

The order of this data package is as follows:

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

Comments:

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11097

EVENT NAME: Mortandad/Sandia (Cr Inv) MY2017 Q2

SAMPLE ID: CAMO-17-129298

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	2/17/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1150		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-44 S2		FIELD PREP:	F	
LOCATION TYPE:	Mon		FIELD QC TYPE:	REG	
TOP DEPTH:	OK		SAMPLE USAGE:	INV	
BOTTOM DEPTH:	✓	✓	EXCAVATED:		YES / NO / NA

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

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Dissolved Oxygen _____ mg/L Flow (in gpm) _____ *AS 2/17/17* Oxidation-Reduction Potential _____ mV
pH _____ SU Specific Conductance _____ uS/cm Temperature _____ deg C
Turbidity _____ NTU

COLLECTED BY (PRINT): *A. Stockers A. Vigil*

RELINQUISHED BY (Printed Name) <i>Allyn Stanfield</i> (Signature) <i>[Signature]</i>	Date/Time <i>2/17/17</i> <i>1335</i>	RECEIVED BY <i>Sherwood</i> (Printed Name) <i>[Signature]</i> (Signature) <i>[Signature]</i>	Date/Time <i>2/17/17</i> <i>1335</i>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 01/18/2017

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11097

EVENT NAME: Mortandad/Sandia (Cr Inv) MY2017 Q2

SAMPLE ID: CAMO-17-129314

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	2/17/17	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1150		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-44 S2		FIELD PREP:	UF	
LOCATION TYPE:	Mon		FIELD QC TYPE:	REG	
TOP DEPTH:	OK		SAMPLE USAGE:	INV	
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1 LITER 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:

Dissolved Oxygen	7.08	mg/L	Flow (in gpm)	3.29	GPM	Oxidation-Reduction Potential	215.8	mV
pH	7.89	SU	Specific Conductance	140.9	uS/cm	Temperature	20.3	deg C
Turbidity	0.09	NTU						

COLLECTED BY (PRINT): A. Stocker, A. Vigil

RELINQUISHED BY (Printed Name) <u>Allynn Stanford</u> (Signature) <u>[Signature]</u>	Date/Time <u>2/17/17</u> <u>1335</u>	RECEIVED BY <u>S. Sherwood</u> (Printed Name) <u>[Signature]</u> (Signature) <u>[Signature]</u>	Date/Time <u>2/17/17</u> <u>1335</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 01/18/2017

DATA VALIDATION REPORT

Chain Of Custody No. 2017-1054

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
417066	EPA:120.1	1				
417066	EPA:150.1	1				
417066	EPA:160.1	1				
417066	EPA:245.2	2				
417066	EPA:300.0	1				
417066	EPA:310.1	1				
417066	EPA:335.4	1				
417066	EPA:350.1	1				
417066	EPA:351.2	1				
417066	EPA:353.2	1				
417066	EPA:365.4	1				
417066	SM:A2340B	1				
417066	SW-846:6010C	1				
417066	SW-846:6020	1				
417066	SW-846:6850	1				
417066	SW-846:9060	1				

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
417066	EPA:120.1	1642194	1642194	1										1				1			
417066	EPA:150.1	1642723	1642723	1										1				1			
417066	EPA:160.1	1641423	1641423	1					1					1				1			
417066	EPA:245.2	1644167	1644166	2					1	2				1				2			
417066	EPA:300.0	1641697	1641697	1					1					1				1			
417066	EPA:310.1	1642724	1642724	1						1				1				1			
417066	EPA:335.4	1641601	1641600	1					1	1				1				1			
417066	EPA:350.1	1641817	1641816	1					1	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
417066	EPA:351.2	1640306	1640305	1					1	1				1			1				
417066	EPA:353.2	1641426	1641426	1					1					1			1				
417066	EPA:365.4	1639607	1639606	1					1	1				1			1				
417066	SM:A2340B	1649178	1649178	1																	
417066	SW-846:6010C	1641631	1641630	1					1	1				1			1				
417066	SW-846:6020	1641599	1641598	1					1	1				1			1				
417066	SW-846:6020	1647988	1647987	1					1	1				1			1				
417066	SW-846:6850	1644349	1644348	1					1	1	1			1							
417066	SW-846:9060	1639822	1639822	1					1					1			1				

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-129298	1203734868	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-129298	417066001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203734867	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-129298	417066001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-17-130020	1203736202	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203736201	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-129298	1203733268	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-129298	417066001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203733267	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203733266	MB	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-129298	417066001	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-129302	1203739596	DUP	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-129302	1203739598	MS	0	0	1	0
EPA:245.2	INORGANIC	CAMO-17-129303	1203739597	DUP	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-129303	1203739599	MS	0	0	1	0
EPA:245.2	INORGANIC	CAMO-17-129314	417066002	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203739595	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203739594	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-17-129298	417066001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-17-129303	1203733884	DUP	4	0	0	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:300.0	GENERAL CHEMISTRY	LCS	1203733883	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203733882	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-129298	417066001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-130020	1203736204	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-130020	1203736205	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203736203	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-129314	1203733649	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-129314	1203733653	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-129314	417066002	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203733648	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203733647	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-129298	417066001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-129406	1203734060	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-129406	1203734062	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203734059	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203734058	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-129314	417066002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-129356	1203730617	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-129356	1203730620	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203730614	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203730613	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-17-129298	417066001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-17-129406	1203734067	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203733282	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203733281	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-129294	1203728893	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-129294	1203728894	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-129298	417066001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203728890	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203728889	MB	1	0	0	0
SM:A2340B	INORGANIC	CAMO-17-129298	417066001	REG	1	0	0	0
SW-846:6010C	INORGANIC	CAMO-17-129298	1203733719	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-17-129298	1203733720	MS	0	0	17	0
SW-846:6010C	INORGANIC	CAMO-17-129298	417066001	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203733718	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203733717	MB	17	0	0	0
SW-846:6020	INORGANIC	CAMO-17-129298	1203733644	DUP	10	0	0	0
SW-846:6020	INORGANIC	CAMO-17-129298	1203733645	MS	0	0	10	0
SW-846:6020	INORGANIC	CAMO-17-129298	1203748531	DUP	1	0	0	0
SW-846:6020	INORGANIC	CAMO-17-129298	1203748532	MS	0	0	1	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
SW-846:6020	INORGANIC	CAMO-17-129298	417066001	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203733643	LCS	0	0	10	0
SW-846:6020	INORGANIC	LCS	1203748530	LCS	0	0	1	0
SW-846:6020	INORGANIC	MB	1203733642	MB	10	0	0	0
SW-846:6020	INORGANIC	MB	1203748529	MB	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-129298	417066001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-129302	1203739945	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-129302	1203739946	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203739944	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203739943	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-129311	1203731502	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-129314	417066002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203731501	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203731500	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name	Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
MB	1203739594	METHOD BLANK	EPA:245.2	W	Mercury	-0.069	J	ug/L	0.200

DATA VALIDATION REPORT

Field Sample ID	Blank Lab	Blank Type	Analytical Method	Parameter Name	Blank Lab Result	Blank Lab Units	Lab Result	Lab Qualifier	Lab Detection Limit	Detect Flag	Detect to Nondetect Factor	Detect to Estimated Factor	Use Factors
CAMO-17-129298	1203739594	METHOD BLANK	EPA:245.2	Mercury	-0.069	ug/L	0.200	U	0.200	N	5	100	Y
CAMO-17-129314	1203739594	METHOD BLANK	EPA:245.2	Mercury	-0.069	ug/L	0.200	U	0.200	N	5	100	Y

6. Any surrogate recoveries outside the control limits?

No.

