

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: 11620

EVENT NAME: LA/Pueblo Cr December Monthly
MY2018 Q1

SAMPLE ID: CAMO-18-150342

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	12/18/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1141		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-45 S1		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:	↓	↓	SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:			EXCAVATED:		YES / <u>NO</u> / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NA
↓	WSP- GENINORG+PerChlorat e	1 LITER POLY	1	ICE	↓	↓
↓	WSP- NH3+NO3/NO2+PO4	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

COLLECTED BY (PRINT): K. Tol

RELINQUISHED BY (Printed Name) Allibyn Stanfield (Signature) <i>[Signature]</i>	Date/Time 12/18/17 1435	RECEIVED BY (Printed Name) Renee Onstott (Signature) <i>[Signature]</i>	Date/Time 12/18/17 1435
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11620

EVENT NAME: LA/Pueblo Cr December Monthly
MY2018 Q1

SAMPLE ID: CAMO-18-150343

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	12/18/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1331		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-45 S2		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:	↓		SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / <input checked="" type="radio"/> NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NA
↓	WSP- GENINORG+PerChlorat	1 LITER POLY	1	ICE	↓	↓
↓	WSP- NH3+NO3/NO2+PO4	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Sample Time	_____	HH:MM	Discharge Rate	12/18/17	Dissolved Oxygen	_____
Groundwater Elevation	_____		Oxidation-Reduction Potential	_____	Period Purge Volume	_____
pH	_____		Purge Volume	_____	Specific Conductance	_____
Temperature	_____		Total Volume Pumped	_____	Turbidity	_____

COLLECTED BY (PRINT): K. TOW

RELINQUISHED BY (Printed Name) Allison Stanfield (Signature) <i>[Signature]</i>	Date/Time 12/18/17 1435	RECEIVED BY (Printed Name) Rancee Onstott (Signature) <i>[Signature]</i>	Date/Time 12/18/17 1435
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11620

EVENT NAME: LA/Pueblo Cr December Monthly
MY2018 Q1

SAMPLE ID: CAMO-18-150350

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	12/18/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1141		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-45 S1		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / <u>NO</u> / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
	MSGP-Hg	500 ML POLY	1	HNO3		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS: Sampled 40 ft from running diesel generator

LOCATION COMMENTS: None

FIELD PARAMETERS:

Sample Time	1141	HH:MM	Discharge Rate	3.57	Dissolved Oxygen	7.14
Groundwater Elevation	5831.43		Oxidation-Reduction Potential	211.2	Period Purge Volume	17.85
pH	7.83		Purge Volume	153.51	Specific Conductance	192.6
Temperature	20.0		Total Volume Pumped	221.34	Turbidity	0.25

COLLECTED BY (PRINT): K. TOW

RELINQUISHED BY (Printed Name) Allizyn Stanfield (Signature)	Date/Time 12/18/17 1435	RECEIVED BY (Printed Name) Rancee Onstoft (Signature)	Date/Time 12/18/17 1435
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11620

EVENT NAME: LA/Pueblo Cr December Monthly
MY2018 Q1

SAMPLE ID: CAMO-18-150351

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	12/18/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1331		MEDIA:	OK	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-45 S2		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:	↓	↓	SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:		✓	EXCAVATED:		YES / <u>NO</u> / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	500 ML POLY	1	HNO3	Y	NA
↓	WSP-CN(T)	250 ML POLY	1	NAOH	↓	↓
↓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS: Sampled 40 ft. from running diesel generator

LOCATION COMMENTS: None

FIELD PARAMETERS:

Sample Time	1331	HH:MM	Discharge Rate	3.61	Dissolved Oxygen	6.24
Groundwater Elevation	5830.84		Oxidation-Reduction Potential	231.0	Period Purge Volume	18.05
pH	8.10		Purge Volume	277.97	Specific Conductance	174.4
Temperature	21.0		Total Volume Pumped	346.56	Turbidity	0.20

COLLECTED BY (PRINT): K. Tow

RELINQUISHED BY (Printed Name) Allizyn Starfield (Signature) <i>Allizyn Starfield</i>	Date/Time 12/18/17 1435	RECEIVED BY (Printed Name) Rance Onstott (Signature) <i>Rance Onstott</i>	Date/Time 12/18/17 1435
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Sampling Plan ID/Name: 11620 CR-45 S1, R-45 S2COC: 2018-1306

TEST - Explosives		YES	NO
Samples collected from a WFO area? (TAs -08, 09, 11, 14, 15, 16, 22, 36, 37, 39, 40, and 49)			<input checked="" type="checkbox"/>
Field Test for Explosives Results		YES	NO
HE SPOT test result positive. If YES - Do not transport.			<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	AND Alpha $\geq 160,000$	AT TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, TA-48, or TA-49		<input checked="" type="checkbox"/>
Alpha ≥ 125	AND Alpha $\geq 1,250,000$	AT other locations		
Beta $\geq 1,500$	AND Beta $\geq 15,000,000$	AT any location		
The sample Alpha $\geq 16,000,000$ dpm*g/100cm ² or Beta $\geq 160,000,000$ 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
• Am-241 ≥ 27 pCi/g	AND	Am-241 $\geq 270,000$ pCi Total		<input checked="" type="checkbox"/>
• Cs-137 ≥ 270 pCi/g	AND	Cs-137 $\geq 270,000$ pCi Total		
• Pu-238 ≥ 27 pCi/g	AND	Pu-238 $\geq 270,000$ pCi Total		
• Pu-239/240 ≥ 27 pCi/g	AND	Pu-239/240 $\geq 270,000$ pCi Total		
• Th-228 ≥ 27 pCi/g	AND	Th-228 $\geq 270,000$ pCi Total		
• U-234 ≥ 270 pCi/g	AND	U-234 $\geq 1,600,000,000$ pCi Total		
• U-238 ≥ 270 pCi/g	AND	U-238 \geq unlimited		
• H-3 $\geq 27,000,000$ pCi/g	AND	H-3 $\geq 27,000,000,000$ pCi Total		
Am-241, Pu-238, Pu-239/240, or Th-228 $\geq 27,000,000$ pCi; or Cs-137 $\geq 270,000,000$ pCi or U-234 $\geq 160,000,000$ pCi; or H-3 ≥ 1 Ci. 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 prior analytical measurements of radioactive isotopes.				

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

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

Hazard Assessment Completed By:	Date/Time
(Printed Name) <u>Allbyn Stanfield</u>	<u>12/18/17</u>
(Signature) <u>[Signature]</u>	<u>1440</u>

Hazard Assessment Reviewed By:	Date/Time
(Printed Name) <u>Ranee Orloff</u>	<u>12/18/17</u>
(Signature) <u>[Signature]</u>	<u>1440</u>

DATA VALIDATION REPORT

Chain Of Custody No. 2018-1306

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
440357	EPA:120.1	2				
440357	EPA:150.1	2				
440357	EPA:160.1	2				
440357	EPA:170.0	4				
440357	EPA:245.2	4				
440357	EPA:300.0	2				
440357	EPA:310.1	2				
440357	EPA:335.4	2				
440357	EPA:350.1	2				
440357	EPA:351.2	2				
440357	EPA:353.2	2				
440357	EPA:365.4	2				
440357	SM:A2340B	2				
440357	SW-846:6010C	2				
440357	SW-846:6020	2				
440357	SW-846:6850	2				
440357	SW-846:9060	2				

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
440357	EPA:120.1	1728640	1728640	2										1			1				
440357	EPA:150.1	1728155	1728155	2										1			1				
440357	EPA:160.1	1727703	1727703	2					1					1			1				
440357	EPA:170.0	NA	NA	4																	
440357	EPA:245.2	1729964	1729963	4					1	1				1			1				
440357	EPA:300.0	1730862	1730862	2					1					1			1				
440357	EPA:310.1	1728150	1728150	2						1				1			1				

DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
440357	EPA:335.4	1727921	1727920	2					1	1				1				1			
440357	EPA:350.1	1728296	1728295	2					1	1				1				1			
440357	EPA:351.2	1727945	1727944	2					1	1				1				1			
440357	EPA:353.2	1727946	1727946	2					1					1				1			
440357	EPA:365.4	1727943	1727942	2					1	1				1				1			
440357	SM:A2340B	1732057	1732057	2																	
440357	SW-846:6010C	1727839	1727838	2					1	1				1				1			
440357	SW-846:6020	1727826	1727825	2					1	1				1				1			
440357	SW-846:6850	1728468	1728467	2					1	1	1			1							
440357	SW-846:9060	1728631	1728631	2					1					1				1			

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CAMO-18-150342	440357001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAMO-18-150343	440357003	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAWA-18-150366	1203944649	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203944648	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-150342	440357001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-18-150343	440357003	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203943441	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	WST-SWPF-18-150779	1203943443	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-18-150340	1203942600	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-18-150342	440357001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-18-150343	440357003	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203942225	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203942224	MB	1	0	0	0
EPA:170.0	VOC	CAMO-18-150342	440357001	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-150343	440357003	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-150350	440357002	REG	1	0	0	0
EPA:170.0	VOC	CAMO-18-150351	440357004	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-150340	1203948091	DUP	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:245.2	INORGANIC	CAMO-18-150340	1203948092	MS	0	0	1	0
EPA:245.2	INORGANIC	CAMO-18-150342	440357001	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-150343	440357003	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-150350	440357002	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-18-150351	440357004	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203948090	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203948089	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-18-150340	1203950387	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-18-150342	440357001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-18-150343	440357003	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203950386	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203950385	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-150342	440357001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-18-150343	440357003	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203943429	LCS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	WST-SWPF-18-150779	1203943431	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	WST-SWPF-18-150779	1203943433	MS	0	0	1	0
EPA:335.4	INORGANIC	CAMO-18-150348	1203942747	DUP	1	0	0	0
EPA:335.4	INORGANIC	CAMO-18-150348	1203942749	MS	0	0	1	0
EPA:335.4	INORGANIC	CAMO-18-150350	440357002	REG	1	0	0	0
EPA:335.4	INORGANIC	CAMO-18-150351	440357004	REG	1	0	0	0
EPA:335.4	INORGANIC	LCS	1203942746	LCS	0	0	1	0
EPA:335.4	INORGANIC	MB	1203942745	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-18-150340	1203943810	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-18-150340	1203943812	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-18-150342	440357001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-18-150343	440357003	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203943809	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203943808	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-18-150348	1203942805	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-18-150348	1203942806	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-18-150350	440357002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-18-150351	440357004	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203942804	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203942803	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-18-150342	440357001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-18-150343	440357003	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203942808	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203942807	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	WST-SWPF-18-150779	1203942809	DUP	1	0	0	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:365.4	GENERAL CHEMISTRY	CAMO-18-150340	1203942801	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-18-150340	1203942802	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-18-150342	440357001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-18-150343	440357003	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203942800	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203942799	MB	1	0	0	0
SM:A2340B	INORGANIC	CAMO-18-150342	440357001	REG	1	0	0	0
SM:A2340B	INORGANIC	CAMO-18-150343	440357003	REG	1	0	0	0
SW-846:6010C	INORGANIC	CAMO-18-150340	1203942543	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-18-150340	1203942544	MS	0	0	17	0
SW-846:6010C	INORGANIC	CAMO-18-150342	440357001	REG	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-18-150343	440357003	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203942542	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203942541	MB	17	0	0	0
SW-846:6020	INORGANIC	CAMO-18-150340	1203942511	DUP	11	0	0	0
SW-846:6020	INORGANIC	CAMO-18-150340	1203942512	MS	0	0	11	0
SW-846:6020	INORGANIC	CAMO-18-150342	440357001	REG	11	0	0	0
SW-846:6020	INORGANIC	CAMO-18-150343	440357003	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203942510	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203942509	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-150340	1203944210	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-150340	1203944211	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-150342	440357001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-18-150343	440357003	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203944209	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203944208	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-18-150350	440357002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-18-150351	440357004	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-18-150354	1203944846	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203944624	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203944623	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

DATA VALIDATION REPORT

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	1203942541	METHOD BLANK	SW-846:6010C	W	Potassium	-55.4	J	ug/L	150
MB	1203943808	METHOD BLANK	EPA:350.1	W	Ammonia as Nitrogen	0.0237	J	mg/L	0.050
MB	1203950385	METHOD BLANK	EPA:300.0	W	Chloride	0.137	J	mg/L	0.200

Field Sample ID	Blank Lab	Blank Type	Analytical Method	Parameter Name	Blank Lab Result	Blank Lab Units	Lab Result	Lab Qualifier	Lab Detection Limit	Detect Flag	Detect to Nondetect Factor	Detect to Estimated Factor	Use Factors
CAMO-18-150342	1203950385	METHOD BLANK	EPA:300.0	Chloride	0.137	mg/L	6.70		0.200	Y	5	100	Y
CAMO-18-150343	1203950385	METHOD BLANK	EPA:300.0	Chloride	0.137	mg/L	4.79		0.200	Y	5	100	Y
CAMO-18-150342	1203943808	METHOD BLANK	EPA:350.1	Ammonia as Nitrogen	0.0237	mg/L	0.0682		0.050	Y	5	100	Y
CAMO-18-150342	1203942541	METHOD BLANK	SW-846:6010C	Potassium	-55.4	ug/L	1120		150	Y			
CAMO-18-150343	1203942541	METHOD BLANK	SW-846:6010C	Potassium	-55.4	ug/L	1160		150	Y			

6. Any surrogate recoveries outside the control limits?

No.

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

DATA VALIDATION REPORT

Field Sample ID	MS Lab Sample ID	MSD Lab Sample ID	Analytical Method	Parameter Name	Analysis Lot ID	Analysis Date	Sample Matrix	MS Spike Recovery	MSD Spike Recovery	MS Upper Limit	MS Lower Limit	MS Reject Limit	RPD	RPD Limit
CAMO-18-150348	1203942806		EPA:351.2	Total Kjeldahl Nitrogen	1727944	12-26-2017	W	114		110	90	10		

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

No.

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

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-45 S1	2018-1306	CAMO-18-150342	REG	INIT	GENERAL CHEMISTRY	EPA:350.1	Ammonia as Nitrogen		U	I4	N	0.0682	mg/L	0.0682	mg/L			W	12/18/2017		1728296	VAL	Y
R-45 S1	2018-1306	CAMO-18-150342	REG	INIT	GENERAL CHEMISTRY	EPA:300.0	Chloride		J+	I4a	Y	6.70	mg/L	6.70	mg/L			W	12/18/2017		1730862	VAL	Y
R-45 S2	2018-1306	CAMO-18-150343	REG	INIT	GENERAL CHEMISTRY	EPA:300.0	Chloride		J+	I4a	Y	4.79	mg/L	4.79	mg/L			W	12/18/2017		1730862	VAL	Y

DATA VALIDATION REPORT

Reason Code

Description

I4	the sample result is =<5x the concentration of related analyte in the method blank.
I4a	The affected analytes are considered estimated and biased high because this analyte was identified in the method blank but was >5x
J_LAB	The analytical laboratory qualified the detected result as estimated (J) because the result was less the PQL but greater than the MDL
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.
U_LAB	The analytical laboratory qualified the analyte as not detected.

