

The order of this data package is as follows:

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

Comments:

[illegible]

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11366

EVENT NAME: Mortandad/Sandia (Cr Inv) MY2017 Q4

SAMPLE ID: CAMO-17-141989

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	8/7/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1242		MEDIA:	UA	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	MCOI-6		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	MS 8/7/17 500 ML POLY 1000	1	HNO3	Y	NA
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS: Sampled 30ft from running diesel generator, sampled during heavy rains and strong winds

LOCATION COMMENTS: None

FIELD PARAMETERS:

Sample Time	1242	HH:MM	Dissolved Oxygen	6.92	Flow (in gpm)	1.08
Oxidation-Reduction Potential	170.4		pH	6.95	Specific Conductance	560
Temperature	16.5		Turbidity	0.39		

COLLECTED BY (PRINT): M. Shendo & D. Jaramillo

RELINQUISHED BY (Printed Name) Daniel Jaramillo (Signature) <i>[Signature]</i>	Date/Time 8/7/2017 1434	RECEIVED BY MATT ENGLERT (Printed Name) <i>[Signature]</i> (Signature)	Date/Time 8-7-2017 1434
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 07/25/2017

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11366

EVENT NAME: Mortandad/Sandia (Cr Inv) MY2017 Q4

SAMPLE ID: CAMO-17-142777

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	8/7/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1242		MEDIA:	UA	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	MCOI-6		FIELD PREP:	F	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

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

SAMPLE COMMENTS: None

LOCATION COMMENTS: None

FIELD PARAMETERS:

Sample Time _____ HH:MM _____ Dissolved Oxygen _____ Flow (in gpm) _____
 Oxidation-Reduction Potential _____ pH _____ Specific Conductance _____
 Temperature _____ Turbidity _____

KT 8/7/17

COLLECTED BY (PRINT): M. Shendo, D. Jaramillo

RELINQUISHED BY (Printed Name) Daniel Jaramillo (Signature) <i>DJ</i>	Date/Time 8/7/2017 1434	RECEIVED BY MATT ENGLERT (Printed Name) <i>M. Englert</i> (Signature) <i>M. Englert</i>	Date/Time 8-7-2017 1434
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

DATA VALIDATION REPORT

Chain Of Custody No. 2017-2376

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
430079	EPA:120.1	1				
430079	EPA:150.1	1				
430079	EPA:160.1	1				
430079	EPA:170.0	2				
430079	EPA:245.2	2				
430079	EPA:300.0	1				
430079	EPA:310.1	1				
430079	EPA:335.4	1				
430079	EPA:350.1	1				
430079	EPA:351.2	1				
430079	EPA:353.2	1				
430079	EPA:365.4	1				
430079	SM:A2340B	1				
430079	SW-846:6010C	1				
430079	SW-846:6020	1				
430079	SW-846:6850	1				
430079	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
430079	EPA:120.1	1697373	1697373	1										1			1				
430079	EPA:150.1	1692037	1692037	1										1			2				
430079	EPA:160.1	1690995	1690995	1					1					1			1				
430079	EPA:170.0	NA	NA	2																	
430079	EPA:245.2	1695634	1695628	2					1	1				1			1				
430079	EPA:300.0	1691290	1691290	1					1					1			2				
430079	EPA:310.1	1692036	1692036	1						2				1			2				

DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
430079	EPA:335.4	1690385	1690384	1					1	1				1				1			
430079	EPA:350.1	1692776	1692775	1					1	2				1				2			
430079	EPA:351.2	1692771	1692769	1					1	2				1				2			
430079	EPA:353.2	1690125	1690125	1					1									1			
430079	EPA:365.4	1692784	1692782	1					1	2				1				2			
430079	SM:A2340B	1698035	1698035	1																	
430079	SW-846:6010C	1690207	1690206	1					1	1				1				1			
430079	SW-846:6020	1690228	1690227	1					1	1				1				1			
430079	SW-846:6850	1690518	1690517	1					1	1	1			1							
430079	SW-846:9060	1690350	1690350	1					1					1				2			

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-17-142777	1203866951	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-142777	430079002	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203866950	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-142053	1203854923	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-142777	1203854922	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-142777	430079002	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203854921	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-142053	1203852305	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-142777	430079002	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203852303	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203852302	MB	1	0	0	0
EPA:170.0	VOC	CAMO-17-141989	430079001	REG	1	0	0	0
EPA:170.0	VOC	CAMO-17-142777	430079002	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-141986	1203862862	DUP	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-141986	1203862864	MS	0	0	1	0
EPA:245.2	INORGANIC	CAMO-17-141989	430079001	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-142777	430079002	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203862861	LCS	0	0	1	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:245.2	INORGANIC	MB	1203862860	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-17-141976	1203853102	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-17-142777	430079002	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-142776	1203853103	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203853101	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203853100	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-142053	1203854904	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-142053	1203854906	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-142777	1203854903	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-142777	1203854905	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-142777	430079002	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203854902	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-141989	1203850685	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-141989	1203850688	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-141989	430079001	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203850684	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203850683	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-141976	1203856529	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-141976	1203856532	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-142777	430079002	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203856527	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203856526	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	WT_SEP-PO-17-140750	1203856528	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	WT_SEP-PO-17-140750	1203856531	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-141989	430079001	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-141990	1203856517	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-141990	1203856519	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-141992	1203856516	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-141992	1203856518	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203856515	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203856514	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-17-142777	430079002	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203850126	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	WST22-17-143234	1203850130	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-142777	1203856570	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-142777	1203856573	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-142777	430079002	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203856567	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203856566	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	WT_SEP-PO-17-140750	1203856568	DUP	1	0	0	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:365.4	GENERAL CHEMISTRY	WT_SEP-PO-17-140750	1203856571	MS	0	0	1	0
SM:A2340B	INORGANIC	CAMO-17-142777	430079002	REG	1	0	0	0
SW-846:6010C	INORGANIC	CAMO-17-142777	1203850313	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-17-142777	1203850314	MS	0	0	17	0
SW-846:6010C	INORGANIC	CAMO-17-142777	430079002	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203850312	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203850311	MB	17	0	0	0
SW-846:6020	INORGANIC	CAMO-17-142777	1203850372	DUP	11	0	0	0
SW-846:6020	INORGANIC	CAMO-17-142777	1203850373	MS	0	0	11	0
SW-846:6020	INORGANIC	CAMO-17-142777	430079002	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203850371	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203850370	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-141979	1203851077	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-141979	1203851078	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-142777	430079002	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203851076	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203851075	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-141989	1203856725	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-141989	430079001	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203856724	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203856723	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	WT_SIP-17-135652	1203856726	DUP	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

DATA VALIDATION REPORT

Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name	Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
MB	1203850311	METHOD BLANK	SW-846:6010C	W	Potassium	133	J	ug/L	150

No.

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-17-142777	1203850314		SW-846:6010C	Calcium	1690206	08-31-2017	W	163		125	75			
CAMO-17-142777	1203850314		SW-846:6010C	Calcium	1690206	08-31-2017	W	163		125	75			

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?

