

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: CASA-17-142018

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	8/9/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1301		MEDIA:	UA	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-43 S1		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1000 500 ML POLY AS 8/9/17	1	HNO3	Y	NA
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS: Sampled 40 ft from running diesel generator

LOCATION COMMENTS: None

FIELD PARAMETERS:

Sample Time	1301	HH:MM	Dissolved Oxygen	6.89	Flow (in gpm)	1.41
Oxidation-Reduction Potential	243.4		pH	7.66	Specific Conductance	196.9
Temperature	19.5		Turbidity	0.51		

COLLECTED BY (PRINT): T. Vander Vis + D. Hughes

RELINQUISHED BY (Printed Name) Tanya Vander Vis (Signature) Tanya Vander Vis	Date/Time 8/9/17 1400	RECEIVED BY (Printed Name) S. Sherwood (Signature) S. Sherwood	Date/Time 8/9/17 1400
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 07/25/2017

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11366

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

SAMPLE ID: CASA-17-142776

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	8/9/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1301		MEDIA:	UA	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-43 S1		FIELD PREP:	F	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

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

SAMPLE COMMENTS: None

LOCATION COMMENTS: None

FIELD PARAMETERS:

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

COLLECTED BY (PRINT): T. Vander Vis & D. Hughes

RELINQUISHED BY (Printed Name) (Signature)	Date/Time 8/9/17 1400	RECEIVED BY (Printed Name) (Signature)	Date/Time 8/9/17 1400
RELINQUISHED BY (Printed Name) Tanya Vander Vis (Signature) Tanya Vander Vis	Date/Time 8-9-17 1400	RECEIVED BY (Printed Name) (Signature)	Date/Time

DATA VALIDATION REPORT

Chain Of Custody No. 2017-2427

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
430398	EPA:120.1	1				
430398	EPA:150.1	1				
430398	EPA:160.1	1				
430398	EPA:170.0	2				
430398	EPA:245.2	2				
430398	EPA:300.0	1				
430398	EPA:310.1	1				
430398	EPA:335.4	1				
430398	EPA:350.1	1				
430398	EPA:351.2	1				
430398	EPA:353.2	1				
430398	EPA:365.4	1				
430398	SM:A2340B	1				
430398	SW-846:6010C	1				
430398	SW-846:6020	1				
430398	SW-846:6850	1				
430398	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
430398	EPA:120.1	1697373	1697373	1										1			1				
430398	EPA:150.1	1692037	1692037	1										1			2				
430398	EPA:160.1	1691865	1691865	1					1					1			1				
430398	EPA:170.0	NA	NA	2																	
430398	EPA:245.2	1696212	1696209	2					1	1				1			1				
430398	EPA:300.0	1691290	1691290	1					1					1			2				
430398	EPA:310.1	1692036	1692036	1						2				1			2				

DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
430398	EPA:335.4	1690985	1690983	1					1	1				1			1				
430398	EPA:350.1	1692776	1692775	1					1	2				1			2				
430398	EPA:351.2	1692771	1692769	1					1	2				1			2				
430398	EPA:353.2	1690783	1690783	1					1					1			1				
430398	EPA:365.4	1692790	1692789	1					1	1				1			1				
430398	SM:A2340B	1698035	1698035	1																	
430398	SW-846:6010C	1690899	1690898	1					1	1				1			1				
430398	SW-846:6020	1690951	1690950	1					1	1				1			1				
430398	SW-846:6850	1691881	1691880	1					1	1	1			1							
430398	SW-846:9060	1690350	1690350	1					1					1			2				

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-142777	1203866951	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-17-142776	430398002	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203866950	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-142053	1203854923	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-142777	1203854922	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-17-142776	430398002	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203854921	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-142057	1203854441	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-17-142776	430398002	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203854438	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203854437	MB	1	0	0	0
EPA:170.0	VOC	CASA-17-142018	430398001	REG	1	0	0	0
EPA:170.0	VOC	CASA-17-142776	430398002	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-142018	430398001	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-142776	430398002	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203864156	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203864155	MB	1	0	0	0
EPA:245.2	INORGANIC	WT_SIP-17-135652	1203864760	DUP	1	0	0	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:245.2	INORGANIC	WT_SIP-17-135652	1203864761	MS	0	0	1	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-17-141976	1203853102	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-142776	1203853103	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-142776	430398002	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203853101	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203853100	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-142053	1203854904	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-142053	1203854906	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-142777	1203854903	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-142777	1203854905	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-142776	430398002	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203854902	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-142018	1203852270	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-142018	1203852273	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-142018	430398001	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203852267	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203852266	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-141976	1203856529	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-141976	1203856532	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-142776	430398002	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	CASA-17-142018	430398001	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	CASA-17-142776	430398002	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203851750	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203851749	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	WT_SEP-PO-17-143830	1203851751	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-141987	1203856595	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-141987	1203856596	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-142776	430398002	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203856592	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203856591	MB	1	0	0	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
SM:A2340B	INORGANIC	CASA-17-142776	430398002	REG	1	0	0	0
SW-846:6010C	INORGANIC	CASA-17-142776	1203852053	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CASA-17-142776	1203852054	MS	0	0	17	0
SW-846:6010C	INORGANIC	CASA-17-142776	430398002	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203852052	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203852051	MB	17	0	0	0
SW-846:6020	INORGANIC	CASA-17-142776	1203852190	DUP	11	0	0	0
SW-846:6020	INORGANIC	CASA-17-142776	1203852191	MS	0	0	11	0
SW-846:6020	INORGANIC	CASA-17-142776	430398002	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203852189	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203852188	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-141974	1203854487	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-141974	1203854488	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-142776	430398002	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203854486	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203854485	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-141989	1203856725	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-17-142018	430398001	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203856724	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203856723	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	WT_SIP-17-135652	1203856726	DUP	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

No.

6. Any surrogate recoveries outside the control limits?

DATA VALIDATION REPORT

No.

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

No.

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.

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.

