike Conc. ug/L	Recovery %	Acceptance Limits
86-73-7	MS Fluorene	122	0.00 U	89.8	74	39-117
7005-72-3	MS 4-Chlorophenylphenylether	122	0.00 U	94.0	77	39-121
100-01-6	MS 4-Nitroaniline	122	0.00 U	121	99	30-133
534-52-1	MS 2-Methyl-4,6-dinitrophenol	122	0.00 U	65.7	54	32-126
122-39-4	MS Diphenylamine	122	0.00 U	90.0	74	37-118
122-66-7	MS Azobenzene	122	0.00 U	89.7	74	38-120
101-55-3	MS 4-Bromophenylphenylether	122	0.00 U	96.6	79	39-121
118-74-1	MS Hexachlorobenzene	122	0.00 U	92.8	76	40-118
87-86-5	MS Pentachlorophenol	122	0.00 U	66.6	55	35-121
85-01-8	MS Phenanthrene	122	0.00 U	100	82	40-115
120-12-7	MS Anthracene	122	0.00 U	103	84	38-120
84-74-2	MS Di-n-butylphthalate	122	0.00 U	105	86	41-128
206-44-0	MS Fluoranthene	122	0.00 U	109	90	41-119
129-00-0	MS Pyrene	122	0.00 U	96.8	79	35-128
85-68-7	MS Butylbenzylphthalate	122	0.00 U	104	85	40-129
117-81-7	MS bis(2-Ethylhexyl)phthalate	122	0.00 U	104	85	38-131
56-55-3	MS Benzo(a)anthracene	122	0.00 U	110	90	39-120
218-01-9	MS Chrysene	122	0.00 U	110	90	41-124
117-84-0	MS Di-n-octylphthalate	122	0.00 U	106	87	37-134
205-99-2	MS Benzo(b)fluoranthene	122	0.00 U	111	91	31-122
207-08-9	MS Benzo(k)fluoranthene	122	0.00 U	110	90	33-123
50-32-8	MS Benzo(a)pyrene	122	0.00 U	110	90	32-118

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Matrix Spike

Client ID: CASA-18-147999MS

Matrix: W

Lab Sample ID 1203917434

Instrument: MSD5.I

Analysis Date: 11/13/2017 18:18

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

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	122	0.00 U	112	92	27-121
53-70-3	MS Dibenzo(a,h)anthracene	122	0.00 U	113	93	30-125
191-24-2	MS Benzo(ghi)perylene	122	0.00 U	105	86	24-126
123-91-1	MS 1,4-Dioxane	122	0.00 U	105	86	24-110
930-55-2	MS N-Nitrosopyrrolidine	122	0.00 U	117	96	47-119
95-94-3	MS 1,2,4,5-Tetrachlorobenzene	122	0.00 U	73.8	61	32-101
1912-24-9	MS Atrazine	122	0.00 U	118	97	42-129
92-87-5	MS Benzidine	244	0.00 U	46.8	19	15-130
91-94-1	MS 3,3'-Dichlorobenzidine	122	0.00 U	107	88	34-124
120-82-1	MS 1,2,4-Trichlorobenzene	122	0.00 U	74.8	61	26-102

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Matrix Spike Duplicate

Client ID: CASA-18-147999MSD

Matrix: W

Lab Sample ID 1203917435

Instrument: MSD5.I

Analysis Date: 11/13/2017 18:48

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

CAS No	Parmname	Amount	Sample	Spike	Recovery	Acceptance	Acceptance	
		Added	Conc.	Conc.		Limits	RPD	Limits
		ug/L	ug/L		%		%	
62-75-9	MSD N-Methyl-N-nitrosomethylamine	122	0.00 U	82.4	68	25-106	0	0-30
110-86-1	MSD Pyridine	122	0.00 U	75.6	62	24-93	49 *	0-30
62-53-3	MSD Aniline	122	0.00 U	104	86	37-113	8	0-30
108-95-2	MSD Phenol	122	0.00 U	66.2	54	23-82	3	0-30
111-44-4	MSD bis(2-Chloroethyl) ether	122	0.00 U	94.9	78	39-114	2	0-30
95-57-8	MSD 2-Chlorophenol	122	0.00 U	88.7	73	37-108	3	0-30
541-73-1	MSD 1,3-Dichlorobenzene	122	0.00 U	73.9	61	27-97	1	0-30
106-46-7	MSD 1,4-Dichlorobenzene	122	0.00 U	70.6	58	28-97	3	0-30
95-50-1	MSD 1,2-Dichlorobenzene	122	0.00 U	74.3	61	28-99	2	0-30
108-60-1	MSD bis(2-Chloro-1-methylethyl)ether	122	0.00 U	81.3	67	32-127	4	0-30
100-51-6	MSD Benzyl alcohol	122	0.00 U	105	86	37-116	1	0-30
95-48-7	MSD o-Cresol	122	0.00 U	95.3	78	34-109	3	0-30
65794-96-9	MSD m,p-Cresols	122	0.00 U	97.8	80	36-120	1	0-30
621-64-7	MSD N-Nitrosodi--n-propylamine N-Nitrosodipropylamine	122	0.00 U	77.6	64	42-118	2	0-30
67-72-1	MSD Hexachloroethane	122	0.00 U	70.9	58	29-94	2	0-30
98-95-3	MSD Nitrobenzene	122	0.00 U	84.0	69	38-123	3	0-30
78-59-1	MSD Isophorone	122	0.00 U	91.5	75	43-120	3	0-30
88-75-5	MSD 2-Nitrophenol	122	0.00 U	91.6	75	39-115	5	0-30
105-67-9	MSD 2,4-Dimethylphenol	122	0.00 U	85.4	70	39-107	3	0-30
111-91-1	MSD bis(2-Chloroethoxy)methane	122	0.00 U	96.6	79	42-118	3	0-30
120-83-2	MSD 2,4-Dichlorophenol	122	0.00 U	90.2	74	40-111	3	0-30
65-85-0	MSD Benzoic acid	244	0.00 U	138	57	17-95	2	0-30

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Matrix Spike Duplicate

Client ID: CASA-18-147999MSD

Matrix: W

Lab Sample ID 1203917435

Instrument: MSD5.I

Analysis Date: 11/13/2017 18:48

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

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	122	0.00 U	129	106	44-138	3	0-30
87-68-3	MSD Hexachlorobutadiene	122	0.00 U	61.3	50	26-98	3	0-30
59-50-7	MSD Parachlorometa cresol 4-Chloro-3-methylphenol	122	0.00 U	102	83	41-122	5	0-30
91-57-6	MSD 2-Methylnaphthalene	122	0.00 U	72.8	60	29-109	4	0-30
91-20-3	MSD Naphthalene	122	0.00 U	74.2	61	31-108	5	0-30
90-12-0	MSD 1-Methylnaphthalene	122	0.00 U	75.1	62	33-112	6	0-30
77-47-4	MSD Hexachlorocyclopentadiene	122	0.00 U	39.0	32	26-79	9	0-30
88-06-2	MSD 2,4,6-Trichlorophenol	122	0.00 U	84.7	69	39-124	2	0-30
95-95-4	MSD 2,4,5-Trichlorophenol	122	0.00 U	93.6	77	42-120	4	0-30
91-58-7	MSD 2-Chloronaphthalene	122	0.00 U	72.0	59	29-113	4	0-30
88-74-4	MSD 2-Nitroaniline o-Nitroaniline	122	0.00 U	93.6	77	41-121	3	0-30
99-09-2	MSD 3-Nitroaniline m-Nitroaniline	122	0.00 U	140	114	42-144	1	0-30
131-11-3	MSD Dimethylphthalate	122	0.00 U	103	85	45-128	4	0-30
606-20-2	MSD 2,6-Dinitrotoluene	122	0.00 U	106	87	46-124	3	0-30
121-14-2	MSD 2,4-Dinitrotoluene	122	0.00 U	105	86	45-125	4	0-30
208-96-8	MSD Acenaphthylene	122	0.00 U	86.0	71	35-120	3	0-30
83-32-9	MSD Acenaphthene	122	0.00 U	90.0	74	35-117	2	0-30
51-28-5	MSD 2,4-Dinitrophenol	122	0.00 U	40.5	33	27-122	13	0-30
132-64-9	MSD Dibenzofuran	122	0.00 U	87.5	72	38-113	3	0-30
58-90-2	MSD 2,3,4,6-Tetrachlorophenol	122	0.00 U	88.8	73	40-128	5	0-30
84-66-2	MSD Diethylphthalate	122	0.00 U	96.2	79	43-127	6	0-30
100-02-7	MSD 4-Nitrophenol	122	0.00 U	76.0	62	17-85	1	0-30

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Matrix Spike Duplicate

Client ID: CASA-18-147999MSD

Matrix: W

Lab Sample ID 1203917435

Instrument: MSD5.I

Analysis Date: 11/13/2017 18:48

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

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	122	0.00 U	85.5	70	39-117	5	0-30
7005-72-3	MSD 4-Chlorophenylphenylether	122	0.00 U	91.8	75	39-121	2	0-30
100-01-6	MSD 4-Nitroaniline <i>p</i> -Nitroaniline	122	0.00 U	122	100	30-133	0	0-30
534-52-1	MSD 2-Methyl-4,6-dinitrophenol	122	0.00 U	67.5	55	32-126	3	0-30
122-39-4	MSD Diphenylamine	122	0.00 U	86.4	71	37-118	4	0-30
122-66-7	MSD Azobenzene <i>1,2-Diphenylhydrazine</i>	122	0.00 U	85.6	70	38-120	5	0-30
101-55-3	MSD 4-Bromophenylphenylether	122	0.00 U	90.3	74	39-121	7	0-30
118-74-1	MSD Hexachlorobenzene	122	0.00 U	86.8	71	40-118	7	0-30
87-86-5	MSD Pentachlorophenol	122	0.00 U	63.7	52	35-121	4	0-30
85-01-8	MSD Phenanthrene	122	0.00 U	94.6	78	40-115	6	0-30
120-12-7	MSD Anthracene	122	0.00 U	94.1	77	38-120	9	0-30
84-74-2	MSD Di-n-butylphthalate	122	0.00 U	96.0	79	41-128	9	0-30
206-44-0	MSD Fluoranthene	122	0.00 U	101	83	41-119	8	0-30
129-00-0	MSD Pyrene	122	0.00 U	88.6	73	35-128	9	0-30
85-68-7	MSD Butylbenzylphthalate	122	0.00 U	97.2	80	40-129	6	0-30
117-81-7	MSD bis(2-Ethylhexyl)phthalate	122	0.00 U	94.9	78	38-131	9	0-30
56-55-3	MSD Benzo(a)anthracene	122	0.00 U	102	83	39-120	8	0-30
218-01-9	MSD Chrysene	122	0.00 U	102	84	41-124	7	0-30
117-84-0	MSD Di-n-octylphthalate	122	0.00 U	99.0	81	37-134	7	0-30
205-99-2	MSD Benzo(b)fluoranthene	122	0.00 U	102	84	31-122	8	0-30
207-08-9	MSD Benzo(k)fluoranthene	122	0.00 U	100	82	33-123	9	0-30
50-32-8	MSD Benzo(a)pyrene	122	0.00 U	101	83	32-118	8	0-30

Semi-Volatile
Quality Control Summary
Spike Recovery Report

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SDG Number: 2018-739

Sample Type: Matrix Spike Duplicate

Client ID: CASA-18-147999MSD

Matrix: W

Lab Sample ID 1203917435

Instrument: MSD5.I

Analysis Date: 11/13/2017 18:48

Dilution: 1

Analyst: JMB3

Prep Batch ID: 1717962

Inj. Vol: 1 uL

Batch ID: 1717963

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	122	0.00	U	91.8	75	27-121	20	0-30
53-70-3	MSD	Dibenzo(a,h)anthracene	122	0.00	U	102	83	30-125	11	0-30
191-24-2	MSD	Benzo(ghi)perylene	122	0.00	U	90.0	74	24-126	15	0-30
123-91-1	MSD	1,4-Dioxane	122	0.00	U	104	86	24-110	1	0-30
930-55-2	MSD	N-Nitrosopyrrolidine	122	0.00	U	116	95	47-119	1	0-30
95-94-3	MSD	1,2,4,5-Tetrachlorobenzene	122	0.00	U	70.5	58	32-101	5	0-30
1912-24-9	MSD	Atrazine	122	0.00	U	109	89	42-129	8	0-30
92-87-5	MSD	Benzidine	244	0.00	U	129	53	15-130	93 *	0-30
91-94-1	MSD	3,3'-Dichlorobenzidine	122	0.00	U	106	87	34-124	1	0-30
120-82-1	MSD	1,2,4-Trichlorobenzene	122	0.00	U	70.9	58	26-102	5	0-30

Method Blank Summary

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SDG Number:	2018-739	Client:	ARSL004	Matrix:	WATER
Client ID:	MB for batch 1717962	Instrument ID:	MSD5.I	Data File:	s111317.B\s5k1310.D
Lab Sample ID:	1203917432	Prep Date:	11/13/2017 05:43	Analyzed:	11/13/17 14:44
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 1717962	1203917433	s111317.B\s5k1311.D	11/13/17	1514
02 CASA-18-148007	437322002	s111317.B\s5k1314.D	11/13/17	1646
03 CASA-18-148008	437322005	s111317.B\s5k1315.D	11/13/17	1717
04 CASA-18-147999	437322008	s111317.B\s5k1316.D	11/13/17	1747
05 CASA-18-147999MS	1203917434	s111317.B\s5k1317.D	11/13/17	1818
06 CASA-18-147999MSD	1203917435	s111317.B\s5k1318.D	11/13/17	1848

Quality Control Data

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

Page 1 of 3

SDG Number: 2018-739
Lab Sample ID: 1203917432
Client Sample: QC for batch 1717962
Client ID: MB for batch 1717962
Batch ID: 1717963
Run Date: 11/13/2017 14:44
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1310.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 1000 mL
Column: DB-5ms