DATA VALIDATION REPORT

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Parameter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detect Flag	Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent	Analysis Lot ID	Validation Status Code	Use Flag
MCOI-6	2017-2376	CAMO-17-142777	REG	INIT	INORGANIC	SW-846:6010C	Calcium	J+	I6b		Y	61000	ug/L	61	mg/L			W	08/07/2017	1690207	VAL	Y	

Reason Code

Description

I6b

The associated matrix spike recovery was above the Upper Acceptance Limit (UAL). Follow the external laboratory limits located within the associated data package.

J_LAB

The analytical laboratory qualified the detected result as estimated (J) because the result was less the PQL but greater than the MDL

NQ

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

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-17-141989	MCOI-6	REG	EPA:170.0	0	1
CAMO-17-141989	MCOI-6	REG	EPA:245.2	0	1
CAMO-17-141989	MCOI-6	REG	EPA:335.4	0	1
CAMO-17-141989	MCOI-6	REG	EPA:351.2	0	1
CAMO-17-141989	MCOI-6	REG	SW-846:9060	0	1
CAMO-17-142777	MCOI-6	REG	EPA:120.1	0	1
CAMO-17-142777	MCOI-6	REG	EPA:150.1	0	1
CAMO-17-142777	MCOI-6	REG	EPA:160.1	0	1
CAMO-17-142777	MCOI-6	REG	EPA:170.0	0	1

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-17-142777	MCOI-6	REG	EPA:245.2	0	1
CAMO-17-142777	MCOI-6	REG	EPA:300.0	0	4
CAMO-17-142777	MCOI-6	REG	EPA:310.1	0	2
CAMO-17-142777	MCOI-6	REG	EPA:350.1	0	1
CAMO-17-142777	MCOI-6	REG	EPA:353.2	0	1
CAMO-17-142777	MCOI-6	REG	EPA:365.4	0	1
CAMO-17-142777	MCOI-6	REG	SM:A2340B	0	1
CAMO-17-142777	MCOI-6	REG	SW-846:6010C	0	17
CAMO-17-142777	MCOI-6	REG	SW-846:6020	0	11
CAMO-17-142777	MCOI-6	REG	SW-846:6850	0	1



September 01, 2017

gel.com

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

Re: LANL- WQH Water Samples
Work Order: 430079
SDG: 2017-2376

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on August 09, 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,

Katrina Hiott for
Valerie Davis
Project Manager

Chain of Custody: 2017-2376
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 430079
SDG: 2017-2376

Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	5
Data Review Qualifier Flag Definition Sheet.....	9
Perchlorates by LCMSMS Analysis.....	12
Case Narrative.....	13
Sample Data Summary.....	19
Quality Control Summary.....	21
Quality Control Data.....	24
Metals Analysis.....	30
Case Narrative.....	31
Sample Data Summary.....	36
Quality Control Summary.....	41
General Chem Analysis.....	55
Case Narrative.....	56
Sample Data Summary.....	86
Quality Control Summary.....	90

Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 430079
SDG # : 2017-2376**

September 01, 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 August 09, 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>
430079001	CAMO-17-141989
430079002	CAMO-17-142777

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.


Katrina Hiott for
Valerie Davis
Project Manager

List of current GEL Certifications as of 01 September 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-23
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Chain of Custody and Supporting Documentation

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ESHL</u>		SDG/AR/COC/Work Order: <u>430079</u>	
Received By: <u>ZKW</u>		Date Received: <u>8/9/17</u>	
Carrier and Tracking Number		Circle Applicable:	
		<input checked="" type="checkbox"/> FedEx Express <input checked="" type="checkbox"/> FedEx Ground <input checked="" type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <u>5908 1782 5163</u> <u>5908 1782 5152</u> <u>5908 1782 5141</u>	
Suspected Hazard Information		Yes	No
Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
COC/Samples marked or classified as radioactive?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Is package, COC, and/or Samples marked HAZ?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation. Hazard Class Shipped: _____ UN#: _____ Maximum Net Counts Observed (Observed Counts - Area Background Counts): <u>0</u> CPM/mR/Hr Classified as: Rad 1 Rad 2 Rad 3 If yes, select Hazards below, and contact the GEL Safety Group. <input checked="" type="checkbox"/> PCB's <input type="checkbox"/> Flammable <input type="checkbox"/> Foreign Soil <input type="checkbox"/> RCRA <input type="checkbox"/> Asbestos <input type="checkbox"/> Beryllium <input type="checkbox"/> Other:			
Sample Receipt Criteria		Yes	NA
1 Shipping containers received intact and sealed?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
2 Chain of custody documents included with shipment?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		<input checked="" type="checkbox"/>	<input type="checkbox"/>
4 Daily check performed and passed on IR temperature gun?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
5 Sample containers intact and sealed?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
6 Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
7 Do any samples require Volatile Analysis?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
8 Samples received within holding time?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
9 Sample ID's on COC match ID's on bottles?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
10 Date & time on COC match date & time on bottles?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
11 Number of containers received match number indicated on COC?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
12 Are sample containers identifiable as GEL provided?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
13 COC form is properly signed in relinquished/received sections?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments (Use Continuation Form if needed): <u>* Samples -142071, -142072, -142053, -142060, -142065, and -142067 have a collect time of 12:24 on samples</u>			

PM (or PMA) review: Initials MECH Date 8/9/17 Page 1 of 1

KEITH GREENE (505) 665-9966
LOS ALAMOS NATL LAB
TA00 BLDG 1237 DPU 03

J17
J MAN
JAFE2916

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

ACTWGT: 55.0 LB 11MM
CAD: 0014176/CAFE2916

BILL SENDER

LOS ALAMOS, NM 87545
UNITED STATES US

LOS ALAMOS, NM 87545
UNITED STATES US

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

CHARLESTON SC 29407

(843) 666-8171

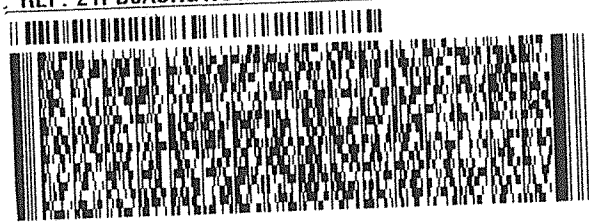
(843) 666-8171

REF: 21PD0ASRGW04BAGWEO

REF: 21PD0ASRGW04BAGWEO



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Express



FedEx
Express



2 of 3
MPS# 5908 1782 5152
Mstr# 5908 1782 5141

WED - 09 AUG 10:30A
PRIORITY OVERNIGHT

X7 RBWA

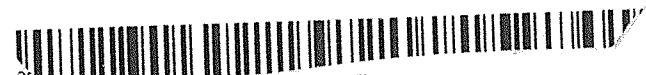
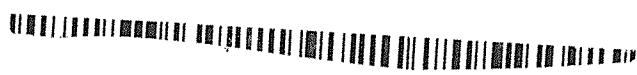
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SC-US CHS