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

Field Sample ID	MS Lab Sample ID	MSD Lab Sample ID	Analytical Method	Parameter Name	Analysis Lot ID	Analysis Date	Sample Matrix	MS Spike Recovery	MSD Spike Recovery	MS Upper Limit	MS Lower Limit	MS Reject Limit	RPD	RPD Limit
CAMO-17-129356	1203730620		EPA:351.2	Total Kjeldahl Nitrogen	1640305	03-02-2017	W	85.6		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.

DATA VALIDATION REPORT

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

None.

Reason Code

Description

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-17-129298	R-44 S2	REG	EPA:120.1	0	1
CAMO-17-129298	R-44 S2	REG	EPA:150.1	0	1
CAMO-17-129298	R-44 S2	REG	EPA:160.1	0	1
CAMO-17-129298	R-44 S2	REG	EPA:245.2	0	1
CAMO-17-129298	R-44 S2	REG	EPA:300.0	0	4
CAMO-17-129298	R-44 S2	REG	EPA:310.1	0	2
CAMO-17-129298	R-44 S2	REG	EPA:350.1	0	1
CAMO-17-129298	R-44 S2	REG	EPA:353.2	0	1
CAMO-17-129298	R-44 S2	REG	EPA:365.4	0	1
CAMO-17-129298	R-44 S2	REG	SM:A2340B	0	1
CAMO-17-129298	R-44 S2	REG	SW-846:6010C	0	17
CAMO-17-129298	R-44 S2	REG	SW-846:6020	0	11
CAMO-17-129298	R-44 S2	REG	SW-846:6850	0	1
CAMO-17-129314	R-44 S2	REG	EPA:245.2	0	1
CAMO-17-129314	R-44 S2	REG	EPA:335.4	0	1
CAMO-17-129314	R-44 S2	REG	EPA:351.2	0	1
CAMO-17-129314	R-44 S2	REG	SW-846:9060	0	1

DATA VALIDATION REPORT

March 13, 2017

Mr. Keith Greene
Los Alamos National Laboratory
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico 87545

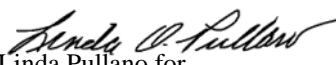
Re: LANL- WQH Water Samples
Work Order: 417066
SDG: 2017-1054

Dear Mr. Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on February 22, 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,


Linda Pullano for
Valerie Davis
Project Manager

Chain of Custody: 2017-1054
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 417066
SDG: 2017-1054

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 417066
SDG # : 2017-1054**

March 13, 2017

Laboratory Identification:

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

Summary

Sample receipt The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on February 22, 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 temperature was within specification (0 - 6C). Shipping container temperatures were checked, documented, and within specifications. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
417066001	CAMO-17-129298
417066002	CAMO-17-129314

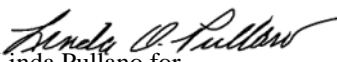
Case Narrative

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.


Linda Pullano for
Valerie Davis
Project Manager

List of current GEL Certifications as of 13 March 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
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
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Chain of Custody and Supporting Documentation

SAMPLE RECEIPT & REVIEW FORM

Client: ESH		SDG/AR/COC/Work Order: 417066	
Received By: zkw		Date Received: 2/22/17	
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.	
COC/Samples marked as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 gpm	
Classified Radioactive II or III by RSO?	<input checked="" type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?	
COC/Samples marked containing PCBs?	<input checked="" type="checkbox"/>		
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input checked="" type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.	
Shipped as a DOT Hazardous?	<input checked="" type="checkbox"/>	Hazard Class Shipped:	UN#:
Samples identified as Foreign Soil?	<input checked="" type="checkbox"/>		

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: Ice bags Blue ice Dry ice None Other (describe) 1°C *all temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: IR3-16 Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's, containers affected and observed pH:
6 Do Low Level Perchlorate samples have headspace as required? yes 2/22/17	<input checked="" type="checkbox"/>			If Preservation added, Lot#: Sample ID's and containers affected:
7 VOA vials contain acid preservation?			<input checked="" type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?			<input checked="" type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?			<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
14 Are sample containers identifiable as GEL provided?			<input checked="" type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
16 Carrier and tracking number.				Circle Applicable: <input checked="" type="checkbox"/> FedEx Air <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other 5908 1781 7533

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials

MEIA

Date

2/22/17

Page

1

of

GL-CHL-SR-001 Rev 3

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

SHIP DATE: 21FEB17
ACTWGT: 28.0 LB MAN
CAD: 0014176/CAFE2916

LOS ALAMOS, NM 87545
UNITED STATES US

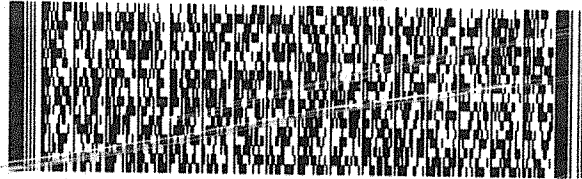
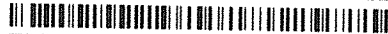
BILL SENDER

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

CHARLESTON SC 29407

(843) 566-8171

REF: 6A000ASRGW04BAGWS0



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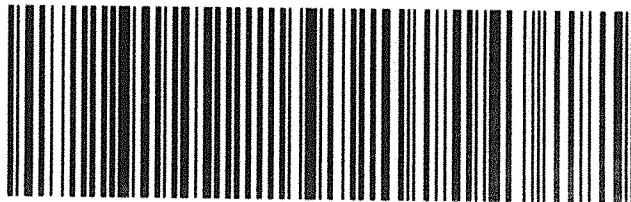
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PRIORITY OVERNIGHT

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SC-US CHS

Part # 15514RV-434 RIT2 05/15



538C1/33BE/329B

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 #: 2017-1054
Work Order #: 417066**

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: 1644349

Prep Batch Number: 1644348

Sample Analysis

Sample ID	Client ID
417066001	417066001 (CAMO-17-129298)
1203740088	Interference Check Sample (ICS)
1203739943	Method Blank (MB)
1203739944	Laboratory Control Sample (LCS)
1203739945	416958001(CAMO-17-129302) Matrix Spike (MS)
1203739946	416958001(CAMO-17-129302) 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.

