

The order of this data package is as follows:

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

Comments:

[illegible]

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11212

EVENT NAME: Mortandad/Sandia (Cr Inv/MDA C)
MY2017 Q3

SAMPLE ID: CASA-17-132319

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/05/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	11:01 10:01 5/5/17TB		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-11		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / <input checked="" type="radio"/> NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NA
	WSP-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:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

COLLECTED BY (PRINT): A. Vigil

RELINQUISHED BY (Printed Name) (Signature)	Andrew Vigil <i>Andrew Vigil</i>	Date/Time 05/05/2017 11:50	RECEIVED BY (Printed Name) (Signature)	K. Green <i>K. Green</i>	Date/Time 5/5/17 11:50
RELINQUISHED BY (Printed Name) (Signature)		Date/Time	RECEIVED BY (Printed Name) (Signature)		Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11212

EVENT NAME: Mortandad/Sandia (Cr Inv/MDA C)
MY2017 Q3

SAMPLE ID: CASA-17-132328

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/05/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	11:01 10:01 5/5/2017 TB		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-11		FIELD PREP:	UF	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / <u>NO</u> / NA

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

SAMPLE COMMENTS: Sampled 50 ft. from running diesel generator

LOCATION COMMENTS: NA

FIELD PARAMETERS:

Sample Time	11:01	HH:MM	Dissolved Oxygen	6.67	Flow (in gpm)	2.86
Oxidation-Reduction Potential	181.8		pH	8.40	Specific Conductance	225.8
Temperature	22.0		Turbidity	0.52		

COLLECTED BY (PRINT): A. Vigil

RELINQUISHED BY (Printed Name) (Signature)	Andrew Vigil <i>Andrew Vigil</i>	Date/Time 05/05/2017 11:50	RECEIVED BY (Printed Name) (Signature)	K. Green <i>K. Green</i>	Date/Time 5/5/17 11:50
RELINQUISHED BY (Printed Name) (Signature)		Date/Time	RECEIVED BY (Printed Name) (Signature)		Date/Time

Report Date: 05/02/2017

DATA VALIDATION REPORT

Chain Of Custody No. 2017-1490

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
422638	EPA:120.1	1				
422638	EPA:150.1	1				
422638	EPA:160.1	1				
422638	EPA:170.0	2				
422638	EPA:245.2	2				
422638	EPA:300.0	1				
422638	EPA:310.1	1				
422638	EPA:335.4	1				
422638	EPA:350.1	1				
422638	EPA:351.2	1				
422638	EPA:353.2	1				
422638	EPA:365.4	1				
422638	SM:A2340B	1				
422638	SW-846:6010C	1				
422638	SW-846:6020	1				
422638	SW-846:6850	1				
422638	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
422638	EPA:120.1	1663499	1663499	1										1			1				
422638	EPA:150.1	1665849	1665849	1										1			1				
422638	EPA:160.1	1664155	1664155	1					1					1			1				
422638	EPA:170.0	NA	NA	2																	
422638	EPA:245.2	1663648	1663647	2					1	1				1			1				
422638	EPA:300.0	1664539	1664539	1					1					1			1				
422638	EPA:310.1	1665848	1665848	1						1				1			1				

DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
422638	EPA:335.4	1663020	1663019	1					1	1				1			1				
422638	EPA:350.1	1663540	1663539	1					1	1				1			1				
422638	EPA:351.2	1663542	1663541	1					1	1				1			1				
422638	EPA:353.2	1664158	1664158	1					1					1			1				
422638	EPA:365.4	1663545	1663543	1					1	1				1			1				
422638	SM:A2340B	1670811	1670811	1																	
422638	SW-846:6010C	1663293	1663292	1					1	1				1			1				
422638	SW-846:6020	1663303	1663302	1					1	1				1			1				
422638	SW-846:6850	1666241	1666240	1					1	1	1			1							
422638	SW-846:9060	1665822	1665822	1					1					1			1				