1 of 3
TRK# 5908 1782 5141
0201
MASTER

WED - 09 AUG 10:30
PRIORITY OVERNIGHT

X7 RBWA

29407
SC-US CH



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

SH
P

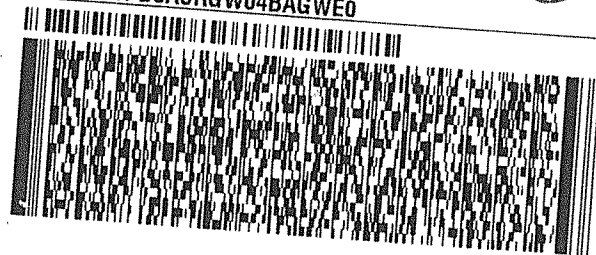
LOS ALAMOS, NM 87545
UNITED STATES US

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 666-8171

REF: 21PD0ASRGW04BAGWEO



FedEx
Exp

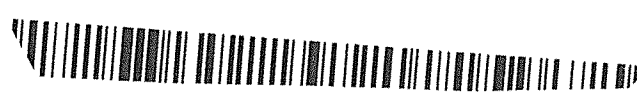


3 of 3
MPS# 5908 1782 5163
0263
Mstr# 5908 1782 5141

WED - 09 AUG 10:30
PRIORITY OVERNIGHT

X7 RBWA

29407
SC-US CH



Data Review Qualifier Flag Definition Sheet

Data Review Qualifier Definitions

Qualifier Explanation

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a surrogate compound

< Result is less than value reported

> Result is greater than value reported

^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL

A The TIC is a suspected aldol-condensation product

B Target analyte was detected in the associated blank

B Metals-Either presence of analyte detected in the associated blank, or
MDL/IDL < sample value < PQL

BD Results are either below the MDC or tracer recovery is low

C Analyte has been confirmed by GC/MS analysis

D Results are reported from a diluted aliquot of the sample

d 5-day BOD-The 2:1 depletion requirement was not met for this sample

E Organics-Concentration of the target analyte exceeds the instrument calibration range

E Metals-%difference of sample and SD is >10%. Sample concentration must meet flagging criteria

H Analytical holding time was exceeded

h Preparation or preservation holding time was exceeded

J Value is estimated

N Metals-The Matrix spike sample recovery is not within specified control limits

N Organics-Presumptive evidence based on mass spectral library search to make a tentative
identification of the analyte (TIC). Quantitation is based on nearest internal standard
response factor

N/A Spike recovery limits do not apply. Sample concentration exceeds spike concentration
by 4X or more

ND Analyte concentration is not detected above the reporting limit

UI Gamma Spectroscopy-Uncertain identification

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Y QC Samples were not spiked with this compound

Z Paint Filter Test-Particulates passed through the filter, however no free liquids were observed.

P Organics-The concentrations between the primary and confirmation columns/detectors is >40% difference.
For HPLC, the difference is >70%.

U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2017-2376
Work Order #: 430079**

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: 1690518

Prep Batch Number: 1690517

Sample Analysis

Sample ID	Client ID
430079002	430079002 (CAMO-17-142777)
1203851079	Interference Check Sample (ICS)
1203851075	Method Blank (MB)
1203851076	Laboratory Control Sample (LCS)
1203851077	429324001(CAMO-17-141979) Matrix Spike (MS)
1203851078	429324001(CAMO-17-141979) 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 429324001 (CAMO-17-141979) 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

Sample 430079002 (CAMO-17-142777) was diluted to bring the over range concentration within the calibration range.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information**Manual Integrations**

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

Method Comments

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

Additional Comments

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

Perchlorate Isotope Ratio

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

System Configuration

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

Electronic Packaging Comment

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

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

Chromatographic Columns

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

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

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2017-2376 GEL Work Order: 430079

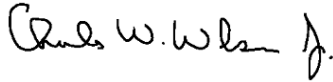
The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Charles Wilson

Date: 16 AUG 2017

Title: Analyst II

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1690517Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-142777Date Received: 09-AUG-17GEL Job No (SDG): 2017-2376GEL Sample ID: 430079002Date Filtered: 10-AUG-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	5	20	82.9	ug/L		100	11-AUG-17 18:26	per0811030a
	Perchlorate Isotope Ratio			2.95			100	11-AUG-17 18:26	per0811030a
14797-73-0	Perchlorate-101	5	20	82.4	ug/L		100	11-AUG-17 18:26	per0811030a
	Perchlorate-O(18)			48.1	ug/L		100	11-AUG-17 18:26	per0811030a

^ 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): 2017-2376

Extract Batch Code: 1690517

Date Filtered: 10-AUG-17

Matrix: WATER

Sample ID: 1203851076

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.21	ug/L	105		85 - 115
Perchlorate Isotope Ratio		3.26				-
Perchlorate-101	0.200	.189	ug/L	94		85 - 115
Perchlorate-O(18)		.48	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): 2017-2376

Extract Batch Code: 1690517

Date Extracted: 10-AUG-17

GEL MS/PS ID: 1203851077

Client ID: CAMO-17-141979

GEL MSD/PSD ID: 1203851078

QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	1.13	ug/L	1.33	100	1.34	107	1	30	75 - 125
Perchlorate Isotope Ratio	0	2.94		2.94		2.87		2		-
Perchlorate-101	0.200	1.12	ug/L	1.33	101	1.37	122	3	30	75 - 125
Perchlorate-O(18)	0	0.527	ug/L	0.517		.503		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: 1690517Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 10-AUG-17GEL Job No (SDG): 2017-2376GEL Sample ID: 1203851075Date Filtered: 10-AUG-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.050	ug/L	U	1	11-AUG-17 14:37	per0811013a
	Perchlorate Isotope Ratio						1	11-AUG-17 14:37	per0811013a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	11-AUG-17 14:37	per0811013a
	Perchlorate-O(18)			0.492	ug/L		1	11-AUG-17 14:37	per0811013a

^ 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: 1690517Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 10-AUG-17GEL Job No (SDG): 2017-2376GEL Sample ID: 1203851076Date Filtered: 10-AUG-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	0.210	ug/L		1	11-AUG-17 14:50	per0811014a
	Perchlorate Isotope Ratio			3.26			1	11-AUG-17 14:50	per0811014a
14797-73-0	Perchlorate-101	.05	.2	0.189	ug/L	J	1	11-AUG-17 14:50	per0811014a
	Perchlorate-O(18)			0.480	ug/L		1	11-AUG-17 14:50	per0811014a

^ 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: 1690517Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2017-2376GEL Sample ID: 1203851079Date Filtered: 10-AUG-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	0.237	ug/L		1	11-AUG-17 15:04	per0811015a
	Perchlorate Isotope Ratio			3.16			1	11-AUG-17 15:04	per0811015a
14797-73-0	Perchlorate-101	.05	.2	0.219	ug/L		1	11-AUG-17 15:04	per0811015a
	Perchlorate-O(18)			0.484	ug/L		1	11-AUG-17 15:04	per0811015a

^ 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: 1690517Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-141979MSDate Received: 01-AUG-17GEL Job No (SDG): 2017-2376GEL Sample ID: 1203851077Date Filtered: 10-AUG-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	1.33	ug/L		1	11-AUG-17 15:31	per0811017a
	Perchlorate Isotope Ratio			2.94			1	11-AUG-17 15:31	per0811017a
14797-73-0	Perchlorate-101	.05	.2	1.33	ug/L		1	11-AUG-17 15:31	per0811017a
	Perchlorate-O(18)			0.517	ug/L		1	11-AUG-17 15:31	per0811017a

