

The order of this data package is as follows:

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

Comments:

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11366

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

SAMPLE ID: CAMO-17-141976

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	08/2/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1423		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-28		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / <input checked="" type="radio"/> NO / NA

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

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

COLLECTED BY (PRINT): A. Vigil & T. VanderVis

RELINQUISHED BY (Printed Name) Tanya VanderVis (Signature) Tanya VanderVis	Date/Time 08/2/2017 1510	RECEIVED BY (Printed Name) S. Sherwood (Signature) S. Sherwood	Date/Time 8/2/17 1510
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 07/24/2017

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11366

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

SAMPLE ID: CAMO-17-141992

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	08/2/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1423		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-28		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / <u>NO</u> / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1000 mL L 500 ML POLY DST 08-02-17	1	HNO3	Y	NA
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS: NA

LOCATION COMMENTS: NA

FIELD PARAMETERS:

Sample Time	1423	HH:MM	Dissolved Oxygen	6.46	Flow (in gpm)	2.50
Oxidation-Reduction Potential	187.8		pH	7.73	Specific Conductance	442.7
Temperature	22.1		Turbidity	0.21		

COLLECTED BY (PRINT): A. Vigil & T. VanderVis

RELINQUISHED BY (Printed Name) Tanya VanderVis (Signature) <i>Tanya VanderVis</i>	Date/Time 08/2/2017 1510	RECEIVED BY (Printed Name) S. Shearwood (Signature) <i>S. Shearwood</i>	Date/Time 8/2/17 1510
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 07/24/2017

DATA VALIDATION REPORT

Chain Of Custody No. 2017-2310

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
429717	EPA:120.1	1				
429717	EPA:150.1	1				
429717	EPA:160.1	1				
429717	EPA:170.0	2				
429717	EPA:245.2	2				
429717	EPA:300.0	1				
429717	EPA:310.1	1				
429717	EPA:335.4	1				
429717	EPA:350.1	1				
429717	EPA:351.2	1				
429717	EPA:353.2	1				
429717	EPA:365.4	1				
429717	SM:A2340B	1				
429717	SW-846:6010C	1				
429717	SW-846:6020	1				
429717	SW-846:6850	1				
429717	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
429717	EPA:120.1	1689860	1689860	1										1			2				
429717	EPA:150.1	1691073	1691073	1										1			1				
429717	EPA:160.1	1688765	1688765	1					1					1			2				
429717	EPA:170.0	NA	NA	2																	
429717	EPA:245.2	1694628	1694626	2					1	1				1			1				
429717	EPA:300.0	1691290	1691290	1					1					1			2				
429717	EPA:310.1	1691070	1691070	1						1				1			1				

DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
429717	EPA:335.4	1688863	1688862	1					1	1				1				1			
429717	EPA:350.1	1692776	1692775	1					1	2				1				2			
429717	EPA:351.2	1692771	1692769	1					1	2				1				2			
429717	EPA:353.2	1689327	1689327	1					1					1				2			
429717	EPA:365.4	1692781	1692780	1					1	2				1				2			
429717	SM:A2340B	1697053	1697053	1																	
429717	SW-846:6010C	1689088	1689087	1					1	1				1				1			
429717	SW-846:6020	1689069	1689068	1					1	1				1				1			
429717	SW-846:6850	1689374	1689372	1					1	1	1			1							
429717	SW-846:9060	1689290	1689290	1					1					1				1			

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-141974	1203849510	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-141976	429717001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-142780	1203849509	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203849508	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-141976	1203852561	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-141976	429717001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203852560	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-141976	429717001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-142778	1203847994	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203846810	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203846809	MB	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	WT_SEP-PO-17-141446	1203846811	DUP	1	0	0	0
EPA:170.0	VOC	CAMO-17-141976	429717001	REG	1	0	0	0
EPA:170.0	VOC	CAMO-17-141992	429717002	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-141976	429717001	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-141992	429717002	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-142006	1203860688	DUP	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-142006	1203860689	MS	0	0	1	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:245.2	INORGANIC	LCS	1203860687	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203860686	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-17-141976	429717001	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-17-141976	1203852503	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-141976	1203852506	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-141976	429717001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203852501	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-141992	429717002	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203847021	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203847020	MB	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	WT_SEP-PO-17-141442	1203847022	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	WT_SEP-PO-17-141442	1203847023	MS	0	0	1	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-17-141976	429717001	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-17-141990	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	CAMO-17-141992	429717002	REG	1	0	0	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-17-141976	429717001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-17-141977	1203848237	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-17-142236	1203848236	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203848235	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203848234	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-141976	429717001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-141979	1203856559	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-141979	1203856561	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-141985	1203856560	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-141985	1203856562	MS	0	0	1	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:365.4	GENERAL CHEMISTRY	LCS	1203856558	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203856557	MB	1	0	0	0
SM:A2340B	INORGANIC	CAMO-17-141976	429717001	REG	1	0	0	0
SW-846:6010C	INORGANIC	CAMO-17-141976	429717001	REG	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-17-142778	1203847642	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-17-142778	1203847643	MS	0	0	17	0
SW-846:6010C	INORGANIC	LCS	1203847641	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203847640	MB	17	0	0	0
SW-846:6020	INORGANIC	CAMO-17-141976	429717001	REG	11	0	0	0
SW-846:6020	INORGANIC	CAMO-17-142778	1203847593	DUP	11	0	0	0
SW-846:6020	INORGANIC	CAMO-17-142778	1203847594	MS	0	0	11	0
SW-846:6020	INORGANIC	LCS	1203847592	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203847591	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-141976	429717001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-141977	1203848365	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-141977	1203848366	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203848364	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203848363	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-141992	429717002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203849663	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203849662	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	WT_LAP-17-133609	1203849664	DUP	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

No.