DATA VALIDATION REPORT

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-17-142018	R-43 S1	REG	EPA:170.0	0	1
CASA-17-142018	R-43 S1	REG	EPA:245.2	0	1
CASA-17-142018	R-43 S1	REG	EPA:335.4	0	1
CASA-17-142018	R-43 S1	REG	EPA:351.2	0	1
CASA-17-142018	R-43 S1	REG	SW-846:9060	0	1
CASA-17-142776	R-43 S1	REG	EPA:120.1	0	1
CASA-17-142776	R-43 S1	REG	EPA:150.1	0	1
CASA-17-142776	R-43 S1	REG	EPA:160.1	0	1
CASA-17-142776	R-43 S1	REG	EPA:170.0	0	1
CASA-17-142776	R-43 S1	REG	EPA:245.2	0	1
CASA-17-142776	R-43 S1	REG	EPA:300.0	0	4
CASA-17-142776	R-43 S1	REG	EPA:310.1	0	2
CASA-17-142776	R-43 S1	REG	EPA:350.1	0	1
CASA-17-142776	R-43 S1	REG	EPA:353.2	0	1
CASA-17-142776	R-43 S1	REG	EPA:365.4	0	1
CASA-17-142776	R-43 S1	REG	SM:A2340B	0	1
CASA-17-142776	R-43 S1	REG	SW-846:6010C	0	17
CASA-17-142776	R-43 S1	REG	SW-846:6020	0	11
CASA-17-142776	R-43 S1	REG	SW-846:6850	0	1

September 01, 2017

gel.com

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

Re: LANL- WQH Water Samples
Work Order: 430398
SDG: 2017-2427

Dear Ms. Patel:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on August 11, 2017, and analyzed for General Chemistry, Metals and Perchlorates by LCMSMS. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4485.

Sincerely,



Katrina Hiott for
Valerie Davis
Project Manager

Chain of Custody: 2017-2427
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 430398
SDG: 2017-2427

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 430398
SDG # : 2017-2427**

September 01, 2017

Laboratory Identification:

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

Summary

Sample receipt The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on August 11, 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>
430398001	CASA-17-142018
430398002	CASA-17-142776

Case Narrative

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

Data Package

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: General Chemistry, Metals and Perchlorates by LCMSMS.

I certify that this data report is in compliance with the terms and conditions of the subcontract and task order, both technically and for completeness, for other than the conditions detailed in the attached case narrative.


Katrina Hiott for
Valerie Davis
Project Manager

List of current GEL Certifications as of 01 September 2017

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

Chain of Custody and Supporting Documentation

General Engineering	<h1>Chain of Custody/Analysis Request</h1>	COC/Lab Request #: 2017-2427 Page 1 of 1
Charleston SC		

[illegible]

Special Instructions:			
Relinquished by:	Print Name: <u>Miss Mary</u>	Date/Time: <u>8/15/73</u>	Received by: <u>[Signature]</u>
Relinquished by:	Print Name:	Date/Time:	Received by:
Relinquished by:	Print Name:	Date/Time:	Received by:



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ESHU</u>		SDG/AR/COC/Work Order: <u>430 398</u>	
Received By: <u>ZKW</u>		Date Received: <u>8/11/17</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>59108 1782 5439</u> <u>59108 1782 5428</u> <u>59108 1782 5417</u> <u>59108 1782 5406</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?	<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____	
COC/Samples marked or classified as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPN/mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?	<input checked="" 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"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: Wet ice <u>Ice Packs</u> Dry ice None Other: *all temperatures are recorded in Celsius TEMP: <u>3c</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" 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"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: If Preservation added, Lot#:
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>			If Yes, Are Encores or Soil Kits present? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes___ No___ N/A___ (If unknown, select No) VOA vials free of headspace? Yes___ No___ N/A___ Sample ID's and containers affected:
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected: <u>See Below</u>
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>			
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments (Use Continuation Form if needed):
We rec'd 2 containers w/ sample labels for -134029 and -134089 on both

PM (or PMA) review: Initials

KH

Date

8/14/17

Page

1 of

1

GL-CHL-SR-001 Rev 5

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: 10AUG17
ACTWGT: 44.0 LB MAN
CAD: 0014176/CAFE2916

BILL SENDER

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

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 10AUG17
ACTWGT: 44.0 LB MAN
CAD: 0014176/CAFE2916

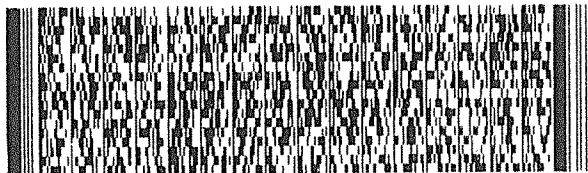
BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

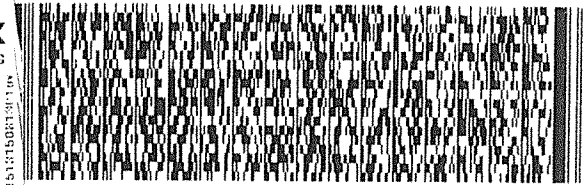
CHARLESTON SC 29407

(843) 556-8171

REF: 21PD0ASRGW04BAGWE0



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Express



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Express



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0201
MASTER

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PRIORITY OVERNIGHT

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263
Mstr# 5908 1782 5428
0201

X7 RBWA

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PRIORITY OVERNIGHT

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: 10AUG17
ACTWGT: 57.0 LB MAN
CAD: 0014176/CAFE2916

BILL SENDER

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

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 10AUG17
ACTWGT: 57.0 LB MAN
CAD: 0014176/CAFE2916

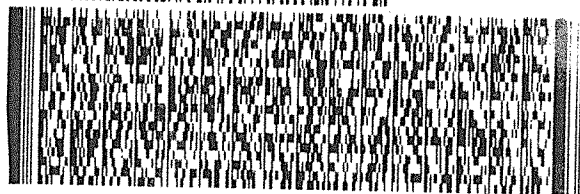
BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