^ 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: 1690517Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-141979MSDDate Received: 01-AUG-17GEL Job No (SDG): 2017-2376GEL Sample ID: 1203851078Date Filtered: 10-AUG-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	1.34	ug/L		1	11-AUG-17 15:44	per0811018a
	Perchlorate Isotope Ratio			2.87			1	11-AUG-17 15:44	per0811018a
14797-73-0	Perchlorate-101	.05	.2	1.37	ug/L		1	11-AUG-17 15:44	per0811018a
	Perchlorate-O(18)			0.503	ug/L		1	11-AUG-17 15:44	per0811018a

^ 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 #: 2017-2376
Work Order #: 430079

Sample ID	Client ID
430079001	CAMO-17-141989
430079002	CAMO-17-142777
1203850311	Method Blank (MB) ICP
1203850312	Laboratory Control Sample (LCS)
1203850315	430079002(CAMO-17-142777L) Serial Dilution (SD)
1203850313	430079002(CAMO-17-142777D) Sample Duplicate (DUP)
1203850314	430079002(CAMO-17-142777S) Matrix Spike (MS)
1203850370	Method Blank (MB) ICP-MS
1203850371	Laboratory Control Sample (LCS)
1203850374	430079002(CAMO-17-142777L) Serial Dilution (SD)
1203850372	430079002(CAMO-17-142777D) Sample Duplicate (DUP)
1203850373	430079002(CAMO-17-142777S) Matrix Spike (MS)
1203862860	Method Blank (MB) CVAA
1203862861	Laboratory Control Sample (LCS)
1203862866	429979001(CAMO-17-141986L) Serial Dilution (SD)
1203862862	429979001(CAMO-17-141986D) Sample Duplicate (DUP)
1203862864	429979001(CAMO-17-141986S) Matrix Spike (MS)

Sample Analysis

Samples 430079001 and 002 in this SDG were analyzed for metals and mercury on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1690207, 1690228, 1695634 and 1698035
Prep Batch :	1690206, 1690227 and 1695628
Standard Operating Procedures:	GL-MA-E-013 REV# 29, GL-MA-E-006 REV# 13, GL-MA-E-014 REV# 31, GL-MA-E-010 REV# 35 and GL-GC-E-107 REV# 10
Analytical Method:	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.2 1974 and SM:A2340B
Prep Method :	SW846 3005A and EPA 245.1/245.2 Prep

Preparation/Analytical Method Verification

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

System Configuration

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

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

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

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

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

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

ICSA/ICSAB Statement

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

Continuing Calibration Blanks (CCB) Requirements

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 430079002 (CAMO-17-142777)-ICP and ICP-MS and 429979001 (CAMO-17-141986)-CVAA.

Matrix Spike (MS/MSD) Recovery Statement

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

Duplicate Relative Percent Difference (RPD) Statement

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate

value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. The relative percent differences (RPD) between the sample and its duplicate (DUP) were within acceptable limits for all applicable analytes.

Serial Dilution % Difference Statement

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Preparation Information

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

Miscellaneous Information

Electronic Packaging Comment

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

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

Additional Comments

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

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

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

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2017-2376 GEL Work Order: 430079

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: 05 SEP 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2376**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 430079001**BASIS:** As Received**DATE COLLECTED** 07-AUG-17**CLIENT ID:** CAMO-17-141989**LEVEL:** Low**DATE RECEIVED** 09-AUG-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.067	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	08/28/17 11:01	082817W1-5	1695634

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1695634	1695628	EPA 245.1/245.2 Prep	20	mL	20	mL	08/25/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2376**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 430079002**BASIS:** As Received**DATE COLLECTED** 07-AUG-17**CLIENT ID:** CAMO-17-142777**LEVEL:** Low**DATE RECEIVED** 09-AUG-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.067	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	08/28/17 11:03	082817W1-5	1695634

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2376

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 430079002

BASIS: As Received

DATE COLLECTED 07-AUG-17

CLIENT ID: CAMO-17-142777

LEVEL: Low

DATE RECEIVED 09-AUG-17

MATRIX: W

%SOLIDS: 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	68	ug/L	U	68	200	200	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	08/23/17 08:55	170822-4	1690228
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	08/22/17 21:31	170822-2	1690228
7440-39-3	Barium	36.4	ug/L		1	5	5	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-42-8	Boron	47	ug/L	J	15	50	50	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	08/22/17 21:31	170822-2	1690228
7440-70-2	Calcium	61000	ug/L		50	200	200	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-47-3	Chromium	66.8	ug/L		3	10	10	1	MS	BAJ	08/22/17 21:31	170822-2	1690228
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-50-8	Copper	7.29	ug/L	J	3	10	10	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	08/22/17 21:31	170822-2	1690228
7439-95-4	Magnesium	11900	ug/L		110	300	300	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7439-98-7	Molybdenum	1.82	ug/L		0.2	0.5	0.5	1	MS	BAJ	08/22/17 21:31	170822-2	1690228
7440-02-0	Nickel	20.4	ug/L		0.6	2	2	1	MS	BAJ	08/22/17 21:31	170822-2	1690228
7440-09-7	Potassium	845	ug/L		50	150	150	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	08/22/17 21:31	170822-2	1690228
7631-86-9	Silica	61400	ug/L		53	213	213	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	08/22/17 21:31	170822-2	1690228
7440-23-5	Sodium	24700	ug/L		100	300	300	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-24-6	Strontium	262	ug/L		1	5	5	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	08/22/17 21:31	170822-2	1690228
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-61-1	Uranium	0.850	ug/L		0.067	0.2	0.2	1	MS	BAJ	08/22/17 21:31	170822-2	1690228
7440-62-2	Vanadium	1.08	ug/L	J	1	5	5	1	P	JWJ	08/31/17 15:13	083117-1	1690207
7440-66-6	Zinc	20.6	ug/L		3.3	10	10	1	P	JWJ	08/31/17 15:13	083117-1	1690207

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2376**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 430079002**BASIS:** As Received**DATE COLLECTED** 07-AUG-17**CLIENT ID:** CAMO-17-142777**LEVEL:** Low**DATE RECEIVED** 09-AUG-17**MATRIX:** W**%SOLIDS:** 0

CAS	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
	Hardness as CaCO3	201	mg/L		0.453	1.24	1.24	1		TXT1	09/01/17 14:19		1698035

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1690207	1690206	SW846 3005A	50	mL	50	mL	08/09/17	JXM8
1690228	1690227	SW846 3005A	50	mL	50	mL	08/09/17	JXM8
1695634	1695628	EPA 245.1/245.2 Prep	20	mL	20	mL	08/25/17	AXS5