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-18-150342	R-45 S1	REG	EPA:120.1	0	1
CAMO-18-150342	R-45 S1	REG	EPA:150.1	0	1
CAMO-18-150342	R-45 S1	REG	EPA:160.1	0	1
CAMO-18-150342	R-45 S1	REG	EPA:170.0	0	1
CAMO-18-150342	R-45 S1	REG	EPA:245.2	0	1
CAMO-18-150342	R-45 S1	REG	EPA:300.0	0	4
CAMO-18-150342	R-45 S1	REG	EPA:310.1	0	2
CAMO-18-150342	R-45 S1	REG	EPA:350.1	0	1
CAMO-18-150342	R-45 S1	REG	EPA:353.2	0	1
CAMO-18-150342	R-45 S1	REG	EPA:365.4	0	1
CAMO-18-150342	R-45 S1	REG	SM:A2340B	0	1
CAMO-18-150342	R-45 S1	REG	SW-846:6010C	0	17
CAMO-18-150342	R-45 S1	REG	SW-846:6020	0	11
CAMO-18-150342	R-45 S1	REG	SW-846:6850	0	1
CAMO-18-150343	R-45 S2	REG	EPA:120.1	0	1
CAMO-18-150343	R-45 S2	REG	EPA:150.1	0	1
CAMO-18-150343	R-45 S2	REG	EPA:160.1	0	1
CAMO-18-150343	R-45 S2	REG	EPA:170.0	0	1
CAMO-18-150343	R-45 S2	REG	EPA:245.2	0	1
CAMO-18-150343	R-45 S2	REG	EPA:300.0	0	4
CAMO-18-150343	R-45 S2	REG	EPA:310.1	0	2
CAMO-18-150343	R-45 S2	REG	EPA:350.1	0	1
CAMO-18-150343	R-45 S2	REG	EPA:353.2	0	1
CAMO-18-150343	R-45 S2	REG	EPA:365.4	0	1
CAMO-18-150343	R-45 S2	REG	SM:A2340B	0	1

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-18-150343	R-45 S2	REG	SW-846:6010C	0	17
CAMO-18-150343	R-45 S2	REG	SW-846:6020	0	11
CAMO-18-150343	R-45 S2	REG	SW-846:6850	0	1
CAMO-18-150350	R-45 S1	REG	EPA:170.0	0	1
CAMO-18-150350	R-45 S1	REG	EPA:245.2	0	1
CAMO-18-150350	R-45 S1	REG	EPA:335.4	0	1
CAMO-18-150350	R-45 S1	REG	EPA:351.2	0	1
CAMO-18-150350	R-45 S1	REG	SW-846:9060	0	1
CAMO-18-150351	R-45 S2	REG	EPA:170.0	0	1
CAMO-18-150351	R-45 S2	REG	EPA:245.2	0	1
CAMO-18-150351	R-45 S2	REG	EPA:335.4	0	1
CAMO-18-150351	R-45 S2	REG	EPA:351.2	0	1
CAMO-18-150351	R-45 S2	REG	SW-846:9060	0	1

January 16, 2018

gel.com

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

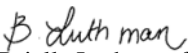
Re: LANL- WQH Water Samples
Work Order: 440357
SDG: 2018-1306

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on December 20, 2017, and analyzed for General Chemistry, Metals and Perchlorates by LCMSMS. 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,


Brielle Luthman for
Valerie Davis
Project Manager

Chain of Custody: 2018-1306
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 440357
SDG: 2018-1306

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 440357
SDG # : 2018-1306**

January 16, 2018

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 December 20, 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>
440357001	CAMO-18-150342
440357002	CAMO-18-150350
440357003	CAMO-18-150343
440357004	CAMO-18-150351

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: General Chemistry, Metals and Perchlorates by LCMSMS.

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.

B. Luthman
Brielle Luthman for
Valerie Davis
Project Manager

List of current GEL Certifications as of 16 January 2018

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-25
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Chain of Custody and Supporting Documentation

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ESHL</u>		SDG/AR/COC/Work Order: <u>440357</u>	
Received By: <u>GA</u>		Date Received: <u>12/20/17</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 3551-2°</u> <u>5908 1783 3540-4°</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> CPM / 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 type="checkbox"/> None <input type="checkbox"/> Other: _____ *all temperatures are recorded in Celsius TEMP: <u>see above</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>743-26</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)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, Are Encores or Soil Kits present? Yes _____ No _____ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes _____ No _____ N/A _____ (If unknown, select No) VOA vials free of headspace? Yes _____ No _____ N/A _____ Sample ID's and containers affected: _____
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: _____
12 Are sample containers identifiable as GEL provided?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials BL Date 12/21/17 Page 1 of 1

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

SHIP DATE: 19DEC17
ACTWGT: 21.0 LB MAN
CAD: 0014176/CAFE2916

LOS ALAMOS, NM 87545
UNITED STATES US

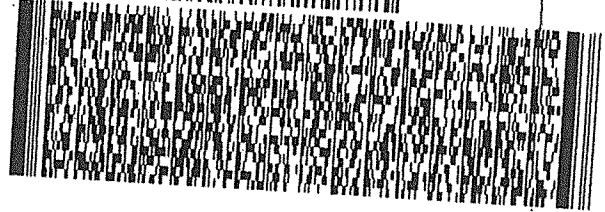
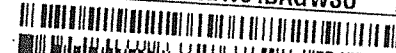
BILL SENDER

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

CHARLESTON SC 29407

(843) 666-8171

REF: 21PD0ASRGW04BAGWS0



2 of 2

MPS# 5908 1783 3551

Mstr# 5908 1783 3540

WED - 20 DEC 10:30A
PRIORITY OVERNIGHT

0201

X7 RBWA

29407

SC-US CHS



Part # 156148V-430 RIT2 08/15 32

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

SHIP DATE: 19DEC17
ACTWGT: 51.0 LB MAN
CAD: 0014176/CAFE2916

LOS ALAMOS, NM 87545
UNITED STATES US

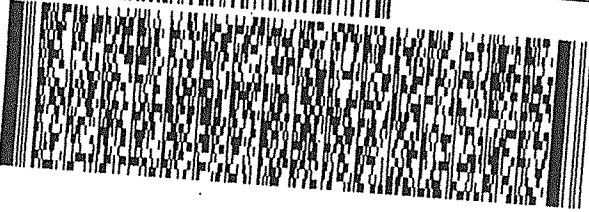
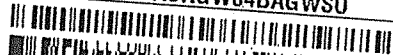
BILL SENDER

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

CHARLESTON SC 29407

(843) 666-8171

REF: 21PD0ASRGW04BAGWS0



1 of 2

TRK# 5908 1783 3540

MASTER

X7 RBWA

WED - 20 DEC 10:30A
PRIORITY OVERNIGHT

29407

SC-US CHS



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.

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2018-1306
Work Order #: 440357**

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: 1728468

Prep Batch Number: 1728467

Sample Analysis

Sample ID	Client ID
440357001	440357001 (CAMO-18-150342)
440357003	440357003 (CAMO-18-150343)
1203944212	Interference Check Sample (ICS)
1203944208	Method Blank (MB)
1203944209	Laboratory Control Sample (LCS)
1203944210	440356001(CAMO-18-150340) Matrix Spike (MS)
1203944211	440356001(CAMO-18-150340) 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 440356001 (CAMO-18-150340) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

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

Internal Standard Area Acceptance

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

Retention Time

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

Technical Information

Holding Time Specifications

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

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Manual Integrations

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

Method Comments

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

Additional Comments

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

Perchlorate Isotope Ratio

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

System Configuration

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

Electronic Packaging Comment

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

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

Chromatographic Columns

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

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

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2018-1306 GEL Work Order: 440357

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: 27 DEC 2017

Title: Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1728467Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-150342Date Received: 20-DEC-17GEL Job No (SDG): 2018-1306GEL Sample ID: 440357001Date Filtered: 22-DEC-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	0.642	ug/L		1	26-DEC-17 15:24	per1226022a
	Perchlorate Isotope Ratio			3.04			1	26-DEC-17 15:24	per1226022a
14797-73-0	Perchlorate-101	.05	.2	0.626	ug/L		1	26-DEC-17 15:24	per1226022a
	Perchlorate-O(18)			0.576	ug/L		1	26-DEC-17 15:24	per1226022a

^ 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: 1728467Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-150343Date Received: 20-DEC-17GEL Job No (SDG): 2018-1306GEL Sample ID: 440357003Date Filtered: 22-DEC-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	0.420	ug/L		1	26-DEC-17 16:00	per1226026a
	Perchlorate Isotope Ratio			2.92			1	26-DEC-17 16:00	per1226026a
14797-73-0	Perchlorate-101	.05	.2	0.425	ug/L		1	26-DEC-17 16:00	per1226026a
	Perchlorate-O(18)			0.561	ug/L		1	26-DEC-17 16:00	per1226026a