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene	U	3.00	ug/L	3.00	10.0
120-82-1	1,2,4-Trichlorobenzene	U	3.00	ug/L	3.00	10.0
95-50-1	1,2-Dichlorobenzene	U	3.00	ug/L	3.00	10.0
122-66-7	Azobenzene	U	3.00	ug/L	3.00	10.0
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	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
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	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: 2018-739
Lab Sample ID: 1203917432
Client Sample: QC for batch 1717962
Client ID: MB for batch 1717962
Batch ID: 1717963
Run Date: 11/13/2017 14:44
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1310.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 1000 mL
Column: DB-5ms

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

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

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

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SDG Number: 2018-739
Lab Sample ID: 1203917432
Client Sample: QC for batch 1717962
Client ID: MB for batch 1717962
Batch ID: 1717963
Run Date: 11/13/2017 14:44
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1310.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 1000 mL
Column: DB-5ms

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
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	49.6	100	ug/L 50	(32%-124%)
2-Fluorobiphenyl	17.3	50.0	ug/L 35	(32%-112%)
2-Fluorophenol	39.7	100	ug/L 40	(15%-88%)
Nitrobenzene-d5	28.0	50.0	ug/L 56	(36%-115%)
Phenol-d5	28.0	100	ug/L 28	(15%-91%)
p-Terphenyl-d14	36.3	50.0	ug/L 73	(36%-121%)

Tentatively Identified Compound Summary

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

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

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SDG Number: 2018-739
Lab Sample ID: 1203917433
Client Sample: QC for batch 1717962
Client ID: LCS for batch 1717962
Batch ID: 1717963
Run Date: 11/13/2017 15:14
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1311.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 1000 mL
Column: DB-5ms

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
95-94-3	1,2,4,5-Tetrachlorobenzene		29.1	ug/L	3.00	10.0
120-82-1	1,2,4-Trichlorobenzene		30.1	ug/L	3.00	10.0
95-50-1	1,2-Dichlorobenzene		30.7	ug/L	3.00	10.0
122-66-7	Azobenzene		35.8	ug/L	3.00	10.0
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		29.9	ug/L	3.00	10.0
106-46-7	1,4-Dichlorobenzene		29.7	ug/L	3.00	10.0
123-91-1	1,4-Dioxane		28.6	ug/L	3.00	10.0
90-12-0	1-Methylnaphthalene		31.5	ug/L	0.300	1.00
58-90-2	2,3,4,6-Tetrachlorophenol		39.3	ug/L	3.00	10.0
95-95-4	2,4,5-Trichlorophenol		40.9	ug/L	3.00	10.0
88-06-2	2,4,6-Trichlorophenol		36.8	ug/L	3.00	10.0
120-83-2	2,4-Dichlorophenol		40.3	ug/L	3.00	10.0
105-67-9	2,4-Dimethylphenol		37.3	ug/L	3.00	10.0
51-28-5	2,4-Dinitrophenol	J	15.2	ug/L	5.00	20.0
121-14-2	2,4-Dinitrotoluene		47.5	ug/L	3.00	10.0
606-20-2	2,6-Dinitrotoluene		46.5	ug/L	3.00	10.0
91-58-7	2-Chloronaphthalene		30.0	ug/L	0.410	1.00
95-57-8	2-Chlorophenol		38.4	ug/L	3.00	10.0
534-52-1	2-Methyl-4,6-dinitrophenol		26.3	ug/L	3.00	10.0
91-57-6	2-Methylnaphthalene		30.6	ug/L	0.300	1.00
88-75-5	2-Nitrophenol		39.4	ug/L	3.00	10.0
91-94-1	3,3'-Dichlorobenzidine		45.1	ug/L	3.00	10.0
101-55-3	4-Bromophenylphenylether		37.4	ug/L	3.00	10.0
59-50-7	Parachlorometa cresol		44.5	ug/L	3.00	10.0
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		57.0	ug/L	3.30	10.0
7005-72-3	4-Chlorophenylphenylether		37.7	ug/L	3.00	10.0
100-02-7	4-Nitrophenol		18.3	ug/L	3.00	10.0
83-32-9	Acenaphthene		36.1	ug/L	0.300	1.00
208-96-8	Acenaphthylene		35.4	ug/L	0.300	1.00
62-53-3	Aniline		42.5	ug/L	4.20	10.0
120-12-7	Anthracene		41.2	ug/L	0.300	1.00
1912-24-9	Atrazine		48.7	ug/L	3.00	10.0
92-87-5	Benzidine		40.0	ug/L	3.90	10.0
56-55-3	Benzo(a)anthracene		46.8	ug/L	0.300	1.00
50-32-8	Benzo(a)pyrene		46.1	ug/L	0.300	1.00
205-99-2	Benzo(b)fluoranthene		45.8	ug/L	0.300	1.00
191-24-2	Benzo(ghi)perylene		42.9	ug/L	0.300	1.00

Semi-Volatile
Certificate of Analysis
Sample Summary

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SDG Number: 2018-739
Lab Sample ID: 1203917433
Client Sample: QC for batch 1717962
Client ID: LCS for batch 1717962
Batch ID: 1717963
Run Date: 11/13/2017 15:14
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1311.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 1000 mL
Column: DB-5ms

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
207-08-9	Benzo(k)fluoranthene		44.8	ug/L	0.300	1.00
65-85-0	Benzoic acid		35.2	ug/L	6.00	20.0
100-51-6	Benzyl alcohol		41.1	ug/L	3.00	10.0
85-68-7	Butylbenzylphthalate		44.0	ug/L	3.00	10.0
218-01-9	Chrysene		47.1	ug/L	0.300	1.00
84-74-2	Di-n-butylphthalate		42.8	ug/L	3.00	10.0
117-84-0	Di-n-octylphthalate		43.3	ug/L	3.00	10.0
53-70-3	Dibenzo(a,h)anthracene		47.7	ug/L	0.300	1.00
132-64-9	Dibenzofuran		35.6	ug/L	3.00	10.0
84-66-2	Diethylphthalate		44.8	ug/L	3.00	10.0
131-11-3	Dimethylphthalate		46.1	ug/L	3.00	10.0
88-85-7	Dinoseb	U	3.00	ug/L	3.00	10.0
122-39-4	Diphenylamine		37.6	ug/L	3.00	10.0
206-44-0	Fluoranthene		44.0	ug/L	0.300	1.00
86-73-7	Fluorene		35.6	ug/L	0.300	1.00
118-74-1	Hexachlorobenzene		37.6	ug/L	3.00	10.0
87-68-3	Hexachlorobutadiene		24.9	ug/L	3.00	10.0
77-47-4	Hexachlorocyclopentadiene		15.8	ug/L	3.00	10.0
67-72-1	Hexachloroethane		28.5	ug/L	3.00	10.0
193-39-5	Indeno(1,2,3-cd)pyrene		45.9	ug/L	0.300	1.00
78-59-1	Isophorone		39.0	ug/L	3.50	10.0
62-75-9	N-Methyl-N-nitrosomethylamine		27.2	ug/L	3.00	10.0
924-16-3	N-Nitrosodi-n-butylamine	U	3.00	ug/L	3.00	10.0
55-18-5	N-Nitrosodiethylamine	U	3.00	ug/L	3.00	10.0
621-64-7	N-Nitrosodi-n-propylamine		33.8	ug/L	3.00	10.0
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		49.4	ug/L	3.00	10.0
91-20-3	Naphthalene		31.3	ug/L	0.300	1.00
98-95-3	Nitrobenzene		36.1	ug/L	3.00	10.0
608-93-5	Pentachlorobenzene	U	3.00	ug/L	3.00	10.0
87-86-5	Pentachlorophenol		24.0	ug/L	3.00	10.0
85-01-8	Phenanthrene		40.8	ug/L	0.300	1.00
108-95-2	Phenol		17.7	ug/L	3.00	10.0
129-00-0	Pyrene		42.1	ug/L	0.300	1.00
110-86-1	Pyridine		21.3	ug/L	3.00	10.0
108-60-1	bis(2-Chloro-1-methylethyl)ether		34.5	ug/L	3.00	10.0
111-91-1	bis(2-Chloroethoxy)methane		41.8	ug/L	3.00	10.0
111-44-4	bis(2-Chloroethyl) ether		41.3	ug/L	3.00	10.0
117-81-7	bis(2-Ethylhexyl)phthalate		43.5	ug/L	3.00	10.0

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

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SDG Number: 2018-739
Lab Sample ID: 1203917433
Client Sample: QC for batch 1717962
Client ID: LCS for batch 1717962
Batch ID: 1717963
Run Date: 11/13/2017 15:14
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1311.D

Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 1000 mL
Column: DB-5ms

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

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols		35.7	ug/L	3.70	10.0
99-09-2	3-Nitroaniline		64.2	ug/L	3.00	10.0
	<i>m-Nitroaniline</i>					
95-48-7	o-Cresol		37.2	ug/L	3.00	10.0
88-74-4	2-Nitroaniline		41.8	ug/L	3.00	10.0
	<i>o-Nitroaniline</i>					
100-01-6	4-Nitroaniline		54.3	ug/L	3.00	10.0
	<i>p-Nitroaniline</i>					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	75.5	100	ug/L	76	(32%-124%)
2-Fluorobiphenyl	33.0	50.0	ug/L	66	(32%-112%)
2-Fluorophenol	49.7	100	ug/L	50	(15%-88%)
Nitrobenzene-d5	35.5	50.0	ug/L	71	(36%-115%)
Phenol-d5	32.9	100	ug/L	33	(15%-91%)
p-Terphenyl-d14	44.1	50.0	ug/L	88	(36%-121%)

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

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SDG Number: 2018-739
Lab Sample ID: 1203917434
Client Sample: QC for batch 1717962
Client ID: CASA-18-147999MS
Batch ID: 1717963
Run Date: 11/13/2017 18:18
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1317.D

Date Collected: 11/06/2017 11:17
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 410 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		73.8	ug/L	7.32	24.4
120-82-1	1,2,4-Trichlorobenzene		74.8	ug/L	7.32	24.4
95-50-1	1,2-Dichlorobenzene		75.6	ug/L	7.32	24.4
122-66-7	Azobenzene		89.7	ug/L	7.32	24.4
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		74.9	ug/L	7.32	24.4
106-46-7	1,4-Dichlorobenzene		73.1	ug/L	7.32	24.4
123-91-1	1,4-Dioxane		105	ug/L	7.32	24.4
90-12-0	1-Methylnaphthalene		79.8	ug/L	0.732	2.44
58-90-2	2,3,4,6-Tetrachlorophenol		93.2	ug/L	7.32	24.4
95-95-4	2,4,5-Trichlorophenol		97.2	ug/L	7.32	24.4
88-06-2	2,4,6-Trichlorophenol		86.4	ug/L	7.32	24.4
120-83-2	2,4-Dichlorophenol		93.0	ug/L	7.32	24.4
105-67-9	2,4-Dimethylphenol		88.0	ug/L	7.32	24.4
51-28-5	2,4-Dinitrophenol	J	35.4	ug/L	12.2	48.8
121-14-2	2,4-Dinitrotoluene		110	ug/L	7.32	24.4
606-20-2	2,6-Dinitrotoluene		110	ug/L	7.32	24.4
91-58-7	2-Chloronaphthalene		74.9	ug/L	1.00	2.44
95-57-8	2-Chlorophenol		91.1	ug/L	7.32	24.4
534-52-1	2-Methyl-4,6-dinitrophenol		65.7	ug/L	7.32	24.4
91-57-6	2-Methylnaphthalene		76.1	ug/L	0.732	2.44
88-75-5	2-Nitrophenol		95.9	ug/L	7.32	24.4
91-94-1	3,3'-Dichlorobenzidine		107	ug/L	7.32	24.4
101-55-3	4-Bromophenylphenylether		96.6	ug/L	7.32	24.4
59-50-7	Parachlorometa cresol		107	ug/L	7.32	24.4
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		133	ug/L	8.05	24.4
7005-72-3	4-Chlorophenylphenylether		94.0	ug/L	7.32	24.4
100-02-7	4-Nitrophenol		75.6	ug/L	7.32	24.4
83-32-9	Acenaphthene		92.1	ug/L	0.732	2.44
208-96-8	Acenaphthylene		88.4	ug/L	0.732	2.44
62-53-3	Aniline		96.8	ug/L	10.2	24.4
120-12-7	Anthracene		103	ug/L	0.732	2.44
1912-24-9	Atrazine		118	ug/L	7.32	24.4
92-87-5	Benzidine		46.8	ug/L	9.51	24.4
56-55-3	Benzo(a)anthracene		110	ug/L	0.732	2.44
50-32-8	Benzo(a)pyrene		110	ug/L	0.732	2.44
205-99-2	Benzo(b)fluoranthene		111	ug/L	0.732	2.44
191-24-2	Benzo(ghi)perylene		105	ug/L	0.732	2.44

**Semi-Volatile
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Sample Summary**

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SDG Number: 2018-739
Lab Sample ID: 1203917434
Client Sample: QC for batch 1717962
Client ID: CASA-18-147999MS
Batch ID: 1717963
Run Date: 11/13/2017 18:18
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1317.D