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-132216	1203785788	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-17-132319	422638001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203785786	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-132216	1203791299	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-17-132319	422638001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203791298	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-132213	1203787280	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-17-132319	422638001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203787278	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203787277	MB	1	0	0	0
EPA:170.0	VOC	CASA-17-132319	422638001	REG	1	0	0	0
EPA:170.0	VOC	CASA-17-132328	422638002	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-132319	422638001	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-132322	1203786030	DUP	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-132322	1203786031	MS	0	0	1	0
EPA:245.2	INORGANIC	CASA-17-132328	422638002	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203786029	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203786028	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
EPA:300.0	GENERAL CHEMISTRY	CAMO-17-132213	1203788155	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-132319	422638001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203788154	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203788153	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-132216	1203791292	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-132216	1203791295	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-132319	422638001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203791289	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-132328	422638002	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-132331	1203785527	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-132331	1203785529	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203784604	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203784603	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-132319	422638001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-132322	1203785837	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-132322	1203785838	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203785834	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203785833	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-132328	422638002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-132331	1203785841	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-132331	1203785842	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203785840	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203785839	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-132319	422638001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-132322	1203787269	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203787256	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203787255	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-132319	422638001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-132322	1203785851	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-132322	1203785852	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203785846	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203785845	MB	1	0	0	0
SM:A2340B	INORGANIC	CASA-17-132319	422638001	REG	1	0	0	0
SW-846:6010C	INORGANIC	CASA-17-132319	422638001	REG	17	0	0	0
SW-846:6010C	INORGANIC	CASA-17-132322	1203785280	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CASA-17-132322	1203785281	MS	0	0	17	0
SW-846:6010C	INORGANIC	LCS	1203785279	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203785278	MB	17	0	0	0
SW-846:6020	INORGANIC	CASA-17-132319	422638001	REG	11	0	0	0
SW-846:6020	INORGANIC	CASA-17-132322	1203785302	DUP	11	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
SW-846:6020	INORGANIC	CASA-17-132322	1203785303	MS	0	0	11	0
SW-846:6020	INORGANIC	LCS	1203785301	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203785300	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-132319	422638001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-132322	1203792176	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-132322	1203792177	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203792175	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203792174	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-17-132328	422638002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-17-132331	1203791710	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203791231	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203791230	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name	Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
MB	1203785278	METHOD BLANK	SW-846:6010C	W	Calcium	-118	J	ug/L	200

DATA VALIDATION REPORT

Field Sample ID	Blank Lab	Blank Type	Analytical Method	Parameter Name	Blank Lab Result	Blank Lab Units	Lab Result	Lab Qualifier	Lab Detection Limit	Detect Flag	Detect to Nondetect Factor	Detect to Estimated Factor	Use Factors
CASA-17-132319	1203785278	METHOD BLANK	SW-846:6010C	Calcium	-118	ug/L	21600		200	Y			

6. Any surrogate recoveries outside the control limits?

No.

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

Field Sample ID	MS Lab Sample ID	MSD Lab Sample ID	Analytical Method	Parameter Name	Analysis Lot ID	Analysis Date	Sample Matrix	MS Spike Recovery	MSD Spike Recovery	MS Upper Limit	MS Lower Limit	MS Reject Limit	RPD	RPD Limit
CASA-17-132322	1203785838		EPA:350.1	Ammonia as Nitrogen	1663539	05-10-2017	W	88.4		110	90	10		
CASA-17-132331	1203785842		EPA:351.2	Total Kjeldahl Nitrogen	1663541	05-16-2017	W	113		110	90	10		

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

No.

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

DATA VALIDATION REPORT

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

None.

Reason Code

Description

J_LAB

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

NQ

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

U_LAB

The analytical laboratory qualified the analyte as not detected.