^ 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): 2018-1306

Extract Batch Code: 1728467

Date Filtered: 22-DEC-17

Matrix: WATER

Sample ID: 1203944209

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.193	ug/L	97		85 - 115
Perchlorate Isotope Ratio		3.12				-
Perchlorate-101	0.200	.183	ug/L	92		85 - 115
Perchlorate-O(18)		.46	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): 2018-1306

Extract Batch Code: 1728467

Date Extracted: 22-DEC-17

GEL MS/PS ID: 1203944210

Client ID: CAMO-18-150340

GEL MSD/PSD ID: 1203944211

QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	0.450	ug/L	0.640	95	.664	107	4	30	75 - 125
Perchlorate Isotope Ratio	0	2.98		3.16		3.12		2		-
Perchlorate-101	0.200	0.447	ug/L	0.599	76	.631	92	5	30	75 - 125
Perchlorate-O(18)	0	0.498	ug/L	0.523		.519		1		-

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

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: EPA 6850 ModifiedMatrix: WATERExtraction Batch ID: 1728467Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 22-DEC-17GEL Job No (SDG): 2018-1306GEL Sample ID: 1203944208Date Filtered: 22-DEC-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.050	ug/L	U	1	26-DEC-17 14:03	per1226013a
	Perchlorate Isotope Ratio						1	26-DEC-17 14:03	per1226013a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	26-DEC-17 14:03	per1226013a
	Perchlorate-O(18)			0.446	ug/L		1	26-DEC-17 14:03	per1226013a

^ 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: 1728467Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 22-DEC-17GEL Job No (SDG): 2018-1306GEL Sample ID: 1203944209Date Filtered: 22-DEC-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.193	ug/L	J	1	26-DEC-17 14:12	per1226014a
	Perchlorate Isotope Ratio			3.12			1	26-DEC-17 14:12	per1226014a
14797-73-0	Perchlorate-101	.05	.2	0.183	ug/L	J	1	26-DEC-17 14:12	per1226014a
	Perchlorate-O(18)			0.460	ug/L		1	26-DEC-17 14:12	per1226014a

^ 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: 1728467Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2018-1306GEL Sample ID: 1203944212Date Filtered: 22-DEC-17Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.234	ug/L		1	26-DEC-17 14:21	per1226015a
	Perchlorate Isotope Ratio			2.93			1	26-DEC-17 14:21	per1226015a
14797-73-0	Perchlorate-101	.05	.2	0.236	ug/L		1	26-DEC-17 14:21	per1226015a
	Perchlorate-O(18)			0.446	ug/L		1	26-DEC-17 14:21	per1226015a

^ 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: 1728467Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-150340MSDate Received: 20-DEC-17GEL Job No (SDG): 2018-1306GEL Sample ID: 1203944210Date Filtered: 22-DEC-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	0.640	ug/L		1	26-DEC-17 14:57	per1226019a
	Perchlorate Isotope Ratio			3.16			1	26-DEC-17 14:57	per1226019a
14797-73-0	Perchlorate-101	.05	.2	0.599	ug/L		1	26-DEC-17 14:57	per1226019a
	Perchlorate-O(18)			0.523	ug/L		1	26-DEC-17 14:57	per1226019a

^ 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: 1728467Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-18-150340MSDDate Received: 20-DEC-17GEL Job No (SDG): 2018-1306GEL Sample ID: 1203944211Date Filtered: 22-DEC-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	0.664	ug/L		1	26-DEC-17 15:06	per1226020a
	Perchlorate Isotope Ratio			3.12			1	26-DEC-17 15:06	per1226020a
14797-73-0	Perchlorate-101	.05	.2	0.631	ug/L		1	26-DEC-17 15:06	per1226020a
	Perchlorate-O(18)			0.519	ug/L		1	26-DEC-17 15:06	per1226020a

^ 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 #: 2018-1306
Work Order #: 440357

Sample ID	Client ID
440357001	CAMO-18-150342
440357002	CAMO-18-150350
440357003	CAMO-18-150343
440357004	CAMO-18-150351
1203942541	Method Blank (MB) ICP
1203942542	Laboratory Control Sample (LCS)
1203942545	440356001(CAMO-18-150340L) Serial Dilution (SD)
1203942543	440356001(CAMO-18-150340D) Sample Duplicate (DUP)
1203942544	440356001(CAMO-18-150340S) Matrix Spike (MS)
1203942509	Method Blank (MB) ICP-MS
1203942510	Laboratory Control Sample (LCS)
1203942513	440356001(CAMO-18-150340L) Serial Dilution (SD)
1203942511	440356001(CAMO-18-150340D) Sample Duplicate (DUP)
1203942512	440356001(CAMO-18-150340S) Matrix Spike (MS)
1203948089	Method Blank (MB) CVAA
1203948090	Laboratory Control Sample (LCS)
1203948093	440356001(CAMO-18-150340L) Serial Dilution (SD)
1203948091	440356001(CAMO-18-150340D) Sample Duplicate (DUP)
1203948092	440356001(CAMO-18-150340S) Matrix Spike (MS)

Sample Analysis

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

Method/Analysis Information

Analytical Batch:	1727839, 1727826 and 1729964
Prep Batch :	1727838, 1727825 and 1729963
Standard Operating Procedures:	GL-MA-E-013 REV# 30, GL-MA-E-006 REV# 14, GL-MA-E-014 REV# 32 and GL-MA-E-010 REV# 36
Analytical Method:	SW846 3005A/6010C, SW846 3005A/6020A and EPA 245.2 1974
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 Metals analysis-ICP was performed on a PE 7300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard.

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

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

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of potassium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 440357001 (CAMO-18-150342) and 440357003 (CAMO-18-150343)-ICP.

ICSA/ICSAB Statement

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

Continuing Calibration Blanks (CCB) Requirements

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 440356001 (CAMO-18-150340)-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

Additional comments were not required for this SDG.

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: 2018-1306 GEL Work Order: 440357

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature:



Name: Nik-Cole Elmore

Date: 16 JAN 2018

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-1306**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 440357001**BASIS:** As Received**DATE COLLECTED** 18-DEC-17**CLIENT ID:** CAMO-18-150342**LEVEL:** Low**DATE RECEIVED** 20-DEC-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	01/09/18 11:23	010918W1-6	1729964

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-1306

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 440357001

BASIS: As Received

DATE COLLECTED 18-DEC-17

CLIENT ID: CAMO-18-150342

LEVEL: Low

DATE RECEIVED 20-DEC-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	01/16/18 06:43	011618-1	1727839
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	01/12/18 09:28	180111-5	1727826
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	01/11/18 18:56	180111-2	1727826
7440-39-3	Barium	29.5	ug/L		1	5	5	1	P	HSC	01/16/18 06:43	011618-1	1727839
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	01/16/18 06:43	011618-1	1727839
7440-42-8	Boron	15.8	ug/L	J	15	50	50	1	P	HSC	01/16/18 06:43	011618-1	1727839
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	01/11/18 18:56	180111-2	1727826
7440-70-2	Calcium	19200	ug/L		50	200	200	1	P	HSC	01/16/18 06:43	011618-1	1727839
7440-47-3	Chromium	50.7	ug/L		3	10	10	1	MS	BAJ	01/11/18 18:56	180111-2	1727826
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	01/16/18 06:43	011618-1	1727839
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	01/16/18 06:43	011618-1	1727839
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	01/16/18 06:43	011618-1	1727839
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	01/11/18 18:56	180111-2	1727826
7439-95-4	Magnesium	5280	ug/L		110	300	300	1	P	HSC	01/16/18 06:43	011618-1	1727839
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	01/16/18 06:43	011618-1	1727839
7439-98-7	Molybdenum	0.790	ug/L		0.2	0.5	0.5	1	MS	BAJ	01/11/18 18:56	180111-2	1727826
7440-02-0	Nickel	0.839	ug/L	J	0.6	2	2	1	MS	BAJ	01/11/18 18:56	180111-2	1727826
7440-09-7	Potassium	1120	ug/L		50	150	150	1	P	HSC	01/16/18 06:43	011618-1	1727839
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	01/11/18 18:56	180111-2	1727826
7631-86-9	Silica	67600	ug/L		53	213	213	1	P	HSC	01/16/18 06:43	011618-1	1727839
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	01/11/18 18:56	180111-2	1727826
7440-23-5	Sodium	10600	ug/L		100	300	300	1	P	HSC	01/16/18 06:43	011618-1	1727839
7440-24-6	Strontium	81.9	ug/L		1	5	5	1	P	HSC	01/16/18 06:43	011618-1	1727839
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	01/11/18 18:56	180111-2	1727826
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	HSC	01/16/18 06:43	011618-1	1727839
7440-61-1	Uranium	0.685	ug/L		0.067	0.2	0.2	1	MS	BAJ	01/11/18 18:56	180111-2	1727826
7440-62-2	Vanadium	5.66	ug/L		1	5	5	1	P	HSC	01/16/18 06:43	011618-1	1727839
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	01/16/18 06:43	011618-1	1727839