Date Collected: 11/06/2017 11:17
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 410 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		110	ug/L	0.732	2.44
65-85-0	Benzoic acid		141	ug/L	14.6	48.8
100-51-6	Benzyl alcohol		105	ug/L	7.32	24.4
85-68-7	Butylbenzylphthalate		104	ug/L	7.32	24.4
218-01-9	Chrysene		110	ug/L	0.732	2.44
84-74-2	Di-n-butylphthalate		105	ug/L	7.32	24.4
117-84-0	Di-n-octylphthalate		106	ug/L	7.32	24.4
53-70-3	Dibenzo(a,h)anthracene		113	ug/L	0.732	2.44
132-64-9	Dibenzofuran		90.0	ug/L	7.32	24.4
84-66-2	Diethylphthalate		102	ug/L	7.32	24.4
131-11-3	Dimethylphthalate		108	ug/L	7.32	24.4
88-85-7	Dinoseb	U	7.32	ug/L	7.32	24.4
122-39-4	Diphenylamine		90.0	ug/L	7.32	24.4
206-44-0	Fluoranthene		109	ug/L	0.732	2.44
86-73-7	Fluorene		89.8	ug/L	0.732	2.44
118-74-1	Hexachlorobenzene		92.8	ug/L	7.32	24.4
87-68-3	Hexachlorobutadiene		63.4	ug/L	7.32	24.4
77-47-4	Hexachlorocyclopentadiene		35.8	ug/L	7.32	24.4
67-72-1	Hexachloroethane		72.1	ug/L	7.32	24.4
193-39-5	Indeno(1,2,3-cd)pyrene		112	ug/L	0.732	2.44
78-59-1	Isophorone		94.2	ug/L	8.54	24.4
62-75-9	N-Methyl-N-nitrosomethylamine		82.6	ug/L	7.32	24.4
924-16-3	N-Nitrosodi-n-butylamine	U	7.32	ug/L	7.32	24.4
55-18-5	N-Nitrosodiethylamine	U	7.32	ug/L	7.32	24.4
621-64-7	N-Nitrosodi-n-propylamine		79.3	ug/L	7.32	24.4
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		117	ug/L	7.32	24.4
91-20-3	Naphthalene		78.2	ug/L	0.732	2.44
98-95-3	Nitrobenzene		86.3	ug/L	7.32	24.4
608-93-5	Pentachlorobenzene	U	7.32	ug/L	7.32	24.4
87-86-5	Pentachlorophenol		66.6	ug/L	7.32	24.4
85-01-8	Phenanthrene		100	ug/L	0.732	2.44
108-95-2	Phenol		68.3	ug/L	7.32	24.4
129-00-0	Pyrene		96.8	ug/L	0.732	2.44
110-86-1	Pyridine		45.9	ug/L	7.32	24.4
108-60-1	bis(2-Chloro-1-methylethyl)ether		84.6	ug/L	7.32	24.4
111-91-1	bis(2-Chloroethoxy)methane		99.5	ug/L	7.32	24.4
111-44-4	bis(2-Chloroethyl) ether		96.5	ug/L	7.32	24.4
117-81-7	bis(2-Ethylhexyl)phthalate		104	ug/L	7.32	24.4

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

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SDG Number: 2018-739
Lab Sample ID: 1203917434
Client Sample: QC for batch 1717962
Client ID: CASA-18-147999MS
Batch ID: 1717963
Run Date: 11/13/2017 18:18
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1317.D

Date Collected: 11/06/2017 11:17
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 410 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		98.5	ug/L	9.02	24.4
99-09-2	3-Nitroaniline		141	ug/L	7.32	24.4
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol		98.1	ug/L	7.32	24.4
88-74-4	2-Nitroaniline		96.4	ug/L	7.32	24.4
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline		121	ug/L	7.32	24.4
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	174	244	ug/L	71	(32%-124%)
2-Fluorobiphenyl	84.1	122	ug/L	69	(32%-112%)
2-Fluorophenol	155	244	ug/L	63	(15%-88%)
Nitrobenzene-d5	86.5	122	ug/L	71	(36%-115%)
Phenol-d5	128	244	ug/L	53	(15%-91%)
p-Terphenyl-d14	106	122	ug/L	87	(36%-121%)

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

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SDG Number: 2018-739
Lab Sample ID: 1203917435
Client Sample: QC for batch 1717962
Client ID: CASA-18-147999MSD
Batch ID: 1717963
Run Date: 11/13/2017 18:48
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1318.D

Date Collected: 11/06/2017 11:17
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 410 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		70.5	ug/L	7.32	24.4
120-82-1	1,2,4-Trichlorobenzene		70.9	ug/L	7.32	24.4
95-50-1	1,2-Dichlorobenzene		74.3	ug/L	7.32	24.4
122-66-7	Azobenzene		85.6	ug/L	7.32	24.4
	<i>1,2-Diphenylhydrazine</i>					
541-73-1	1,3-Dichlorobenzene		73.9	ug/L	7.32	24.4
106-46-7	1,4-Dichlorobenzene		70.6	ug/L	7.32	24.4
123-91-1	1,4-Dioxane		104	ug/L	7.32	24.4
90-12-0	1-Methylnaphthalene		75.1	ug/L	0.732	2.44
58-90-2	2,3,4,6-Tetrachlorophenol		88.8	ug/L	7.32	24.4
95-95-4	2,4,5-Trichlorophenol		93.6	ug/L	7.32	24.4
88-06-2	2,4,6-Trichlorophenol		84.7	ug/L	7.32	24.4
120-83-2	2,4-Dichlorophenol		90.2	ug/L	7.32	24.4
105-67-9	2,4-Dimethylphenol		85.4	ug/L	7.32	24.4
51-28-5	2,4-Dinitrophenol	J	40.5	ug/L	12.2	48.8
121-14-2	2,4-Dinitrotoluene		105	ug/L	7.32	24.4
606-20-2	2,6-Dinitrotoluene		106	ug/L	7.32	24.4
91-58-7	2-Chloronaphthalene		72.0	ug/L	1.00	2.44
95-57-8	2-Chlorophenol		88.7	ug/L	7.32	24.4
534-52-1	2-Methyl-4,6-dinitrophenol		67.5	ug/L	7.32	24.4
91-57-6	2-Methylnaphthalene		72.8	ug/L	0.732	2.44
88-75-5	2-Nitrophenol		91.6	ug/L	7.32	24.4
91-94-1	3,3'-Dichlorobenzidine		106	ug/L	7.32	24.4
101-55-3	4-Bromophenylphenylether		90.3	ug/L	7.32	24.4
59-50-7	Parachlorometa cresol		102	ug/L	7.32	24.4
	<i>4-Chloro-3-methylphenol</i>					
106-47-8	4-Chloroaniline		129	ug/L	8.05	24.4
7005-72-3	4-Chlorophenylphenylether		91.8	ug/L	7.32	24.4
100-02-7	4-Nitrophenol		76.0	ug/L	7.32	24.4
83-32-9	Acenaphthene		90.0	ug/L	0.732	2.44
208-96-8	Acenaphthylene		86.0	ug/L	0.732	2.44
62-53-3	Aniline		104	ug/L	10.2	24.4
120-12-7	Anthracene		94.1	ug/L	0.732	2.44
1912-24-9	Atrazine		109	ug/L	7.32	24.4
92-87-5	Benzidine		129	ug/L	9.51	24.4
56-55-3	Benzo(a)anthracene		102	ug/L	0.732	2.44
50-32-8	Benzo(a)pyrene		101	ug/L	0.732	2.44
205-99-2	Benzo(b)fluoranthene		102	ug/L	0.732	2.44
191-24-2	Benzo(ghi)perylene		90.0	ug/L	0.732	2.44

**Semi-Volatile
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Sample Summary**

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SDG Number: 2018-739
Lab Sample ID: 1203917435
Client Sample: QC for batch 1717962
Client ID: CASA-18-147999MSD
Batch ID: 1717963
Run Date: 11/13/2017 18:48
Prep Date: 11/13/2017 05:43
Data File: s111317.B\s5k1318.D

Date Collected: 11/06/2017 11:17
Date Received: 11/08/2017 09:00
Client: ARSL004
Method: SW846 3510C/8270D
Inst: MSD5.I
Analyst: JMB3
Aliquot: 410 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		100	ug/L	0.732	2.44
65-85-0	Benzoic acid		138	ug/L	14.6	48.8
100-51-6	Benzyl alcohol		105	ug/L	7.32	24.4
85-68-7	Butylbenzylphthalate		97.2	ug/L	7.32	24.4
218-01-9	Chrysene		102	ug/L	0.732	2.44
84-74-2	Di-n-butylphthalate		96.0	ug/L	7.32	24.4
117-84-0	Di-n-octylphthalate		99.0	ug/L	7.32	24.4
53-70-3	Dibenzo(a,h)anthracene		102	ug/L	0.732	2.44
132-64-9	Dibenzofuran		87.5	ug/L	7.32	24.4
84-66-2	Diethylphthalate		96.2	ug/L	7.32	24.4
131-11-3	Dimethylphthalate		103	ug/L	7.32	24.4
88-85-7	Dinoseb	U	7.32	ug/L	7.32	24.4
122-39-4	Diphenylamine		86.4	ug/L	7.32	24.4
206-44-0	Fluoranthene		101	ug/L	0.732	2.44
86-73-7	Fluorene		85.5	ug/L	0.732	2.44
118-74-1	Hexachlorobenzene		86.8	ug/L	7.32	24.4
87-68-3	Hexachlorobutadiene		61.3	ug/L	7.32	24.4
77-47-4	Hexachlorocyclopentadiene		39.0	ug/L	7.32	24.4
67-72-1	Hexachloroethane		70.9	ug/L	7.32	24.4
193-39-5	Indeno(1,2,3-cd)pyrene		91.8	ug/L	0.732	2.44
78-59-1	Isophorone		91.5	ug/L	8.54	24.4
62-75-9	N-Methyl-N-nitrosomethylamine		82.4	ug/L	7.32	24.4
924-16-3	N-Nitrosodi-n-butylamine	U	7.32	ug/L	7.32	24.4
55-18-5	N-Nitrosodiethylamine	U	7.32	ug/L	7.32	24.4
621-64-7	N-Nitrosodi-n-propylamine		77.6	ug/L	7.32	24.4
	<i>N-Nitrosodipropylamine</i>					
930-55-2	N-Nitrosopyrrolidine		116	ug/L	7.32	24.4
91-20-3	Naphthalene		74.2	ug/L	0.732	2.44
98-95-3	Nitrobenzene		84.0	ug/L	7.32	24.4
608-93-5	Pentachlorobenzene	U	7.32	ug/L	7.32	24.4
87-86-5	Pentachlorophenol		63.7	ug/L	7.32	24.4
85-01-8	Phenanthrene		94.6	ug/L	0.732	2.44
108-95-2	Phenol		66.2	ug/L	7.32	24.4
129-00-0	Pyrene		88.6	ug/L	0.732	2.44
110-86-1	Pyridine		75.6	ug/L	7.32	24.4
108-60-1	bis(2-Chloro-1-methylethyl)ether		81.3	ug/L	7.32	24.4
111-91-1	bis(2-Chloroethoxy)methane		96.6	ug/L	7.32	24.4
111-44-4	bis(2-Chloroethyl) ether		94.9	ug/L	7.32	24.4
117-81-7	bis(2-Ethylhexyl)phthalate		94.9	ug/L	7.32	24.4

**Semi-Volatile
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Sample Summary**

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SDG Number: 2018-739	Date Collected: 11/06/2017 11:17	Matrix: W
Lab Sample ID: 1203917435	Date Received: 11/08/2017 09:00	
Client Sample: QC for batch 1717962	Client: ARSL004	Project: QC
Client ID: CASA-18-147999MSD	Method: SW846 3510C/8270D	SOP Ref: GL-OA-E-009
Batch ID: 1717963	Inst: MSD5.I	Dilution: 1
Run Date: 11/13/2017 18:48	Analyst: JMB3	Inj. Vol: 1 uL
Prep Date: 11/13/2017 05:43	Aliquot: 410 mL	Final Volume: 1 mL
Data File: s111317.B\s5k1318.D	Column: DB-5ms	

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
65794-96-9	m,p-Cresols		97.8	ug/L	9.02	24.4
99-09-2	3-Nitroaniline		140	ug/L	7.32	24.4
	<i>m</i> -Nitroaniline					
95-48-7	o-Cresol		95.3	ug/L	7.32	24.4
88-74-4	2-Nitroaniline		93.6	ug/L	7.32	24.4
	<i>o</i> -Nitroaniline					
100-01-6	4-Nitroaniline		122	ug/L	7.32	24.4
	<i>p</i> -Nitroaniline					

Surrogate/Tracer recovery	Result	Nominal		Recovery%	Acceptable Limits
2,4,6-Tribromophenol	167	244	ug/L	68	(32%-124%)
2-Fluorobiphenyl	82.3	122	ug/L	67	(32%-112%)
2-Fluorophenol	153	244	ug/L	63	(15%-88%)
Nitrobenzene-d5	84.1	122	ug/L	69	(36%-115%)
Phenol-d5	127	244	ug/L	52	(15%-91%)
p-Terphenyl-d14	98.2	122	ug/L	81	(36%-121%)

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-739
Work Order #: 437322**

Method/Analysis Information

Procedure:	Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)
Analytical Method:	SW-846:6850
Prep Method:	SW-846:6850
Analytical Batch Number:	1717124
Prep Batch Number:	1717121

Sample Analysis

Sample ID	Client ID
437322001	437322001 (CASA-18-148005)
437322004	437322004 (CASA-18-148006)
437322007	437322007 (CASA-18-147992)
1203915263	Interference Check Sample (ICS)
1203915259	Method Blank (MB)
1203915260	Laboratory Control Sample (LCS)
1203915261	437184003(CrIN6-18-148622) Matrix Spike (MS)
1203915262	437184003(CrIN6-18-148622) 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 437184003 (CrIN6-18-148622) 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 1203915261 (CrIN6-18-148622MS) and 1203915262 (CrIN6-18-148622MSD). The failing recoveries are attributed to background concentrations of target analytes in the parent sample.