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-17-132319	R-11	REG	EPA:120.1	0	1
CASA-17-132319	R-11	REG	EPA:150.1	0	1
CASA-17-132319	R-11	REG	EPA:160.1	0	1
CASA-17-132319	R-11	REG	EPA:170.0	0	1
CASA-17-132319	R-11	REG	EPA:245.2	0	1
CASA-17-132319	R-11	REG	EPA:300.0	0	4
CASA-17-132319	R-11	REG	EPA:310.1	0	2
CASA-17-132319	R-11	REG	EPA:350.1	0	1
CASA-17-132319	R-11	REG	EPA:353.2	0	1
CASA-17-132319	R-11	REG	EPA:365.4	0	1
CASA-17-132319	R-11	REG	SM:A2340B	0	1
CASA-17-132319	R-11	REG	SW-846:6010C	0	17
CASA-17-132319	R-11	REG	SW-846:6020	0	11
CASA-17-132319	R-11	REG	SW-846:6850	0	1
CASA-17-132328	R-11	REG	EPA:170.0	0	1
CASA-17-132328	R-11	REG	EPA:245.2	0	1
CASA-17-132328	R-11	REG	EPA:335.4	0	1

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-17-132328	R-11	REG	EPA:351.2	0	1
CASA-17-132328	R-11	REG	SW-846:9060	0	1

June 02, 2017

gel.com

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

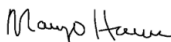
Re: LANL- WQH Water Samples
Work Order: 422638
SDG: 2017-1490

Dear Mr. Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on May 09, 2017, and analyzed for General Chemistry, Metals and Perchlorates by LCMSMS. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,


Margo Herron for
Valerie Davis
Project Manager

Chain of Custody: 2017-1490
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 422638
SDG: 2017-1490

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 422638
SDG # : 2017-1490**

June 02, 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 May 09, 2017 for analysis. The samples were delivered with proper chain of custody documentation and signatures. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. Containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Shipping container temperature was within specification (0 - 6C). Shipping container temperatures were checked, documented, and within specifications. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
422638001	CASA-17-132319
422638002	CASA-17-132328

Case Narrative

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

Data Package

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

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

Margo Herron
Margo Herron for
Valerie Davis
Project Manager

List of current GEL Certifications as of 02 June 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	SC000122017-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-22
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Chain of Custody and Supporting Documentation



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: <u>ESHL</u>		SDG/AR/COC/Work Order: <u>422638</u>	
Received By: <u>ZKW</u>		Date Received: <u>5/9/17</u>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <u>5908 1782 0460</u> <u>5908 1782 0470</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input 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> CPM/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"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice <u>Ice Packs</u> Dry ice None Other: *all temperatures are recorded in Celsius TEMP: <u>2°C</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR3-16</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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 ___ <input checked="" type="checkbox"/> Sample ID's and containers affected:
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
12 Are sample containers identifiable as GEL provided?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials

MEJA

Date

5/9/17

Page

1 of 1

GL-CHL-SR-001 Rev 5

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 #: 2017-1490
Work Order #: 422638**

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: 1666241

Prep Batch Number: 1666240

Sample Analysis

Sample ID	Client ID
422638001	422638001 (CASA-17-132319)
1203792178	Interference Check Sample (ICS)
1203792174	Method Blank (MB)
1203792175	Laboratory Control Sample (LCS)
1203792176	422637001(CASA-17-132322) Matrix Spike (MS)
1203792177	422637001(CASA-17-132322) 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 422637001 (CASA-17-132322) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

In sample 1203792176 (MS) a low recovery of 65% was observed for Perchlorate-101. In sample 1203792177 (MSD) a low recovery of 71% and 50% were observed for Perchlorate and Perchlorate-101, respectively. The acceptance range is from 75-125%. The outliers observed for the matrix spikes may be due to the background concentration in the parent sample, 422637001 (CASA-17-132322). Recoveries in 1203792175 (LCS) and 1203792178 (ICS) were acceptable. 1203792176 (CASA-17-132322MS) and 1203792177 (CASA-17-132322MSD).