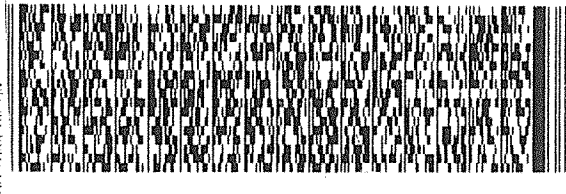
CHARLESTON SC 29407

(843) 556-8171

REF: 21PD0ASRGW04BAGWE0



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SC-US CHS



Data Review Qualifier Flag Definition Sheet

Data Review Qualifier Definitions

Qualifier	Explanation
-----------	-------------

*	A quality control analyte recovery is outside of specified acceptance criteria
**	Analyte is a surrogate compound
<	Result is less than value reported
>	Result is greater than value reported
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL
A	The TIC is a suspected aldol-condensation product
B	Target analyte was detected in the associated blank
B	Metals-Either presence of analyte detected in the associated blank, or MDL/IDL < sample value < PQL
BD	Results are either below the MDC or tracer recovery is low
C	Analyte has been confirmed by GC/MS analysis
D	Results are reported from a diluted aliquot of the sample
d	5-day BOD-The 2:1 depletion requirement was not met for this sample
E	Organics-Concentration of the target analyte exceeds the instrument calibration range
E	Metals-%difference of sample and SD is >10%. Sample concentration must meet flagging criteria
H	Analytical holding time was exceeded
h	Preparation or preservation holding time was exceeded
J	Value is estimated
N	Metals-The Matrix spike sample recovery is not within specified control limits
N	Organics-Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor
N/A	Spike recovery limits do not apply. Sample concentration exceeds spike concentration by 4X or more
ND	Analyte concentration is not detected above the reporting limit
UI	Gamma Spectroscopy-Uncertain identification
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	QC Samples were not spiked with this compound
Z	Paint Filter Test-Particulates passed through the filter, however no free liquids were observed.

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

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

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2017-2427
Work Order #: 430398**

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: 1691881

Prep Batch Number: 1691880

Sample Analysis

Sample ID	Client ID
430398002	430398002 (CASA-17-142776)
1203854494	Interference Check Sample (ICS)
1203854485	Method Blank (MB)
1203854486	Laboratory Control Sample (LCS)
1203854487	429873001(CAMO-17-141974) Matrix Spike (MS)
1203854488	429873001(CAMO-17-141974) 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 429873001 (CAMO-17-141974) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

In QC sample 1203854487 (CAMO-17-141974MS), Perchlorate-101 was recovered at 65%. The acceptance range is from 75-125%. The failure in the MS was either due to the background concentration in the parent sample, 429873001 (CAMO-17-141974) or vagaries in the extraction process. The LCS and MSD were within the acceptance ranges.

MS/MSD Relative Percent Difference (RPD) Statement

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

Internal Standard Area Acceptance

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

Retention Time

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

Technical Information

Holding Time Specifications

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those

holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Manual Integrations

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

Method Comments

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

Additional Comments

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

Perchlorate Isotope Ratio

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

System Configuration

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

Electronic Packaging Comment

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

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

Chromatographic Columns

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

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

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2017-2427 GEL Work Order: 430398

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Michael Penny

Date: 21 AUG 2017

Title: Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1691880Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-142776Date Received: 11-AUG-17GEL Job No (SDG): 2017-2427GEL Sample ID: 430398002Date Filtered: 15-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	0.897	ug/L		1	16-AUG-17 00:03	per0815033a
	Perchlorate Isotope Ratio			2.95			1	16-AUG-17 00:03	per0815033a
14797-73-0	Perchlorate-101	.05	.2	0.878	ug/L		1	16-AUG-17 00:03	per0815033a
	Perchlorate-O(18)			0.418	ug/L		1	16-AUG-17 00:03	per0815033a

^ 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): 2017-2427

Extract Batch Code: 1691880

Date Filtered: 15-AUG-17

Matrix: WATER

Sample ID: 1203854486

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.203	ug/L	102		85 - 115
Perchlorate Isotope Ratio		2.75				-
Perchlorate-101	0.200	.214	ug/L	107		85 - 115
Perchlorate-O(18)		.451	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): 2017-2427

Extract Batch Code: 1691880

Date Extracted: 15-AUG-17

GEL MS/PS ID: 1203854487

Client ID: CAMO-17-141974

GEL MSD/PSD ID: 1203854488

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	0.447	ug/L	0.605	79	.607	80	0	30	75 - 125
Perchlorate Isotope Ratio	0	2.95		3.08		2.88		7		-
Perchlorate-101	0.200	0.438	ug/L	0.569	65 *	.608	85	7	30	75 - 125
Perchlorate-O(18)	0	0.441	ug/L	0.453		.459		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: 1691880Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 15-AUG-17GEL Job No (SDG): 2017-2427GEL Sample ID: 1203854485Date Filtered: 15-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	15-AUG-17 19:34	per0815013a
	Perchlorate Isotope Ratio						1	15-AUG-17 19:34	per0815013a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	15-AUG-17 19:34	per0815013a
	Perchlorate-O(18)			0.456	ug/L		1	15-AUG-17 19:34	per0815013a

^ 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: 1691880Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 15-AUG-17GEL Job No (SDG): 2017-2427GEL Sample ID: 1203854486Date Filtered: 15-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	0.203	ug/L		1	15-AUG-17 19:47	per0815014a
	Perchlorate Isotope Ratio			2.75			1	15-AUG-17 19:47	per0815014a
14797-73-0	Perchlorate-101	.05	.2	0.214	ug/L		1	15-AUG-17 19:47	per0815014a
	Perchlorate-O(18)			0.451	ug/L		1	15-AUG-17 19:47	per0815014a

^ 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: 1691880Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2017-2427GEL Sample ID: 1203854494Date Filtered: 15-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	0.221	ug/L		1	15-AUG-17 20:01	per0815015a
	Perchlorate Isotope Ratio			3			1	15-AUG-17 20:01	per0815015a
14797-73-0	Perchlorate-101	.05	.2	0.213	ug/L		1	15-AUG-17 20:01	per0815015a
	Perchlorate-O(18)			0.485	ug/L		1	15-AUG-17 20:01	per0815015a

^ 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: 1691880Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-141974MSDate Received: 05-AUG-17GEL Job No (SDG): 2017-2427GEL Sample ID: 1203854487Date Filtered: 15-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	0.605	ug/L		1	15-AUG-17 20:28	per0815017a
	Perchlorate Isotope Ratio			3.08			1	15-AUG-17 20:28	per0815017a
14797-73-0	Perchlorate-101	.05	.2	0.569	ug/L		1	15-AUG-17 20:28	per0815017a
	Perchlorate-O(18)			0.453	ug/L		1	15-AUG-17 20:28	per0815017a