Interference Check Sample (ICS)

The ICS spike recoveries met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 416958001 (CAMO-17-129302) 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**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

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: 2017-1054 GEL Work Order: 417066

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Michael Penny

Date: 09 MAR 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: 1644348Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-129298Date Received: 22-FEB-17GEL Job No (SDG): 2017-1054GEL Sample ID: 417066001Date Filtered: 03-MAR-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	0.346	ug/L		1	06-MAR-17 15:56	per0306027a
	Perchlorate Isotope Ratio			2.91			1	06-MAR-17 15:56	per0306027a
14797-73-0	Perchlorate-101	.05	.2	0.365	ug/L		1	06-MAR-17 15:56	per0306027a
	Perchlorate-O(18)			0.486	ug/L		1	06-MAR-17 15:56	per0306027a

^ 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): 2017-1054

Extract Batch Code: 1644348

Date Filtered: 03-MAR-17

Matrix: WATER

Sample ID: 1203739944

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.213	ug/L	106		85 - 115
Perchlorate Isotope Ratio		3.15				-
Perchlorate-101	0.200	.208	ug/L	104		85 - 115
Perchlorate-O(18)		.474	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): 2017-1054

Extract Batch Code: 1644348

Date Extracted: 03-MAR-17

GEL MS/PS ID: 1203739945

Client ID: CAMO-17-129302

GEL MSD/PSD ID: 1203739946

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	0.331	ug/L	0.525	97	.518	93	1	30	75 - 125
Perchlorate Isotope Ratio	0	2.92		3.19		2.92		9		-
Perchlorate-101	0.200	0.348	ug/L	0.506	79	.545	98	7	30	75 - 125
Perchlorate-O(18)	0	0.477	ug/L	0.492		.478		3		-

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

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: EPA 6850 ModifiedMatrix: WATERExtraction Batch ID: 1644348Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 03-MAR-17GEL Job No (SDG): 2017-1054GEL Sample ID: 1203739943Date Filtered: 03-MAR-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	06-MAR-17 14:42	per0306017a
	Perchlorate Isotope Ratio						1	06-MAR-17 14:42	per0306017a
14797-73-0	Perchlorate-101	.05	.2	0.200	ug/L	U	1	06-MAR-17 14:42	per0306017a
	Perchlorate-O(18)			0.476	ug/L		1	06-MAR-17 14:42	per0306017a

^ 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: 1644348Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 03-MAR-17GEL Job No (SDG): 2017-1054GEL Sample ID: 1203739944Date Filtered: 03-MAR-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	0.213	ug/L		1	06-MAR-17 14:50	per0306018a
	Perchlorate Isotope Ratio			3.15			1	06-MAR-17 14:50	per0306018a
14797-73-0	Perchlorate-101	.05	.2	0.208	ug/L		1	06-MAR-17 14:50	per0306018a
	Perchlorate-O(18)			0.474	ug/L		1	06-MAR-17 14:50	per0306018a

^ 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: 1644348Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2017-1054GEL Sample ID: 1203740088Date Filtered: 03-MAR-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	0.213	ug/L		1	06-MAR-17 14:57	per0306019a
	Perchlorate Isotope Ratio			2.99			1	06-MAR-17 14:57	per0306019a
14797-73-0	Perchlorate-101	.05	.2	0.219	ug/L		1	06-MAR-17 14:57	per0306019a
	Perchlorate-O(18)			0.495	ug/L		1	06-MAR-17 14:57	per0306019a

^ 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: 1644348Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-129302MSDate Received: 18-FEB-17GEL Job No (SDG): 2017-1054GEL Sample ID: 1203739945Date Filtered: 03-MAR-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	0.525	ug/L		1	06-MAR-17 15:12	per0306021a
	Perchlorate Isotope Ratio			3.19			1	06-MAR-17 15:12	per0306021a
14797-73-0	Perchlorate-101	.05	.2	0.506	ug/L		1	06-MAR-17 15:12	per0306021a
	Perchlorate-O(18)			0.492	ug/L		1	06-MAR-17 15:12	per0306021a

^ 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: 1644348Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-129302MSDDate Received: 18-FEB-17GEL Job No (SDG): 2017-1054GEL Sample ID: 1203739946Date Filtered: 03-MAR-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	0.518	ug/L		1	06-MAR-17 15:19	per0306022a
	Perchlorate Isotope Ratio			2.92			1	06-MAR-17 15:19	per0306022a
14797-73-0	Perchlorate-101	.05	.2	0.545	ug/L		1	06-MAR-17 15:19	per0306022a
	Perchlorate-O(18)			0.478	ug/L		1	06-MAR-17 15:19	per0306022a

^ 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 #: 2017-1054
Work Order #: 417066

Sample ID	Client ID
417066001	CAMO-17-129298
417066002	CAMO-17-129314
1203733717	Method Blank (MB) ICP
1203733718	Laboratory Control Sample (LCS)
1203733721	417066001(CAMO-17-129298L) Serial Dilution (SD)
1203733719	417066001(CAMO-17-129298D) Sample Duplicate (DUP)
1203733720	417066001(CAMO-17-129298S) Matrix Spike (MS)
1203733642	Method Blank (MB) ICP-MS
1203748529	Method Blank (MB) ICP-MS
1203733643	Laboratory Control Sample (LCS)
1203748530	Laboratory Control Sample (LCS)
1203733646	417066001(CAMO-17-129298L) Serial Dilution (SD)
1203748533	417066001(CAMO-17-129298L) Serial Dilution (SD)
1203733644	417066001(CAMO-17-129298D) Sample Duplicate (DUP)
1203748531	417066001(CAMO-17-129298D) Sample Duplicate (DUP)
1203733645	417066001(CAMO-17-129298S) Matrix Spike (MS)
1203748532	417066001(CAMO-17-129298S) Matrix Spike (MS)
1203739594	Method Blank (MB) CVAA
1203739595	Laboratory Control Sample (LCS)
1203739600	416958001(CAMO-17-129302L) Serial Dilution (SD)
1203739596	416958001(CAMO-17-129302D) Sample Duplicate (DUP)
1203739598	416958001(CAMO-17-129302S) Matrix Spike (MS)

Sample Analysis

Samples 417066001 and 002 in this SDG were analyzed for metals and mercury on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1641631, 1641599, 1647988, 1644167 and 1649178
Prep Batch :	1641630, 1641598, 1647987 and 1644166
Standard Operating Procedures:	GL-MA-E-013 REV# 28, GL-MA-E-006 REV# 13, GL-MA-E-014 REV# 29, GL-MA-E-010 REV# 34 and GL-GC-E-107 REV# 10
Analytical Method:	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.2 1974 and SM:A2340B
Prep Method :	SW846 3005A and EPA 245.1/245.2 Prep

Preparation/Analytical Method Verification

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

System Configuration

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

The Metals analysis-ICP was performed on a PE 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard.

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

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 9000 inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum.

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

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

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

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

ICSA/ICSAB Statement

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria. However, the ICSA contained 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 (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: 417066001 (CAMO-17-129298)-ICP, ICP-MS and ICP-MS and 416958001 (CAMO-17-129302)-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.