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-1306**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 440357001**BASIS:** As Received**DATE COLLECTED** 18-DEC-17**CLIENT ID:** CAMO-18-150342**LEVEL:** Low**DATE RECEIVED** 20-DEC-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	69.7	mg/L		0.453	1.24	1.24	1		NOR1	01/16/18 10:06		1732057

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1727826	1727825	SW846 3005A	50	mL	50	mL	12/20/17	JXM8
1727839	1727838	SW846 3005A	50	mL	50	mL	12/20/17	JXM8
1729964	1729963	EPA 245.1/245.2 Prep	20	mL	20	mL	01/08/18	AXS5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-1306**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 440357002**BASIS:** As Received**DATE COLLECTED** 18-DEC-17**CLIENT ID:** CAMO-18-150350**LEVEL:** Low**DATE RECEIVED** 20-DEC-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	01/09/18 11:25	010918W1-6	1729964

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1729964	1729963	EPA 245.1/245.2 Prep	20	mL	20	mL	01/08/18	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-1306**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 440357003**BASIS:** As Received**DATE COLLECTED** 18-DEC-17**CLIENT ID:** CAMO-18-150343**LEVEL:** Low**DATE RECEIVED** 20-DEC-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	01/09/18 11:26	010918W1-6	1729964

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-1306

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 440357003

BASIS: As Received

DATE COLLECTED 18-DEC-17

CLIENT ID: CAMO-18-150343

LEVEL: Low

DATE RECEIVED 20-DEC-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	01/16/18 06:46	011618-1	1727839
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	01/12/18 09:29	180111-5	1727826
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	01/11/18 19:00	180111-2	1727826
7440-39-3	Barium	27.9	ug/L		1	5	5	1	P	HSC	01/16/18 06:46	011618-1	1727839
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	HSC	01/16/18 06:46	011618-1	1727839
7440-42-8	Boron	16.1	ug/L	J	15	50	50	1	P	HSC	01/16/18 06:46	011618-1	1727839
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	01/11/18 19:00	180111-2	1727826
7440-70-2	Calcium	16300	ug/L		50	200	200	1	P	HSC	01/16/18 06:46	011618-1	1727839
7440-47-3	Chromium	25.1	ug/L		3	10	10	1	MS	BAJ	01/11/18 19:00	180111-2	1727826
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	HSC	01/16/18 06:46	011618-1	1727839
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	HSC	01/16/18 06:46	011618-1	1727839
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	HSC	01/16/18 06:46	011618-1	1727839
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	01/11/18 19:00	180111-2	1727826
7439-95-4	Magnesium	4600	ug/L		110	300	300	1	P	HSC	01/16/18 06:46	011618-1	1727839
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	HSC	01/16/18 06:46	011618-1	1727839
7439-98-7	Molybdenum	0.928	ug/L		0.2	0.5	0.5	1	MS	BAJ	01/11/18 19:00	180111-2	1727826
7440-02-0	Nickel	1.6	ug/L	J	0.6	2	2	1	MS	BAJ	01/11/18 19:00	180111-2	1727826
7440-09-7	Potassium	1160	ug/L		50	150	150	1	P	HSC	01/16/18 06:46	011618-1	1727839
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	01/11/18 19:00	180111-2	1727826
7631-86-9	Silica	66400	ug/L		53	213	213	1	P	HSC	01/16/18 06:46	011618-1	1727839
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	01/11/18 19:00	180111-2	1727826
7440-23-5	Sodium	9930	ug/L		100	300	300	1	P	HSC	01/16/18 06:46	011618-1	1727839
7440-24-6	Strontium	67	ug/L		1	5	5	1	P	HSC	01/16/18 06:46	011618-1	1727839
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	01/11/18 19:00	180111-2	1727826
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	HSC	01/16/18 06:46	011618-1	1727839
7440-61-1	Uranium	0.670	ug/L		0.067	0.2	0.2	1	MS	BAJ	01/11/18 19:00	180111-2	1727826
7440-62-2	Vanadium	6.59	ug/L		1	5	5	1	P	HSC	01/16/18 06:46	011618-1	1727839
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	HSC	01/16/18 06:46	011618-1	1727839

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-1306**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 440357003**BASIS:** As Received**DATE COLLECTED** 18-DEC-17**CLIENT ID:** CAMO-18-150343**LEVEL:** Low**DATE RECEIVED** 20-DEC-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	59.6	mg/L		0.453	1.24	1.24	1		NOR1	01/16/18 10:06		1732057

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1727826	1727825	SW846 3005A	50	mL	50	mL	12/20/17	JXM8
1727839	1727838	SW846 3005A	50	mL	50	mL	12/20/17	JXM8
1729964	1729963	EPA 245.1/245.2 Prep	20	mL	20	mL	01/08/18	AXS5

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2018-1306**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 440357004**BASIS:** As Received**DATE COLLECTED** 18-DEC-17**CLIENT ID:** CAMO-18-150351**LEVEL:** Low**DATE RECEIVED** 20-DEC-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	01/09/18 11:28	010918W1-6	1729964

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1729964	1729963	EPA 245.1/245.2 Prep	20	mL	20	mL	01/08/18	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2018-1306

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>
1203942509								
	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
	Lead	0.5	ug/L	+/-2	U	MS	0.5	2
	Selenium	2	ug/L	+/-5	U	MS	2	5
	Nickel	0.6	ug/L	+/-2	U	MS	0.6	2
	Molybdenum	0.2	ug/L	+/-0.5	U	MS	0.2	0.5
	Chromium	3	ug/L	+/-10	U	MS	3	10
	Silver	0.3	ug/L	+/-1	U	MS	0.3	1
	Uranium	0.067	ug/L	+/-0.2	U	MS	0.067	0.2
	Thallium	0.6	ug/L	+/-2	U	MS	0.6	2
1203942541								
	Silica	53	ug/L	+/-213	U	P	53	213
	Sodium	100	ug/L	+/-300	U	P	100	300
	Strontium	1	ug/L	+/-5	U	P	1	5
	Barium	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Potassium	-55.4	ug/L	+/-150	J	P	50	150
	Manganese	2	ug/L	+/-10	U	P	2	10
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Iron	30	ug/L	+/-100	U	P	30	100
	Copper	3	ug/L	+/-10	U	P	3	10
	Calcium	50	ug/L	+/-200	U	P	50	200
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Aluminum	68	ug/L	+/-200	U	P	68	200
	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
1203948089								
	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. 2018-1306 Client ID CAMO-18-150340S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 440356001 Spike ID: 1203942512

<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	55		1	U	50	110		MS
Arsenic	ug/L	75-125	50.1		2	U	50	97.7		MS
Cadmium	ug/L	75-125	48.1		0.3	U	50	96.1		MS
Chromium	ug/L	75-125	62.1		14.3		50	95.8		MS
Lead	ug/L	75-125	47.1		0.5	U	50	94.2		MS
Molybdenum	ug/L	75-125	58		0.942		50	114		MS
Nickel	ug/L	75-125	43		0.6	U	50	85.1		MS
Selenium	ug/L	75-125	50.9		2	U	50	102		MS
Silver	ug/L	75-125	46.3		0.3	U	50	92.5		MS
Thallium	ug/L	75-125	44.5		0.6	U	50	88.9		MS
Uranium	ug/L	75-125	45.8		0.433		50	90.8		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2018-1306 Client ID CAMO-18-150340S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 440356001 Spike ID: 1203942544