^ 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: 1691880Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-141974MSDDate Received: 05-AUG-17GEL Job No (SDG): 2017-2427GEL Sample ID: 1203854488Date Filtered: 15-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	0.607	ug/L		1	15-AUG-17 20:41	per0815018a
	Perchlorate Isotope Ratio			2.88			1	15-AUG-17 20:41	per0815018a
14797-73-0	Perchlorate-101	.05	.2	0.608	ug/L		1	15-AUG-17 20:41	per0815018a
	Perchlorate-O(18)			0.459	ug/L		1	15-AUG-17 20:41	per0815018a

^ 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 #: 2017-2427
Work Order #: 430398

Sample ID	Client ID
430398001	CASA-17-142018
430398002	CASA-17-142776
1203852051	Method Blank (MB) ICP
1203852052	Laboratory Control Sample (LCS)
1203852055	430398002(CASA-17-142776L) Serial Dilution (SD)
1203852053	430398002(CASA-17-142776D) Sample Duplicate (DUP)
1203852054	430398002(CASA-17-142776S) Matrix Spike (MS)
1203852188	Method Blank (MB) ICP-MS
1203852189	Laboratory Control Sample (LCS)
1203852192	430398002(CASA-17-142776L) Serial Dilution (SD)
1203852190	430398002(CASA-17-142776D) Sample Duplicate (DUP)
1203852191	430398002(CASA-17-142776S) Matrix Spike (MS)
1203864155	Method Blank (MB) CVAA
1203864156	Laboratory Control Sample (LCS)
1203864762	430356001(NonSDGL) Serial Dilution (SD)
1203864760	430356001(NonSDGD) Sample Duplicate (DUP)
1203864761	430356001(NonSDGS) Matrix Spike (MS)

Sample Analysis

Samples 430398001 and 002 in this SDG were analyzed for metals and mercury on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1690899, 1690951, 1696212 and 1698035
Prep Batch :	1690898, 1690950 and 1696209
Standard Operating Procedures:	GL-MA-E-013 REV# 29, GL-MA-E-006 REV# 13, GL-MA-E-014 REV# 31, GL-MA-E-010 REV# 35 and GL-GC-E-107 REV# 10
Analytical Method:	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.2 1974 and SM:A2340B
Prep Method :	SW846 3005A and EPA 245.1/245.2 Prep

Preparation/Analytical Method Verification

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

System Configuration

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

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

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

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

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

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

ICSA/ICSAB Statement

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

Continuing Calibration Blanks (CCB) Requirements

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 430398002 (CASA-17-142776)-ICP and ICP-MS and 430356001 (NonSDG)-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

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 25x the IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified.

Sample	Analyte	Value
1203852055 (CASA-17-142776SDILT)	Sodium	12.7 *(0%-10%)

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: 2017-2427 GEL Work Order: 430398

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- E %difference of sample and SD is >10%. Sample concentration must meet flagging criteria
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

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

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

Signature:



Name: Nik-Cole Elmore

Date: 05 SEP 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2427**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 430398001**BASIS:** As Received**DATE COLLECTED** 09-AUG-17**CLIENT ID:** CASA-17-142018**LEVEL:** Low**DATE RECEIVED** 11-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	08/29/17 11:16	082917W1-5	1696212

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1696212	1696209	EPA 245.1/245.2 Prep	20	mL	20	mL	08/28/17	AXS5

***Analytical Methods:**

AV EPA 245.2 1974

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2427**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 430398002**BASIS:** As Received**DATE COLLECTED** 09-AUG-17**CLIENT ID:** CASA-17-142776**LEVEL:** Low**DATE RECEIVED** 11-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	08/29/17 11:18	082917W1-5	1696212

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2427

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 430398002

BASIS: As Received

DATE COLLECTED 09-AUG-17

CLIENT ID: CASA-17-142776

LEVEL: Low

DATE RECEIVED 11-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	08/25/17 21:34	082517A-1	1690899
7440-36-0	Antimony	1	ug/L	U	1	3	3	1	MS	BAJ	08/23/17 09:09	170822-4	1690951
7440-38-2	Arsenic	2	ug/L	U	2	5	5	1	MS	BAJ	08/22/17 22:37	170822-2	1690951
7440-39-3	Barium	23.9	ug/L		1	5	5	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7440-41-7	Beryllium	1	ug/L	U	1	5	5	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7440-42-8	Boron	15	ug/L	U	15	50	50	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7440-43-9	Cadmium	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	08/22/17 22:37	170822-2	1690951
7440-70-2	Calcium	19100	ug/L		50	200	200	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7440-47-3	Chromium	176	ug/L		3	10	10	1	MS	BAJ	08/22/17 22:37	170822-2	1690951
7440-48-4	Cobalt	1	ug/L	U	1	5	5	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7440-50-8	Copper	3	ug/L	U	3	10	10	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7439-89-6	Iron	30	ug/L	U	30	100	100	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7439-92-1	Lead	0.50	ug/L	U	0.5	2	2	1	MS	BAJ	08/22/17 22:37	170822-2	1690951
7439-95-4	Magnesium	4100	ug/L		110	300	300	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7439-96-5	Manganese	2	ug/L	U	2	10	10	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7439-98-7	Molybdenum	1.23	ug/L		0.2	0.5	0.5	1	MS	BAJ	08/22/17 22:37	170822-2	1690951
7440-02-0	Nickel	7.25	ug/L		0.6	2	2	1	MS	BAJ	08/22/17 22:37	170822-2	1690951
7440-09-7	Potassium	1400	ug/L		50	150	150	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7782-49-2	Selenium	2	ug/L	U	2	5	5	1	MS	BAJ	08/22/17 22:37	170822-2	1690951
7631-86-9	Silica	70000	ug/L		53	213	213	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7440-22-4	Silver	0.30	ug/L	U	0.3	1	1	1	MS	BAJ	08/22/17 22:37	170822-2	1690951
7440-23-5	Sodium	10200	ug/L	E	100	300	300	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7440-24-6	Strontium	72.9	ug/L		1	5	5	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7440-28-0	Thallium	0.60	ug/L	U	0.6	2	2	1	MS	BAJ	08/22/17 22:37	170822-2	1690951
7440-31-5	Tin	2.5	ug/L	U	2.5	10	10	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7440-61-1	Uranium	0.101	ug/L	J	0.067	0.2	0.2	1	MS	BAJ	08/22/17 22:37	170822-2	1690951
7440-62-2	Vanadium	5.52	ug/L		1	5	5	1	P	JWJ	08/25/17 21:34	082517A-1	1690899
7440-66-6	Zinc	10.2	ug/L		3.3	10	10	1	P	JWJ	08/25/17 21:34	082517A-1	1690899