MS/MSD Relative Percent Difference (RPD) Statement

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

Internal Standard Area Acceptance

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

Retention Time

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Manual Integrations

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

Method Comments

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

Additional Comments

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

Perchlorate Isotope Ratio

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

System Configuration

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

Electronic Packaging Comment

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

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An

electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Chromatographic Columns

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

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

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2018-739 GEL Work Order: 437322

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: 13 NOV 2017

Title: Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1717121Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-18-148005Date Received: 08-NOV-17GEL Job No (SDG): 2018-739GEL Sample ID: 437322001Date Filtered: 08-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	0.400	ug/L		1	09-NOV-17 00:16	per1108044a
	Perchlorate Isotope Ratio			3.09			1	09-NOV-17 00:16	per1108044a
14797-73-0	Perchlorate-101	.05	.2	0.413	ug/L		1	09-NOV-17 00:16	per1108044a
	Perchlorate-O(18)			0.499	ug/L		1	09-NOV-17 00:16	per1108044a

^ 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: 1717121Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-18-148006Date Received: 08-NOV-17GEL Job No (SDG): 2018-739GEL Sample ID: 437322004Date Filtered: 08-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	0.533	ug/L		1	09-NOV-17 00:26	per1108045a
	Perchlorate Isotope Ratio			3.18			1	09-NOV-17 00:26	per1108045a
14797-73-0	Perchlorate-101	.05	.2	0.535	ug/L		1	09-NOV-17 00:26	per1108045a
	Perchlorate-O(18)			0.494	ug/L		1	09-NOV-17 00:26	per1108045a

^ 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: 1717121Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-18-147992Date Received: 08-NOV-17GEL Job No (SDG): 2018-739GEL Sample ID: 437322007Date Filtered: 08-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	1.35	ug/L		1	09-NOV-17 00:35	per1108046a
	Perchlorate Isotope Ratio			3.1			1	09-NOV-17 00:35	per1108046a
14797-73-0	Perchlorate-101	.05	.2	1.39	ug/L		1	09-NOV-17 00:35	per1108046a
	Perchlorate-O(18)			0.537	ug/L		1	09-NOV-17 00:35	per1108046a

^ 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): 2018-739

Extract Batch Code: 1717121

Date Filtered: 08-NOV-17

Matrix: WATER

Sample ID: 1203915260

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.198	ug/L	99		85 - 115
Perchlorate Isotope Ratio		3.45				-
Perchlorate-101	0.200	.183	ug/L	92		85 - 115
Perchlorate-O(18)		.638	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): 2018-739

Extract Batch Code: 1717121

Date Extracted: 08-NOV-17

GEL MS/PS ID: 1203915261

Client ID: CrIN6-18-148622

GEL MSD/PSD ID: 1203915262

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	1.03	ug/L	1.26	116	1.15	62 *	9	30	75 - 125
Perchlorate Isotope Ratio	0	3.13		3.04		3.32		9		-
Perchlorate-101	0.200	1.05	ug/L	1.33	137 *	1.11	30 *	18	30	75 - 125
Perchlorate-O(18)	0	0.647	ug/L	0.539		.581		8		-

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

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample No.

MBLab Code: GELDate Received: 08-NOV-17Instrument: LCMSMSGEL Job No (SDG): 2018-739Method: EPA 6850 ModifiedGEL Sample ID: 1203915259Matrix: WATERDate Filtered: 08-NOV-17Extraction Batch ID: 1717121Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL%Solids: Concentrated Extract Volume: 10.0

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.050	ug/L	U	1	08-NOV-17 21:16	per1108025a
	Perchlorate Isotope Ratio						1	08-NOV-17 21:16	per1108025a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	08-NOV-17 21:16	per1108025a
	Perchlorate-O(18)			0.642	ug/L		1	08-NOV-17 21:16	per1108025a

^ 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: 1717121Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 08-NOV-17GEL Job No (SDG): 2018-739GEL Sample ID: 1203915260Date Filtered: 08-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	0.198	ug/L	J	1	08-NOV-17 21:26	per1108026a
	Perchlorate Isotope Ratio			3.45			1	08-NOV-17 21:26	per1108026a
14797-73-0	Perchlorate-101	.05	.2	0.183	ug/L	J	1	08-NOV-17 21:26	per1108026a
	Perchlorate-O(18)			0.638	ug/L		1	08-NOV-17 21:26	per1108026a

^ 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: 1717121Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2018-739GEL Sample ID: 1203915263Date Filtered: 08-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	0.219	ug/L		1	08-NOV-17 21:35	per1108027a
	Perchlorate Isotope Ratio			3.08			1	08-NOV-17 21:35	per1108027a
14797-73-0	Perchlorate-101	.05	.2	0.228	ug/L		1	08-NOV-17 21:35	per1108027a
	Perchlorate-O(18)			0.658	ug/L		1	08-NOV-17 21:35	per1108027a

^ 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: 1717121Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CrIN6-18-148622MSDate Received: 07-NOV-17GEL Job No (SDG): 2018-739GEL Sample ID: 1203915261Date Filtered: 08-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	1.26	ug/L		1	08-NOV-17 23:19	per1108038a
	Perchlorate Isotope Ratio			3.04			1	08-NOV-17 23:19	per1108038a
14797-73-0	Perchlorate-101	.05	.2	1.33	ug/L		1	08-NOV-17 23:19	per1108038a
	Perchlorate-O(18)			0.539	ug/L		1	08-NOV-17 23:19	per1108038a

^ 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: 1717121Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CrIN6-18-148622MSDDate Received: 07-NOV-17GEL Job No (SDG): 2018-739GEL Sample ID: 1203915262Date Filtered: 08-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	1.15	ug/L		1	08-NOV-17 23:29	per1108039a
	Perchlorate Isotope Ratio			3.32			1	08-NOV-17 23:29	per1108039a
14797-73-0	Perchlorate-101	.05	.2	1.11	ug/L		1	08-NOV-17 23:29	per1108039a
	Perchlorate-O(18)			0.581	ug/L		1	08-NOV-17 23:29	per1108039a

^ 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 #: 2018-739
Work Order #: 437322

Sample ID	Client ID
437322001	CASA-18-148005
437322002	CASA-18-148007
437322004	CASA-18-148006
437322005	CASA-18-148008
437322007	CASA-18-147992
437322008	CASA-18-147999
1203915214	Method Blank (MB) ICP
1203915215	Laboratory Control Sample (LCS)
1203915218	437322001(CASA-18-148005L) Serial Dilution (SD)
1203915216	437322001(CASA-18-148005D) Sample Duplicate (DUP)
1203915217	437322001(CASA-18-148005S) Matrix Spike (MS)
1203915224	Method Blank (MB) ICP-MS
1203915225	Laboratory Control Sample (LCS)
1203915228	437322001(CASA-18-148005L) Serial Dilution (SD)
1203915226	437322001(CASA-18-148005D) Sample Duplicate (DUP)
1203915227	437322001(CASA-18-148005S) Matrix Spike (MS)
1203926922	Method Blank (MB) CVAA
1203926923	Laboratory Control Sample (LCS)
1203926926	437322001(CASA-18-148005L) Serial Dilution (SD)
1203926924	437322001(CASA-18-148005D) Sample Duplicate (DUP)
1203926925	437322001(CASA-18-148005S) Matrix Spike (MS)

Sample Analysis

Samples 437322001,002,004,005,007 and 008 in this SDG were analyzed for metals and mercury on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1717104, 1717109, 1721699 and 1723726
Prep Batch :	1717102, 1717107 and 1721691
Standard Operating Procedures:	GL-MA-E-013 REV# 30, GL-MA-E-006 REV# 14, GL-MA-E-014 REV# 32, GL-MA-E-010 REV# 36 and GL-GC-E-107 REV# 10
Analytical Method:	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.2 1974 and SM:A2340B
Prep Method :	SW846 3005A and EPA 245.1/245.2 Prep

Preparation/Analytical Method Verification

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

System Configuration

The Hardness as CaCO₃ is calculated from Calcium and Magnesium results.

The Metals analysis-ICP was performed on a 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-ICP was performed on a PE 7300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard.

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

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

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

The CRDL/PQL standard recoveries met the referenced advisory control limits.

ICSA/ICSAB Statement

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

Continuing Calibration Blanks (CCB) Requirements

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 437322001 (CASA-18-148005)-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: 2018-739 GEL Work Order: 437322

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- B Either presence of analyte detected in the associated blank, or MDL/IDL < sample value < PQL
- 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: 06 DEC 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437322001**BASIS:** As Received**DATE COLLECTED** 06-NOV-17**CLIENT ID:** CASA-18-148005**LEVEL:** Low**DATE RECEIVED** 08-NOV-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.067	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	11/28/17 11:11	112817W2-4	1721699

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 437322001

BASIS: As Received

DATE COLLECTED 06-NOV-17

CLIENT ID: CASA-18-148005

LEVEL: Low

DATE RECEIVED 08-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	12/04/17 17:17	120417A-1	1717104
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7440-38-2	Arsenic	2.96	ug/L	J	2	5	5	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7440-39-3	Barium	351	ug/L		1	5	5	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7440-42-8	Boron	38.8	ug/L	J	15	50	50	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7440-70-2	Calcium	22500	ug/L		50	200	200	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7440-47-3	Chromium	4.91	ug/L	J	3	10	10	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7439-95-4	Magnesium	5910	ug/L		110	300	300	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7439-98-7	Molybdenum	1.17	ug/L		0.2	0.5	0.5	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7440-02-0	Nickel	7.58	ug/L		0.6	2	2	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7440-09-7	Potassium	3950	ug/L		50	150	150	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7631-86-9	Silica	78600	ug/L		53	213	213	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7440-23-5	Sodium	16100	ug/L		100	300	300	1	P	HSC	12/05/17 08:48	120517A-2	1717104
7440-24-6	Strontium	164	ug/L		1	5	5	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7440-31-5	Tin	3.12	ug/L	J	2.5	10	10	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7440-61-1	Uranium	0.742	ug/L		0.067	0.2	0.2	1	MS	BAJ	11/28/17 20:17	171128-3	1717109
7440-62-2	Vanadium	15.8	ug/L		1	5	5	1	P	HSC	12/04/17 17:17	120417A-1	1717104
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	12/04/17 17:17	120417A-1	1717104

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 437322001**BASIS:** As Received**DATE COLLECTED** 06-NOV-17**CLIENT ID:** CASA-18-148005**LEVEL:** Low**DATE RECEIVED** 08-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	80.6	mg/L		0.453	1.24	1.24	1		JJ2	12/05/17 11:30		1723726

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1717104	1717102	SW846 3005A	50	mL	50	mL	11/08/17	JXM8
1717109	1717107	SW846 3005A	50	mL	50	mL	11/08/17	JXM8
1721699	1721691	EPA 245.1/245.2 Prep	20	mL	20	mL	11/27/17	AXS5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437322002**BASIS:** As Received**DATE COLLECTED** 06-NOV-17**CLIENT ID:** CASA-18-148007**LEVEL:** Low**DATE RECEIVED** 08-NOV-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.067	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	11/28/17 11:19	112817W2-4	1721699

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1721699	1721691	EPA 245.1/245.2 Prep	20	mL	20	mL	11/27/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437322004**BASIS:** As Received**DATE COLLECTED** 06-NOV-17**CLIENT ID:** CASA-18-148006**LEVEL:** Low**DATE RECEIVED** 08-NOV-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.067	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	11/28/17 11:24	112817W2-4	1721699

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 437322004

BASIS: As Received

DATE COLLECTED 06-NOV-17

CLIENT ID: CASA-18-148006

LEVEL: Low

DATE RECEIVED 08-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	12/04/17 17:10	120417A-1	1717104
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7440-38-2	Arsenic	2.69	ug/L	J	2	5	5	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7440-39-3	Barium	38.5	ug/L		1	5	5	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7440-42-8	Boron	24.6	ug/L	J	15	50	50	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7440-70-2	Calcium	15700	ug/L		50	200	200	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7440-47-3	Chromium	5.53	ug/L	J	3	10	10	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7439-95-4	Magnesium	4980	ug/L		110	300	300	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7439-98-7	Molybdenum	1.4	ug/L		0.2	0.5	0.5	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7440-02-0	Nickel	5.5	ug/L		0.6	2	2	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7440-09-7	Potassium	2110	ug/L		50	150	150	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7631-86-9	Silica	72600	ug/L		53	213	213	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7440-23-5	Sodium	10100	ug/L		100	300	300	1	P	HSC	12/05/17 08:43	120517A-2	1717104
7440-24-6	Strontium	63	ug/L		1	5	5	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7440-61-1	Uranium	0.279	ug/L		0.067	0.2	0.2	1	MS	BAJ	11/28/17 20:33	171128-3	1717109
7440-62-2	Vanadium	12.8	ug/L		1	5	5	1	P	HSC	12/04/17 17:10	120417A-1	1717104
7440-66-6	Zinc	14.5	ug/L		3.3	10	10	1	P	HSC	12/04/17 17:10	120417A-1	1717104

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 437322004**BASIS:** As Received**DATE COLLECTED** 06-NOV-17**CLIENT ID:** CASA-18-148006**LEVEL:** Low**DATE RECEIVED** 08-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	59.8	mg/L		0.453	1.24	1.24	1		JJ2	12/05/17 11:30		1723726

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1717104	1717102	SW846 3005A	50	mL	50	mL	11/08/17	JXM8
1717109	1717107	SW846 3005A	50	mL	50	mL	11/08/17	JXM8
1721699	1721691	EPA 245.1/245.2 Prep	20	mL	20	mL	11/27/17	AXS5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437322005**BASIS:** As Received**DATE COLLECTED** 06-NOV-17**CLIENT ID:** CASA-18-148008**LEVEL:** Low**DATE RECEIVED** 08-NOV-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.067	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	11/28/17 11:26	112817W2-4	1721699

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1721699	1721691	EPA 245.1/245.2 Prep	20	mL	20	mL	11/27/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437322007**BASIS:** As Received**DATE COLLECTED** 06-NOV-17**CLIENT ID:** CASA-18-147992**LEVEL:** Low**DATE RECEIVED** 08-NOV-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.067	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	11/28/17 11:28	112817W2-4	1721699