***Analytical Methods:**

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

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2017-2376

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>
1203850311	Aluminum	68	ug/L	+/-200	U	P	68	200
	Barium	1	ug/L	+/-5	U	P	1	5
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Calcium	50	ug/L	+/-200	U	P	50	200
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Copper	3	ug/L	+/-10	U	P	3	10
	Iron	30	ug/L	+/-100	U	P	30	100
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Manganese	2	ug/L	+/-10	U	P	2	10
	Potassium	133	ug/L	+/-150	J	P	50	150
	Silica	53	ug/L	+/-213	U	P	53	213
	Sodium	100	ug/L	+/-300	U	P	100	300
	Strontium	1	ug/L	+/-5	U	P	1	5
	Tin	2.5	ug/L	+/-10	U	P	2.5	10
	Vanadium	1	ug/L	+/-5	U	P	1	5
	Zinc	3.3	ug/L	+/-10	U	P	3.3	10
1203850370	Antimony	1	ug/L	+/-3	U	MS	1	3
	Arsenic	2	ug/L	+/-5	U	MS	2	5
	Cadmium	0.3	ug/L	+/-1	U	MS	0.3	1
	Chromium	3	ug/L	+/-10	U	MS	3	10
	Lead	0.5	ug/L	+/-2	U	MS	0.5	2
	Molybdenum	0.2	ug/L	+/-0.5	U	MS	0.2	0.5
	Nickel	0.6	ug/L	+/-2	U	MS	0.6	2
	Selenium	2	ug/L	+/-5	U	MS	2	5
	Silver	0.3	ug/L	+/-1	U	MS	0.3	1
	Thallium	0.6	ug/L	+/-2	U	MS	0.6	2
	Uranium	0.067	ug/L	+/-0.2	U	MS	0.067	0.2
1203862860	Mercury	0.067	ug/L	+/-0.2	U	AV	0.067	0.2

*Analytical Methods:

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

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-2376 Client ID: CAMO-17-142777S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 430079002 Spike ID: 1203850314

<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	5010		68	U	5000	99.7		P
Barium	ug/L	75-125	524		36.4		500	97.5		P
Beryllium	ug/L	75-125	487		1	U	500	97.5		P
Boron	ug/L	75-125	544		47	J	500	99.5		P
Calcium	ug/L		69200		61000		5000	163	N/A	P
Cobalt	ug/L	75-125	483		1	U	500	96.5		P
Copper	ug/L	75-125	497		7.29	J	500	98		P
Iron	ug/L	75-125	5040		30	U	5000	101		P
Magnesium	ug/L	75-125	17500		11900		5000	113		P
Manganese	ug/L	75-125	483		2	U	500	96.3		P
Potassium	ug/L	75-125	5590		845		5000	95		P
Silica	ug/L		73800		61400		10700	116	N/A	P
Sodium	ug/L		30700		24700		5000	121	N/A	P
Strontium	ug/L	75-125	761		262		500	99.8		P
Tin	ug/L	75-125	483		2.5	U	500	96.6		P
Vanadium	ug/L	75-125	492		1.08	J	500	98.1		P
Zinc	ug/L	75-125	504		20.6		500	96.7		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-2376 **Client ID:** CAMO-17-142777S

Contract: ESHL00114 **Level:** Low

Matrix: WATER **% Solids:**

Sample ID: 430079002 **Spike ID:** 1203850373

<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	47.8		1	U	50	94.9		MS
Arsenic	ug/L	75-125	51.7		2	U	50	100		MS
Cadmium	ug/L	75-125	49.1		0.3	U	50	98.2		MS
Chromium	ug/L	75-125	116		66.8		50	99		MS
Lead	ug/L	75-125	46.8		0.5	U	50	93.5		MS
Molybdenum	ug/L	75-125	51.4		1.82		50	99.2		MS
Nickel	ug/L	75-125	66.3		20.4		50	91.8		MS
Selenium	ug/L	75-125	50.8		2	U	50	101		MS
Silver	ug/L	75-125	47.9		0.3	U	50	95.9		MS
Thallium	ug/L	75-125	44.8		0.6	U	50	89.2		MS
Uranium	ug/L	75-125	49.1		0.85		50	96.5		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-2376 **Client ID:** CAMO-17-141986S**Contract:** ESHL00114 **Level:** Low**Matrix:** WATER **% Solids:****Sample ID:** 429979001 **Spike ID:** 1203862864

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Mercury	ug/L	75-125	2.13		0.067	U	2	106		AV

*Analytical Methods:

AV EPA 245.1/245.2

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-2376

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-17-142777D

Matrix: WATER

Level: Low

Sample ID: 430079002

Duplicate ID: 1203850313

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		68 U		68 U				P
Barium	ug/L	+/-20%	36.4		37.8		3.89		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	47 J		48.4 J		2.97		P
Calcium	ug/L	+/-20%	61000		62900		2.99		P
Cobalt	ug/L		1 U		1 U				P
Copper	ug/L	+/-10	7.29 J		6.8 J		6.98		P
Iron	ug/L		30 U		30 U				P
Magnesium	ug/L	+/-20%	11900		12100		2.04		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	845		823		2.72		P
Silica	ug/L	+/-20%	61400		63300		3.07		P
Sodium	ug/L	+/-20%	24700		25300		2.64		P
Strontium	ug/L	+/-20%	262		269		2.53		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	1.08 J		1.08 J		.38		P
Zinc	ug/L	+/-10	20.6		22.2		7.37		P

*Analytical Methods:

P SW846 3005A/6010C

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-2376

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-17-142777D

Matrix: WATER

Level: Low

Sample ID: 430079002

Duplicate ID: 1203850372

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Antimony	ug/L		1 U		1 U				MS
Arsenic	ug/L		2 U		2 U				MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-20%	66.8		71		6.1		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	1.82		1.83		.219		MS
Nickel	ug/L	+/-20%	20.4		20.6		1.21		MS
Selenium	ug/L		2 U		2 U				MS
Silver	ug/L		0.3 U		0.3 U				MS
Thallium	ug/L		0.6 U		0.6 U				MS
Uranium	ug/L	+/- .2	0.85		0.888		4.37		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
–6–
Duplicate Sample Summary

SDG No.: 2017–2376**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CAMO–17–141986D**Matrix:** WATER**Level:** Low**Sample ID:** 429979001**Duplicate ID:** 1203862862**Percent Solids for Dup:** N/A

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

*Analytical Methods:
AV EPA 245.1/245.2

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2017-2376

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>
1203850312								
	Aluminum	ug/L	5000	4960		99.2	80-120	P
	Barium	ug/L	500	483		96.6	80-120	P
	Beryllium	ug/L	500	475		95.1	80-120	P
	Boron	ug/L	500	478		95.7	80-120	P
	Calcium	ug/L	5000	5150		103	80-120	P
	Cobalt	ug/L	500	494		98.7	80-120	P
	Copper	ug/L	500	485		96.9	80-120	P
	Iron	ug/L	5000	5030		101	80-120	P
	Magnesium	ug/L	5000	5140		103	80-120	P
	Manganese	ug/L	500	483		96.7	80-120	P
	Potassium	ug/L	5000	5160		103	80-120	P
	Silica	ug/L	10700	9750		91.1	80-120	P
	Sodium	ug/L	5000	5130		103	80-120	P
	Strontium	ug/L	500	487		97.4	80-120	P
	Tin	ug/L	500	476		95.2	80-120	P
	Vanadium	ug/L	500	481		96.2	80-120	P
	Zinc	ug/L	500	482		96.5	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2017-2376