MS/MSD Relative Percent Difference (RPD) Statement

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

Internal Standard Area Acceptance

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

Retention Time

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

A data exception report (DER) 1635606 was generated for samples 1203792176 (CASA-17-132322MS) and 1203792177 (CASA-17-132322MSD) in this SDG/batch.

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: 2017-1490 GEL Work Order: 422638

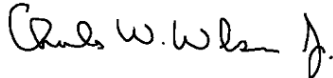
The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Charles Wilson

Date: 31 MAY 2017

Title: Analyst II

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1666240Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-132319Date Received: 09-MAY-17GEL Job No (SDG): 2017-1490GEL Sample ID: 422638001Date Filtered: 18-MAY-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	0.816	ug/L		1	19-MAY-17 17:34	per0519019a
	Perchlorate Isotope Ratio			2.86			1	19-MAY-17 17:34	per0519019a
14797-73-0	Perchlorate-101	.05	.2	0.805	ug/L		1	19-MAY-17 17:34	per0519019a
	Perchlorate-O(18)			0.490	ug/L		1	19-MAY-17 17:34	per0519019a

^ 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): 2017-1490

Extract Batch Code: 1666240

Date Filtered: 18-MAY-17

Matrix: WATER

Sample ID: 1203792175

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.201	ug/L	101		85 - 115
Perchlorate Isotope Ratio		2.89				-
Perchlorate-101	0.200	.197	ug/L	99		85 - 115
Perchlorate-O(18)		.473	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): 2017-1490

Extract Batch Code: 1666240

Date Extracted: 18-MAY-17

GEL MS/PS ID: 1203792176

Client ID: CASA-17-132322

GEL MSD/PSD ID: 1203792177

QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	1.57	ug/L	1.72	79	1.71	71 *	1	30	75 - 125
Perchlorate Isotope Ratio	0	2.91		2.95		2.98		1		-
Perchlorate-101	0.200	1.52	ug/L	1.65	65 *	1.62	50 *	2	30	75 - 125
Perchlorate-O(18)	0	0.505	ug/L	0.501		.527		5		-

^ 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: 1666240Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 18-MAY-17GEL Job No (SDG): 2017-1490GEL Sample ID: 1203792174Date Filtered: 18-MAY-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	19-MAY-17 16:40	per0519013a
	Perchlorate Isotope Ratio						1	19-MAY-17 16:40	per0519013a
14797-73-0	Perchlorate-101	.05	.2	0.200	ug/L	U	1	19-MAY-17 16:40	per0519013a
	Perchlorate-O(18)			0.478	ug/L		1	19-MAY-17 16:40	per0519013a

^ 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: 1666240Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 18-MAY-17GEL Job No (SDG): 2017-1490GEL Sample ID: 1203792175Date Filtered: 18-MAY-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	0.201	ug/L		1	19-MAY-17 16:49	per0519014a
	Perchlorate Isotope Ratio			2.89			1	19-MAY-17 16:49	per0519014a
14797-73-0	Perchlorate-101	.05	.2	0.197	ug/L	J	1	19-MAY-17 16:49	per0519014a
	Perchlorate-O(18)			0.473	ug/L		1	19-MAY-17 16:49	per0519014a

^ 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: 1666240Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2017-1490GEL Sample ID: 1203792178Date Filtered: 18-MAY-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	0.202	ug/L		1	19-MAY-17 16:58	per0519015a
	Perchlorate Isotope Ratio			3.12			1	19-MAY-17 16:58	per0519015a
14797-73-0	Perchlorate-101	.05	.2	0.183	ug/L	J	1	19-MAY-17 16:58	per0519015a
	Perchlorate-O(18)			0.521	ug/L		1	19-MAY-17 16:58	per0519015a