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 437322007

BASIS: As Received

DATE COLLECTED 06-NOV-17

CLIENT ID: CASA-18-147992

LEVEL: Low

DATE RECEIVED 08-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	12/04/17 17:13	120417A-1	1717104
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7440-38-2	Arsenic	3.08	ug/L	J	2	5	5	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7440-39-3	Barium	33.8	ug/L		1	5	5	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7440-42-8	Boron	25	ug/L	J	15	50	50	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7440-70-2	Calcium	17900	ug/L		50	200	200	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7440-47-3	Chromium	5.74	ug/L	J	3	10	10	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7439-95-4	Magnesium	4270	ug/L		110	300	300	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7439-98-7	Molybdenum	1.87	ug/L		0.2	0.5	0.5	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7440-02-0	Nickel	0.901	ug/L	J	0.6	2	2	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7440-09-7	Potassium	2140	ug/L		50	150	150	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7631-86-9	Silica	69200	ug/L		53	213	213	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7440-23-5	Sodium	13600	ug/L		100	300	300	1	P	HSC	12/05/17 08:45	120517A-2	1717104
7440-24-6	Strontium	65	ug/L		1	5	5	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7440-61-1	Uranium	0.276	ug/L		0.067	0.2	0.2	1	MS	BAJ	11/28/17 20:36	171128-3	1717109
7440-62-2	Vanadium	14.9	ug/L		1	5	5	1	P	HSC	12/04/17 17:13	120417A-1	1717104
7440-66-6	Zinc	26.3	ug/L		3.3	10	10	1	P	HSC	12/04/17 17:13	120417A-1	1717104

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 437322007**BASIS:** As Received**DATE COLLECTED** 06-NOV-17**CLIENT ID:** CASA-18-147992**LEVEL:** Low**DATE RECEIVED** 08-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	62.4	mg/L		0.453	1.24	1.24	1		JJ2	12/05/17 11:36		1723726

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1717104	1717102	SW846 3005A	50	mL	50	mL	11/08/17	JXM8
1717109	1717107	SW846 3005A	50	mL	50	mL	11/08/17	JXM8
1721699	1721691	EPA 245.1/245.2 Prep	20	mL	20	mL	11/27/17	AXS5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-739**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 437322008**BASIS:** As Received**DATE COLLECTED** 06-NOV-17**CLIENT ID:** CASA-18-147999**LEVEL:** Low**DATE RECEIVED** 08-NOV-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.067	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	11/28/17 11:29	112817W2-4	1721699

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1721699	1721691	EPA 245.1/245.2 Prep	20	mL	20	mL	11/27/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2018-739
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>
1203915214	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	125	ug/L	+/-150	J	P	50	150
	Silica	53	ug/L	+/-213	U	P	53	213
	Sodium	100	ug/L	+/-300	U	P	100	300
	Strontium	1.29	ug/L	+/-5	J	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
1203915224	Antimony	1	ug/L	+/-3	U	MS	1	3
	Arsenic	2	ug/L	+/-5	U	MS	2	5
	Cadmium	0.3	ug/L	+/-1	U	MS	0.3	1
	Chromium	3	ug/L	+/-10	U	MS	3	10
	Lead	0.5	ug/L	+/-2	U	MS	0.5	2
	Molybdenum	0.2	ug/L	+/-0.5	U	MS	0.2	0.5
	Nickel	0.6	ug/L	+/-2	U	MS	0.6	2
	Selenium	2	ug/L	+/-5	U	MS	2	5
	Silver	0.3	ug/L	+/-1	U	MS	0.3	1
	Thallium	0.6	ug/L	+/-2	U	MS	0.6	2
	Uranium	0.067	ug/L	+/-0.2	U	MS	0.067	0.2
1203926922	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. 2018-739

Client ID: CASA-18-148005S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 437322001

Spike ID: 1203915217

<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>
Silica	ug/L		86400		78600		10700	73.1	N/A	P
Sodium	ug/L	75-125	19900		16100		5000	75.4		P
Strontium	ug/L	75-125	608		164		500	89		P
Tin	ug/L	75-125	485		3.12	J	500	96.3		P
Vanadium	ug/L	75-125	497		15.8		500	96.2		P
Zinc	ug/L	75-125	465		3.3	U	500	92.5		P
Aluminum	ug/L	75-125	4740		68	U	5000	94.6		P
Barium	ug/L	75-125	815		351		500	92.8		P
Beryllium	ug/L	75-125	481		1	U	500	96.3		P
Boron	ug/L	75-125	538		38.8	J	500	99.9		P
Calcium	ug/L		26800		22500		5000	84.6	N/A	P
Cobalt	ug/L	75-125	482		1	U	500	96.3		P
Copper	ug/L	75-125	490		3	U	500	97.9		P
Iron	ug/L	75-125	4720		30	U	5000	94.2		P
Magnesium	ug/L	75-125	10600		5910		5000	93.2		P
Manganese	ug/L	75-125	474		2	U	500	94.7		P
Potassium	ug/L	75-125	8540		3950		5000	91.7		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2018-739

Client ID: CASA-18-148005S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 437322001

Spike ID: 1203915227

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Antimony	ug/L	75-125	48.8		1	U	50	96.2		MS
Arsenic	ug/L	75-125	53.7		2.96	J	50	102		MS
Cadmium	ug/L	75-125	50.3		0.3	U	50	101		MS
Chromium	ug/L	75-125	51.7		4.91	J	50	93.6		MS
Lead	ug/L	75-125	48.1		0.5	U	50	96.2		MS
Molybdenum	ug/L	75-125	54.4		1.17		50	106		MS
Nickel	ug/L	75-125	54.8		7.58		50	94.5		MS
Selenium	ug/L	75-125	51.4		2	U	50	101		MS
Silver	ug/L	75-125	50.3		0.3	U	50	101		MS
Thallium	ug/L	75-125	47.2		0.6	U	50	94.3		MS
Uranium	ug/L	75-125	49.1		0.742		50	96.7		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2018-739

Client ID: CASA-18-148005S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 437322001

Spike ID: 1203926925

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Mercury	ug/L	75-125	2.01		0.067	U	2	101		AV

*Analytical Methods:

AV EPA 245.1/245.2

Metals
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Duplicate Sample Summary

SDG No.: 2018-739

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-18-148005D

Matrix: WATER

Level: Low

Sample ID: 437322001

Duplicate ID: 1203915216

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%	351		351		.0199		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	38.8 J		38.7 J		.31		P
Calcium	ug/L	+/-20%	22500		22500		.315		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%	5910		5890		.42		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	3950		3990		1.08		P
Silica	ug/L	+/-20%	78600		78800		.187		P
Sodium	ug/L	+/-20%	16100		16400		2.16		P
Strontium	ug/L	+/-20%	164		161		1.42		P
Tin	ug/L		3.12 J		2.5 U		200		P
Vanadium	ug/L	+/-5	15.8		16.3		3.43		P
Zinc	ug/L		3.3 U		3.3 U				P

*Analytical Methods:

P SW846 3005A/6010C

Metals
-6-
Duplicate Sample Summary

SDG No.: 2018-739

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-18-148005D

Matrix: WATER

Level: Low

Sample ID: 437322001

Duplicate ID: 1203915226

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	2.96 J		2.86 J		3.68		MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-10	4.91 J		4.39 J		11.2		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	1.17		1		14.9		MS
Nickel	ug/L	+/-2	7.58		6.97		8.37		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	0.742		0.577		25		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
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Duplicate Sample Summary

SDG No.: 2018–739**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CASA–18–148005D**Matrix:** WATER**Level:** Low**Sample ID:** 437322001**Duplicate ID:** 1203926924**Percent Solids for Dup:** N/A

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

***Analytical Methods:**

AV EPA 245.1/245.2

METALS

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Laboratory Control Sample Summary

SDG NO. 2018-739

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>
1203915215								
	Aluminum	ug/L	5000	5220		104	80-120	P
	Barium	ug/L	500	518		104	80-120	P
	Beryllium	ug/L	500	513		103	80-120	P
	Boron	ug/L	500	529		106	80-120	P
	Calcium	ug/L	5000	5300		106	80-120	P
	Cobalt	ug/L	500	529		106	80-120	P
	Copper	ug/L	500	476		95.2	80-120	P
	Iron	ug/L	5000	5220		104	80-120	P
	Magnesium	ug/L	5000	5430		109	80-120	P
	Manganese	ug/L	500	477		95.4	80-120	P
	Potassium	ug/L	5000	5280		106	80-120	P
	Silica	ug/L	10700	9620		89.9	80-120	P
	Sodium	ug/L	5000	4840		96.9	80-120	P
	Strontium	ug/L	500	501		100	80-120	P
	Tin	ug/L	500	474		94.8	80-120	P
	Vanadium	ug/L	500	473		94.5	80-120	P
	Zinc	ug/L	500	462		92.5	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Laboratory Control Sample Summary

SDG NO. 2018-739

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>
1203915225								
	Antimony	ug/L	50	48.4		96.7	80-120	MS
	Arsenic	ug/L	50	52		104	80-120	MS
	Cadmium	ug/L	50	53.1		106	80-120	MS
	Chromium	ug/L	50	51		102	80-120	MS
	Lead	ug/L	50	50.9		102	80-120	MS
	Molybdenum	ug/L	50	51.2		102	80-120	MS
	Nickel	ug/L	50	49.8		99.5	80-120	MS
	Selenium	ug/L	50	51.9		104	80-120	MS
	Silver	ug/L	50	50		100	80-120	MS
	Thallium	ug/L	50	49.3		98.6	80-120	MS
	Uranium	ug/L	50	49.4		98.7	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Laboratory Control Sample Summary

SDG NO. 2018-739

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>
1203926923	Mercury	ug/L	2	2.06		103	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

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Serial Dilution Sample Summary

SDG NO. 2018-739

Client ID: CASA-18-148005L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 437322001

Serial Dilution ID: 1203915218

<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	351		348		.777		10	P
Beryllium	1	U	5	U				P
Boron	38.8	J	75	U	14.812			P
Calcium	22500		22700		.834		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	5910		6020		1.746		10	P
Manganese	2	U	10	U				P
Potassium	3950		4020		1.869		10	P
Silica	78600		78800		.215		10	P
Sodium	16100		16800		4.613		10	P
Strontium	164		167		2.36		10	P
Tin	3.12	J	12.5	U	119.781			P
Vanadium	15.8		15.8	J	.606			P
Zinc	3.3	U	26.7	J				P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Serial Dilution Sample Summary

SDG NO. 2018-739

Client ID: CASA-18-148005L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 437322001

Serial Dilution ID: 1203915228

<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	2.96	J	10	U	87.416			MS
Cadmium	.3	U	1.5	U				MS
Chromium	4.91	J	15	U	4.485			MS
Lead	.5	U	2.5	U				MS
Molybdenum	1.17		1.16	J	.943			MS
Nickel	7.58		7.97	J	5.079			MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.742		.65	J	12.399			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Serial Dilution Sample Summary

SDG NO. 2018-739 **Client ID:** CASA-18-148005L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 437322001 **Serial Dilution ID:** 1203926926

<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 #: 2018-739
Work Order #: 437322**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1717030

Method: SW 9060 Total Organic Carbon

Sample Analysis

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

Sample ID	Client ID
437322002	CASA-18-148007
437322005	CASA-18-148008
437322008	CASA-18-147999
1203916271	Method Blank (MB)
1203916272	Laboratory Control Sample (LCS)
1203916273	437322005(CASA-18-148008) Sample Duplicate (DUP)
1203916274	437322005(CASA-18-148008) 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 437322005 (CASA-18-148008) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Cyanide and Total

Analytical Batch: 1716988 **Method:** WSP-CN(T)

Prep Batch : 1716987 **Method:** EPA 335.4

Sample Analysis

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

Sample ID	Client ID
437322002	CASA-18-148007
437322005	CASA-18-148008
437322008	CASA-18-147999
1203914936	Method Blank (MB)
1203914937	Laboratory Control Sample (LCS)
1203915928	437314001(WST03-18-148752) Sample Duplicate (DUP)
1203915930	437314001(WST03-18-148752) 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.