DATA VALIDATION REPORT

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
WT_SEP-PO-17-141442	1203847023		EPA:335.4	Cyanide (Total)	1688862	08-09-2017	W	112		110	90	10		

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

No.

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

DATA VALIDATION REPORT

None.

Reason Code

Description

J_LAB

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

NQ

The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualify. 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-17-141976	R-28	REG	EPA:120.1	0	1
CAMO-17-141976	R-28	REG	EPA:150.1	0	1
CAMO-17-141976	R-28	REG	EPA:160.1	0	1
CAMO-17-141976	R-28	REG	EPA:170.0	0	1
CAMO-17-141976	R-28	REG	EPA:245.2	0	1
CAMO-17-141976	R-28	REG	EPA:300.0	0	4
CAMO-17-141976	R-28	REG	EPA:310.1	0	2
CAMO-17-141976	R-28	REG	EPA:350.1	0	1
CAMO-17-141976	R-28	REG	EPA:353.2	0	1
CAMO-17-141976	R-28	REG	EPA:365.4	0	1
CAMO-17-141976	R-28	REG	SM:A2340B	0	1
CAMO-17-141976	R-28	REG	SW-846:6010C	0	17
CAMO-17-141976	R-28	REG	SW-846:6020	0	11
CAMO-17-141976	R-28	REG	SW-846:6850	0	1
CAMO-17-141992	R-28	REG	EPA:170.0	0	1
CAMO-17-141992	R-28	REG	EPA:245.2	0	1
CAMO-17-141992	R-28	REG	EPA:335.4	0	1
CAMO-17-141992	R-28	REG	EPA:351.2	0	1
CAMO-17-141992	R-28	REG	SW-846:9060	0	1

August 29, 2017

gel.com

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

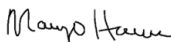
Re: LANL- WQH Water Samples
Work Order: 429717
SDG: 2017-2310

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on August 04, 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,


Margo Herron for
Valerie Davis
Project Manager

Chain of Custody: 2017-2310
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 429717
SDG: 2017-2310

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 429717
SDG # : 2017-2310**

August 29, 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 04, 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>
429717001	CAMO-17-141976
429717002	CAMO-17-141992

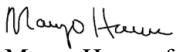
Case Narrative

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.


Margo Herron for
Valerie Davis
Project Manager

List of current GEL Certifications as of 29 August 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>429717</u>	
Received By: <u>ZKW</u>		Date Received: <u>8/7/17</u>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other	
		<u>5908 1782 4833-4c</u> <u>5908 1782 4844-5c</u> <u>5908 1782 4806-22c</u> <u>5908 1782 4796-5c</u> <u>5908 1782 4822-5c</u> <u>5908 1782 4811-5c</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
Shipped as a DOT Hazardous?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____	
COC/Samples marked or classified as radioactive?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM/mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	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	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3 Samples requiring cold preservation within (0 ≤ deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice <input checked="" type="checkbox"/> Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius <div style="text-align: right;">TEMP: <u>None</u></div>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR3-16</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: <u>WST-143206 rec'd unopened and</u> <u>If Preservation added, Lot# 170530 - 134 278 preserved w/ HNO3 upon arrival</u>
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Yes, Are Encores or Soil Kits present? Yes ___ No <input checked="" type="checkbox"/> (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes <input checked="" type="checkbox"/> No ___ N/A ___ (If unknown, select No) VOA vials free of headspace? Yes ___ No <input checked="" type="checkbox"/> N/A ___ Sample ID's and containers affected: <u>All vials for -143207 and -143206 rec'd w/ headspace</u>
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
12 Are sample containers identifiable as GEL provided?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials MEH Date 8/7/17 Page 1 of 1

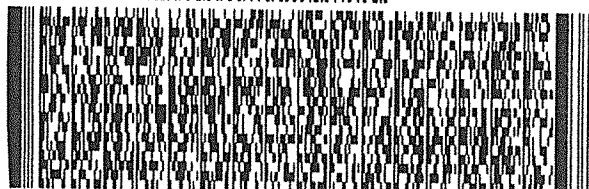
ORIGIN ID:SAFA (505) 665-9966
KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03
LOS ALAMOS, NM 87545
UNITED STATES US

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

REF: 21PD0ASRSW2CHWC00



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2 of 3

MPS# 5908 1782 4833

Mstr# 5908 1782 4822

0201

FRI - 04 AUG 10:30A
PRIORITY OVERNIGHT

X7 RBWA

29407

SC-US CHS



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

SHIP DATE: 03AUG17
ACTWGT: 58.0 LB MAN
CAD: 0014176/CAFE2916

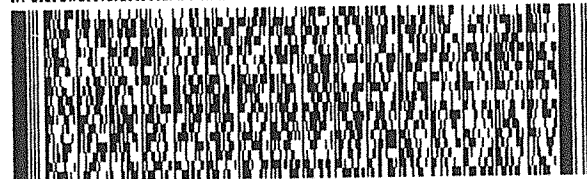
BILL SENDER

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GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