<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>
Zinc	ug/L	75-125	456		3.3	U	500	90.6		P
Vanadium	ug/L	75-125	474		5.31		500	93.7		P
Aluminum	ug/L	75-125	4810		68	U	5000	96		P
Barium	ug/L	75-125	491		19.6		500	94.3		P
Beryllium	ug/L	75-125	471		1	U	500	94.2		P
Boron	ug/L	75-125	489		15	U	500	95.5		P
Calcium	ug/L	75-125	17100		12500		5000	90.7		P
Cobalt	ug/L	75-125	474		1	U	500	94.7		P
Copper	ug/L	75-125	481		3	U	500	96.1		P
Iron	ug/L	75-125	4840		30	U	5000	96.7		P
Magnesium	ug/L	75-125	8400		3460		5000	98.8		P
Manganese	ug/L	75-125	469		2	U	500	93.8		P
Potassium	ug/L	75-125	5690		1070		5000	92.4		P
Silica	ug/L		73600		64900		10700	81	N/A	P
Sodium	ug/L	75-125	13500		8960		5000	91.2		P
Strontium	ug/L	75-125	516		52.8		500	92.6		P
Tin	ug/L	75-125	471		2.5	U	500	93.9		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2018-1306 **Client ID:** CAMO-18-150340S**Contract:** ESHL00114 **Level:** Low**Matrix:** WATER **% Solids:****Sample ID:** 440356001 **Spike ID:** 1203948092

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

*Analytical Methods:

AV EPA 245.1/245.2

Metals
-6-
Duplicate Sample Summary

SDG No.: 2018-1306

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-18-150340D

Matrix: WATER

Level: Low

Sample ID: 440356001

Duplicate ID: 1203942511

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Antimony	ug/L		1 U		1 U				MS
Arsenic	ug/L		2 U		2 U				MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-10	14.3		14		1.81		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	0.942		0.907		3.79		MS
Nickel	ug/L		0.6 U		0.6 U				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	0.433		0.419		3.29		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
-6-
Duplicate Sample Summary

SDG No.: 2018-1306

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-18-150340D

Matrix: WATER

Level: Low

Sample ID: 440356001

Duplicate ID: 1203942543

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		68 U		68 U				P
Barium	ug/L	+/-5	19.6		19.5		.138		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L		15 U		15 U				P
Calcium	ug/L	+/-20%	12500		12500		.0479		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%	3460		3480		.585		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	1070		997		7.24		P
Silica	ug/L	+/-20%	64900		64600		.423		P
Sodium	ug/L	+/-20%	8960		8970		.151		P
Strontium	ug/L	+/-20%	52.8		53		.354		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	5.31		5.28		.64		P
Zinc	ug/L		3.3 U		3.3 U				P

*Analytical Methods:

P SW846 3005A/6010C

Metals
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Duplicate Sample Summary

SDG No.: 2018–1306**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CAMO–18–150340D**Matrix:** WATER**Level:** Low**Sample ID:** 440356001**Duplicate ID:** 1203948091**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. 2018-1306

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>
1203942510								
	Antimony	ug/L	50	51		102	80-120	MS
	Arsenic	ug/L	50	51.8		104	80-120	MS
	Cadmium	ug/L	50	51.4		103	80-120	MS
	Chromium	ug/L	50	54.3		109	80-120	MS
	Lead	ug/L	50	50.8		102	80-120	MS
	Molybdenum	ug/L	50	48.6		97.1	80-120	MS
	Nickel	ug/L	50	49		98.1	80-120	MS
	Selenium	ug/L	50	51.4		103	80-120	MS
	Silver	ug/L	50	49.7		99.4	80-120	MS
	Thallium	ug/L	50	50		100	80-120	MS
	Uranium	ug/L	50	49.2		98.5	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Laboratory Control Sample Summary

SDG NO. 2018-1306

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>
1203942542								
	Aluminum	ug/L	5000	4880		97.5	80-120	P
	Barium	ug/L	500	470		94	80-120	P
	Beryllium	ug/L	500	466		93.3	80-120	P
	Boron	ug/L	500	468		93.6	80-120	P
	Calcium	ug/L	5000	4920		98.3	80-120	P
	Cobalt	ug/L	500	475		94.9	80-120	P
	Copper	ug/L	500	471		94.2	80-120	P
	Iron	ug/L	5000	4790		95.7	80-120	P
	Magnesium	ug/L	5000	5020		100	80-120	P
	Manganese	ug/L	500	472		94.3	80-120	P
	Potassium	ug/L	5000	4510		90.2	80-120	P
	Silica	ug/L	10700	9570		89.4	80-120	P
	Sodium	ug/L	5000	4550		91.1	80-120	P
	Strontium	ug/L	500	467		93.3	80-120	P
	Tin	ug/L	500	468		93.6	80-120	P
	Vanadium	ug/L	500	465		93.1	80-120	P
	Zinc	ug/L	500	454		90.8	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2018-1306

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>
1203948090	Mercury	ug/L	2	2.01		100	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2018-1306 **Client ID:** CAMO-18-150340L

Contract: ESHL00114

Matrix: LIQUID **Level:** Low

Sample ID: 440356001 **Serial Dilution ID:** 1203942513

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Antimony	1	U	5	U				MS
Arsenic	2	U	10	U				MS
Cadmium	.3	U	1.5	U				MS
Chromium	14.3		15.1	J	5.555			MS
Lead	.5	U	2.5	U				MS
Molybdenum	.942		1.12	J	18.365			MS
Nickel	.6	U	3	U				MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.433		.465	J	7.39			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2018-1306 Client ID CAMO-18-150340L

Contract: ESHL00114

Matrix: LIQUID Level: Low

Sample ID: 440356001 Serial Dilution ID: 1203942545

<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	19.6		20.2	J	3.073			P
Beryllium	1	U	5	U				P
Boron	15	U	75	U				P
Calcium	12500		12600		.818		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	3460		3650		5.499			P
Manganese	2	U	10	U				P
Potassium	1070		1180		9.887			P
Silica	64900		66100		1.813		10	P
Sodium	8960		9070		1.315		10	P
Strontium	52.8		53.8		2.006		10	P
Tin	2.5	U	12.5	U				P
Vanadium	5.31		7.97	J	50.121			P
Zinc	3.3	U	16.6	J				P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2018-1306 **Client ID:** CAMO-18-150340L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 440356001 **Serial Dilution ID:** 1203948093

<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 #: 2018-1306
Work Order #: 440357**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1728631

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
440357002	CAMO-18-150350
440357004	CAMO-18-150351
1203944623	Method Blank (MB)
1203944624	Laboratory Control Sample (LCS)
1203944846	440509002(CAMO-18-150354) Sample Duplicate (DUP)
1203944849	440509002(CAMO-18-150354) 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 440509002 (CAMO-18-150354) 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 440357004 (CAMO-18-150351) was diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range. **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:	1727921	Method:	WSP-CN(T)
Prep Batch :	1727920	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
440357002	CAMO-18-150350
440357004	CAMO-18-150351
1203942745	Method Blank (MB)
1203942746	Laboratory Control Sample (LCS)
1203942747	440356002(CAMO-18-150348) Sample Duplicate (DUP)
1203942749	440356002(CAMO-18-150348) 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 440356002 (CAMO-18-150348) 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: 1730862 **Method:** WSP-ANIONS

Sample Analysis

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

Sample ID	Client ID
440357001	CAMO-18-150342
440357003	CAMO-18-150343
1203950385	Method Blank (MB)
1203950386	Laboratory Control Sample (LCS)
1203950387	440356001(CAMO-18-150340) Sample Duplicate (DUP)
1203950388	440356001(CAMO-18-150340) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

The Ion Chromatography analysis was performed on a Dionex ICS-1600 Ion Chromatograph.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Designation

Sample 440356001 (CAMO-18-150340) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

Samples 1203950385 (MB), 1203950386 (LCS), 1203950387 (CAMO-18-150340DUP), 1203950388 (CAMO-18-150340PS), 440357001 (CAMO-18-150342) and 440357003 (CAMO-18-150343) were re-analyzed due to CCV failure. The reanalysis data with passing instrument QC was reported.