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 437314001 (WST03-18-148752) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Ion Chromatography

Analytical Batch: 1718519

Method: WSP-ANIONS

Sample Analysis

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

Sample ID	Client ID
437322001	CASA-18-148005
437322004	CASA-18-148006
437322007	CASA-18-147992
1203918853	Method Blank (MB)
1203918854	Laboratory Control Sample (LCS)
1203918855	437515004(CAMO-18-148060) Sample Duplicate (DUP)
1203918856	437515004(CAMO-18-148060) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

The Ion Chromatography analysis was performed on a Dionex ICS-3000 Ion Chromatograph.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 437515004 (CAMO-18-148060) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Manual Integrations

Samples 1203918855 (CAMO-18-148060DUP), 1203918856 (CAMO-18-148060PS), 437322001 (CASA-18-148005), 437322004 (CASA-18-148006) and 437322007 (CASA-18-147992) 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: 1716959 **Method:** NH3
Prep Batch : 1716958 **Method:** EPA 350.1 Prep

Sample Analysis

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

Sample ID	Client ID
437322001	CASA-18-148005
437322004	CASA-18-148006
437322007	CASA-18-147992
1203914834	Method Blank (MB)
1203914835	Laboratory Control Sample (LCS)
1203914836	437078001(CAPA-18-147556) Sample Duplicate (DUP)
1203914837	437078001(CAPA-18-147556) 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 437078001 (CAPA-18-147556) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Total Kjeldahl Nitrogen		
Analytical Batch:	1717811	Method:	TKN
Prep Batch :	1717809	Method:	EPA 351.2 Prep

Sample Analysis

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

Sample ID	Client ID
437322002	CASA-18-148007
437322005	CASA-18-148008
437322008	CASA-18-147999
1203916954	Method Blank (MB)
1203916955	Laboratory Control Sample (LCS)
1203916956	437300004(CrIN6-18-148629) Sample Duplicate (DUP)
1203916957	437300004(CrIN6-18-148629) 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 437300004 (CrIN6-18-148629) 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 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
Nitrogen, Total Kjeldahl	1203916956 (CrIN6-18-148629DUP)	abs(.0953 - -.0265)* (+/- .1 mg/L)

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 1203916954 (MB), 1203916955 (LCS), 1203916956 (CrIN6-18-148629DUP) and 1203916957 (CrIN6-18-148629MS) 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: 1717193

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
437322001	CASA-18-148005
437322004	CASA-18-148006
437322007	CASA-18-147992
1203915476	Method Blank (MB)
1203915477	Laboratory Control Sample (LCS)
1203915478	437314001(WST03-18-148752) Sample Duplicate (DUP)
1203915480	437314001(WST03-18-148752) 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 437314001 (WST03-18-148752) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The following sample 437322007 (CASA-18-147992) was diluted because target analyte concentrations exceeded the calibration range. The following sample 437322004 (CASA-18-148006) in this sample group was diluted due to matrix interference. 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	437322	
	004	007
Nitrogen, Nitrate/Nitrite	5X	5X

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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Method/Analysis Information

Product:	Total Phosphorus		
Analytical Batch:	1717814	Method:	PO4
Prep Batch :	1717812	Method:	EPA 365.4 Prep

Sample Analysis

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

Sample ID	Client ID
437322001	CASA-18-148005
437322004	CASA-18-148006
437322007	CASA-18-147992
1203916964	Method Blank (MB)
1203916965	Laboratory Control Sample (LCS)
1203916966	437300004(CrIN6-18-148629) Sample Duplicate (DUP)
1203916967	437300004(CrIN6-18-148629) 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 437300004 (CrIN6-18-148629) 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: 1717342

Method: TDS

Sample Analysis

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

Sample ID	Client ID
437322001	CASA-18-148005
437322004	CASA-18-148006
437322007	CASA-18-147992
1203915794	Method Blank (MB)
1203915795	Laboratory Control Sample (LCS)
1203915797	437300004(CrIN6-18-148629) 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 437300004 (CrIN6-18-148629) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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Method/Analysis Information

Product: Specific Conductivity

Analytical Batch: 1717162

Method: EPA120.1 Specific Conductivity

Sample Analysis

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

Sample ID	Client ID
437322001	CASA-18-148005
437322004	CASA-18-148006
437322007	CASA-18-147992
1203915371	Laboratory Control Sample (LCS)
1203915372	436983003(CrIN6-18-148623) 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

Sample 436983003 (CrIN6-18-148623) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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Method/Analysis Information

Product: pH

Analytical Batch: 1717129 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
437322001	CASA-18-148005
437322004	CASA-18-148006
437322007	CASA-18-147992
1203915277	Laboratory Control Sample (LCS)
1203915279	437322007(CASA-18-147992) 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 437322007 (CASA-18-147992) 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
1203915279 (CASA-18-147992DUP)	pH	Received 08-NOV-17, out of holding 06-NOV-17
437322001 (CASA-18-148005)	pH	Received 08-NOV-17, out of holding 06-NOV-17
437322004 (CASA-18-148006)	pH	Received 08-NOV-17, out of holding 06-NOV-17
437322007 (CASA-18-147992)	pH	Received 08-NOV-17, out of holding 06-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: 1717125 **Method:** EPA 310.1 Total Alkalinity

Sample Analysis

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

Sample ID	Client ID
437322001	CASA-18-148005
437322004	CASA-18-148006
437322007	CASA-18-147992
1203915264	Laboratory Control Sample (LCS)
1203915266	437322007(CASA-18-147992) Sample Duplicate (DUP)
1203915268	437322007(CASA-18-147992) 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 437322007 (CASA-18-147992) 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: 2018-739 GEL Work Order: 437322


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: Aubrey Kingsbury

Date: 22 NOV 2017

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: November 22, 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: 2018-739

Client Sample ID: CASA-18-148005
Sample ID: 437322001
Matrix: W
Collect Date: 06-NOV-17 13:22
Receive Date: 08-NOV-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide	J	0.0687	0.067	0.200	mg/L		1	MXL2	11/13/17	1817	1718519	1
Chloride		6.26	0.067	0.200	mg/L		1					
Fluoride		0.282	0.033	0.100	mg/L		1					
Sulfate		5.48	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	U	ND	0.017	0.050	mg/L	1.00	1	KLP1	11/09/17	1525	1716959	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		0.406	0.017	0.050	mg/L		1	KLP1	11/08/17	1401	1717193	3
PO4 "As Received"												
Phosphorus, Total as P	J	0.0322	0.020	0.050	mg/L	1.00	1	KLP1	11/13/17	1356	1717814	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		199	3.40	14.3	mg/L			KLP1	11/13/17	0823	1717342	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		111	1.45	4.00	mg/L			RXB5	11/11/17	1247	1717125	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		294	1.00	1.00	umhos/cm		1	VH1	11/14/17	1321	1717162	7
PH "As Received"												
pH at Temp 13.9C	H	8.16	0.010	0.100	SU		1	RXB5	11/11/17	1246	1717129	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	11/09/17	1049	1716958
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	AXH3	11/13/17	1030	1717812

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Certificate of Analysis

Report Date: November 22, 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: 2018-739

Client Sample ID: CASA-18-148005
Sample ID: 437322001

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: November 22, 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: 2018-739

Client Sample ID: CASA-18-148007
Sample ID: 437322002
Matrix: W
Collect Date: 06-NOV-17 13:22
Receive Date: 08-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	0.341	0.330	1.00	mg/L		1	TSM	11/14/17	0546	1717030	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	11/09/17	0904	1716988	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	11/14/17	1342	1717811	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/09/17	0812	1716987
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	AXH3	11/13/17	1030	1717809

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

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

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Report Date: November 22, 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: 2018-739

Client Sample ID: CASA-18-148006
Sample ID: 437322004
Matrix: W
Collect Date: 06-NOV-17 13:37
Receive Date: 08-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	11/13/17	1848	1718519	1
Chloride		2.79	0.067	0.200	mg/L		1					
Fluoride		0.465	0.033	0.100	mg/L		1					
Sulfate		3.55	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.0531	0.017	0.050	mg/L	1.00	1	KLP1	11/09/17	1526	1716959	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		1.27	0.085	0.250	mg/L		5	KLP1	11/08/17	1407	1717193	3
PO4 "As Received"												
Phosphorus, Total as P	J	0.0366	0.020	0.050	mg/L	1.00	1	KLP1	11/13/17	1357	1717814	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		161	3.40	14.3	mg/L			KLP1	11/13/17	0823	1717342	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		74.8	1.45	4.00	mg/L			RXB5	11/11/17	1249	1717125	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		201	1.00	1.00	umhos/cm		1	VH1	11/14/17	1321	1717162	7
PH "As Received"												
pH at Temp 14.8C	H	7.90	0.010	0.100	SU		1	RXB5	11/11/17	1248	1717129	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	11/09/17	1049	1716958
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	AXH3	11/13/17	1030	1717812

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Report Date: November 22, 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: 2018-739

Client Sample ID: CASA-18-148006
Sample ID: 437322004

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Report Date: November 22, 2017

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Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Client SDG: 2018-739

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-148008

Project: ESHL00114

Sample ID: 437322005

Client ID: ARSL004

Matrix: W

Collect Date: 06-NOV-17 13:37

Receive Date: 08-NOV-17

Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	U	ND	0.330	1.00	mg/L		1	TSM	11/14/17	0633	1717030	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	11/09/17	0905	1716988	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	11/14/17	1343	1717811	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/09/17	0812	1716987
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	AXH3	11/13/17	1030	1717809

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Report Date: November 22, 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: 2018-739

Client Sample ID: CASA-18-147992
Sample ID: 437322007
Matrix: W
Collect Date: 06-NOV-17 11:17
Receive Date: 08-NOV-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide	J	0.103	0.067	0.200	mg/L		1	MXL2	11/13/17	1919	1718519	1
Chloride		5.97	0.067	0.200	mg/L		1					
Fluoride		0.469	0.033	0.100	mg/L		1					
Sulfate		7.06	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.0793	0.017	0.050	mg/L	1.00	1	KLP1	11/09/17	1527	1716959	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		2.55	0.085	0.250	mg/L		5	KLP1	11/08/17	1409	1717193	3
PO4 "As Received"												
Phosphorus, Total as P	J	0.0348	0.020	0.050	mg/L	1.00	1	KLP1	11/13/17	1357	1717814	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		176	3.40	14.3	mg/L			KLP1	11/13/17	0823	1717342	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		70.8	1.45	4.00	mg/L			RXB5	11/11/17	1255	1717125	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		235	1.00	1.00	umhos/cm		1	VH1	11/14/17	1321	1717162	7
PH "As Received"												
pH at Temp 15.1C	H	7.62	0.010	0.100	SU		1	RXB5	11/11/17	1253	1717129	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	11/09/17	1049	1716958
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	AXH3	11/13/17	1030	1717812

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Certificate of Analysis

Report Date: November 22, 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: 2018-739

Client Sample ID: CASA-18-147992
Sample ID: 437322007

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

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Report Date: November 22, 2017

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Client SDG: 2018-739

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-147999

Project: ESHL00114

Sample ID: 437322008

Client ID: ARSL004

Matrix: W

Collect Date: 06-NOV-17 11:17

Receive Date: 08-NOV-17

Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	U	ND	0.330	1.00	mg/L		1	TSM	11/14/17	0854	1717030	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	11/09/17	0906	1716988	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	11/14/17	1344	1717811	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	11/09/17	0812	1716987
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	AXH3	11/13/17	1030	1717809

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

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QC Summary

Report Date: November 22, 2017

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

Contact: Ms. Nita Patel

Workorder: 437322

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1717030										
QC1203916273	437322005	DUP									
Total Organic Carbon Average		U	ND	U	ND	mg/L	N/A		TSM	11/14/17	07:20
QC1203916272	LCS										
Total Organic Carbon Average	10.0				10.5	mg/L	105	(80%-120%)		11/14/17	03:14
QC1203916271	MB										
Total Organic Carbon Average			U	ND	mg/L					11/14/17	03:02
QC1203916274	437322005	PS									
Total Organic Carbon Average	10.0	U	ND		11.2	mg/L	110	(75%-125%)		11/14/17	08:07
Flow Injection Analysis											
Batch	1716988										
QC1203915928	437314001	DUP									
Cyanide, Total		J	2.84	J	2.14	ug/L	28.1 ^	(+/-5.00)	AXH3	11/09/17	09:02
QC1203914937	LCS										
Cyanide, Total	50.0				51.9	ug/L	104	(90%-110%)		11/09/17	08:47
QC1203914936	MB										
Cyanide, Total			U	ND	ug/L					11/09/17	08:46
QC1203915930	437314001	MS									
Cyanide, Total	100	J	2.84		105	ug/L	102	(90%-110%)		11/09/17	09:03
Ion Chromatography											
Batch	1718519										
QC1203918855	437515004	DUP									
Bromide		U	ND	U	ND	mg/L	N/A		MXL2	11/13/17	23:58

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QC Summary

Workorder: 437322

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1718519										
Chloride		1.96		1.96	mg/L	0.0971		(0%-20%)	MXL2	11/13/17	23:58
Fluoride		0.144		0.143	mg/L	0.556	^	(+/-0.100)			
Sulfate		2.27		2.21	mg/L	2.97		(0%-20%)			
QC1203918854 LCS											
Bromide	1.25			1.19	mg/L		95	(80%-120%)		11/13/17	17:16
Chloride	5.00			4.64	mg/L		92.8	(80%-120%)			
Fluoride	2.50			2.52	mg/L		101	(80%-120%)			
Sulfate	10.0			9.58	mg/L		95.8	(80%-120%)			
QC1203918853 MB											
Bromide			U	ND	mg/L					11/13/17	16:45
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203918856 437515004 PS											
Bromide	1.25	U	ND	1.26	mg/L		96.2	(75%-125%)		11/14/17	00:29
Chloride	5.00		1.96	6.68	mg/L		94.5	(75%-125%)			
Fluoride	2.50		0.144	2.62	mg/L		98.9	(75%-125%)			
Sulfate	10.0		2.27	11.7	mg/L		94.4	(75%-125%)			

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QC Summary

Workorder: 437322

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1716959										
QC1203914836	437078001	DUP									
Nitrogen, Ammonia	J	0.0188	J	0.0352	mg/L	60.7	^	(+/-0.050)	KLP1	11/09/17	14:59
QC1203914835	LCS										
Nitrogen, Ammonia	1.00			1.05	mg/L		105	(90%-110%)		11/09/17	14:58
QC1203914834	MB										
Nitrogen, Ammonia			U	ND	mg/L					11/09/17	14:57
QC1203914837	437078001	MS									
Nitrogen, Ammonia	1.00	J	0.0188	1.04	mg/L		102	(90%-110%)		11/09/17	15:00
Batch	1717193										
QC1203915478	437314001	DUP									
Nitrogen, Nitrate/Nitrite	U	ND	U	ND	mg/L	N/A			KLP1	11/08/17	13:59
QC1203915477	LCS										
Nitrogen, Nitrate/Nitrite	1.00			0.903	mg/L		90.3	(90%-110%)		11/08/17	13:51
QC1203915476	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					11/08/17	13:45
QC1203915480	437314001	PS									
Nitrogen, Nitrate/Nitrite	1.00	U	ND	0.936	mg/L		92.4	(90%-110%)		11/08/17	14:00
Batch	1717811										
QC1203916956	437300004	DUP									
Nitrogen, Total Kjeldahl	U	ND	J	0.0953	mg/L	200			KLP1	11/14/17	13:33
QC1203916955	LCS										
Nitrogen, Total Kjeldahl	1.00			1.03	mg/L		103	(90%-110%)		11/14/17	13:30
QC1203916954	MB										
Nitrogen, Total Kjeldahl			U	ND	mg/L					11/14/17	13:29