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-2427**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 430398002**BASIS:** As Received**DATE COLLECTED** 09-AUG-17**CLIENT ID:** CASA-17-142776**LEVEL:** Low**DATE RECEIVED** 11-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	64.7	mg/L		0.453	1.24	1.24	1		TXT1	09/01/17 14:19		1698035

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1690899	1690898	SW846 3005A	50	mL	50	mL	08/14/17	SXW1
1690951	1690950	SW846 3005A	50	mL	50	mL	08/14/17	SXW1
1696212	1696209	EPA 245.1/245.2 Prep	20	mL	20	mL	08/28/17	AXS5

***Analytical Methods:**

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

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2017-2427

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>
1203852051	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
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Calcium	50	ug/L	+/-200	U	P	50	200
	Boron	15	ug/L	+/-50	U	P	15	50
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Barium	1	ug/L	+/-5	U	P	1	5
	Aluminum	68	ug/L	+/-200	U	P	68	200
	Copper	3	ug/L	+/-10	U	P	3	10
	Zinc	3.3	ug/L	+/-10	U	P	3.3	10
1203852188	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
1203864155	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. 2017-2427

Client ID: CASA-17-142776S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 430398002

Spike ID: 1203852054

<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	4840		68	U	5000	96.8		P
Barium	ug/L	75-125	516		23.9		500	98.5		P
Beryllium	ug/L	75-125	493		1	U	500	98.5		P
Boron	ug/L	75-125	506		15	U	500	98.5		P
Calcium	ug/L	75-125	23700		19100		5000	91.8		P
Cobalt	ug/L	75-125	499		1	U	500	99.9		P
Copper	ug/L	75-125	496		3	U	500	99.1		P
Iron	ug/L	75-125	5000		30	U	5000	99.9		P
Magnesium	ug/L	75-125	9090		4100		5000	99.8		P
Manganese	ug/L	75-125	490		2	U	500	97.9		P
Potassium	ug/L	75-125	6170		1400		5000	95.4		P
Silica	ug/L		80300		70000		10700	96.5	N/A	P
Sodium	ug/L	75-125	15300		10200		5000	101		P
Strontium	ug/L	75-125	558		72.9		500	97.1		P
Tin	ug/L	75-125	495		2.5	U	500	98.8		P
Vanadium	ug/L	75-125	502		5.52		500	99.4		P
Zinc	ug/L	75-125	489		10.2		500	95.7		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-2427 Client ID: CASA-17-142776S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 430398002 Spike ID: 1203852191

<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>
Cadmium	ug/L	75-125	50.9		0.3	U	50	102		MS
Chromium	ug/L	75-125	222		176		50	92		MS
Lead	ug/L	75-125	49.9		0.5	U	50	99.7		MS
Molybdenum	ug/L	75-125	51.2		1.23		50	99.9		MS
Nickel	ug/L	75-125	55.1		7.25		50	95.6		MS
Selenium	ug/L	75-125	51.6		2	U	50	99.3		MS
Silver	ug/L	75-125	50.9		0.3	U	50	102		MS
Thallium	ug/L	75-125	47.4		0.6	U	50	94.6		MS
Uranium	ug/L	75-125	49.7		0.101	J	50	99.2		MS
Antimony	ug/L	75-125	48		1	U	50	95.3		MS
Arsenic	ug/L	75-125	51		2	U	50	98.1		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-2427 Client ID: WT_SIP-17-135652S

Contract: ESHL00114 Level: Low

Matrix: STORM WATER % Solids:

Sample ID: 430356001 Spike ID: 1203864761

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

*Analytical Methods:

AV EPA 245.1/245.2

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-2427

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-17-142776D

Matrix: WATER

Level: Low

Sample ID: 430398002

Duplicate ID: 1203852053

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		68 U		68 U				P
Barium	ug/L	+/-5	23.9		23.4		2.13		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L		15 U		15 U				P
Calcium	ug/L	+/-20%	19100		19100		.0209		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%	4100		4030		1.78		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	1400		1350		3.24		P
Silica	ug/L	+/-20%	70000		69600		.582		P
Sodium	ug/L	+/-20%	10200		10200		.234		P
Strontium	ug/L	+/-20%	72.9		72.4		.704		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	5.52		5.3		4.09		P
Zinc	ug/L	+/-10	10.2		10		1.26		P

*Analytical Methods:

P SW846 3005A/6010C

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-2427

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-17-142776D

Matrix: WATER

Level: Low

Sample ID: 430398002

Duplicate ID: 1203852190

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		2.03 J		200		MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-20%	176		173		1.8		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	1.23		1.16		5.52		MS
Nickel	ug/L	+/-2	7.25		6.87		5.43		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	0.101 J		0.097 J		4.04		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
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Duplicate Sample Summary

SDG No.: 2017–2427**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** WT_SIP–17–135652D**Matrix:** STORM WATER**Level:** Low**Sample ID:** 430356001**Duplicate ID:** 1203864760**Percent Solids for Dup:** N/A

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

*Analytical Methods:

AV EPA 245.1/245.2

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2017-2427

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>
1203852052								
	Aluminum	ug/L	5000	5010		100	80-120	P
	Barium	ug/L	500	489		97.9	80-120	P
	Beryllium	ug/L	500	483		96.5	80-120	P
	Boron	ug/L	500	484		96.8	80-120	P
	Calcium	ug/L	5000	5030		101	80-120	P
	Cobalt	ug/L	500	501		100	80-120	P
	Copper	ug/L	500	488		97.6	80-120	P
	Iron	ug/L	5000	5010		100	80-120	P
	Magnesium	ug/L	5000	5050		101	80-120	P
	Manganese	ug/L	500	490		98	80-120	P
	Potassium	ug/L	5000	4800		96	80-120	P
	Silica	ug/L	10700	10000		93.5	80-120	P
	Sodium	ug/L	5000	5150		103	80-120	P
	Strontium	ug/L	500	495		99.1	80-120	P
	Tin	ug/L	500	493		98.7	80-120	P
	Vanadium	ug/L	500	489		97.7	80-120	P
	Zinc	ug/L	500	473		94.7	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-2427

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>
1203852189								
	Antimony	ug/L	50	48		96.1	80-120	MS
	Arsenic	ug/L	50	52		104	80-120	MS
	Cadmium	ug/L	50	51.6		103	80-120	MS
	Chromium	ug/L	50	49.5		99	80-120	MS
	Lead	ug/L	50	50.5		101	80-120	MS
	Molybdenum	ug/L	50	48.7		97.4	80-120	MS
	Nickel	ug/L	50	49.6		99.3	80-120	MS
	Selenium	ug/L	50	52.9		106	80-120	MS
	Silver	ug/L	50	51.5		103	80-120	MS
	Thallium	ug/L	50	49.1		98.3	80-120	MS
	Uranium	ug/L	50	49.9		99.9	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-2427

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>
1203864156	Mercury	ug/L	2	2.13		106	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-2427

Client ID: CASA-17-142776L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 430398002

Serial Dilution ID: 1203852055

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Aluminum	68	U	340	U				P
Barium	23.9		24.8	J	3.795			P
Beryllium	1	U	5	U				P
Boron	15	U	75	U				P
Calcium	19100		20800		8.692		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	4100		4510		9.911			P
Manganese	2	U	10	U				P
Potassium	1400		1370		2.241			P
Silica	70000		74300		6.126		10	P
Sodium	10200		11500		12.682	E	10	P
Strontium	72.9		77.9		6.737		10	P
Tin	2.5	U	12.5	U				P
Vanadium	5.52		5	U	17.863			P
Zinc	10.2		16.5	U	49.017			P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-2427

Client ID: CASA-17-142776L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 430398002

Serial Dilution ID: 1203852192

<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	176		172		2.011			MS
Lead	.5	U	2.5	U				MS
Molybdenum	1.23		1.2	J	2.28			MS
Nickel	7.25		7.34	J	1.255			MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.101	J	.335	U	23.762			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-2427 **Client ID:** WT_SIP-17-135652L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 430356001 **Serial Dilution ID:** 1203864762

<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 #: 2017-2427
Work Order #: 430398**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1690350

Method: SW 9060 Total Organic Carbon

Sample Analysis

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

Sample ID	Client ID
430398001	CASA-17-142018
1203856723	Method Blank (MB)
1203856724	Laboratory Control Sample (LCS)
1203856725	430079001(CAMO-17-141989) Sample Duplicate (DUP)
1203856726	430356001(NonSDG) Sample Duplicate (DUP)
1203856727	430079001(CAMO-17-141989) Post Spike (PS)
1203856728	430356001(NonSDG) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

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

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Cyanide and Total		
Analytical Batch:	1690985	Method:	WSP-CN(T)
Prep Batch :	1690983	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
430398001	CASA-17-142018
1203852266	Method Blank (MB)
1203852267	Laboratory Control Sample (LCS)
1203852270	430398001(CASA-17-142018) Sample Duplicate (DUP)
1203852273	430398001(CASA-17-142018) 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 430398001 (CASA-17-142018) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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Method/Analysis Information

Product: Ion Chromatography

Analytical Batch: 1691290

Method: WSP-ANIONS

Sample Analysis

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

Sample ID	Client ID
430398002	CASA-17-142776
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) and 1203853104 (CAMO-17-141976PS) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Sample Re-analysis

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

Miscellaneous Information

Manual Integrations

Samples 1203853102 (CAMO-17-141976DUP), 1203853103 (CASA-17-142776DUP), 1203853104 (CAMO-17-141976PS), 1203853105 (CASA-17-142776PS) and 430398002 (CASA-17-142776) 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
430398002	CASA-17-142776
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
430398001	CASA-17-142018
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: 1690783

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
430398002	CASA-17-142776
1203851749	Method Blank (MB)
1203851750	Laboratory Control Sample (LCS)
1203851751	430247001(NonSDG) Sample Duplicate (DUP)
1203851754	430247001(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-128 REV# 9.

Preparation/Analytical Method Verification

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

Calibration Information

The Nutrient analysis was performed on a Lachat QuickChem FIA+ 8500 Series.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 430247001 (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 spike recovery falls outside of the GEL acceptance limits but within the client specified limits.

Analyte	Sample	Value
Nitrogen, Nitrate/Nitrite	1203851754 (Non SDG 430247001PS)	84* (90.0%-110.0%)

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 430398002 (CASA-17-142776) was diluted because target analyte concentrations exceeded the calibration range. The following samples 1203851751 (Non SDG 430247001DUP) and 1203851754 (Non SDG 430247001PS) in this sample group were diluted due to matrix interference. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	430398
	002
Nitrogen, Nitrate/Nitrite	5X

Sample Re-analysis

Samples 1203851751 (Non SDG 430247001DUP) and 1203851754 (Non SDG 430247001PS) were re-analyzed due to CCB failure. The reanalysis data with passing instrument QC was reported.

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Total Phosphorus		
Analytical Batch:	1692790	Method:	PO4
Prep Batch :	1692789	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
430398002	CASA-17-142776
1203856591	Method Blank (MB)
1203856592	Laboratory Control Sample (LCS)
1203856595	430213001(CAMO-17-141987) Sample Duplicate (DUP)
1203856596	430213001(CAMO-17-141987) 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

Sample 430213001 (CAMO-17-141987) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product: Solids and Total Dissolved

Analytical Batch: 1691865

Method: TDS

Sample Analysis

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

Sample ID	Client ID
430398002	CASA-17-142776
1203854437	Method Blank (MB)
1203854438	Laboratory Control Sample (LCS)
1203854441	430276001(CAMO-17-142057) Sample Duplicate (DUP)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Consecutive Weight Checks

All consecutive weight checks were met.