REF: 21PD0ASRGW04BAGWE0



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1 of 2

TRK# 5908 1782 4796

MASTER

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PRIORITY OVERNIGHT

X7 RBWA

2940

SC-US CH



X7 RBWA

TRK# 5908 1782 4811

FRI - 04 AUG 10:30A
PRIORITY OVERNIGHT

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TO VALERIE DAVIS

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

SHIP DATE: 03AUG17
ACTWGT: 46.0 LB MAN
CAD: 0014176/CAFE2916
BILL SENDER

5c

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

SHIP DATE: 03AUG17
ACTWGT: 42.0 LB MAN
CAD: 0014176/CAFE2916

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REF: 21PD0ASRSW2CHWC00

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1 of 3
TRK# 5908 1782 4822
MASTER

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X7 RBWA

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

10 VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 656-8171

REF: 21PD0ASRGW04BAGWEO

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2 of 2
MPS# 5908 1782 4800
Mstr# 5908 1782 4796

FRI - 04 AUG 10:30A
PRIORITY OVERNIGHT

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SC-US CHS

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8V-434 HIT2 08/15



X7 RBWA

29407
SC-US CHS

3 of 3
MPS# 5908 1782 4844
Mstr# 5908 1782 4822

FRI - 04 AUG 10:30A
PRIORITY OVERNIGHT



10 VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD
CHARLESTON SC 29407

(843) 656-8171
REF: 21PD0ASRSW2CHWC00

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

SHIP DATE: 03AUG17
ACTWGT: 53.0 LB MAN
CAD: 0014176/CAFE2916
BILL SENDER

538C1/577E/329B

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 #: 2017-2310
Work Order #: 429717**

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: 1689374

Prep Batch Number: 1689372

Sample Analysis

Sample ID	Client ID
429717001	429717001 (CAMO-17-141976)
1203848618	Interference Check Sample (ICS)
1203848363	Method Blank (MB)
1203848364	Laboratory Control Sample (LCS)
1203848365	429570001(CAMO-17-141977) Matrix Spike (MS)
1203848366	429570001(CAMO-17-141977) 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 429570001 (CAMO-17-141977) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

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

Internal Standard Area Acceptance

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

Retention Time

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information**Manual Integrations**

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

Method Comments

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

Additional Comments

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

Perchlorate Isotope Ratio

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

System Configuration

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

Electronic Packaging Comment

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

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

Chromatographic Columns

The LC-MS/MS Perchlorate analysis was performed on a Quattro 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: 2017-2310 GEL Work Order: 429717

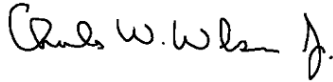
The Qualifiers in this report are defined as follows:

- * 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: 1689372Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-141976Date Received: 04-AUG-17GEL Job No (SDG): 2017-2310GEL Sample ID: 429717001Date Filtered: 07-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	1.05	ug/L		1	12-AUG-17 05:26	per0811079a
	Perchlorate Isotope Ratio			2.99			1	12-AUG-17 05:26	per0811079a
14797-73-0	Perchlorate-101	.05	.2	1.03	ug/L		1	12-AUG-17 05:26	per0811079a
	Perchlorate-O(18)			0.459	ug/L		1	12-AUG-17 05:26	per0811079a

^ 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): 2017-2310

Extract Batch Code: 1689372

Date Filtered: 07-AUG-17

Matrix: WATER

Sample ID: 1203848364

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.199	ug/L	99		85 - 115
Perchlorate Isotope Ratio		3.01				-
Perchlorate-101	0.200	.194	ug/L	97		85 - 115
Perchlorate-O(18)		.443	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): 2017-2310

Extract Batch Code: 1689372

Date Extracted: 07-AUG-17

GEL MS/PS ID: 1203848365

Client ID: CAMO-17-141977

GEL MSD/PSD ID: 1203848366

QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	0.418	ug/L	0.602	92	.614	98	2	30	75 - 125
Perchlorate Isotope Ratio	0	3.07		2.96		2.95		0		-
Perchlorate-101	0.200	0.399	ug/L	0.596	99	.61	105	2	30	75 - 125
Perchlorate-O(18)	0	0.446	ug/L	0.438		.434		1		-

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

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: EPA 6850 ModifiedMatrix: WATERExtraction Batch ID: 1689372Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 07-AUG-17GEL Job No (SDG): 2017-2310GEL Sample ID: 1203848363Date Filtered: 07-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	12-AUG-17 02:04	per0811064a
	Perchlorate Isotope Ratio						1	12-AUG-17 02:04	per0811064a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	12-AUG-17 02:04	per0811064a
	Perchlorate-O(18)			0.429	ug/L		1	12-AUG-17 02:04	per0811064a

^ 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: 1689372Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 07-AUG-17GEL Job No (SDG): 2017-2310GEL Sample ID: 1203848364Date Filtered: 07-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	0.199	ug/L	J	1	12-AUG-17 02:18	per0811065a
	Perchlorate Isotope Ratio			3.01			1	12-AUG-17 02:18	per0811065a
14797-73-0	Perchlorate-101	.05	.2	0.194	ug/L	J	1	12-AUG-17 02:18	per0811065a
	Perchlorate-O(18)			0.443	ug/L		1	12-AUG-17 02:18	per0811065a