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QC Summary

Workorder: 437322

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1717811										
QC1203916957	437300004	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND	1.05	mg/L		105	(90%-110%)	KLP1	11/14/17	13:34
<hr/>											
Batch	1717814										
QC1203916966	437300004	DUP									
Phosphorus, Total as P		J	0.0238	U	ND	mg/L	200	^	KLP1	11/13/17	13:54
<hr/>											
QC1203916965	LCS										
Phosphorus, Total as P	1.00			1.01	mg/L		101	(80%-124%)		11/13/17	13:52
<hr/>											
QC1203916964	MB										
Phosphorus, Total as P			J	0.0291	mg/L					11/13/17	13:51
<hr/>											
QC1203916967	437300004	MS									
Phosphorus, Total as P	1.00	J	0.0238	0.991	mg/L		96.7	(63%-139%)		11/13/17	13:55
<hr/>											
Solids Analysis											
Batch	1717342										
QC1203915797	437300004	DUP									
Total Dissolved Solids			251	253	mg/L	0.567		(0%-5%)	KLP1	11/13/17	08:23
<hr/>											
QC1203915795	LCS										
Total Dissolved Solids	300			299	mg/L		99.5	(95%-105%)		11/13/17	08:23
<hr/>											
QC1203915794	MB										
Total Dissolved Solids			J	4.29	mg/L					11/13/17	08:23
<hr/>											
Titration and Ion Analysis											
Batch	1717125										
QC1203915266	437322007	DUP									
Alkalinity, Total as CaCO3			70.8	70.6	mg/L	0.285		(0%-20%)	RXB5	11/11/17	12:56
<hr/>											
Carbonate alkalinity (CaCO3)		U	ND	U	ND	mg/L	N/A				

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QC Summary

Workorder: 437322

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1717125										
QC1203915264	LCS										
Alkalinity, Total as CaCO3	100			108	mg/L		108	(90%-110%)	RXB5	11/11/17	11:49
QC1203915268	437322007	MS									
Alkalinity, Total as CaCO3	100	70.8		176	mg/L		105	(80%-120%)		11/11/17	12:59
Batch	1717129										
QC1203915279	437322007	DUP									
pH		H	7.62	H	7.63	SU	0.131	(0%-5%)	RXB5	11/11/17	12:55
QC1203915277	LCS										
pH	7.00			7.00	SU		100	(99%-101%)		11/11/17	11:46
Batch	1717162										
QC1203915372	436983003	DUP									
Conductivity			418		415	umhos/cm	0.72	(0%-10%)	VH1	11/14/17	13:17
QC1203915371	LCS										
Conductivity	1410			1400	umhos/cm		99.2	(95%-105%)		11/14/17	13:16

Notes:

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

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QC Summary

Workorder: 437322

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

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

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

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

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

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

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-739
Work Order #: 437322**

Method/Analysis Information

Product: Alphaspec Am241 Liquid

Analytical Method: HASL-300:AM-241

Analytical Batch Number: 1718541

Sample ID	Client ID
437322002	CASA-18-148007
437322005	CASA-18-148008
437322008	CASA-18-147999
1203918915	Method Blank (MB)
1203918917	Laboratory Control Sample (LCS)
1203918916	437632010(CAMO-18-148111) Sample Duplicate (DUP)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 26.

Calibration Information:

Calibration Information

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

Standards Information

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

Sample Geometry

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

Quality Control (QC) Information:

Blank Information

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

Method Blank Criteria

The Method Blank (MB) met acceptance criteria.

CSU

The blank result is less than 1.65 times the CSU.

Blank Decision Level

The blank result is less than the decision level.

Tracer/Carrier Yield

All yields met the required acceptance limits.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Designated QC

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

Duplication Criteria between QC Sample and Duplicate Sample

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

RDL Met

The method RDL has been met.

Technical Information:**Holding Time**

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

Negative > 3 sigma TPU

Samples results are not more negative than three sigma TPU.

Sample Re-prep/Re-analysis

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

Recounts

Sample 1203918917 (LCS) was recounted due to a peak shift. The recount is reported.

Miscellaneous Information:**Manual Integration**

No manual integrations were performed on data in this batch.

Sample-Specific MDA/MDC

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

Additional Comments

Additional comments were not required for this sample set.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

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

Sample ID	Client ID
437322002	CASA-18-148007
437322005	CASA-18-148008
437322008	CASA-18-147999
1203918921	Method Blank (MB)
1203918923	Laboratory Control Sample (LCS)
1203918922	437632010(CAMO-18-148111) Sample Duplicate (DUP)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 26.

Calibration Information:

Calibration Information

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

Standards Information

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

Sample Geometry

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

Quality Control (QC) Information:

Blank Information

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

Method Blank Criteria

The Method Blank (MB) met acceptance criteria.

CSU

The blank result is less than 1.65 times the CSU.

Blank Decision Level

The blank result is less than the decision level.

Tracer/Carrier Yield

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

Sample	Analyte	Value
437322008 (CASA-18-147999)	Plutonium-242 Tracer	47.8* (50%-105%)

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Designated QC

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

Duplication Criteria between QC Sample and Duplicate Sample

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

RDL Met

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

Sample	Analyte	Value
1203918921 (MB)	Plutonium-239/240	Result 0.00818 < MDA 0.0575 > RDL 0.05 pCi/L
1203918922 (CAMO-18-148111DUP)	Plutonium-238	Result -0.00868 < MDA 0.064 > RDL 0.05 pCi/L
	Plutonium-239/240	Result -0.00434 < MDA 0.0914 > RDL 0.05 pCi/L
437322005 (CASA-18-148008)	Plutonium-239/240	Result 0 < MDA 0.07 > RDL 0.05 pCi/L

Technical Information:**Holding Time**

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

Negative > 3 sigma TPU

Samples results are not more negative than three sigma TPU.

Sample Re-prep/Re-analysis

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

Recounts

Sample 437322008 (CASA-18-147999) was recounted due to low carrier/tracer yield. The recount is reported. Samples 1203918922 (CAMO-18-148111DUP) and 437322002 (CASA-18-148007) 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:	1718546

Sample ID	Client ID
437322002	CASA-18-148007
437322005	CASA-18-148008
437322008	CASA-18-147999
1203918932	Method Blank (MB)
1203918934	Laboratory Control Sample (LCS)
1203918933	437632010(CAMO-18-148111) Sample Duplicate (DUP)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 26.

Calibration Information:

Calibration Information

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

Standards Information

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

Sample Geometry

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

Quality Control (QC) Information:

Blank Information

Aliquots for samples 1203918932 (MB) and 1203918934 (LCS) were changed to 1.0, and the MDCs (and Lc if

requested) for all samples are calculated using a blank population per client request.

Method Blank Criteria

The Method Blank (MB) met acceptance criteria.

CSU

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

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

Blank Decision Level

The blank result is less than the decision level.

Tracer/Carrier Yield

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

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

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Designated QC

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

Duplication Criteria between QC Sample and Duplicate Sample

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

RDL Met

The method RDL has been met.

Technical Information:

Holding Time

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

Negative > 3 sigma TPU

Samples results are not more negative than three sigma TPU.

Sample Re-prep/Re-analysis

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

Recounts

None of the samples in this sample set were recounted.

Miscellaneous Information:

Manual Integration

No manual integrations were performed on data in this batch.

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

Additional comments were not required for this sample set.

Manual qualifiers were not required.

Product:	GammaSpec
Analytical Method:	EPA:901.1
Analytical Batch Number:	1713592

Sample ID	Client ID
437322002	CASA-18-148007
437322005	CASA-18-148008
437322008	CASA-18-147999
1203906422	Method Blank (MB)
1203906424	Laboratory Control Sample (LCS)
1203906423	436149002(CAPA-18-147574) Sample Duplicate (DUP)

SOP Reference

Calibration Information:

All initial and continuing calibration requirements have been met. The initial Calibrations were performed in August 2017, February 2017, June 2017, March 2017, October 2017 and September 2017.

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

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: 436149002 (CAPA-18-147574). The QC was from ARSL work order 436149.

Duplication Criteria between QC Sample and Duplicate Sample

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

RDL Met

The method RDL has been met.

Technical Information:**Holding Time**

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

Sample Re-prep/Re-analysis

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

Recounts

None of the samples in this sample set were recounted.

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

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

Additional Comments

Additional comments were not required for this sample set.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product: GFPC, Sr90, liquid

Analytical Method: EPA:905.0

Analytical Batch Number: 1717217

Sample ID	Client ID
437322002	CASA-18-148007
437322005	CASA-18-148008
437322008	CASA-18-147999
1203915510	Method Blank (MB)
1203915513	Laboratory Control Sample (LCS)
1203915511	436615005(CAPA-18-147593) Sample Duplicate (DUP)
1203915512	436615005(CAPA-18-147593) 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 1203915510 (MB) and 1203915513 (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: 436615005 (CAPA-18-147593). The QC was from ARSL work order 436615.

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 prep or reanalysis.

Recounts

Samples 437322002 (CASA-18-148007) and 437322005 (CASA-18-148008) were recounted due to results more negative than the three sigma TPU. The second counts are reported. Sample 437322008 (CASA-18-147999) was recounted due to a suspected false positive. The recount is reported.

Miscellaneous Information:

Sample-Specific MDA/MDC

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

Additional Comments

The matrix spike, 1203915512 (CAPA-18-147593MS), aliquot was reduced to conserve sample volume.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product:	WSP-GrossA/B
Analytical Method:	EPA 900.0/SW846 9310
Analytical Batch Number:	1717573

Sample ID	Client ID
437322002	CASA-18-148007
437322005	CASA-18-148008
437322008	CASA-18-147999
1203916323	Method Blank (MB)
1203916327	Laboratory Control Sample (LCS)
1203916324	437322008(CASA-18-147999) Sample Duplicate (DUP)
1203916325	437322008(CASA-18-147999) Matrix Spike (MS)
1203916326	437322008(CASA-18-147999) 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 1203916323 (MB) and 1203916327 (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: 437322008 (CASA-18-147999). The QC was from ARSL work order 437322.

Matrix Spike (MS) Recovery

The MS spike recoveries met acceptance limits.

Duplication Criteria between MS and MSD

The Matrix Spike and Matrix Spike Duplicate (See Below) do not meet the duplication requirement; however, they both meet the spiked recovery requirement.

Sample	Analyte	Value
1203916325MS and 1203916326MSD (CASA-18-147999)	ALPHA	RPD 24* (0%-20%) RER .599 (0-1)

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 1203916327 (LCS) 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, 1203916325 (CASA-18-147999MS) and 1203916326 (CASA-18-147999MSD), aliquots were reduced to conserve sample volume.

Qualifier Information

Manual qualifiers were not required.

Certification Statement

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

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Qualifier Definition Report for

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

Client SDG: 2018-739 GEL Work Order: 437322

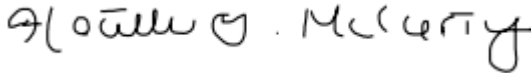
The Qualifiers in this report are defined as follows:

- * 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: 03 DEC 2017

Title: Analyst II

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Report Date: December 3, 2017

Client Sample ID: CASA-18-148007
Sample ID: 437322002
Matrix: W
Collect Date: 06-NOV-17
Receive Date: 08-NOV-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Analysis															
<i>Alphaspec Am241 Liquid "As Received"</i>															
Americium-241	U	0.00386	+/-0.0061	0.0343	0.0145	+/-0.0061	0.050	pCi/L			BXA4	11/25/17	1129	1718541	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	0.00251	+/-0.00973	0.037	0.0151	+/-0.00973	0.050	pCi/L			BXA4	11/28/17	1814	1718543	2
Plutonium-239/240	U	0.010	+/-0.0107	0.0529	0.0231	+/-0.0107	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		0.626	+/-0.0418	0.129	0.0611	+/-0.0519	1.00	pCi/L			BXA4	11/26/17	1118	1718546	3
Uranium-235/236	U	0.0321	+/-0.0111	0.0559	0.0236	+/-0.0112	1.00	pCi/L							
Uranium-238		0.229	+/-0.0257	0.0756	0.0343	+/-0.028	0.500	pCi/L							
Rad Gamma Spec Analysis															
<i>Gammasespec "As Received"</i>															
Cesium-137	U	1.64	+/-0.942	4.08	1.79	+/-1.02	8.00	pCi/L			BSW1	11/14/17	0553	1713592	4
Cobalt-60	U	0.433	+/-0.852	3.79	1.53	+/-0.858	8.00	pCi/L							
Neptunium-237	U	2.14	+/-1.89	7.02	3.19	+/-1.96		pCi/L							
Potassium-40	U	-12.9	+/-11.4	48.8	20.8	+/-11.8		pCi/L							
Sodium-22	U	-2.46	+/-0.913	2.44	0.871	+/-1.08		pCi/L							
Rad Gas Flow Proportional Counting															
<i>GFPC, Sr90, liquid "As Received"</i>															
Strontium-90	U	-0.169	+/-0.108	0.466	0.202	+/-0.108	0.500	pCi/L			KSD1	11/17/17	0756	1717217	5
<i>WSP-GrossA/B "As Received"</i>															
Beta		3.89	+/-0.932	2.62	1.17	+/-0.988	3.00	pCi/L			AXH4	11/13/17	0924	1717573	6
Alpha	U	-0.165	+/-0.664	2.86	1.13	+/-0.664	3.00	pCi/L			AXH4	11/13/17	1514	1717573	7

The following Analytical Methods were performed

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

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Am241 Liquid "As Received"	1718541	90.2	(50%-105%)
Plutonium-242 Tracer	ISOPU "As Received"	1718543	75.9	(50%-105%)
Uranium-232 Tracer	IsoU "As Received"	1718546	71.2	(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-18-148007

Sample ID: 437322002

Project: ESHL00114

Client ID: ARSL004

Report Date: December 3, 2017

Parameter	Qualifier	Result Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				
Strontium Carrier		GFPC, Sr90, liquid "As Received"						1717217	99.4	(50%-105%)				

Notes:

The MDC is a sample specific MDC.