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>
1203850371								
	Antimony	ug/L	50	47.1		94.2	80-120	MS
	Arsenic	ug/L	50	50.2		100	80-120	MS
	Cadmium	ug/L	50	50.4		101	80-120	MS
	Chromium	ug/L	50	48.8		97.6	80-120	MS
	Lead	ug/L	50	48.4		96.8	80-120	MS
	Molybdenum	ug/L	50	48.8		97.5	80-120	MS
	Nickel	ug/L	50	49.7		99.4	80-120	MS
	Selenium	ug/L	50	50.3		101	80-120	MS
	Silver	ug/L	50	50.8		102	80-120	MS
	Thallium	ug/L	50	46.3		92.6	80-120	MS
	Uranium	ug/L	50	47.9		95.8	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2017-2376

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>
1203862861	Mercury	ug/L	2	2.12		106	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2017-2376

Client ID: CAMO-17-142777L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 430079002

Serial Dilution ID: 1203850315

<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	36.4		38		4.494			P
Beryllium	1	U	5	U				P
Boron	47	J	75	U	34.129			P
Calcium	61000		63700		4.334		10	P
Cobalt	1	U	5	U				P
Copper	7.29	J	15	U	12.155			P
Iron	30	U	150	U				P
Magnesium	11900		12800		8.011		10	P
Manganese	2	U	10	U				P
Potassium	845		1050		23.666			P
Silica	61400		64100		4.413		10	P
Sodium	24700		25800		4.731		10	P
Strontium	262		269		2.516		10	P
Tin	2.5	U	12.5	U				P
Vanadium	1.08	J	5	U	34.008			P
Zinc	20.6		27.4	J	33.236			P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2017-2376 Client ID CAMO-17-142777L

Contract: ESHL00114

Matrix: LIQUID Level: Low

Sample ID: 430079002 Serial Dilution ID: 1203850374

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Antimony	1	U	5	U				MS
Arsenic	2	U	10	U				MS
Cadmium	.3	U	1.5	U				MS
Chromium	66.8		66.3		.744			MS
Lead	.5	U	2.5	U				MS
Molybdenum	1.82		1.77	J	2.801			MS
Nickel	20.4		20.2		.76			MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.85		.85	J	0			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2017-2376 **Client ID:** CAMO-17-141986L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 429979001 **Serial Dilution ID:** 1203862866

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Mercury	.067	U	.335	U				AV

*Analytical Methods:

AV EPA 245.1/245.2

General Chem Analysis

Case Narrative

**General Chemistry
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2017-2376
Work Order #: 430079**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1690350

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
430079001	CAMO-17-141989
1203856723	Method Blank (MB)
1203856724	Laboratory Control Sample (LCS)
1203856725	430079001(CAMO-17-141989) Sample Duplicate (DUP)
1203856726	430356001(NonSDG) Sample Duplicate (DUP)
1203856727	430079001(CAMO-17-141989) Post Spike (PS)
1203856728	430356001(NonSDG) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 430079001 (CAMO-17-141989) and 430356001 (NonSDG) were selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Cyanide and Total		
Analytical Batch:	1690385	Method:	WSP-CN(T)
Prep Batch :	1690384	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
430079001	CAMO-17-141989
1203850683	Method Blank (MB)
1203850684	Laboratory Control Sample (LCS)
1203850685	430079001(CAMO-17-141989) Sample Duplicate (DUP)
1203850688	430079001(CAMO-17-141989) 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# 20.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 430079001 (CAMO-17-141989) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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Method/Analysis Information

Product: Ion Chromatography

Analytical Batch: 1691290

Method: WSP-ANIONS

Sample Analysis

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

Sample ID	Client ID
430079002	CAMO-17-142777
1203853100	Method Blank (MB)
1203853101	Laboratory Control Sample (LCS)
1203853102	429717001(CAMO-17-141976) Sample Duplicate (DUP)
1203853103	430398002(CASA-17-142776) Sample Duplicate (DUP)
1203853104	429717001(CAMO-17-141976) Post Spike (PS)
1203853105	430398002(CASA-17-142776) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 429717001 (CAMO-17-141976) and 430398002 (CASA-17-142776) were selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The following samples 1203853102 (CAMO-17-141976DUP), 1203853104 (CAMO-17-141976PS) and 430079002 (CAMO-17-142777) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	430079
	002
Chloride	10X
Sulfate	10X

Sample Re-analysis

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

Miscellaneous Information

Manual Integrations

Samples 1203853102 (CAMO-17-141976DUP), 1203853103 (CASA-17-142776DUP), 1203853104 (CAMO-17-141976PS), 1203853105 (CASA-17-142776PS) and 430079002 (CAMO-17-142777) 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: 1692776 **Method:** NH3
Prep Batch : 1692775 **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
430079002	CAMO-17-142777
1203856526	Method Blank (MB)
1203856527	Laboratory Control Sample (LCS)
1203856528	430548005(NonSDG) Sample Duplicate (DUP)
1203856529	429717001(CAMO-17-141976) Sample Duplicate (DUP)
1203856531	430548005(NonSDG) Matrix Spike (MS)
1203856532	429717001(CAMO-17-141976) 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 Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 429717001 (CAMO-17-141976) and 430548005 (NonSDG) were selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Total Kjeldahl Nitrogen		
Analytical Batch:	1692771	Method:	TKN
Prep Batch :	1692769	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
430079001	CAMO-17-141989
1203856514	Method Blank (MB)
1203856515	Laboratory Control Sample (LCS)
1203856516	429717002(CAMO-17-141992) Sample Duplicate (DUP)
1203856517	429873002(CAMO-17-141990) Sample Duplicate (DUP)
1203856518	429717002(CAMO-17-141992) Matrix Spike (MS)
1203856519	429873002(CAMO-17-141990) 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 Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 429717002 (CAMO-17-141992) and 429873002 (CAMO-17-141990) were selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Nitrate Nitrite by Cadmium Reduction

Analytical Batch: 1690125

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
430079002	CAMO-17-142777
1203850126	Method Blank (MB)
1203850127	Laboratory Control Sample (LCS)
1203850130	429981001(WST22-17-143234) Sample Duplicate (DUP)
1203850134	429981001(WST22-17-143234) 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# 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+ 8500 Series.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 429981001 (WST22-17-143234) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The following sample 430079002 (CAMO-17-142777) was diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	430079
	002
Nitrogen, Nitrate/Nitrite	10X

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Total Phosphorus		
Analytical Batch:	1692784	Method:	PO4
Prep Batch :	1692782	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
430079002	CAMO-17-142777
1203856566	Method Blank (MB)
1203856567	Laboratory Control Sample (LCS)
1203856568	430548005(NonSDG) Sample Duplicate (DUP)
1203856570	430079002(CAMO-17-142777) Sample Duplicate (DUP)
1203856571	430548005(NonSDG) Matrix Spike (MS)
1203856573	430079002(CAMO-17-142777) 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 Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 430079002 (CAMO-17-142777) and 430548005 (NonSDG) were selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Solids and Total Dissolved

Analytical Batch: 1690995

Method: TDS

Sample Analysis

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

Sample ID	Client ID
430079002	CAMO-17-142777
1203852302	Method Blank (MB)
1203852303	Laboratory Control Sample (LCS)
1203852305	430087001(CAMO-17-142053) Sample Duplicate (DUP)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-001 REV# 15.