^ 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: 1666240Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-132322MSDate Received: 09-MAY-17GEL Job No (SDG): 2017-1490GEL Sample ID: 1203792176Date Filtered: 18-MAY-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	1.72	ug/L		1	19-MAY-17 17:16	per0519017a
	Perchlorate Isotope Ratio			2.95			1	19-MAY-17 17:16	per0519017a
14797-73-0	Perchlorate-101	.05	.2	1.65	ug/L		1	19-MAY-17 17:16	per0519017a
	Perchlorate-O(18)			0.501	ug/L		1	19-MAY-17 17:16	per0519017a

^ 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: 1666240Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-132322MSDDate Received: 09-MAY-17GEL Job No (SDG): 2017-1490GEL Sample ID: 1203792177Date Filtered: 18-MAY-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	1.71	ug/L		1	19-MAY-17 17:25	per0519018a
	Perchlorate Isotope Ratio			2.98			1	19-MAY-17 17:25	per0519018a
14797-73-0	Perchlorate-101	.05	.2	1.62	ug/L		1	19-MAY-17 17:25	per0519018a
	Perchlorate-O(18)			0.527	ug/L		1	19-MAY-17 17:25	per0519018a

^ 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 =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Miscellaneous

DATA EXCEPTION REPORT

Mo.Day Yr. 25-MAY-17	Division: Federal	Quality Criteria: Others	Type: Process
Instrument Type: LC-MS/MS	Test / Method: SW846-6850 Modified	Matrix Type: Liquid	Client Code: ARSL004
Batch ID: 1666241	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 422637(2017-1489),422638(2017-1490),422730(2017-1496),422853(2017-1506),422859(2017-1505),422869(2017-1504),423072(2017-1517),423077(2017-1516),423224(2017-1524) Application Issues: Failed Recovery for MS/MSD, or PS/PSD			
Specification and Requirements		DER Disposition:	
Exception Description:			
1. In sample 1203792176 (MS) a low recovery of 65% was observed for Perchlorate-101. In sample 1203792177 (MSD) a low recovery of 71% and 50% were observed for Perchlorate and Perchlorate-101, respectively. The acceptance range is from 75-125%.		1. The outliers observed for the matrix spikes may be due to the background concentration in the parent sample, 422637001 (CASA-17-132322). Recoveries in 1203792175 (LCS) and 1203792178 (ICS) were acceptable. Will report data and note in case narrative.	

Originator's Name:

Grace Cappelmann 25-MAY-17

Data Validator/Group Leader:

Charles Wilson 31-MAY-17

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2017-1490
Work Order #: 422638

Sample ID	Client ID
422638001	CASA-17-132319
422638002	CASA-17-132328
1203785278	Method Blank (MB)ICP
1203785279	Laboratory Control Sample (LCS)
1203785282	422637001(CASA-17-132322L) Serial Dilution (SD)
1203785280	422637001(CASA-17-132322D) Sample Duplicate (DUP)
1203785281	422637001(CASA-17-132322S) Matrix Spike (MS)
1203785300	Method Blank (MB)ICP-MS
1203785301	Laboratory Control Sample (LCS)
1203785304	422637001(CASA-17-132322L) Serial Dilution (SD)
1203785302	422637001(CASA-17-132322D) Sample Duplicate (DUP)
1203785303	422637001(CASA-17-132322S) Matrix Spike (MS)
1203786028	Method Blank (MB)CVAA
1203786029	Laboratory Control Sample (LCS)
1203786032	422637001(CASA-17-132322L) Serial Dilution (SD)
1203786030	422637001(CASA-17-132322D) Sample Duplicate (DUP)
1203786031	422637001(CASA-17-132322S) Matrix Spike (MS)

Sample Analysis

Samples 422638001 and 002 in this SDG were analyzed for metals and mercury on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1663293, 1663303, 1663648 and 1670811
Prep Batch :	1663292, 1663302 and 1663647
Standard Operating Procedures:	GL-MA-E-013 REV# 28, GL-MA-E-006 REV# 13, GL-MA-E-014 REV# 29, GL-MA-E-010 REV# 34 and GL-GC-E-107 REV# 10
Analytical Method:	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.2 1974 and SM:A2340B
Prep Method :	SW846 3005A and EPA 245.1/245.2 Prep

Preparation/Analytical Method Verification

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

System Configuration

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

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

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

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

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 422638001 (CASA-17-132319)-ICP.