^ 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: 1689372Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2017-2310GEL Sample ID: 1203848618Date Filtered: 07-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	0.230	ug/L		1	12-AUG-17 02:31	per0811066a
	Perchlorate Isotope Ratio			2.78			1	12-AUG-17 02:31	per0811066a
14797-73-0	Perchlorate-101	.05	.2	0.243	ug/L		1	12-AUG-17 02:31	per0811066a
	Perchlorate-O(18)			0.442	ug/L		1	12-AUG-17 02:31	per0811066a

^ 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: 1689372Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-141977MSDate Received: 03-AUG-17GEL Job No (SDG): 2017-2310GEL Sample ID: 1203848365Date Filtered: 07-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	0.602	ug/L		1	12-AUG-17 03:38	per0811071a
	Perchlorate Isotope Ratio			2.96			1	12-AUG-17 03:38	per0811071a
14797-73-0	Perchlorate-101	.05	.2	0.596	ug/L		1	12-AUG-17 03:38	per0811071a
	Perchlorate-O(18)			0.438	ug/L		1	12-AUG-17 03:38	per0811071a

^ 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: 1689372Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-141977MSDDate Received: 03-AUG-17GEL Job No (SDG): 2017-2310GEL Sample ID: 1203848366Date Filtered: 07-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	0.614	ug/L		1	12-AUG-17 03:52	per0811072a
	Perchlorate Isotope Ratio			2.95			1	12-AUG-17 03:52	per0811072a
14797-73-0	Perchlorate-101	.05	.2	0.610	ug/L		1	12-AUG-17 03:52	per0811072a
	Perchlorate-O(18)			0.434	ug/L		1	12-AUG-17 03:52	per0811072a

^ 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 #: 2017-2310
Work Order #: 429717

Sample ID	Client ID
429717001	CAMO-17-141976
429717002	CAMO-17-141992
1203847640	Method Blank (MB) ICP
1203847641	Laboratory Control Sample (LCS)
1203847644	429754003(CAMO-17-142778L) Serial Dilution (SD)
1203847642	429754003(CAMO-17-142778D) Sample Duplicate (DUP)
1203847643	429754003(CAMO-17-142778S) Matrix Spike (MS)
1203847591	Method Blank (MB) ICP-MS
1203847592	Laboratory Control Sample (LCS)
1203847595	429754003(CAMO-17-142778L) Serial Dilution (SD)
1203847593	429754003(CAMO-17-142778D) Sample Duplicate (DUP)
1203847594	429754003(CAMO-17-142778S) Matrix Spike (MS)
1203860686	Method Blank (MB) CVAA
1203860687	Laboratory Control Sample (LCS)
1203860690	429620001(CASA-17-142006L) Serial Dilution (SD)
1203860688	429620001(CASA-17-142006D) Sample Duplicate (DUP)
1203860689	429620001(CASA-17-142006S) Matrix Spike (MS)

Sample Analysis

Samples 429717001 and 002 in this SDG were analyzed for metals and mercury on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1689088, 1689069, 1694628 and 1697053
Prep Batch :	1689087, 1689068 and 1694626
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 PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of silica. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 429717001 (CAMO-17-141976)-ICP.

ICSA/ICSAB Statement

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

Continuing Calibration Blanks (CCB) Requirements

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 429754003 (CAMO-17-142778)-ICP and ICP-MS and 429620001 (CASA-17-142006)-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: 2017-2310 GEL Work Order: 429717

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: 31 AUG 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2310**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 429717001**BASIS:** As Received**DATE COLLECTED** 02-AUG-17**CLIENT ID:** CAMO-17-141976**LEVEL:** Low**DATE RECEIVED** 04-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	08/24/17 11:01	082417W1-5	1694628

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2310

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 429717001

BASIS: As Received

DATE COLLECTED 02-AUG-17

CLIENT ID: CAMO-17-141976

LEVEL: Low

DATE RECEIVED 04-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	08/10/17 17:45	081017-1	1689088
7440-36-0	Antimony	1.3	ug/L	J	1	3	3	1	MS	BAJ	08/27/17 14:30	170827-3	1689069
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	08/27/17 15:33	170827-4	1689069
7440-39-3	Barium	69.4	ug/L		1	5	5	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7440-42-8	Boron	19.4	ug/L	J	15	50	50	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	08/26/17 15:59	170826-2	1689069
7440-70-2	Calcium	47200	ug/L		50	200	200	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7440-47-3	Chromium	466	ug/L		3	10	10	1	MS	BAJ	08/26/17 15:59	170826-2	1689069
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	08/26/17 15:59	170826-2	1689069
7439-95-4	Magnesium	11800	ug/L		110	300	300	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7439-98-7	Molybdenum	0.722	ug/L		0.2	0.5	0.5	1	MS	BAJ	08/26/17 15:59	170826-2	1689069
7440-02-0	Nickel	14.5	ug/L		0.6	2	2	1	MS	BAJ	08/26/17 15:59	170826-2	1689069
7440-09-7	Potassium	1720	ug/L		50	150	150	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	08/27/17 15:33	170827-4	1689069
7631-86-9	Silica	67800	ug/L		53	213	213	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	08/26/17 15:59	170826-2	1689069
7440-23-5	Sodium	16600	ug/L		100	300	300	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7440-24-6	Strontium	175	ug/L		1	5	5	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	08/26/17 15:59	170826-2	1689069
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7440-61-1	Uranium	1.24	ug/L		0.067	0.2	0.2	1	MS	BAJ	08/26/17 15:59	170826-2	1689069
7440-62-2	Vanadium	4.79	ug/L	J	1	5	5	1	P	JWJ	08/10/17 17:45	081017-1	1689088
7440-66-6	Zinc	3.3	ug/L	U	3.3	10	10	1	P	JWJ	08/10/17 17:45	081017-1	1689088