Data Exception (DER) Documentation

A data exception report was not required for this SDG.

Additional Comments

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

Hardness = 2.497 (Ca) + 4.118 (Mg)

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

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2017-1054 GEL Work Order: 417066

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: 21 MAR 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1054**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 417066001**BASIS:** As Received**DATE COLLECTED** 17-FEB-17**CLIENT ID:** CAMO-17-129298**LEVEL:** Low**DATE RECEIVED** 22-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	03/06/17 12:51	030617W4-6	1644167

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1054

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 417066001

BASIS: As Received

DATE COLLECTED 17-FEB-17

CLIENT ID: CAMO-17-129298

LEVEL: Low

DATE RECEIVED 22-FEB-17

MATRIX: W

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	200	ug/L	U	68	200	200	1	P	HSC	03/01/17 18:12	030117-1	1641631
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	SKJ	03/15/17 11:42	170315-5	1641599
7440-38-2	Arsenic	5	ug/L	U	1.7	5	5	1	MS	SKJ	03/14/17 17:43	170314-3	1641599
7440-39-3	Barium	21.4	ug/L		1	5	5	1	P	HSC	03/01/17 18:12	030117-1	1641631
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	03/01/17 18:12	030117-1	1641631
7440-42-8	Boron	16.4	ug/L	J	15	50	50	1	P	HSC	03/01/17 18:12	030117-1	1641631
7440-43-9	Cadmium	1	ug/L	U	0.3	1	1	1	MS	SKJ	03/14/17 17:43	170314-3	1641599
7440-70-2	Calcium	12900	ug/L		50	200	200	1	P	HSC	03/02/17 11:53	030217-2	1641631
7440-47-3	Chromium	8.19	ug/L	J	3	10	10	1	MS	SKJ	03/14/17 17:43	170314-3	1641599
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	03/01/17 18:12	030117-1	1641631
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	03/01/17 18:12	030117-1	1641631
7439-89-6	Iron	100	ug/L	U	30	100	100	1	P	HSC	03/01/17 18:12	030117-1	1641631
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	SKJ	03/14/17 17:43	170314-3	1641599
7439-95-4	Magnesium	3770	ug/L		110	300	300	1	P	HSC	03/01/17 18:12	030117-1	1641631
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	03/01/17 18:12	030117-1	1641631
7439-98-7	Molybdenum	0.907	ug/L		0.3	0.5	0.5	1	MS	SKJ	03/20/17 10:47	170320-4	1647988
7440-02-0	Nickel	1.61	ug/L	J	0.5	2	2	1	MS	SKJ	03/14/17 17:43	170314-3	1641599
7440-09-7	Potassium	1310	ug/L		50	150	150	1	P	HSC	03/01/17 18:12	030117-1	1641631
7782-49-2	Selenium	5	ug/L	U	2	5	5	1	MS	SKJ	03/14/17 17:43	170314-3	1641599
7631-86-9	Silica	68900	ug/L		53	213	213	1	P	HSC	03/01/17 18:12	030117-1	1641631
7440-22-4	Silver	1	ug/L	U	0.4	1	1	1	MS	SKJ	03/14/17 17:43	170314-3	1641599
7440-23-5	Sodium	9690	ug/L		100	300	300	1	P	HSC	03/01/17 18:12	030117-1	1641631
7440-24-6	Strontium	53.8	ug/L		1	5	5	1	P	HSC	03/01/17 18:12	030117-1	1641631
7440-28-0	Thallium	0.775	ug/L	J	0.6	2	2	1	MS	SKJ	03/14/17 17:43	170314-3	1641599
7440-31-5	Tin	10	ug/L	U	2.5	10	10	1	P	HSC	03/01/17 18:12	030117-1	1641631
7440-61-1	Uranium	0.536	ug/L		0.067	0.2	0.2	1	MS	SKJ	03/14/17 17:43	170314-3	1641599
7440-62-2	Vanadium	5.31	ug/L		1	5	5	1	P	HSC	03/01/17 18:12	030117-1	1641631
7440-66-6	Zinc	4.68	ug/L	J	3.3	10	10	1	P	HSC	03/02/17 11:53	030217-2	1641631

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1054**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 417066001**BASIS:** As Received**DATE COLLECTED** 17-FEB-17**CLIENT ID:** CAMO-17-129298**LEVEL:** Low**DATE RECEIVED** 22-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
	Hardness as CaCO3	47.7	mg/L		0.453	1.24	1.24	1		TXT1	03/20/17 16:16		1649178

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1641599	1641598	SW846 3005A	50	mL	50	mL	02/22/17	CXW4
1641631	1641630	SW846 3005A	50	mL	50	mL	02/22/17	CXW4
1644167	1644166	EPA 245.1/245.2 Prep	20	mL	20	mL	03/03/17	JXH5
1647988	1647987	SW846 3005A	50	mL	50	mL	03/16/17	CXW4

***Analytical Methods:**

P SW846 3005A/6010C
MS SW846 3005A/6020A
AV EPA 245.1/245.2

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1054**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 417066002**BASIS:** As Received**DATE COLLECTED** 17-FEB-17**CLIENT ID:** CAMO-17-129314**LEVEL:** Low**DATE RECEIVED** 22-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	03/06/17 12:52	030617W4-6	1644167

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1644167	1644166	EPA 245.1/245.2 Prep	20	mL	20	mL	03/03/17	JXH5

***Analytical Methods:**

AV EPA 245.1/245.2

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2017-1054

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>
1203733642	Antimony	1	ug/L	+/-3	U	MS	1	3
	Arsenic	1.7	ug/L	+/-5	U	MS	1.7	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
	Thallium	0.6	ug/L	+/-2	U	MS	0.6	2
	Uranium	0.067	ug/L	+/-0.2	U	MS	0.067	0.2
	Silver	0.4	ug/L	+/-1	U	MS	0.4	1
	Nickel	0.5	ug/L	+/-2	U	MS	0.5	2
	Chromium	3	ug/L	+/-10	U	MS	3	10
1203733717	Aluminum	68	ug/L	+/-200	U	P	68	200
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Calcium	50	ug/L	+/-200	U	P	50	200
	Copper	3	ug/L	+/-10	U	P	3	10
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Potassium	50	ug/L	+/-150	U	P	50	150
	Sodium	100	ug/L	+/-300	U	P	100	300
	Zinc	3.3	ug/L	+/-10	U	P	3.3	10
	Vanadium	1	ug/L	+/-5	U	P	1	5
	Tin	2.5	ug/L	+/-10	U	P	2.5	10
	Strontium	1	ug/L	+/-5	U	P	1	5
	Silica	53	ug/L	+/-213	U	P	53	213
	Manganese	2	ug/L	+/-10	U	P	2	10
	Iron	30	ug/L	+/-100	U	P	30	100
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Barium	1	ug/L	+/-5	U	P	1	5
1203739594	Mercury	-0.069	ug/L	+/-0.2	J	AV	0.067	0.2
1203748529	Molybdenum	0.3	ug/L	+/-0.5	U	MS	0.3	0.5