ICSA/ICSAB Statement

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria. However, the ICSA contained analyte concentrations which are verified trace impurities indigenous to the purchased standard.

Continuing Calibration Blanks (CCB) Requirements

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample 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: 422637001 (CASA-17-132322)-ICP, ICP-MS and CVAA.

Matrix Spike (MS/MSD) Recovery Statement

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

Duplicate Relative Percent Difference (RPD) Statement

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. The relative percent differences (RPD) between the sample and its duplicate (DUP) were within acceptable limits for all applicable analytes.

Serial Dilution % Difference Statement

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Preparation Information

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

Miscellaneous Information

Electronic Packaging Comment

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

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

Data Exception (DER) Documentation

A data exception report was not required for this SDG.

Additional Comments

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

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

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: 2017-1490 GEL Work Order: 422638

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature:



Name: Nik-Cole Elmore

Date: 05 JUN 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1490**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 422638001**BASIS:** As Received**DATE COLLECTED** 05-MAY-17**CLIENT ID:** CASA-17-132319**LEVEL:** Low**DATE RECEIVED** 09-MAY-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	05/11/17 11:26	051117W2-6	1663648

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1490

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 422638001

BASIS: As Received

DATE COLLECTED 05-MAY-17

CLIENT ID: CASA-17-132319

LEVEL: Low

DATE RECEIVED 09-MAY-17

MATRIX: W

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	200	ug/L	U	68	200	200	1	P	HSC	05/29/17 11:37	052917-2	1663293
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	BAJ	05/26/17 15:25	170526-5	1663303
7440-38-2	Arsenic	2.1	ug/L	J	2	5	5	1	MS	BAJ	05/25/17 20:52	170525-4	1663303
7440-39-3	Barium	41.9	ug/L		1	5	5	1	P	HSC	05/29/17 11:37	052917-2	1663293
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	05/29/17 11:37	052917-2	1663293
7440-42-8	Boron	29	ug/L	J	15	50	50	1	P	HSC	05/29/17 11:37	052917-2	1663293
7440-43-9	Cadmium	1	ug/L	U	0.3	1	1	1	MS	BAJ	05/25/17 20:52	170525-4	1663303
7440-70-2	Calcium	21600	ug/L		50	200	200	1	P	HSC	05/29/17 07:09	052917-1	1663293
7440-47-3	Chromium	16.4	ug/L		3	10	10	1	MS	BAJ	05/25/17 20:52	170525-4	1663303
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	05/29/17 11:37	052917-2	1663293
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	05/29/17 11:37	052917-2	1663293
7439-89-6	Iron	100	ug/L	U	30	100	100	1	P	HSC	05/29/17 11:37	052917-2	1663293
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	BAJ	05/25/17 20:52	170525-4	1663303
7439-95-4	Magnesium	6280	ug/L		110	300	300	1	P	HSC	05/29/17 11:37	052917-2	1663293
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	05/29/17 11:37	052917-2	1663293
7439-98-7	Molybdenum	1.6	ug/L		0.2	0.5	0.5	1	MS	BAJ	05/26/17 15:25	170526-5	1663303
7440-02-0	Nickel	2	ug/L	U	0.6	2	2	1	MS	BAJ	05/25/17 20:52	170525-4	1663303
7440-09-7	Potassium	1490	ug/L		50	150	150	1	P	HSC	06/02/17 10:55	060217-3	1663293
7782-49-2	Selenium	5	ug/L	U	2	5	5	1	MS	BAJ	05/25/17 20:52	170525-4	1663303
7631-86-9	Silica	70800	ug/L		53	213	213	1	P	HSC	05/29/17 11:37	052917-2	1663293
7440-22-4	Silver	1	ug/L	U	0.3	1	1	1	MS	BAJ	05/25/17 20:52	170525-4	1663303
7440-23-5	Sodium	11900	ug/L		100	300	300	1	P	HSC	06/02/17 10:55	060217-3	1663293
7440-24-6	Strontium	94.3	ug/L		1	5	5	1	P	HSC	05/29/17 11:37	052917-2	1663293
7440-28-0	Thallium	2	ug/L	U	0.6	2	2	1	MS	BAJ	05/25/17 20:52	170525-4	1663303
7440-31-5	Tin	10	ug/L	U	2.5	10	10	1	P	HSC	05/29/17 11:37	052917-2	1663293
7440-61-1	Uranium	0.70	ug/L		0.067	0.2	0.2	1	MS	BAJ	05/26/17 15:25	170526-5	1663303
7440-62-2	Vanadium	7.12	ug/L		1	5	5	1	P	HSC	05/29/17 11:37	052917-2	1663293
7440-66-6	Zinc	3.64	ug/L	J	3.3	10	10	1	P	HSC	05/29/17 11:37	052917-2	1663293