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2310**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 429717001**BASIS:** As Received**DATE COLLECTED** 02-AUG-17**CLIENT ID:** CAMO-17-141976**LEVEL:** Low**DATE RECEIVED** 04-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	167	mg/L		0.453	1.24	1.24	1		TXT1	08/30/17 11:17		1697053

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1689069	1689068	SW846 3005A	50	mL	50	mL	08/05/17	SXW1
1689088	1689087	SW846 3005A	50	mL	50	mL	08/05/17	SXW1
1694628	1694626	EPA 245.1/245.2 Prep	20	mL	20	mL	08/23/17	AXS5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2310**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 429717002**BASIS:** As Received**DATE COLLECTED** 02-AUG-17**CLIENT ID:** CAMO-17-141992**LEVEL:** Low**DATE RECEIVED** 04-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	08/24/17 11:03	082417W1-5	1694628

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1694628	1694626	EPA 245.1/245.2 Prep	20	mL	20	mL	08/23/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2017-2310

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>
1203847591	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
1203847640	Aluminum	68	ug/L	+/-200	U	P	68	200
	Barium	1	ug/L	+/-5	U	P	1	5
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Calcium	50	ug/L	+/-200	U	P	50	200
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Copper	3	ug/L	+/-10	U	P	3	10
	Iron	30	ug/L	+/-100	U	P	30	100
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Manganese	2	ug/L	+/-10	U	P	2	10
	Potassium	50	ug/L	+/-150	U	P	50	150
	Silica	53	ug/L	+/-213	U	P	53	213
	Sodium	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
1203860686	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. 2017-2310 Client ID CAMO-17-142778S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 429754003 Spike ID: 1203847594

<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	47.7		1	U	50	93.9		MS
Arsenic	ug/L	75-125	50		2	U	50	96.6		MS
Cadmium	ug/L	75-125	49.2		0.3	U	50	98.4		MS
Chromium	ug/L	75-125	89.3		42.7		50	93.1		MS
Lead	ug/L	75-125	48.3		0.5	U	50	96.5		MS
Molybdenum	ug/L	75-125	50.9		0.78		50	100		MS
Nickel	ug/L	75-125	49.1		0.845	J	50	96.5		MS
Selenium	ug/L	75-125	47.9		2	U	50	93		MS
Silver	ug/L	75-125	49		0.3	U	50	98		MS
Thallium	ug/L	75-125	46.2		0.6	U	50	92.3		MS
Uranium	ug/L	75-125	46.6		0.634		50	92		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-2310 Client ID: CAMO-17-142778S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 429754003 Spike ID: 1203847643

<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	4970		68	U	5000	99.2		P
Barium	ug/L	75-125	507		28.2		500	95.9		P
Beryllium	ug/L	75-125	477		1	U	500	95.4		P
Boron	ug/L	75-125	492		15	U	500	95.8		P
Calcium	ug/L	75-125	23200		19000		5000	84.5		P
Cobalt	ug/L	75-125	484		1	U	500	96.7		P
Copper	ug/L	75-125	491		3	U	500	97.9		P
Iron	ug/L	75-125	4990		30	U	5000	99.8		P
Magnesium	ug/L	75-125	10100		5160		5000	98.5		P
Manganese	ug/L	75-125	481		2	U	500	96.1		P
Potassium	ug/L	75-125	6010		1240		5000	95.5		P
Silica	ug/L		73500		65300		10700	76.6	N/A	P
Sodium	ug/L	75-125	15800		10900		5000	97.2		P
Strontium	ug/L	75-125	559		80.2		500	95.7		P
Tin	ug/L	75-125	479		2.5	U	500	95.9		P
Vanadium	ug/L	75-125	485		4.4	J	500	96.1		P
Zinc	ug/L	75-125	465		3.3	U	500	92.7		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-2310 **Client ID:** CASA-17-142006S**Contract:** ESHL00114 **Level:** Low**Matrix:** WATER **% Solids:****Sample ID:** 429620001 **Spike ID:** 1203860689

<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	2.07		0.067	U	2	103		AV

*Analytical Methods:

AV EPA 245.1/245.2

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-2310

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-17-142778D

Matrix: WATER

Level: Low

Sample ID: 429754003

Duplicate ID: 1203847593

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Antimony	ug/L		1 U		1 U				MS
Arsenic	ug/L		2 U		2 U				MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-10	42.7		42.6		.384		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	0.78		0.771		1.16		MS
Nickel	ug/L	+/-2	0.845 J		0.821 J		2.88		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	0.634		0.615		3.04		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
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Duplicate Sample Summary

SDG No.: 2017-2310

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-17-142778D

Matrix: WATER

Level: Low

Sample ID: 429754003

Duplicate ID: 1203847642

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%	28.2		28.5		1.21		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L		15 U		15 U				P
Calcium	ug/L	+/-20%	19000		19000		.0158		P
Cobalt	ug/L		1 U		1 U				P
Copper	ug/L		3 U		3 U				P
Iron	ug/L		30 U		30 U				P
Magnesium	ug/L	+/-20%	5160		5160		.14		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	1240		1160		5.91		P
Silica	ug/L	+/-20%	65300		64900		.573		P
Sodium	ug/L	+/-20%	10900		11000		.356		P
Strontium	ug/L	+/-20%	80.2		79.9		.403		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	4.4 J		4.72 J		6.89		P
Zinc	ug/L		3.3 U		3.3 U				P