*Analytical Methods:

P SW846 3005A/6010C
MS SW846 3005A/6020A
AV EPA 245.1/245.2

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-1054 Client ID CAMO-17-129298S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 417066001 Spike ID: 1203733645

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Antimony	ug/L	75-125	49.3		1	U	50	97.8		MS
Arsenic	ug/L	75-125	52.8		1.7	U	50	105		MS
Cadmium	ug/L	75-125	53.1		0.3	U	50	106		MS
Chromium	ug/L	75-125	59.1		8.19	J	50	102		MS
Lead	ug/L	75-125	53.6		0.5	U	50	107		MS
Nickel	ug/L	75-125	50.9		1.61	J	50	98.6		MS
Selenium	ug/L	75-125	52.5		2	U	50	101		MS
Silver	ug/L	75-125	52		0.4	U	50	104		MS
Thallium	ug/L	75-125	48.6		0.775	J	50	95.6		MS
Uranium	ug/L	75-125	55.1		0.536		50	109		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-1054 Client ID CAMO-17-129298S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 417066001 Spike ID: 1203733720

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Aluminum	ug/L	75-125	4900		68	U	5000	98		P
Barium	ug/L	75-125	494		21.4		500	94.4		P
Beryllium	ug/L	75-125	482		1	U	500	96.3		P
Boron	ug/L	75-125	512		16.4	J	500	99		P
Calcium	ug/L	75-125	17600		12900		5000	94.2		P
Cobalt	ug/L	75-125	466		1	U	500	93.3		P
Copper	ug/L	75-125	493		3	U	500	98.6		P
Iron	ug/L	75-125	4770		30	U	5000	95.3		P
Magnesium	ug/L	75-125	8380		3770		5000	92.3		P
Manganese	ug/L	75-125	473		2	U	500	94.6		P
Potassium	ug/L	75-125	6080		1310		5000	95.5		P
Silica	ug/L		79000		68900		10700	94.8	N/A	P
Sodium	ug/L	75-125	13800		9690		5000	82.4		P
Strontium	ug/L	75-125	510		53.8		500	91.3		P
Tin	ug/L	75-125	481		2.5	U	500	95.9		P
Vanadium	ug/L	75-125	492		5.31		500	97.4		P
Zinc	ug/L	75-125	470		4.68	J	500	93.1		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-1054 Client ID CAMO-17-129302S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 416958001 Spike ID: 1203739598

<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	1.91		0.067	U	2	95.4		AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-1054 **Client ID:** CAMO-17-129298S**Contract:** ESHL00114 **Level:** Low**Matrix:** WATER **% Solids:****Sample ID:** 417066001 **Spike ID:** 1203748532

<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>
Molybdenum	ug/L	75-125	54.5		0.907		50	107		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-1054

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-17-129298D

Matrix: WATER

Level: Low

Sample ID: 417066001

Duplicate ID: 1203733644

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		1.7 U		2.97 J		200		MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-10	8.19 J		8.71 J		6.13		MS
Lead	ug/L		0.5 U		0.5 U				MS
Nickel	ug/L	+/-2	1.61 J		1.11 J		36.2		MS
Selenium	ug/L		2 U		2.09 J		200		MS
Silver	ug/L		0.4 U		0.4 U				MS
Thallium	ug/L		0.775 J		0.6 U		200		MS
Uranium	ug/L	+/-2	0.536		0.547		2.03		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-1054

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-17-129298D

Matrix: WATER

Level: Low

Sample ID: 417066001

Duplicate ID: 1203733719

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	21.4		21.2		.714		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	16.4 J		15 J		9.19		P
Calcium	ug/L	+/-20%	12900		13000		1.04		P
Cobalt	ug/L		1 U		1 U				P
Copper	ug/L		3 U		3 U				P
Iron	ug/L		30 U		63.9 J		200		P
Magnesium	ug/L	+/-20%	3770		3750		.586		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	1310		1280		1.99		P
Silica	ug/L	+/-20%	68900		70400		2.19		P
Sodium	ug/L	+/-20%	9690		9650		.464		P
Strontium	ug/L	+/-20%	53.8		52.9		1.85		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	5.31		5.63		5.94		P
Zinc	ug/L		4.68 J		3.3 U		200		P

*Analytical Methods:

P SW846 3005A/6010C

Metals
–6–
Duplicate Sample Summary

SDG No.: 2017–1054**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CAMO–17–129302D**Matrix:** WATER**Level:** Low**Sample ID:** 416958001**Duplicate ID:** 1203739596**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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Duplicate Sample Summary

SDG No.: 2017-1054**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CAMO-17-129298D**Matrix:** WATER**Level:** Low**Sample ID:** 417066001**Duplicate ID:** 1203748531**Percent Solids for Dup:** N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Molybdenum	ug/L	+/- .5	0.907		0.915		.878		MS

***Analytical Methods:**

MS SW846 3005A/6020A

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-1054

Contract: ESHL00114

Aqueous LCS Source:O2Si

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>
1203733643								
	Antimony	ug/L	50	50.5		101	80-120	MS
	Arsenic	ug/L	50	55.6		111	80-120	MS
	Cadmium	ug/L	50	54.8		110	80-120	MS
	Chromium	ug/L	50	53.9		108	80-120	MS
	Lead	ug/L	50	55.6		111	80-120	MS
	Nickel	ug/L	50	55.1		110	80-120	MS
	Selenium	ug/L	50	55.3		111	80-120	MS
	Silver	ug/L	50	54.8		110	80-120	MS
	Thallium	ug/L	50	50.2		100	80-120	MS
	Uranium	ug/L	50	55.2		110	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-1054

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>
1203733718								
	Aluminum	ug/L	5000	4930		98.6	80-120	P
	Barium	ug/L	500	483		96.6	80-120	P
	Beryllium	ug/L	500	483		96.6	80-120	P
	Boron	ug/L	500	499		99.7	80-120	P
	Calcium	ug/L	5000	5060		101	80-120	P
	Cobalt	ug/L	500	480		96.1	80-120	P
	Copper	ug/L	500	487		97.5	80-120	P
	Iron	ug/L	5000	4880		97.5	80-120	P
	Magnesium	ug/L	5000	4890		97.8	80-120	P
	Manganese	ug/L	500	482		96.3	80-120	P
	Potassium	ug/L	5000	4940		98.8	80-120	P
	Silica	ug/L	10700	10300		95.9	80-120	P
	Sodium	ug/L	5000	4750		95	80-120	P
	Strontium	ug/L	500	470		94	80-120	P
	Tin	ug/L	500	485		97	80-120	P
	Vanadium	ug/L	500	486		97.1	80-120	P
	Zinc	ug/L	500	475		95	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-1054

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>
1203739595	Mercury	ug/L	2	1.95		97.4	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2017-1054