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1490**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 422638001**BASIS:** As Received**DATE COLLECTED** 05-MAY-17**CLIENT ID:** CASA-17-132319**LEVEL:** Low**DATE RECEIVED** 09-MAY-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
	Hardness as CaCO3	79.8	mg/L		0.453	1.24	1.24	1		TXT1	06/02/17 14:57		1670811

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1663293	1663292	SW846 3005A	50	mL	50	mL	05/09/17	CXW4
1663303	1663302	SW846 3005A	50	mL	50	mL	05/09/17	CXW4
1663648	1663647	EPA 245.1/245.2 Prep	20	mL	20	mL	05/10/17	JXH5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1490**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 422638002**BASIS:** As Received**DATE COLLECTED** 05-MAY-17**CLIENT ID:** CASA-17-132328**LEVEL:** Low**DATE RECEIVED** 09-MAY-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	05/11/17 11:27	051117W2-6	1663648

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1663648	1663647	EPA 245.1/245.2 Prep	20	mL	20	mL	05/10/17	JXH5

***Analytical Methods:**

AV EPA 245.2 1974

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2017-1490

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>
1203785278	Aluminum	68	ug/L	+/-200	U	P	68	200
	Barium	1	ug/L	+/-5	U	P	1	5
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Calcium	-118	ug/L	+/-200	J	P	50	200
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Copper	3	ug/L	+/-10	U	P	3	10
	Iron	30	ug/L	+/-100	U	P	30	100
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Manganese	2	ug/L	+/-10	U	P	2	10
	Potassium	50	ug/L	+/-150	U	P	50	150
	Silica	53	ug/L	+/-213	U	P	53	213
	Sodium	100	ug/L	+/-300	U	P	100	300
	Strontium	1	ug/L	+/-5	U	P	1	5
	Tin	2.5	ug/L	+/-10	U	P	2.5	10
	Vanadium	1	ug/L	+/-5	U	P	1	5
	Zinc	3.3	ug/L	+/-10	U	P	3.3	10
1203785300	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
1203786028	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. 2017-1490

Client ID: CASA-17-132322S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 422637001