*Analytical Methods:

P SW846 3005A/6010C

Metals
–6–
Duplicate Sample Summary

SDG No.: 2017–2310**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CASA–17–142006D**Matrix:** WATER**Level:** Low**Sample ID:** 429620001**Duplicate ID:** 1203860688**Percent Solids for Dup:** N/A

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

***Analytical Methods:**

AV EPA 245.1/245.2

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-2310

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>
1203847592								
	Antimony	ug/L	50	46.9		93.9	80-120	MS
	Arsenic	ug/L	50	51.6		103	80-120	MS
	Cadmium	ug/L	50	50		100	80-120	MS
	Chromium	ug/L	50	47.7		95.3	80-120	MS
	Lead	ug/L	50	50.3		101	80-120	MS
	Molybdenum	ug/L	50	49.6		99.2	80-120	MS
	Nickel	ug/L	50	48.4		96.7	80-120	MS
	Selenium	ug/L	50	51.4		103	80-120	MS
	Silver	ug/L	50	50.4		101	80-120	MS
	Thallium	ug/L	50	47.2		94.5	80-120	MS
	Uranium	ug/L	50	46.5		93	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-2310

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>
1203847641								
	Aluminum	ug/L	5000	5080		102	80-120	P
	Barium	ug/L	500	477		95.5	80-120	P
	Beryllium	ug/L	500	471		94.1	80-120	P
	Boron	ug/L	500	469		93.8	80-120	P
	Calcium	ug/L	5000	5080		102	80-120	P
	Cobalt	ug/L	500	489		97.8	80-120	P
	Copper	ug/L	500	481		96.2	80-120	P
	Iron	ug/L	5000	5010		100	80-120	P
	Magnesium	ug/L	5000	5170		103	80-120	P
	Manganese	ug/L	500	482		96.4	80-120	P
	Potassium	ug/L	5000	4930		98.7	80-120	P
	Silica	ug/L	10700	9670		90.3	80-120	P
	Sodium	ug/L	5000	5230		105	80-120	P
	Strontium	ug/L	500	484		96.8	80-120	P
	Tin	ug/L	500	470		94.1	80-120	P
	Vanadium	ug/L	500	477		95.4	80-120	P
	Zinc	ug/L	500	461		92.2	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-2310

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>
1203860687	Mercury	ug/L	2	2.06		103	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-2310

Client ID: CAMO-17-142778L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 429754003

Serial Dilution ID: 1203847595

<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	42.7		42.5	J	.59			MS
Lead	.5	U	2.5	U				MS
Molybdenum	.78		1	U	5.128			MS
Nickel	.845	J	3	U	5.917			MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.634		.56	J	11.672			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-2310

Client ID: CAMO-17-142778L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 429754003

Serial Dilution ID: 1203847644

<u>Analyte</u>	<u>Initial Value</u> ug/L	<u>C</u>	<u>Serial Value</u> ug/L	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Aluminum	68	U	340	U				P
Barium	28.2		29.9		6.217			P
Beryllium	1	U	5	U				P
Boron	15	U	75	U				P
Calcium	19000		19700		3.715		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	5160		5690		10.294			P
Manganese	2	U	10	U				P
Potassium	1240		1220		1.154			P
Silica	65300		67500		3.337		10	P
Sodium	10900		11600		5.704		10	P
Strontium	80.2		82		2.245		10	P
Tin	2.5	U	12.5	U				P
Vanadium	4.4	J	5	U	8.537			P
Zinc	3.3	U	16.5	U				P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-2310 **Client ID:** CASA-17-142006L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 429620001 **Serial Dilution ID:** 1203860690

<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 #: 2017-2310
Work Order #: 429717**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1689290

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
429717002	CAMO-17-141992
1203849662	Method Blank (MB)
1203849663	Laboratory Control Sample (LCS)
1203849664	429727002(NonSDG) Sample Duplicate (DUP)
1203849666	429727002(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

Sample 429727002 (NonSDG) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The following samples 1203849664 (Non SDG 429727002DUP) and 1203849666 (Non SDG 429727002PS) in this sample group were diluted due to matrix interference. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

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:	1688863	Method:	WSP-CN(T)
Prep Batch :	1688862	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
429717002	CAMO-17-141992
1203847020	Method Blank (MB)
1203847021	Laboratory Control Sample (LCS)
1203847022	429712004(NonSDG) Sample Duplicate (DUP)
1203847023	429712004(NonSDG) 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 429712004 (NonSDG) was selected for QC analysis.