Miscellaneous Information

Manual Integrations

Samples 1203950387 (CAMO-18-150340DUP), 1203950388 (CAMO-18-150340PS), 440357001 (CAMO-18-150342) and 440357003 (CAMO-18-150343) 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:	1728296	Method:	NH3
Prep Batch :	1728295	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
440357001	CAMO-18-150342
440357003	CAMO-18-150343
1203943808	Method Blank (MB)
1203943809	Laboratory Control Sample (LCS)
1203943810	440356001(CAMO-18-150340) Sample Duplicate (DUP)
1203943812	440356001(CAMO-18-150340) Matrix Spike (MS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data.

Sample	Analyte	Value
1203943808 (MB)	Nitrogen, Ammonia	0.0237 between (0.017 - 0.05)

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 440356001 (CAMO-18-150340) 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:	Total Kjeldahl Nitrogen		
Analytical Batch:	1727945	Method:	TKN
Prep Batch :	1727944	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
440357002	CAMO-18-150350
440357004	CAMO-18-150351
1203942803	Method Blank (MB)
1203942804	Laboratory Control Sample (LCS)
1203942805	440356002(CAMO-18-150348) Sample Duplicate (DUP)
1203942806	440356002(CAMO-18-150348) 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 440356002 (CAMO-18-150348) was selected for QC analysis.

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

The percent recoveries (%R) obtained from the spike analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The matrix spike recovered outside of the established acceptance limits due to matrix interference and/or non-homogeneity.

Analyte	Sample	Value
Nitrogen, Total Kjeldahl	1203942806 (CAMO-18-150348MS)	114* (90%-110%)

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

Sample1203942804 (LCS) was re-analyzed due to instrument failure. The results from the reanalysis are reported.

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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Method/Analysis Information

Product: Nitrate Nitrite by Cadmium Reduction

Analytical Batch: 1727946

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
440357001	CAMO-18-150342
440357003	CAMO-18-150343
1203942807	Method Blank (MB)
1203942808	Laboratory Control Sample (LCS)
1203942809	440347001(WST-SWPF-18-150779) Sample Duplicate (DUP)
1203942813	440347001(WST-SWPF-18-150779) 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 440347001 (WST-SWPF-18-150779) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The following samples 1203942809 (WST-SWPF-18-150779DUP), 1203942813 (WST-SWPF-18-150779PS) and 440357003 (CAMO-18-150343) in this sample group were 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	440357
	003
Nitrogen, Nitrate/Nitrite	5X

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Total Phosphorus		
Analytical Batch:	1727943	Method:	PO4
Prep Batch :	1727942	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
440357001	CAMO-18-150342
440357003	CAMO-18-150343
1203942799	Method Blank (MB)
1203942800	Laboratory Control Sample (LCS)
1203942801	440356001(CAMO-18-150340) Sample Duplicate (DUP)
1203942802	440356001(CAMO-18-150340) 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 440356001 (CAMO-18-150340) 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

Sample1203942800 (LCS) was re-analyzed to verify the result.

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are

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

Method/Analysis Information

Product: Solids and Total Dissolved

Analytical Batch: 1727703

Method: TDS

Sample Analysis

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

Sample ID	Client ID
440357001	CAMO-18-150342
440357003	CAMO-18-150343
1203942224	Method Blank (MB)
1203942225	Laboratory Control Sample (LCS)
1203942600	440356001(CAMO-18-150340) 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 440356001 (CAMO-18-150340) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Analyte	Sample	Value
Total Dissolved Solids	1203942600 (CAMO-18-150340DUP)	12.3* (0%-5%)

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

Method/Analysis Information

Product: Specific Conductivity

Analytical Batch: 1728640

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
440357001	CAMO-18-150342
440357003	CAMO-18-150343
1203944648	Laboratory Control Sample (LCS)
1203944649	439936006(CAWA-18-150366) 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 Thermo Scientific Orion Star A212 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 439936006 (CAWA-18-150366) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: pH
Analytical Batch: 1728155 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
440357001	CAMO-18-150342
440357003	CAMO-18-150343
1203943441	Laboratory Control Sample (LCS)
1203943443	440347001(WST-SWPF-18-150779) 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# 23.

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 440347001 (WST-SWPF-18-150779) 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
1203943443 (WST-SWPF-18-150779DUP)	pH	Received 19-DEC-17, out of holding 15-DEC-17
440357001 (CAMO-18-150342)	pH	Received 20-DEC-17, out of holding 18-DEC-17
440357003 (CAMO-18-150343)	pH	Received 20-DEC-17, out of holding 18-DEC-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: 1728150 **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
440357001	CAMO-18-150342
440357003	CAMO-18-150343
1203943429	Laboratory Control Sample (LCS)
1203943431	440347001(WST-SWPF-18-150779) Sample Duplicate (DUP)
1203943433	440347001(WST-SWPF-18-150779) 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 440347001 (WST-SWPF-18-150779) 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

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Qualifier Definition Report for

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

Client SDG: 2018-1306 GEL Work Order: 440357

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Kristen Mizzell

Date: 12 JAN 2018

Title: Team Leader

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: January 12, 2018

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: 2018-1306

Client Sample ID: CAMO-18-150342
Sample ID: 440357001
Matrix: W
Collect Date: 18-DEC-17 11:41
Receive Date: 20-DEC-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	0.0774	0.067	0.200	mg/L		1	JXH5	01/11/18	0649	1730862	1
Chloride		6.70	0.067	0.200	mg/L		1					
Sulfate		10.2	0.133	0.400	mg/L		1					
Fluoride		0.326	0.033	0.100	mg/L		1	JXH5	01/11/18	2100	1730862	2
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.0682	0.017	0.050	mg/L	1.00	1	KLP1	12/27/17	1241	1728296	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		2.91	0.017	0.050	mg/L		1	AXH3	12/22/17	0718	1727946	4
PO4 "As Received"												
Phosphorus, Total as P		0.231	0.020	0.050	mg/L	1.00	1	KLP1	12/26/17	1531	1727943	5
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		94.3	3.40	14.3	mg/L			KLP1	12/22/17	0837	1727703	6
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		66.4	1.45	4.00	mg/L			RXB5	12/27/17	1407	1728150	7
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		194	1.00	1.00	umhos/cm		1	VH1	01/06/18	1017	1728640	8
PH "As Received"												
pH at Temp 10.7C	H	7.91	0.010	0.100	SU		1	HXC1	12/27/17	1414	1728155	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	KLP1	12/27/17	1115	1728295
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	AXH3	12/26/17	1000	1727942

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: January 12, 2018

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: 2018-1306

Client Sample ID: CAMO-18-150342
Sample ID: 440357001

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: January 12, 2018

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: 2018-1306

Client Sample ID: CAMO-18-150350
Sample ID: 440357002
Matrix: W
Collect Date: 18-DEC-17 11:41
Receive Date: 20-DEC-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	0.403	0.330	1.00	mg/L		1	TSM	12/28/17	1155	1728631	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	12/26/17	0947	1727921	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	12/26/17	1630	1727945	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	12/26/17	0937	1727920
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	AXH3	12/26/17	1000	1727944

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

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

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: January 12, 2018

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: 2018-1306

Client Sample ID: CAMO-18-150343
Sample ID: 440357003
Matrix: W
Collect Date: 18-DEC-17 13:31
Receive Date: 20-DEC-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	JXH5	01/11/18	0719	1730862	1
Chloride		4.79	0.067	0.200	mg/L		1					
Sulfate		5.74	0.133	0.400	mg/L		1					
Fluoride		0.387	0.033	0.100	mg/L		1	JXH5	01/11/18	2130	1730862	2
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	U	ND	0.017	0.050	mg/L	1.00	1	KLP1	12/27/17	1242	1728296	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		0.905	0.085	0.250	mg/L		5	AXH3	12/22/17	0719	1727946	4
PO4 "As Received"												
Phosphorus, Total as P		0.229	0.020	0.050	mg/L	1.00	1	KLP1	12/26/17	1532	1727943	5
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		133	3.40	14.3	mg/L			KLP1	12/22/17	0837	1727703	6
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		73.5	1.45	4.00	mg/L			RXB5	12/27/17	1411	1728150	7
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		175	1.00	1.00	umhos/cm		1	VH1	01/06/18	1017	1728640	8
PH "As Received"												
pH at Temp 10.9C	H	8.18	0.010	0.100	SU		1	HXC1	12/27/17	1414	1728155	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	KLP1	12/27/17	1115	1728295
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	AXH3	12/26/17	1000	1727942