Contract: ESHL00114

Aqueous LCS Source:O2Si

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>
1203748530	Molybdenum	ug/L	50	51.3		103	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-1054 **Client ID:** CAMO-17-129298L

Contract: ESHL00114

Matrix: LIQUID **Level:** Low

Sample ID: 417066001 **Serial Dilution ID:** 1203733646

<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	1.7	U	8.5	U				MS
Cadmium	.3	U	1.5	U				MS
Chromium	8.19	J	15	U	8.364			MS
Lead	.5	U	2.5	U				MS
Nickel	1.61	J	2.5	U	35.283			MS
Selenium	2	U	10	U				MS
Silver	.4	U	2	U				MS
Thallium	.775	J	3	U	252.903			MS
Uranium	.536		.6	J	11.94			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-1054

Client ID: CAMO-17-129298L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 417066001

Serial Dilution ID: 1203733721

<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	21.4		21.9	J	2.349			P
Beryllium	1	U	5	U				P
Boron	16.4	J	75	U	53.92			P
Calcium	12900		13000		1.057		10	P
Cobalt	1	U	5	U				P
Copper	3	U	939					P
Iron	30	U	150	U				P
Magnesium	3770		3690		2.045			P
Manganese	2	U	10	U				P
Potassium	1310		1190		9.071			P
Silica	68900		70400		2.203		10	P
Sodium	9690		9720		.336		10	P
Strontium	53.8		55.1		2.401		10	P
Tin	2.5	U	12.5	U				P
Vanadium	5.31		5.96	J	12.394			P
Zinc	4.68	J	39.7	J	747.182			P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-1054 **Client ID:** CAMO-17-129302L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 416958001 **Serial Dilution ID:** 1203739600

<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

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-1054 **Client ID:** CAMO-17-129298L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 417066001 **Serial Dilution ID:** 1203748533

<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>
Molybdenum	.907		1.5	U	.882			MS

*Analytical Methods:

MS SW846 3005A/6020A

General Chem Analysis

Case Narrative

**General Chemistry
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2017-1054
Work Order #: 417066**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1639822

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
417066002	CAMO-17-129314
1203731500	Method Blank (MB)
1203731501	Laboratory Control Sample (LCS)
1203731502	416658004(CAMO-17-129311) Sample Duplicate (DUP)
1203731504	416658004(CAMO-17-129311) 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# 14.

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 (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 416658004 (CAMO-17-129311) 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

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

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:	1641601	Method:	WSP-CN(T)
Prep Batch :	1641600	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
417066002	CAMO-17-129314
1203733647	Method Blank (MB)
1203733648	Laboratory Control Sample (LCS)
1203733649	417066002(CAMO-17-129314) Sample Duplicate (DUP)
1203733653	417066002(CAMO-17-129314) 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# 18.

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 (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 417066002 (CAMO-17-129314) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

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: Ion Chromatography

Analytical Batch: 1641697

Method: WSP-ANIONS

Sample Analysis

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

Sample ID	Client ID
417066001	CAMO-17-129298
1203733882	Method Blank (MB)
1203733883	Laboratory Control Sample (LCS)
1203733884	417152001(CAMO-17-129303) Sample Duplicate (DUP)
1203733885	417152001(CAMO-17-129303) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 417152001 (CAMO-17-129303) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The following samples 1203733884 (CAMO-17-129303DUP) and 1203733885 (CAMO-17-129303PS) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Manual Integrations

Samples 1203733884 (CAMO-17-129303DUP), 1203733885 (CAMO-17-129303PS) and 417066001 (CAMO-17-129298) 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:	1641817	Method:	NH3
Prep Batch :	1641816	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
417066001	CAMO-17-129298
1203734058	Method Blank (MB)
1203734059	Laboratory Control Sample (LCS)
1203734060	417067001(CAMO-17-129406) Sample Duplicate (DUP)
1203734062	417067001(CAMO-17-129406) 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# 9.

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 (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 417067001 (CAMO-17-129406) 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

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

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:	1640306	Method:	TKN
Prep Batch :	1640305	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
417066002	CAMO-17-129314
1203730613	Method Blank (MB)
1203730614	Laboratory Control Sample (LCS)
1203730617	416868002(CAMO-17-129356) Sample Duplicate (DUP)
1203730620	416868002(CAMO-17-129356) 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# 14.

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 (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 416868002 (CAMO-17-129356) 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	1203730620 (CAMO-17-129356MS)	85.6* (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 following sample 417066002 (CAMO-17-129314) in this sample group was diluted due to matrix interference. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	417066
	002
Nitrogen, Total Kjeldahl	5X

Sample Re-analysis

Sample 1203730614 (LCS) was re-analyzed due to instrument failure. The results from the reanalysis are reported. Samples were accidentally re-analyzed. 417066002 (CAMO-17-129314).

Miscellaneous Information**Data Exception (DER) Documentation**

A data exception report (DER) 1609372 was generated for samples 417066002 (CAMO-17-129314) and 1203730620 (CAMO-17-129356MS) in this SDG/batch.

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Nitrate Nitrite by Cadmium Reduction

Analytical Batch: 1641426

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
417066001	CAMO-17-129298
1203733281	Method Blank (MB)
1203733282	Laboratory Control Sample (LCS)
1203734067	417067001(CAMO-17-129406) Sample Duplicate (DUP)
1203734070	417067001(CAMO-17-129406) 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# 8.

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 (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 417067001 (CAMO-17-129406) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

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:	1639607	Method:	PO4
Prep Batch :	1639606	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
417066001	CAMO-17-129298
1203728889	Method Blank (MB)
1203728890	Laboratory Control Sample (LCS)
1203728893	416658001(CAMO-17-129294) Sample Duplicate (DUP)
1203728894	416658001(CAMO-17-129294) 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# 10.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 416658001 (CAMO-17-129294) 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

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

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: 1641423

Method: TDS

Sample Analysis

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

Sample ID	Client ID
417066001	CAMO-17-129298
1203733266	Method Blank (MB)
1203733267	Laboratory Control Sample (LCS)
1203733268	417066001(CAMO-17-129298) 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 (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Consecutive Weight Checks

All consecutive weight checks were met.

Quality Control (QC) Designation

Sample 417066001 (CAMO-17-129298) 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

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

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: 1642194

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
417066001	CAMO-17-129298
1203734867	Laboratory Control Sample (LCS)
1203734868	417066001(CAMO-17-129298) 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# 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 Orion 160 Conductivity Meter.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 417066001 (CAMO-17-129298) 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

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

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: 1642723 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
417066001	CAMO-17-129298
1203736201	Laboratory Control Sample (LCS)
1203736202	417305009(CASA-17-130020) Sample Duplicate (DUP)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 417305009 (CASA-17-130020) 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
1203736202 (CASA-17-130020DUP)	pH	Received 24-FEB-17, out of holding 22-FEB-17
417066001 (CAMO-17-129298)	pH	Received 22-FEB-17, out of holding 17-FEB-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

Data Exception (DER) Documentation

A data exception report (DER) 1614308 was generated for samples 417066001 (CAMO-17-129298) and 1203736202 (CASA-17-130020DUP) in this SDG/batch.