Quality Control (QC) Designation

Sample 430276001 (CAMO-17-142057) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Specific Conductivity

Analytical Batch: 1697373

Method: EPA120.1 Specific Conductivity

Sample Analysis

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

Sample ID	Client ID
430398002	CASA-17-142776
1203866950	Laboratory Control Sample (LCS)
1203866951	430079002(CAMO-17-142777) Sample Duplicate (DUP)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-009 REV# 14.

Preparation/Analytical Method Verification

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

Calibration Information

The Titration and Ion analysis was performed on a Orion 160 Conductivity Meter.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: pH

Analytical Batch: 1692037 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
430398002	CASA-17-142776
1203854921	Laboratory Control Sample (LCS)
1203854922	430079002(CAMO-17-142777) Sample Duplicate (DUP)
1203854923	430087001(CAMO-17-142053) Sample Duplicate (DUP)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

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

Sample	Analyte	Value
1203854922 (CAMO-17-142777DUP)	pH	Received 09-AUG-17, out of holding 07-AUG-17
1203854923 (CAMO-17-142053DUP)	pH	Received 09-AUG-17, out of holding 07-AUG-17
430398002 (CASA-17-142776)	pH	Received 11-AUG-17, out of holding 09-AUG-17

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Alkalinity

Analytical Batch: 1692036 **Method:** EPA 310.1 Total Alkalinity

Sample Analysis

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

Sample ID	Client ID
430398002	CASA-17-142776
1203854902	Laboratory Control Sample (LCS)
1203854903	430079002(CAMO-17-142777) Sample Duplicate (DUP)
1203854904	430087001(CAMO-17-142053) Sample Duplicate (DUP)
1203854905	430079002(CAMO-17-142777) Matrix Spike (MS)
1203854906	430087001(CAMO-17-142053) Matrix Spike (MS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

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

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Additional Comments**

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Certification Statement

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

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Qualifier Definition Report for

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

Client SDG: 2017-2427 GEL Work Order: 430398

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Kristen Mizzell

Date: 01 SEP 2017

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: September 1, 2017

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

Los Alamos, New Mexico 87545

Contact: Ms. Nita Patel
Project: LANL- WQH Water Samples

Client SDG: 2017-2427

Client Sample ID: CASA-17-142018
Sample ID: 430398001
Matrix: W
Collect Date: 09-AUG-17 13:01
Receive Date: 11-AUG-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	J	0.488	0.330	1.00	mg/L		1	TSM	08/18/17	2302	1690350	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	08/14/17	1347	1690985	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl		0.113	0.033	0.100	mg/L	1.00	1	KLP1	08/25/17	0919	1692771	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	08/14/17	1301	1690983
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	08/23/17	1700	1692769

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

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

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 1, 2017

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

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

Client SDG: 2017-2427

Client Sample ID: CASA-17-142776
Sample ID: 430398002
Matrix: W
Collect Date: 09-AUG-17 13:01
Receive Date: 11-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	J	0.0965	0.067	0.200	mg/L		1	MXL2	08/12/17	1019	1691290	1
Chloride		8.37	0.067	0.200	mg/L		1					
Fluoride		0.281	0.033	0.100	mg/L		1					
Sulfate		17.1	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	U	ND	0.017	0.050	mg/L	1.00	1	KLP1	08/22/17	1257	1692776	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		4.90	0.085	0.250	mg/L		5	AXH3	08/16/17	1003	1690783	3
PO4 "As Received"												
Phosphorus, Total as P	U	ND	0.020	0.050	mg/L	1.00	1	KLP1	08/23/17	1004	1692790	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		187	3.40	14.3	mg/L			KLP1	08/15/17	1518	1691865	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		45.4	1.45	4.00	mg/L			RXB5	08/19/17	1456	1692036	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		223	1.00	1.00	umhos/cm		1	VH1	08/31/17	1116	1697373	7
PH "As Received"												
pH at Temp 12.0C	H	7.78	0.010	0.100	SU		1	RXB5	08/19/17	1454	1692037	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	08/22/17	1056	1692775
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	08/22/17	1700	1692789

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: September 1, 2017

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

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

Client SDG: 2017-2427

Client Sample ID: CASA-17-142776
Sample ID: 430398002

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: September 1, 2017

Page 1 of 7

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

Contact: Ms. Nita Patel

Workorder: 430398

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1690350										
QC1203856725	430079001	DUP									
Total Organic Carbon Average	J	0.910	J	0.850	mg/L	6.82	^	(+/-1.00)	TSM	08/18/17	10:08
QC1203856726	430356001	DUP									
Total Organic Carbon Average		9.40		9.39	mg/L	0.149		(0%-20%)		08/18/17	19:54
QC1203856724	LCS										
Total Organic Carbon Average	10.0			9.47	mg/L			94.7 (80%-120%)		08/18/17	12:17
QC1203856723	MB										
Total Organic Carbon Average			U	ND	mg/L					08/18/17	12:05
QC1203856727	430079001	PS									
Total Organic Carbon Average	10.0	J	0.910	11.0	mg/L			101 (75%-125%)		08/18/17	10:55
QC1203856728	430356001	PS									
Total Organic Carbon Average	10.0		9.40	18.9	mg/L			95.3 (75%-125%)		08/18/17	20:41
Flow Injection Analysis											
Batch	1690985										
QC1203852270	430398001	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	08/14/17	13:48
QC1203852267	LCS										
Cyanide, Total	50.0			53.5	ug/L			107 (90%-110%)		08/14/17	13:13
QC1203852266	MB										
Cyanide, Total			U	ND	ug/L					08/14/17	13:12
QC1203852273	430398001	MS									
Cyanide, Total	100	U	ND	100	ug/L			100 (90%-110%)		08/14/17	13:49