Preparation/Analytical Method Verification

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

Calibration Information

The Solids analysis was performed on a Sartorius Balance BAL216. Solids lab

Initial Calibration

All initial calibration requirements have been met for this SDG.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Consecutive Weight Checks

All consecutive weight checks were met.

Quality Control (QC) Designation

Sample 430087001 (CAMO-17-142053) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Specific Conductivity

Analytical Batch: 1697373

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
430079002	CAMO-17-142777
1203866950	Laboratory Control Sample (LCS)
1203866951	430079002(CAMO-17-142777) 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# 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 Titration and Ion analysis was performed on a Orion 160 Conductivity Meter.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 430079002 (CAMO-17-142777) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: pH

Analytical Batch: 1692037 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
430079002	CAMO-17-142777
1203854921	Laboratory Control Sample (LCS)
1203854922	430079002(CAMO-17-142777) Sample Duplicate (DUP)
1203854923	430087001(CAMO-17-142053) Sample Duplicate (DUP)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 430079002 (CAMO-17-142777) and 430087001 (CAMO-17-142053) were selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

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

Sample	Analyte	Value
1203854922 (CAMO-17-142777DUP)	pH	Received 09-AUG-17, out of holding 07-AUG-17
1203854923 (CAMO-17-142053DUP)	pH	Received 09-AUG-17, out of holding 07-AUG-17
430079002 (CAMO-17-142777)	pH	Received 09-AUG-17, out of holding 07-AUG-17

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Alkalinity

Analytical Batch: 1692036 **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
430079002	CAMO-17-142777
1203854902	Laboratory Control Sample (LCS)
1203854903	430079002(CAMO-17-142777) Sample Duplicate (DUP)
1203854904	430087001(CAMO-17-142053) Sample Duplicate (DUP)
1203854905	430079002(CAMO-17-142777) Matrix Spike (MS)
1203854906	430087001(CAMO-17-142053) Matrix Spike (MS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 430079002 (CAMO-17-142777) and 430087001 (CAMO-17-142053) were selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Certification Statement

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

GEL LABORATORIES LLC

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Qualifier Definition Report for

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

Client SDG: 2017-2376 GEL Work Order: 430079

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Kristen Mizzell

Date: 01 SEP 2017

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 1, 2017

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

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

Client SDG: 2017-2376

Client Sample ID: CAMO-17-141989
Sample ID: 430079001
Matrix: W
Collect Date: 07-AUG-17 12:42
Receive Date: 09-AUG-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	J	0.910	0.330	1.00	mg/L		1	TSM	08/18/17	0921	1690350	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	J	2.97	1.67	5.00	ug/L	1.00	1	AXH3	08/16/17	1200	1690385	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl		0.162	0.033	0.100	mg/L	1.00	1	KLP1	08/25/17	0913	1692771	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	08/16/17	1135	1690384
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	08/23/17	1700	1692769

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

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

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 1, 2017

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

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

Client SDG: 2017-2376

Client Sample ID: CAMO-17-142777
Sample ID: 430079002
Matrix: W
Collect Date: 07-AUG-17 12:42
Receive Date: 09-AUG-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide		0.528	0.067	0.200	mg/L		1	MXL2	08/12/17	0555	1691290	1
Fluoride		0.469	0.033	0.100	mg/L		1					
Chloride		53.4	0.670	2.00	mg/L		10	MXL2	08/14/17	1929	1691290	2
Sulfate		54.2	1.33	4.00	mg/L		10					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.109	0.017	0.050	mg/L	1.00	1	KLP1	08/22/17	1247	1692776	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		9.71	0.170	0.500	mg/L		10	AXH3	08/10/17	0643	1690125	4
PO4 "As Received"												
Phosphorus, Total as P		0.0572	0.020	0.050	mg/L	1.00	1	KLP1	08/23/17	1032	1692784	5
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		401	3.40	14.3	mg/L			KLP1	08/14/17	1451	1690995	6
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		91.8	1.45	4.00	mg/L			RXB5	08/19/17	1418	1692036	7
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		635	1.00	1.00	umhos/cm		1	VH1	08/31/17	1103	1697373	8
PH "As Received"												
pH at Temp 13.4C	H	7.39	0.010	0.100	SU		1	RXB5	08/19/17	1429	1692037	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	08/22/17	1056	1692775
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	08/22/17	1700	1692782

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: September 1, 2017

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

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

Client SDG: 2017-2376

Client Sample ID: CAMO-17-142777
Sample ID: 430079002

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: September 1, 2017

Page 1 of 7

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

Contact: Ms. Nita Patel

Workorder: 430079

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1690350										
QC1203856725	430079001	DUP									
Total Organic Carbon Average	J	0.910	J	0.850	mg/L	6.82	^	(+/-1.00)	TSM	08/18/17	10:08
QC1203856726	430356001	DUP									
Total Organic Carbon Average		9.40		9.39	mg/L	0.149		(0%-20%)		08/18/17	19:54
QC1203856724	LCS										
Total Organic Carbon Average	10.0			9.47	mg/L			94.7 (80%-120%)		08/18/17	12:17
QC1203856723	MB										
Total Organic Carbon Average			U	ND	mg/L					08/18/17	12:05
QC1203856727	430079001	PS									
Total Organic Carbon Average	10.0	J	0.910	11.0	mg/L			101 (75%-125%)		08/18/17	10:55
QC1203856728	430356001	PS									
Total Organic Carbon Average	10.0		9.40	18.9	mg/L			95.3 (75%-125%)		08/18/17	20:41
Flow Injection Analysis											
Batch	1690385										
QC1203850685	430079001	DUP									
Cyanide, Total	J	2.97	J	2.84	ug/L	4.48	^	(+/-5.00)	AXH3	08/16/17	12:01
QC1203850684	LCS										
Cyanide, Total	50.0			52.3	ug/L			105 (90%-110%)		08/16/17	11:46
QC1203850683	MB										
Cyanide, Total			U	ND	ug/L					08/16/17	11:45
QC1203850688	430079001	MS									
Cyanide, Total	100	J	2.97	109	ug/L			106 (90%-110%)		08/16/17	12:02

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QC Summary

Workorder: 430079

Page 2 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1691290										
QC1203853102	429717001	DUP									
Bromide		0.274		0.275	mg/L	0.328	^	(+/-0.200)	MXL2	08/11/17	23:03
Chloride		38.9		39.0	mg/L	0.0462		(0%-20%)		08/14/17	18:01
Fluoride		0.193		0.198	mg/L	2.45	^	(+/-0.100)		08/11/17	23:03
Sulfate		55.9		56.1	mg/L	0.23		(0%-20%)		08/14/17	18:01
QC1203853103	430398002	DUP									
Bromide	J	0.0965	J	0.0985	mg/L	2.05	^	(+/-0.200)		08/12/17	10:49
Chloride		8.37		8.39	mg/L	0.165		(0%-20%)			
Fluoride		0.281		0.287	mg/L	1.87	^	(+/-0.100)			
Sulfate		17.1		17.0	mg/L	0.428		(0%-20%)			
QC1203853101	LCS										
Bromide		1.25		1.23	mg/L			98.3	(80%-120%)	08/11/17	22:04
Chloride		5.00		4.63	mg/L			92.5	(80%-120%)		
Fluoride		2.50		2.41	mg/L			96.2	(80%-120%)		
Sulfate		10.0		9.47	mg/L			94.7	(80%-120%)		
QC1203853100	MB										
Bromide			U	ND	mg/L					08/11/17	21:35
Chloride			U	ND	mg/L						