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: 1642724 **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
417066001	CAMO-17-129298
1203736203	Laboratory Control Sample (LCS)
1203736204	417305009(CASA-17-130020) Sample Duplicate (DUP)
1203736205	417305009(CASA-17-130020) 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 manually operated 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 (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 417305009 (CASA-17-130020) 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

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

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: 2017-1054 GEL Work Order: 417066


The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Aubrey Kingsbury

Date: 20 MAR 2017

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 20, 2017

Company : Los Alamos National Laboratory
Address : TA-03, SM271, Drop Pt. 02U, Rm111

Los Alamos, New Mexico 87545
Contact: Mr. Keith Greene
Project: LANL- WQH Water Samples

Client SDG: 2017-1054

Client Sample ID: CAMO-17-129298
Sample ID: 417066001
Matrix: W
Collect Date: 17-FEB-17 11:50
Receive Date: 22-FEB-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide	U	ND	0.067	0.200	mg/L		1	MXL2	02/24/17	1243	1641697	1
Chloride		2.14	0.067	0.200	mg/L		1					
Fluoride		0.289	0.033	0.100	mg/L		1					
Sulfate		2.58	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.0617	0.017	0.050	mg/L	1.00	1	KLP1	02/23/17	1144	1641817	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		0.632	0.017	0.050	mg/L		1	KLP1	02/27/17	1556	1641426	3
PO4 "As Received"												
Phosphorus, Total as P		0.153	0.020	0.050	mg/L	1.00	1	KLP1	02/28/17	1355	1639607	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		180	3.40	14.3	mg/L			KLP1	02/23/17	1146	1641423	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		67.0	1.45	4.00	mg/L			RXB5	03/03/17	1503	1642724	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		190	1.00	1.00	umhos/cm		1	VH1	02/24/17	1408	1642194	7
PH "As Received"												
pH at Temp 16.4C	H	8.01	0.010	0.100	SU		1	RXB5	03/03/17	1503	1642723	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	KLP1	02/23/17	1110	1641816
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	02/27/17	1900	1639606

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 20, 2017

Company : Los Alamos National Laboratory
Address : TA-03, SM271, Drop Pt. 02U, Rm111

Los Alamos, New Mexico 87545
Contact: Mr. Keith Greene
Project: LANL- WQH Water Samples

Client SDG: 2017-1054

Client Sample ID: CAMO-17-129298
Sample ID: 417066001

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

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

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 20, 2017

Company : Los Alamos National Laboratory
Address : TA-03, SM271, Drop Pt. 02U, Rm111

Los Alamos, New Mexico 87545

Contact: Mr. Keith Greene
Project: LANL- WQH Water Samples

Client SDG: 2017-1054

Client Sample ID: CAMO-17-129314
Sample ID: 417066002
Matrix: W
Collect Date: 17-FEB-17 11:50
Receive Date: 22-FEB-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	U	ND	0.330	1.00	mg/L		1	TSM	02/25/17	1223	1639822	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	02/23/17	1126	1641601	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.165	0.500	mg/L	1.00	5	KLP1	03/02/17	1031	1640306	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	02/23/17	0839	1641600
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	03/01/17	1500	1640305

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

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

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: March 20, 2017

Page 1 of 6

Los Alamos National Laboratory
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico

Contact: Mr. Keith Greene

Workorder: 417066

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1639822										
QC1203731502	416658004	DUP									
Total Organic Carbon Average		U	ND	U	ND	mg/L	N/A		TSM	02/24/17	20:30
QC1203731501	LCS										
Total Organic Carbon Average	10.0				10.8	mg/L	108	(80%-120%)		02/24/17	18:15
QC1203731500	MB										
Total Organic Carbon Average			U	ND	mg/L					02/24/17	17:28
QC1203731504	416658004	PS									
Total Organic Carbon Average	10.0	U	ND		11.0	mg/L	108	(75%-125%)		02/24/17	21:14
Flow Injection Analysis											
Batch	1641601										
QC1203733649	417066002	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	02/23/17	11:27
QC1203733648	LCS										
Cyanide, Total	50.0				54.9	ug/L	110	(90%-110%)		02/23/17	11:21
QC1203733647	MB										
Cyanide, Total			U	ND	ug/L					02/23/17	11:20
QC1203733653	417066002	MS									
Cyanide, Total	100	U	ND		108	ug/L	108	(90%-110%)		02/23/17	11:28
Ion Chromatography											
Batch	1641697										
QC1203733884	417152001	DUP									
Bromide		J	0.121	J	0.113	mg/L	7.1 ^	(+/-0.200)	MXL2	02/24/17	14:41

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QC Summary

Workorder: 417066

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1641697										
Chloride		11.2		11.3	mg/L	0.221		(0%-20%)	MXL2	02/24/17	17:08
Fluoride		0.150		0.147	mg/L	2.15	^	(+/-0.100)		02/24/17	14:41
Sulfate		20.1		20.1	mg/L	0.277		(0%-20%)		02/24/17	17:08
QC1203733883	LCS										
Bromide	1.25			1.19	mg/L		95.4	(80%-120%)		02/24/17	10:08
Chloride	5.00			4.64	mg/L		92.8	(80%-120%)			
Fluoride	2.50			2.45	mg/L		97.9	(80%-120%)			
Sulfate	10.0			9.64	mg/L		96.4	(80%-120%)			
QC1203733882	MB										
Bromide			U	ND	mg/L					02/24/17	09:39
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203733885	417152001	PS									
Bromide	1.25	J	0.121	1.29	mg/L		93.1	(75%-125%)		02/24/17	15:10
Chloride	5.00		5.62	11.0	mg/L		108	(75%-125%)		02/24/17	17:37
Fluoride	2.50		0.150	2.41	mg/L		90.5	(75%-125%)		02/24/17	15:10
Sulfate	10.0		10.1	20.3	mg/L		102	(75%-125%)		02/24/17	17:37

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QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1639607										
QC1203728893	416658001	DUP									
Phosphorus, Total as P		0.171		0.158	mg/L	7.9 ^		(+/-0.050)	KLP1	02/28/17	13:38
QC1203728890	LCS										
Phosphorus, Total as P	1.00			1.01	mg/L		101	(80%-124%)		02/28/17	13:24
QC1203728889	MB										
Phosphorus, Total as P			U	ND	mg/L					02/28/17	13:24
QC1203728894	416658001	MS									
Phosphorus, Total as P	1.00	0.171		1.33	mg/L		116	(63%-139%)		02/28/17	13:39
Batch	1640306										
QC1203730617	416868002	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A		KLP1	03/02/17	10:18
QC1203730614	LCS										
Nitrogen, Total Kjeldahl	1.00			1.03	mg/L		103	(90%-110%)		03/02/17	10:05
QC1203730613	MB										
Nitrogen, Total Kjeldahl			U	ND	mg/L					03/02/17	09:52
QC1203730620	416868002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND	0.856	mg/L		85.6*	(90%-110%)		03/02/17	10:19
Batch	1641426										
QC1203734067	417067001	DUP									
Nitrogen, Nitrate/Nitrite		0.693		0.695	mg/L	0.288		(0%-20%)	KLP1	02/27/17	15:59
QC1203733282	LCS										
Nitrogen, Nitrate/Nitrite	1.00			0.932	mg/L		93.2	(90%-110%)		02/27/17	15:41
QC1203733281	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					02/27/17	15:40