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

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

Analyte	Sample	Value
Cyanide, Total	1203847023 (Non SDG 429712004MS)	112* (90%-110%)

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages

electronically. The following change from traditional packages should be noted:

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

Method/Analysis Information

Product: Ion Chromatography
Analytical Batch: 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
429717001	CAMO-17-141976
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 429717001 (CAMO-17-141976) 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	429717
	001
Chloride	5X
Sulfate	5X

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 429717001 (CAMO-17-141976) 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
429717001	CAMO-17-141976
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
429717002	CAMO-17-141992
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: 1689327

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
429717001	CAMO-17-141976
1203848234	Method Blank (MB)
1203848235	Laboratory Control Sample (LCS)
1203848236	429449001(CAMO-17-142236) Sample Duplicate (DUP)
1203848237	429570001(CAMO-17-141977) Sample Duplicate (DUP)
1203848238	429449001(CAMO-17-142236) Post Spike (PS)
1203848239	429570001(CAMO-17-141977) 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

Samples 429449001 (CAMO-17-142236) and 429570001 (CAMO-17-141977) 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 following sample 429717001 (CAMO-17-141976) 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	429717
	001
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:	1692781	Method:	PO4
Prep Batch :	1692780	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
429717001	CAMO-17-141976
1203856557	Method Blank (MB)
1203856558	Laboratory Control Sample (LCS)
1203856559	429324001(CAMO-17-141979) Sample Duplicate (DUP)
1203856560	429324005(CAMO-17-141985) Sample Duplicate (DUP)
1203856561	429324001(CAMO-17-141979) Matrix Spike (MS)
1203856562	429324005(CAMO-17-141985) 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 429324001 (CAMO-17-141979) and 429324005 (CAMO-17-141985) 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: 1688765

Method: TDS

Sample Analysis

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

Sample ID	Client ID
429717001	CAMO-17-141976
1203846809	Method Blank (MB)
1203846810	Laboratory Control Sample (LCS)
1203846811	429712006(NonSDG) Sample Duplicate (DUP)
1203847994	429754003(CAMO-17-142778) 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

Samples 429712006 (NonSDG) and 429754003 (CAMO-17-142778) 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

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

Sample	Analyte	Value
1203846811 (Non SDG 429712006DUP)	Total Dissolved Solids	Received 04-AUG-17, out of holding 03-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: Specific Conductivity

Analytical Batch: 1689860

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
429717001	CAMO-17-141976
1203849508	Laboratory Control Sample (LCS)
1203849509	429324004(CAMO-17-142780) Sample Duplicate (DUP)
1203849510	429873001(CAMO-17-141974) 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

Samples 429324004 (CAMO-17-142780) and 429873001 (CAMO-17-141974) were selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: pH

Analytical Batch: 1691073 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
429717001	CAMO-17-141976
1203852560	Laboratory Control Sample (LCS)
1203852561	429717001(CAMO-17-141976) Sample Duplicate (DUP)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 429717001 (CAMO-17-141976) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

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

Sample	Analyte	Value
1203852561 (CAMO-17-141976DUP)	pH	Received 04-AUG-17, out of holding 02-AUG-17
429717001 (CAMO-17-141976)	pH	Received 04-AUG-17, out of holding 02-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: 1691070 **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
429717001	CAMO-17-141976
1203852501	Laboratory Control Sample (LCS)
1203852503	429717001(CAMO-17-141976) Sample Duplicate (DUP)
1203852506	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-033 REV# 13.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 429717001 (CAMO-17-141976) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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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: 2017-2310 GEL Work Order: 429717

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: 30 AUG 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: August 30, 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: 2017-2310

Client Sample ID: CAMO-17-141976
Sample ID: 429717001
Matrix: W
Collect Date: 02-AUG-17 14:23
Receive Date: 04-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		0.274	0.067	0.200	mg/L		1	MXL2	08/11/17	2234	1691290	1
Fluoride		0.193	0.033	0.100	mg/L		1					
Chloride		38.9	0.335	1.00	mg/L		5	MXL2	08/14/17	1731	1691290	2
Sulfate		55.9	0.665	2.00	mg/L		5					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	J	0.0244	0.017	0.050	mg/L	1.00	1	KLP1	08/22/17	1242	1692776	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		4.20	0.170	0.500	mg/L		10	AXH3	08/10/17	0710	1689327	4
PO4 "As Received"												
Phosphorus, Total as P	U	ND	0.020	0.050	mg/L	1.00	1	KLP1	08/23/17	1117	1692781	5
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		337	3.40	14.3	mg/L			KLP1	08/07/17	1011	1688765	6
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		78.3	1.45	4.00	mg/L			RXB5	08/16/17	1204	1691070	7
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		499	1.00	1.00	umhos/cm		1	RXB5	08/15/17	1403	1689860	8
PH "As Received"												
pH at Temp 14.5C	H	7.95	0.010	0.100	SU		1	RXB5	08/16/17	1202	1691073	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	1692780

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: August 30, 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: 2017-2310

Client Sample ID: CAMO-17-141976
Sample ID: 429717001

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: August 30, 2017

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel

Client SDG: 2017-2310

Project: LANL- WQH Water Samples

Client Sample ID: CAMO-17-141992

Project: ESHL00114

Sample ID: 429717002

Client ID: ARSL004

Matrix: W

Collect Date: 02-AUG-17 14:23

Receive Date: 04-AUG-17

Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	J	0.667	0.330	1.00	mg/L		1	TSM	08/11/17	0151	1689290	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	J	4.81	1.67	5.00	ug/L	1.00	1	AXH3	08/09/17	0801	1688863	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	08/25/17	0853	1692771	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	08/09/17	0737	1688862
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