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Certificate of Analysis

Report Date: January 12, 2018

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: 2018-1306

Client Sample ID: CAMO-18-150343
Sample ID: 440357003

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: January 12, 2018

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: 2018-1306

Client Sample ID: CAMO-18-150351
Sample ID: 440357004
Matrix: W
Collect Date: 18-DEC-17 13:31
Receive Date: 20-DEC-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	0.384	0.330	1.00	mg/L		1	TSM	12/28/17	1235	1728631	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	12/26/17	0948	1727921	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	12/26/17	1630	1727945	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	12/26/17	0937	1727920
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	AXH3	12/26/17	1000	1727944

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

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

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: January 12, 2018

Page 1 of 6

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

Contact: Ms. Nita Patel

Workorder: 440357

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1728631										
QC1203944846	440509002	DUP									
Total Organic Carbon Average		1.03		1.07	mg/L	3.62	^	(+/-1.00)	TSM	12/28/17	18:51
QC1203944624	LCS										
Total Organic Carbon Average	10.0			10.4	mg/L			(80%-120%)		12/28/17	08:24
QC1203944623	MB										
Total Organic Carbon Average			U	ND	mg/L					12/28/17	08:14
QC1203944849	440509002	PS									
Total Organic Carbon Average	10.0	1.03		12.5	mg/L			(75%-125%)		12/28/17	19:31
Flow Injection Analysis											
Batch	1727921										
QC1203942747	440356002	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	12/26/17	09:44
QC1203942746	LCS										
Cyanide, Total	50.0			54.1	ug/L			(90%-110%)		12/26/17	09:42
QC1203942745	MB										
Cyanide, Total			U	ND	ug/L					12/26/17	09:41
QC1203942749	440356002	MS									
Cyanide, Total	100	U	ND	106	ug/L			(90%-110%)		12/26/17	09:45
Ion Chromatography											
Batch	1730862										
QC1203950387	440356001	DUP									
Bromide		U	ND	U	ND	mg/L	N/A		JXH5	01/11/18	05:19

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1730862										
Chloride		2.61		2.59	mg/L	0.697		(0%-20%)	JXH5	01/11/18	05:19
Fluoride		0.321		0.321	mg/L	0.0935	^	(+/-0.100)		01/11/18	19:30
Sulfate		3.75		3.74	mg/L	0.189		(0%-20%)		01/11/18	05:19
QC1203950386 LCS											
Bromide	1.25			1.32	mg/L		106	(80%-120%)		01/11/18	04:19
Chloride	5.00			5.30	mg/L		106	(80%-120%)			
Fluoride	2.50			2.74	mg/L		110	(80%-120%)		01/11/18	18:30
Sulfate	10.0			11.0	mg/L		110	(80%-120%)		01/11/18	04:19
QC1203950385 MB											
Bromide			U	ND	mg/L					01/11/18	03:49
Chloride			J	0.137	mg/L						
Fluoride			U	ND	mg/L					01/11/18	18:01
Sulfate			U	ND	mg/L					01/11/18	03:49
QC1203950388 440356001 PS											
Bromide	1.25	U	ND	1.36	mg/L		104	(75%-125%)		01/11/18	05:49
Chloride	5.00		2.61	8.06	mg/L		109	(75%-125%)			
Fluoride	2.50		0.321	3.04	mg/L		109	(75%-125%)		01/11/18	20:00
Sulfate	10.0		3.75	14.5	mg/L		107	(75%-125%)		01/11/18	05:49

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1727943										
QC1203942801	440356001	DUP									
Phosphorus, Total as P		0.214		0.224	mg/L	4.57	^	(+/-0.050)	KLP1	12/26/17	15:28
QC1203942800	LCS										
Phosphorus, Total as P	1.00			1.02	mg/L			102 (80%-124%)		12/26/17	15:39
QC1203942799	MB										
Phosphorus, Total as P			U	ND	mg/L					12/26/17	15:26
QC1203942802	440356001	MS									
Phosphorus, Total as P	1.00	0.214		1.53	mg/L			132 (63%-139%)		12/26/17	15:29
Batch	1727945										
QC1203942805	440356002	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A		KLP1	12/26/17	16:27
QC1203942804	LCS										
Nitrogen, Total Kjeldahl	1.00			1.09	mg/L			109 (90%-110%)		12/26/17	16:25
QC1203942803	MB										
Nitrogen, Total Kjeldahl			U	ND	mg/L					12/26/17	16:24
QC1203942806	440356002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND	1.15	mg/L			114* (90%-110%)		12/26/17	16:28
Batch	1727946										
QC1203942809	440347001	DUP									
Nitrogen, Nitrate/Nitrite		U	ND	U	ND	mg/L	N/A		AXH3	12/22/17	07:07
QC1203942808	LCS										
Nitrogen, Nitrate/Nitrite	1.00			1.06	mg/L			106 (90%-110%)		12/22/17	06:46
QC1203942807	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					12/22/17	06:44

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1727946										
QC1203942813	440347001	PS									
Nitrogen, Nitrate/Nitrite	1.00	U	ND	1.02	mg/L		102	(90%-110%)	AXH3	12/22/17	07:08
Batch	1728296										
QC1203943810	440356001	DUP									
Nitrogen, Ammonia			0.0826	J	0.0326	mg/L	86.8	^	(+/-0.050)	KLP1	12/27/17 12:39
QC1203943809	LCS										
Nitrogen, Ammonia	1.00			1.03	mg/L		103	(90%-110%)			12/27/17 12:37
QC1203943808	MB										
Nitrogen, Ammonia			J	0.0237	mg/L						12/27/17 12:36
QC1203943812	440356001	MS									
Nitrogen, Ammonia	1.00		0.0826	1.09	mg/L		101	(90%-110%)			12/27/17 12:40
Solids Analysis											
Batch	1727703										
QC1203942600	440356001	DUP									
Total Dissolved Solids			98.6	87.1	mg/L	12.3*		(0%-5%)	KLP1	12/22/17	08:37
QC1203942225	LCS										
Total Dissolved Solids	300			289	mg/L		96.2	(95%-105%)			12/22/17 08:37
QC1203942224	MB										
Total Dissolved Solids			U	ND	mg/L						12/22/17 08:37
Titration and Ion Analysis											
Batch	1728150										
QC1203943431	440347001	DUP									
Alkalinity, Total as CaCO3			20.3	21.7	mg/L	6.7		(0%-20%)	RXB5	12/27/17	13:56
Carbonate alkalinity (CaCO3)		U	ND	U	ND	mg/L	N/A				

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1728150										
QC1203943429	LCS										
Alkalinity, Total as CaCO3	100			108	mg/L		108	(90%-110%)	RXB5	12/27/17	13:43
QC1203943433	440347001	MS									
Alkalinity, Total as CaCO3	100	20.3		125	mg/L		104	(80%-120%)		12/27/17	13:58
Batch	1728155										
QC1203943443	440347001	DUP									
pH		H	6.58	H	6.52	SU	0.916	(0%-5%)	HXC1	12/27/17	14:10
QC1203943441	LCS										
pH	7.00			7.00	SU		100	(99%-101%)		12/27/17	13:41
Batch	1728640										
QC1203944649	439936006	DUP									
Conductivity			116		116 umhos/cm	0.086		(0%-10%)	VH1	01/06/18	10:12
QC1203944648	LCS										
Conductivity	1410			1400	umhos/cm		99.3	(95%-105%)		01/06/18	10:11

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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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.