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

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

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Certificate of Analysis

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Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-148008

Sample ID: 437322005

Matrix: W

Collect Date: 06-NOV-17

Receive Date: 08-NOV-17

Collector: Client

Report Date: December 3, 2017

Project: ESHL00114

Client ID: ARSL004

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Analysis															
<i>Alphaspec Am241 Liquid "As Received"</i>															
Americium-241	U	-0.0077	+/-0.00667	0.0343	0.0145	+/-0.00667	0.050	pCi/L			BXA4	11/25/17	1129	1718541	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	0.00997	+/-0.012	0.049	0.020	+/-0.012	0.050	pCi/L			BXA4	11/25/17	1131	1718543	2
Plutonium-239/240	U	0.00	+/-0.00814	0.070	0.0305	+/-0.00814	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		0.291	+/-0.0307	0.142	0.0672	+/-0.034	1.00	pCi/L			BXA4	11/26/17	1118	1718546	3
Uranium-235/236	U	0.0353	+/-0.0141	0.0614	0.0259	+/-0.0142	1.00	pCi/L							
Uranium-238		0.157	+/-0.0223	0.0831	0.0377	+/-0.0236	0.500	pCi/L							
Rad Gamma Spec Analysis															
<i>Gammasespec "As Received"</i>															
Cesium-137	U	-1.44	+/-1.74	5.92	2.60	+/-1.77	8.00	pCi/L			BSW1	11/14/17	0618	1713592	4
Cobalt-60	U	-2.65	+/-2.12	6.67	2.79	+/-2.21	8.00	pCi/L							
Neptunium-237	U	4.81	+/-3.18	11.9	5.57	+/-3.37		pCi/L							
Potassium-40	U	28.9	+/-22.5	91.7	40.4	+/-23.5		pCi/L							
Sodium-22	U	0.0698	+/-1.73	6.87	2.91	+/-1.73		pCi/L							
Rad Gas Flow Proportional Counting															
<i>GFPC, Sr90, liquid "As Received"</i>															
Strontium-90	U	-0.117	+/-0.114	0.478	0.206	+/-0.114	0.500	pCi/L			KSD1	11/17/17	0756	1717217	5
<i>WSP-GrossA/B "As Received"</i>															
Beta	U	1.07	+/-0.857	2.88	1.31	+/-0.862	3.00	pCi/L			AXH4	11/13/17	0924	1717573	6
Alpha	U	1.08	+/-0.647	2.09	0.758	+/-0.654	3.00	pCi/L			AXH4	11/13/17	1514	1717573	7

The following Analytical Methods were performed

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

Surrogate/Tracer	Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Americium-243 Tracer		Alphaspec Am241 Liquid "As Received"	1718541	91.3	(50%-105%)
Plutonium-242 Tracer		ISOPU "As Received"	1718543	78	(50%-105%)
Uranium-232 Tracer		IsoU "As Received"	1718546	75.7	(50%-105%)
Strontium Carrier		GFPC, Sr90, liquid "As Received"	1717217	91.7	(50%-105%)

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Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-148008

Sample ID: 437322005

Project: ESHL00114

Client ID: ARSL004

Report Date: December 3, 2017

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

Notes:

The MDC is a sample specific MDC.

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

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Los Alamos National Laboratory
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Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Project: LANL- WQH Water Samples

Client Sample ID: CASA-18-147999

Sample ID: 437322008

Matrix: W

Collect Date: 06-NOV-17

Receive Date: 08-NOV-17

Collector: Client

Report Date: December 3, 2017

Project: ESHL00114

Client ID: ARSL004

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Analysis															
<i>Alphaspec Am241 Liquid "As Received"</i>															
Americium-241	U	0.0035	+/-0.00743	0.0311	0.0132	+/-0.00743	0.050	pCi/L			BXA4	11/25/17	1129	1718541	1
<i>ISOPU "As Received"</i>															
Plutonium-238	U	-0.00155	+/-0.010	0.030	0.0127	+/-0.010	0.050	pCi/L			BXA4	11/29/17	1544	1718543	2
Plutonium-239/240	U	-0.0135	+/-0.0122	0.0434	0.0194	+/-0.0122	0.050	pCi/L							
<i>IsoU "As Received"</i>															
Uranium-234		0.326	+/-0.0337	0.156	0.0737	+/-0.0376	1.00	pCi/L			BXA4	11/26/17	1118	1718546	3
Uranium-235/236	U	0.0464	+/-0.0155	0.0674	0.0285	+/-0.0157	1.00	pCi/L							
Uranium-238		0.172	+/-0.0241	0.0912	0.0414	+/-0.0256	0.500	pCi/L							
Rad Gamma Spec Analysis															
<i>Gammaspes "As Received"</i>															
Cesium-137	U	0.437	+/-1.06	3.73	1.64	+/-1.06	8.00	pCi/L			BSW1	11/14/17	0618	1713592	4
Cobalt-60	U	1.42	+/-0.997	4.57	1.94	+/-1.05	8.00	pCi/L							
Neptunium-237	U	7.97	+/-2.15	9.15	4.26	+/-2.85		pCi/L							
Potassium-40	U	-16.1	+/-14.1	52.6	22.9	+/-14.6		pCi/L							
Sodium-22	U	0.857	+/-1.19	4.75	2.04	+/-1.21		pCi/L							
Rad Gas Flow Proportional Counting															
<i>GFPC, Sr90, liquid "As Received"</i>															
Strontium-90	U	0.374	+/-0.150	0.470	0.210	+/-0.153	0.500	pCi/L			KSD1	11/17/17	1047	1717217	5
<i>WSP-GrossA/B "As Received"</i>															
Beta	U	1.19	+/-0.574	1.82	0.776	+/-0.583	3.00	pCi/L			AXH4	11/13/17	0924	1717573	6
Alpha	U	0.672	+/-0.647	2.34	0.886	+/-0.650	3.00	pCi/L			AXH4	11/13/17	1514	1717573	7

The following Analytical Methods were performed

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

Surrogate/Tracer	Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Americium-243 Tracer		Alphaspec Am241 Liquid "As Received"	1718541	95.9	(50%-105%)
Plutonium-242 Tracer		ISOPU "As Received"	1718543	47.8 *	(50%-105%)
Uranium-232 Tracer		IsoU "As Received"	1718546	65.9	(50%-105%)
Strontium Carrier		GFPC, Sr90, liquid "As Received"	1717217	93	(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-18-147999

Sample ID: 437322008

Report Date: December 3, 2017

Project: ESHL00114

Client ID: ARSL004

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

Notes:

The MDC is a sample specific MDC.

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

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

Quality Control Summary

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QC Summary

Report Date: December 3, 2017

Page 1 of 6

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

Los Alamos, New Mexico

Contact: Ms. Nita Patel

Workorder: 437322

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

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QC Summary

Workorder: 437322

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

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QC Summary

Workorder: 437322

Page 3 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	1718546										
**Uranium-232 Tracer		2.09		1.21	pCi/L		57.7	(50%-105%)			
		Uncert:		+/-0.0709							
		TPU:		+/-0.127							
Rad Gamma Spec											
Batch	1713592										
QC1203906423	436149002	DUP									
Cesium-137	U	2.44	U	-1.28	pCi/L	0.651		(0-1)	BSW1	11/14/17	06:19
	Uncert:	+/-1.27		+/-1.55							
	TPU:	+/-1.28		+/-1.57							
Cobalt-60	U	1.51	U	-2.02	pCi/L	0.627		(0-1)			
	Uncert:	+/-1.17		+/-1.52							
	TPU:	+/-1.22		+/-1.60							
Neptunium-237	U	2.10	U	-3.74	pCi/L	0.605		(0-1)			
	Uncert:	+/-2.08		+/-2.54							
	TPU:	+/-2.14		+/-2.69							
Potassium-40	U	3.77	U	-53.9	pCi/L	0.648		(0-1)			
	Uncert:	+/-20.6		+/-20.3							
	TPU:	+/-20.6		+/-23.9							
Sodium-22	U	-0.439	U	-2.32	pCi/L	0.298		(0-1)			
	Uncert:	+/-1.19		+/-1.88							
	TPU:	+/-1.19		+/-1.96							
QC1203906424	LCS										
Americium-241	34300			37300	pCi/L		109	(80%-120%)	BSW1	11/12/17	11:39
	Uncert:			+/-795							
	TPU:			+/-2210							
Cesium-137	13000			13700	pCi/L		105	(80%-120%)			
	Uncert:			+/-177							
	TPU:			+/-587							
Cobalt-60	11300			11300	pCi/L		100	(80%-120%)			
	Uncert:			+/-183							
	TPU:			+/-547							
Neptunium-237			U	-70.9	pCi/L						
	Uncert:			+/-56.2							
	TPU:			+/-58.6							
Potassium-40			U	-50.6	pCi/L						
	Uncert:			+/-124							
	TPU:			+/-124							
Sodium-22			U	30.2	pCi/L						
	Uncert:			+/-18.6							
	TPU:			+/-19.9							
QC1203906422	MB										
Cesium-137			U	-2.2	pCi/L				BSW1	11/14/17	06:18
	Uncert:			+/-1.21							
	TPU:			+/-1.31							
Cobalt-60			U	0.387	pCi/L						
	Uncert:			+/-1.16							

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QC Summary

Workorder: 437322

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	1713592										
Neptunium-237	TPU:			+/-1.16							
			U	0.751	pCi/L						
	Uncert:			+/-2.18							
Potassium-40	TPU:			+/-2.19							
			U	-18	pCi/L						
	Uncert:			+/-15.0							
Sodium-22	TPU:			+/-15.6							
			U	-0.202	pCi/L						
	Uncert:			+/-0.761							
	TPU:			+/-0.762							
Rad Gas Flow											
Batch	1717217										
QC1203915511	436615005	DUP									
Strontium-90	U	0.110	U	0.0423	pCi/L	0.262		(0-1)	KSD1	11/16/17	18:56
	Uncert:	+/-0.0726		+/-0.0553							
	TPU:	+/-0.0731		+/-0.0554							
**Strontium Carrier	7.85	6.30		7.50	mg		95.5	(50%-105%)			
QC1203915513	LCS										
Strontium-90	23.7			22.5	pCi/L		95.1	(80%-120%)	KSD1	11/16/17	18:56
	Uncert:			+/-0.646							
	TPU:			+/-1.93							
**Strontium Carrier	7.85			7.90	mg		101	(50%-105%)			
QC1203915510	MB										
Strontium-90			U	-0.689	pCi/L				KSD1	11/16/17	18:56
	Uncert:			+/-0.0522							
	TPU:			+/-0.0522							
**Strontium Carrier	7.85			6.70	mg		85.4	(50%-105%)			
QC1203915512	436615005	MS									
Strontium-90	237	U	0.110	210	pCi/L		88.4	(75%-125%)	KSD1	11/16/17	18:56
	Uncert:		+/-0.0726	+/-6.05							
	TPU:		+/-0.0731	+/-17.9							
**Strontium Carrier	7.85	6.30		7.50	mg		95.5	(50%-105%)			
Batch	1717573										
QC1203916324	437322008	DUP									
Alpha	U	0.672	U	1.28	pCi/L	0.217		(0-1)	AXH4	11/13/17	15:14
	Uncert:	+/-0.647		+/-0.747							
	TPU:	+/-0.650		+/-0.755							
Beta	U	1.19	U	0.536	pCi/L	0.287		(0-1)		11/13/17	09:24
	Uncert:		+/-0.574	+/-0.559							
	TPU:		+/-0.583	+/-0.561							
QC1203916327	LCS										
Alpha	12.1			13.0	pCi/L		108	(80%-120%)	AXH4	11/14/17	07:20
	Uncert:			+/-0.612							
	TPU:			+/-1.25							
Beta	47.4			48.6	pCi/L		102	(80%-120%)		11/13/17	09:24

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QC Summary

Workorder: 437322

Page 5 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time	
Rad Gas Flow												
Batch	1717573											
				Uncert:								
				TPU:								
QC1203916323	MB											
Alpha			U	-0.0182	pCi/L				AXH4	11/13/17	15:14	
				Uncert:								
				TPU:								
Beta			U	0.0156	pCi/L					11/13/17	09:24	
				Uncert:								
				TPU:								
QC1203916325	437322008	MS										
Alpha		483	U	0.672	455	pCi/L		94.1	(75%-125%)	AXH4	11/13/17	16:24
				Uncert:	+/-0.647							
				TPU:	+/-0.650							
Beta		1900	U	1.19	1940	pCi/L		102	(75%-125%)		11/13/17	09:24
				Uncert:	+/-0.574							
				TPU:	+/-0.583							
QC1203916326	437322008	MSD										
Alpha		483	U	0.672	579	pCi/L	0.599	120	(0-1)	AXH4	11/13/17	16:24
				Uncert:	+/-0.647							
				TPU:	+/-0.650							
Beta		1900	U	1.19	1970	pCi/L	0.0494	104	(0-1)		11/13/17	09:24
				Uncert:	+/-0.574							
				TPU:	+/-0.583							

Notes:

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

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M M if above MDC and less than LLD
- M REMF Result > MDC/CL and < RDL
- N/A RPD or %Recovery limits do not apply.
- N1 See case narrative
- ND Analyte concentration is not detected above the detection limit
- NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Q One or more quality control criteria have not been met. Refer to the applicable narrative or DER.

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QC Summary

Workorder: 437322

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

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

** Indicates analyte is a surrogate/tracer compound.

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

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

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