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1641426										
QC1203734070	417067001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.693		1.67	mg/L		97.7	(90%-110%)	KLP1	02/27/17	16:00
Batch	1641817										
QC1203734060	417067001	DUP									
Nitrogen, Ammonia	J	0.0277		0.0628	mg/L	77.6	^	(+/-0.050)	KLP1	02/23/17	11:46
QC1203734059	LCS										
Nitrogen, Ammonia	1.00			0.994	mg/L		99.4	(90%-110%)		02/23/17	11:32
QC1203734058	MB										
Nitrogen, Ammonia		U		ND	mg/L					02/23/17	11:31
QC1203734062	417067001	MS									
Nitrogen, Ammonia	1.00	J	0.0277	0.973	mg/L		94.5	(90%-110%)		02/23/17	11:46
Solids Analysis											
Batch	1641423										
QC1203733268	417066001	DUP									
Total Dissolved Solids		180		177	mg/L	1.6		(0%-5%)	KLP1	02/23/17	11:46
QC1203733267	LCS										
Total Dissolved Solids	300			293	mg/L		97.6	(95%-105%)		02/23/17	11:46
QC1203733266	MB										
Total Dissolved Solids		U		ND	mg/L					02/23/17	11:46
Titration and Ion Analysis											
Batch	1642194										
QC1203734868	417066001	DUP									
Conductivity		190		190	umhos/cm	0.105		(0%-10%)	VH1	02/24/17	14:08
QC1203734867	LCS										
Conductivity	1410			1390	umhos/cm		98.2	(95%-105%)		02/24/17	14:06

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QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1642723										
QC1203736202	417305009	DUP									
pH		H	8.53	H	8.52	SU	0.117	(0%-5%)	RXB5	03/03/17	14:18
QC1203736201	LCS										
pH	7.00				6.97	SU	99.6	(99%-101%)		03/03/17	13:51
Batch	1642724										
QC1203736204	417305009	DUP									
Alkalinity, Total as CaCO3			122		121	mg/L	0.823	(0%-20%)	RXB5	03/03/17	14:17
Carbonate alkalinity (CaCO3)			6.00		6.00	mg/L	0 ^	(0%-20%)			
QC1203736203	LCS										
Alkalinity, Total as CaCO3	100				109	mg/L	109	(90%-110%)		03/03/17	13:51
QC1203736205	417305009	MS									
Alkalinity, Total as CaCO3	100		122		228	mg/L	106	(80%-120%)		03/03/17	14:21

Notes:

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

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QC Summary

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

Miscellaneous

DATA EXCEPTION REPORT

Mo.Day Yr. 02-MAR-17	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: LACHAT Flow Injection Analyzer	Test / Method: EPA 351.2, EPA 351.2 SC	Matrix Type: Liquid	Client Code: BEAL, BETT, CCUV, ESHL,
Batch ID: 1640306	Sample Numbers: See Below		
<p>Potentially affected work order(s)(SDG): 416677(BEA01-323-03),416709,416786(LMP17026013A_WCH),416793,416868(2017-1029),416958(2017-1050),417066(2017-1054),417150(2017-1060),417152(2017-1058),417305(2017-1078)</p> <p>Application Issues:</p> <p>Failed Recovery for MS/MSD, or PS/PSD Container scanning event for custody missed Failed RPD for DUP</p>			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. Container scanning event for custody missed:</p> <p>416677 003,009</p> <p>416709 003,007,011</p> <p>416786 002,006,009</p> <p>416793 001,002,003,004,005</p> <p>416868 002</p> <p>416958 002,004</p> <p>417066 002</p> <p>417150 001</p> <p>417152 002</p> <p>417305 007</p> <p>2. Failed RPD for DUP:</p> <p>QC 1203730615DUP</p> <p>3. Failed Recovery for MS/MSD, or PS/PSD:</p> <p>QC 1203730618MS,</p> <p>1203730619MS,</p> <p>1203730620MS</p>		<p>1. Scanning was accidentally missed by analyst. Samples were in custody at time of analysis.</p> <p>2. 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: Nitrogen, Total Kjeldahl 1203730615 (BEA01-323-09DUP) [abs(.25 - .407)* (+/-1 mg/L)].</p> <p>3. The matrix spike recovered outside of the established acceptance limits due to matrix interference and/or non-homogeneity. Nitrogen, Total Kjeldahl 1203730618 (BEA01-323-09MS) [72.3* (90%-110%)], 1203730619 (LMP17026019AMS) [120* (90%-110%)] and 1203730620 (CAMO-17-129356MS) [85.6* (90%-110%)].</p>	

Originator's Name:

Kristen Mizzell 02-MAR-17

Data Validator/Group Leader:

Aubrey Kingsbury 02-MAR-17

DATA EXCEPTION REPORT			
Mo.Day Yr. 16-MAR-17	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ELECTRODE	Test / Method: EPA 150.1, SM 4500-H B	Matrix Type: Liquid	Client Code: ESHL
Batch ID: 1642723	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 417066(2017-1054),417150(2017-1060),417152(2017-1058),417305(2017-1078) Application Issues: Sample received out of holding			
Specification and Requirements		DER Disposition:	
Exception Description:			
1. Sample received out of holding: 417066 001 417150 002 417152 001 417305 002,004,005,007,009 QC 1203736202DUP		1. Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified. 1203736202 (CASA-17-130020DUP) [Received 24-FEB-17, out of holding 22-FEB-17]. 417066001 (CAMO-17-129298) [Received 22-FEB-17, out of holding 17-FEB-17]. 417150002 (CAMO-17-129413) [Received 23-FEB-17, out of holding 21-FEB-17]. 417152001 (CAMO-17-129303) [Received 23-FEB-17, out of holding 21-FEB-17]. 417305002 (CASA-17-130018) [Received 24-FEB-17, out of holding 22-FEB-17]. 417305004 (CASA-17-130019) [Received 24-FEB-17, out of holding 22-FEB-17]. 417305005 (CASA-17-130022) [Received 24-FEB-17, out of holding 22-FEB-17]. 417305007 (CASA-17-130025) [Received 24-FEB-17, out of holding 22-FEB-17]. 417305009 (CASA-17-130020) [Received 24-FEB-17, out of holding 22-FEB-17].	

Originator's Name:

Rachael Bell 16-MAR-17

Data Validator/Group Leader:

Elzbieta Szulc 17-MAR-17