GEL LABORATORIES LLC

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QC Summary

Workorder: 430079

Page 3 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1691290										
Fluoride			U	ND	mg/L				MXL2	08/11/17	21:35
Sulfate			U	ND	mg/L						
QC1203853104 429717001 PS											
Bromide	1.25	0.274		1.51	mg/L		98.5	(75%-125%)		08/11/17	23:32
Chloride	5.00	7.79		13.3	mg/L		110	(75%-125%)		08/14/17	18:30
Fluoride	2.50	0.193		2.58	mg/L		95.5	(75%-125%)		08/11/17	23:32
Sulfate	10.0	11.2		21.7	mg/L		106	(75%-125%)		08/14/17	18:30
QC1203853105 430398002 PS											
Bromide	1.25	J 0.0965		1.31	mg/L		96.8	(75%-125%)		08/12/17	11:18
Chloride	5.00	8.37		14.0	mg/L		113	(75%-125%)			
Fluoride	2.50	0.281		2.66	mg/L		95.3	(75%-125%)			
Sulfate	10.0	17.1		28.0	mg/L		109	(75%-125%)			
Nutrient Analysis											
Batch	1690125										
QC1203850130 429981001 DUP											
Nitrogen, Nitrate/Nitrite		0.163		0.162	mg/L	^		(+/-0.050)	AXH3	08/10/17	06:29
QC1203850127 LCS											
Nitrogen, Nitrate/Nitrite				1.01	mg/L			(90%-110%)		08/10/17	06:03
QC1203850126 MB											
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					08/10/17	06:02

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

QC Summary

Workorder: 430079

Page 4 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1690125										
QC1203850134	429981001	PS									
Nitrogen, Nitrate/Nitrite		0.163		1.17	mg/L			(90%-110%)	AXH3	08/10/17	06:35
Batch	1692771										
QC1203856516	429717002	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A		KLP1	08/25/17	08:58
QC1203856517	429873002	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A			08/25/17	09:01
QC1203856515	LCS										
Nitrogen, Total Kjeldahl	1.00				1.08	mg/L	108	(90%-110%)		08/25/17	08:52
QC1203856514	MB										
Nitrogen, Total Kjeldahl			U		ND	mg/L				08/25/17	08:51
QC1203856518	429717002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND		1.00	mg/L	97.8	(90%-110%)		08/25/17	08:59
QC1203856519	429873002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND		1.05	mg/L	105	(90%-110%)		08/25/17	09:02
Batch	1692776										
QC1203856528	430548005	DUP									
Nitrogen, Ammonia		0.665		0.697	mg/L	4.7		(0%-20%)	KLP1	08/22/17	13:00
QC1203856529	429717001	DUP									
Nitrogen, Ammonia		J	0.0244	U	ND	mg/L	200 ^			08/22/17	12:43
QC1203856527	LCS										
Nitrogen, Ammonia	1.00				1.01	mg/L	101	(90%-110%)		08/22/17	12:41
QC1203856526	MB										
Nitrogen, Ammonia			U		ND	mg/L				08/22/17	12:36

GEL LABORATORIES LLC

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

QC Summary

Workorder: 430079

Page 5 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1692776										
QC1203856531	430548005	MS									
Nitrogen, Ammonia	2.00	0.665		2.77	mg/L		105	(90%-110%)	KLP1	08/22/17	13:01
QC1203856532	429717001	MS									
Nitrogen, Ammonia	1.00	J	0.0244	1.07	mg/L		105	(90%-110%)		08/22/17	12:43
Batch	1692784										
QC1203856568	430548005	DUP									
Phosphorus, Total as P		0.555		0.541	mg/L	2.55		(0%-27%)	KLP1	08/23/17	10:51
QC1203856570	430079002	DUP									
Phosphorus, Total as P		0.0572		0.0579	mg/L	1.22 ^		(+/-0.050)		08/23/17	10:37
QC1203856567	LCS										
Phosphorus, Total as P	1.00			1.03	mg/L		103	(80%-124%)		08/23/17	10:18
QC1203856566	MB										
Phosphorus, Total as P		U		ND	mg/L					08/23/17	10:17
QC1203856571	430548005	MS									
Phosphorus, Total as P	1.00	0.555		1.63	mg/L		108	(63%-139%)		08/23/17	10:52
QC1203856573	430079002	MS									
Phosphorus, Total as P	1.00	0.0572		1.18	mg/L		112	(63%-139%)		08/23/17	10:38
Solids Analysis											
Batch	1690995										
QC1203852305	430087001	DUP									
Total Dissolved Solids		299		289	mg/L	3.41		(0%-5%)	KLP1	08/14/17	14:51
QC1203852303	LCS										
Total Dissolved Solids	300			293	mg/L		97.6	(95%-105%)		08/14/17	14:51

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

QC Summary

Workorder: 430079

Page 6 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Solids Analysis											
Batch	1690995										
QC1203852302	MB										
Total Dissolved Solids			U	ND	mg/L				KLP1	08/14/17	14:51
Titration and Ion Analysis											
Batch	1692036										
QC1203854903	430079002	DUP									
Alkalinity, Total as CaCO3			91.8	91.4	mg/L	0.441		(0%-20%)	RXB5	08/19/17	14:19
Carbonate alkalinity (CaCO3)	U	ND	U	ND	mg/L	N/A					
QC1203854904	430087001	DUP									
Alkalinity, Total as CaCO3			127	127	mg/L	0.317		(0%-20%)		08/19/17	14:23
Carbonate alkalinity (CaCO3)	U	ND	U	ND	mg/L	N/A					
QC1203854902	LCS										
Alkalinity, Total as CaCO3	100			109	mg/L		109	(90%-110%)		08/19/17	14:17
QC1203854905	430079002	MS									
Alkalinity, Total as CaCO3	100		91.8	196	mg/L		104	(80%-120%)		08/19/17	14:19
QC1203854906	430087001	MS									
Alkalinity, Total as CaCO3	100		127	231	mg/L		104	(80%-120%)		08/19/17	14:25
Batch	1692037										
QC1203854922	430079002	DUP									
pH	H	7.39	H	7.42	SU	0.405		(0%-5%)	RXB5	08/19/17	14:30
QC1203854923	430087001	DUP									
pH	H	7.26	H	7.29	SU	0.412		(0%-5%)		08/19/17	14:31
QC1203854921	LCS										
pH	7.00			7.00	SU		100	(99%-101%)		08/19/17	13:56

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QC Summary

Workorder: 430079

Page 7 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1697373										
QC1203866951	430079002	DUP									
Conductivity		635		636	umhos/cm	0.157		(0%-10%)	VH1	08/31/17	11:13
QC1203866950	LCS										
Conductivity	1410			1400	umhos/cm		99.3	(95%-105%)		08/31/17	11:03

Notes:

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