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: August 30, 2017

Page 1 of 7

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

Contact: Ms. Nita Patel

Workorder: 429717

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1689290										
QC1203849664	429727002	DUP									
Total Organic Carbon Average		6.40		6.45	mg/L	0.809	^	(+/-2.00)	TSM	08/11/17	03:25
QC1203849663	LCS										
Total Organic Carbon Average	10.0			9.47	mg/L			(80%-120%)		08/11/17	00:52
QC1203849662	MB										
Total Organic Carbon Average			U	ND	mg/L					08/11/17	00:41
QC1203849666	429727002	PS									
Total Organic Carbon Average	10.0	3.20		13.0	mg/L			(75%-125%)		08/11/17	04:12
Flow Injection Analysis											
Batch	1688863										
QC1203847022	429712004	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	08/09/17	07:58
QC1203847021	LCS										
Cyanide, Total	50.0			54.3	ug/L			(90%-110%)		08/09/17	07:56
QC1203847020	MB										
Cyanide, Total			U	ND	ug/L					08/09/17	07:51
QC1203847023	429712004	MS									
Cyanide, Total	100	U	ND	113	ug/L			(90%-110%)		08/09/17	07:59
Ion Chromatography											
Batch	1691290										
QC1203853102	429717001	DUP									
Bromide		0.274		0.275	mg/L	0.328	^	(+/-0.200)	MXL2	08/11/17	23:03

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1691290										
Chloride		38.9		39.0	mg/L	0.0462		(0%-20%)	MXL2	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						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1691290										
QC1203853104 429717001 PS											
Bromide	1.25	0.274		1.51	mg/L		98.5	(75%-125%)	MXL2	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	1689327										
QC1203848236 429449001 DUP											
Nitrogen, Nitrate/Nitrite		0.693		0.694	mg/L	0.144		(0%-20%)	AXH3	08/10/17	06:54
QC1203848237 429570001 DUP											
Nitrogen, Nitrate/Nitrite		0.544		0.540	mg/L	0.738		(0%-20%)		08/10/17	06:58
QC1203848235 LCS											
Nitrogen, Nitrate/Nitrite	1.00			0.999	mg/L		99.9	(90%-110%)		08/10/17	06:52
QC1203848234 MB											
Nitrogen, Nitrate/Nitrite		U		ND	mg/L					08/10/17	06:46

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1689327										
QC1203848238	429449001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.693		1.69	mg/L		99.7	(90%-110%)	AXH3	08/10/17	06:55
QC1203848239	429570001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.544		1.55	mg/L		101	(90%-110%)		08/10/17	06:59
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

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1692776										
QC1203856526	MB										
Nitrogen, Ammonia			U	ND	mg/L				KLP1	08/22/17	12:36
QC1203856531	430548005	MS									
Nitrogen, Ammonia	2.00	0.665		2.77	mg/L		105	(90%-110%)		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	1692781										
QC1203856559	429324001	DUP									
Phosphorus, Total as P		U	ND	U	ND	mg/L	N/A		KLP1	08/23/17	10:57
QC1203856560	429324005	DUP									
Phosphorus, Total as P		U	ND	U	ND	mg/L	N/A			08/23/17	11:04
QC1203856558	LCS										
Phosphorus, Total as P	1.00			1.07	mg/L		107	(80%-124%)		08/23/17	10:55
QC1203856557	MB										
Phosphorus, Total as P			U	ND	mg/L					08/23/17	10:54
QC1203856561	429324001	MS									
Phosphorus, Total as P	1.00	U	ND	1.07	mg/L		107	(63%-139%)		08/23/17	10:58
QC1203856562	429324005	MS									
Phosphorus, Total as P	1.00	U	ND	1.06	mg/L		104	(63%-139%)		08/23/17	11:05
Solids Analysis											
Batch	1688765										
QC1203846811	429712006	DUP									
Total Dissolved Solids		H	513	H	520	mg/L	1.38	(0%-5%)	KLP1	08/07/17	10:11

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Solids Analysis											
Batch	1688765										
QC1203847994	429754003	DUP									
Total Dissolved Solids		164		173	mg/L	1.67		(0%-5%)	KLP1	08/07/17	10:11
QC1203846810	LCS										
Total Dissolved Solids	300			290	mg/L		96.7	(95%-105%)		08/07/17	10:11
QC1203846809	MB										
Total Dissolved Solids			U	ND	mg/L					08/07/17	10:11
Titration and Ion Analysis											
Batch	1689860										
QC1203849509	429324004	DUP									
Conductivity		198		201	umhos/cm	1.4		(0%-10%)	RXB5	08/15/17	14:01
QC1203849510	429873001	DUP									
Conductivity		151		150	umhos/cm	0.797		(0%-10%)		08/15/17	14:07
QC1203849508	LCS										
Conductivity	1410			1430	umhos/cm		101	(95%-105%)		08/15/17	13:59
Batch	1691070										
QC1203852503	429717001	DUP									
Alkalinity, Total as CaCO3		78.3		78.7	mg/L	0.514		(0%-20%)	RXB5	08/16/17	12:05
Carbonate alkalinity (CaCO3)		U	ND	U	ND	mg/L	N/A				
QC1203852501	LCS										
Alkalinity, Total as CaCO3	100			109	mg/L		109	(90%-110%)		08/16/17	11:19
QC1203852506	429717001	MS									
Alkalinity, Total as CaCO3	100	78.3		183	mg/L		104	(80%-120%)		08/16/17	12:06

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1691073										
QC1203852561	429717001	DUP									
pH		H	7.95	H	7.96	SU	0.126	(0%-5%)	RXB5	08/16/17	12:04
QC1203852560	LCS										
pH	7.00				7.01	SU		100	(99%-101%)	08/16/17	12:01

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.