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QC Summary

Workorder: 430398

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

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QC Summary

Workorder: 430398

Page 3 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1691290										
Fluoride			U	ND	mg/L				MXL2	08/11/17	21:35
Sulfate			U	ND	mg/L						
QC1203853104 429717001 PS											
Bromide	1.25	0.274		1.51	mg/L		98.5	(75%-125%)		08/11/17	23:32
Chloride	5.00	7.79		13.3	mg/L		110	(75%-125%)		08/14/17	18:30
Fluoride	2.50	0.193		2.58	mg/L		95.5	(75%-125%)		08/11/17	23:32
Sulfate	10.0	11.2		21.7	mg/L		106	(75%-125%)		08/14/17	18:30
QC1203853105 430398002 PS											
Bromide	1.25	J 0.0965		1.31	mg/L		96.8	(75%-125%)		08/12/17	11:18
Chloride	5.00	8.37		14.0	mg/L		113	(75%-125%)			
Fluoride	2.50	0.281		2.66	mg/L		95.3	(75%-125%)			
Sulfate	10.0	17.1		28.0	mg/L		109	(75%-125%)			
Nutrient Analysis											
Batch	1690783										
QC1203851751 430247001 DUP											
Nitrogen, Nitrate/Nitrite		0.340		0.345	mg/L	1.46 ^		(+/-0.250)	AXH3	08/16/17	09:43
QC1203851750 LCS											
Nitrogen, Nitrate/Nitrite	1.00			1.02	mg/L		102	(90%-110%)		08/16/17	08:24
QC1203851749 MB											
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					08/16/17	08:23

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1690783										
QC1203851754	430247001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.068		0.908	mg/L		84 *	(90%-110%)	AXH3	08/16/17	09:44
Batch	1692771										
QC1203856516	429717002	DUP									
Nitrogen, Total Kjeldahl	U	ND	U	ND	mg/L	N/A			KLP1	08/25/17	08:58
QC1203856517	429873002	DUP									
Nitrogen, Total Kjeldahl	U	ND	U	ND	mg/L	N/A				08/25/17	09:01
QC1203856515	LCS										
Nitrogen, Total Kjeldahl	1.00			1.08	mg/L		108	(90%-110%)		08/25/17	08:52
QC1203856514	MB										
Nitrogen, Total Kjeldahl			U	ND	mg/L					08/25/17	08:51
QC1203856518	429717002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND	1.00	mg/L		97.8	(90%-110%)		08/25/17	08:59
QC1203856519	429873002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND	1.05	mg/L		105	(90%-110%)		08/25/17	09:02
Batch	1692776										
QC1203856528	430548005	DUP									
Nitrogen, Ammonia		0.665		0.697	mg/L	4.7		(0%-20%)	KLP1	08/22/17	13:00
QC1203856529	429717001	DUP									
Nitrogen, Ammonia	J	0.0244	U	ND	mg/L	200	^			08/22/17	12:43
QC1203856527	LCS										
Nitrogen, Ammonia	1.00			1.01	mg/L		101	(90%-110%)		08/22/17	12:41
QC1203856526	MB										
Nitrogen, Ammonia			U	ND	mg/L					08/22/17	12:36

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1692776										
QC1203856531	430548005	MS									
Nitrogen, Ammonia	2.00	0.665		2.77	mg/L		105	(90%-110%)	KLP1	08/22/17	13:01
QC1203856532	429717001	MS									
Nitrogen, Ammonia	1.00	J	0.0244	1.07	mg/L		105	(90%-110%)		08/22/17	12:43
Batch	1692790										
QC1203856595	430213001	DUP									
Phosphorus, Total as P		U	ND	U	ND	mg/L	N/A		KLP1	08/23/17	10:02
QC1203856592	LCS										
Phosphorus, Total as P	1.00			1.07	mg/L		107	(80%-124%)		08/23/17	09:53
QC1203856591	MB										
Phosphorus, Total as P			U	ND	mg/L					08/23/17	09:53
QC1203856596	430213001	MS									
Phosphorus, Total as P	1.00	U	ND	1.07	mg/L		106	(63%-139%)		08/23/17	10:03
Solids Analysis											
Batch	1691865										
QC1203854441	430276001	DUP									
Total Dissolved Solids			151		156	mg/L	0.913	(0%-5%)	KLP1	08/15/17	15:18
QC1203854438	LCS										
Total Dissolved Solids	300			304	mg/L		101	(95%-105%)		08/15/17	15:18
QC1203854437	MB										
Total Dissolved Solids			U	ND	mg/L					08/15/17	15:18
Titration and Ion Analysis											
Batch	1692036										
QC1203854903	430079002	DUP									
Alkalinity, Total as CaCO3			91.8		91.4	mg/L	0.441	(0%-20%)	RXB5	08/19/17	14:19

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1692036										
Carbonate alkalinity (CaCO3)	U	ND	U	ND	mg/L	N/A			RXB5	08/19/17	14:19
QC1203854904 430087001 DUP Alkalinity, Total as CaCO3		127		127	mg/L	0.317		(0%-20%)		08/19/17	14:23
Carbonate alkalinity (CaCO3)	U	ND	U	ND	mg/L	N/A					
QC1203854902 LCS Alkalinity, Total as CaCO3	100			109	mg/L		109	(90%-110%)		08/19/17	14:17
QC1203854905 430079002 MS Alkalinity, Total as CaCO3	100	91.8		196	mg/L		104	(80%-120%)		08/19/17	14:19
QC1203854906 430087001 MS Alkalinity, Total as CaCO3	100	127		231	mg/L		104	(80%-120%)		08/19/17	14:25
Batch	1692037										
QC1203854922 430079002 DUP pH	H	7.39	H	7.42	SU	0.405		(0%-5%)	RXB5	08/19/17	14:30
QC1203854923 430087001 DUP pH	H	7.26	H	7.29	SU	0.412		(0%-5%)		08/19/17	14:31
QC1203854921 LCS pH	7.00			7.00	SU		100	(99%-101%)		08/19/17	13:56
Batch	1697373										
QC1203866951 430079002 DUP Conductivity		635		636	umhos/cm	0.157		(0%-10%)	VH1	08/31/17	11:13
QC1203866950 LCS Conductivity	1410			1400	umhos/cm		99.3	(95%-105%)		08/31/17	11:03

Notes:

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