Spike ID: 1203785281

<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	4830		68	U	5000	96		P
Barium	ug/L	75-125	526		34.5		500	98.2		P
Beryllium	ug/L	75-125	497		1	U	500	99.3		P
Boron	ug/L	75-125	535		24.1	J	500	102		P
Calcium	ug/L	75-125	22200		17300		5000	97.4		P
Cobalt	ug/L	75-125	499		1	U	500	99.7		P
Copper	ug/L	75-125	516		3	U	500	103		P
Iron	ug/L	75-125	5210		30	U	5000	104		P
Magnesium	ug/L	75-125	8930		4050		5000	97.7		P
Manganese	ug/L	75-125	493		2	U	500	98.3		P
Potassium	ug/L	75-125	6800		1970		5000	96.7		P
Silica	ug/L		75700		65800		10700	92.5	N/A	P
Sodium	ug/L	75-125	18400		13900		5000	90.2		P
Strontium	ug/L	75-125	569		67.7		500	100		P
Tin	ug/L	75-125	497		2.76	J	500	98.9		P
Vanadium	ug/L	75-125	519		14.2		500	101		P
Zinc	ug/L	75-125	478		24.6		500	90.7		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-1490

Client ID: CASA-17-132322S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 422637001

Spike ID: 1203785303

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Antimony	ug/L	75-125	52.4		1	U	50	104		MS
Arsenic	ug/L	75-125	54.2		3.04	J	50	102		MS
Cadmium	ug/L	75-125	50.9		0.3	U	50	102		MS
Chromium	ug/L	75-125	54.4		5.61	J	50	97.5		MS
Lead	ug/L	75-125	50.4		0.5	U	50	100		MS
Molybdenum	ug/L	75-125	57.5		1.94		50	111		MS
Nickel	ug/L	75-125	51.4		0.848	J	50	101		MS
Selenium	ug/L	75-125	51.2		2	U	50	101		MS
Silver	ug/L	75-125	52.7		0.3	U	50	105		MS
Thallium	ug/L	75-125	47.9		0.6	U	50	94.9		MS
Uranium	ug/L	75-125	48.3		0.283		50	96		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-1490

Client ID: CASA-17-132322S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 422637001

Spike ID: 1203786031

<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	2.02		0.067	U	2	101		AV

*Analytical Methods:

AV EPA 245.1/245.2

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-1490

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-17-132322D

Matrix: WATER

Level: Low

Sample ID: 422637001

Duplicate ID: 1203785280

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		68 U		68 U				P
Barium	ug/L	+/-20%	34.5		33.7		2.45		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	24.1 J		24.5 J		1.83		P
Calcium	ug/L	+/-20%	17300		18700		7.77		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%	4050		4150		2.34		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	1970		2020		2.92		P
Silica	ug/L	+/-20%	65800		67300		2.26		P
Sodium	ug/L	+/-20%	13900		14200		2.25		P
Strontium	ug/L	+/-20%	67.7		69.1		1.96		P
Tin	ug/L		2.76 J		2.5 U		200		P
Vanadium	ug/L	+/-5	14.2		15.3		6.92		P
Zinc	ug/L	+/-10	24.6		24.4		.837		P

*Analytical Methods:

P SW846 3005A/6010C

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-1490

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-17-132322D

Matrix: WATER

Level: Low

Sample ID: 422637001

Duplicate ID: 1203785302

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	+/-5	3.04 J		2.82 J		7.38		MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-10	5.61 J		5.75 J		2.57		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	1.94		1.91		1.5		MS
Nickel	ug/L	+/-2	0.848 J		0.837 J		1.31		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	0.283		0.279		1.42		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
–6–
Duplicate Sample Summary

SDG No.: 2017–1490**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CASA–17–132322D**Matrix:** WATER**Level:** Low**Sample ID:** 422637001**Duplicate ID:** 1203786030**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. 2017-1490

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>
1203785279								
	Aluminum	ug/L	5000	4990		99.8	80-120	P
	Barium	ug/L	500	510		102	80-120	P
	Beryllium	ug/L	500	504		101	80-120	P
	Boron	ug/L	500	515		103	80-120	P
	Calcium	ug/L	5000	4910		98.1	80-120	P
	Cobalt	ug/L	500	523		105	80-120	P
	Copper	ug/L	500	514		103	80-120	P
	Iron	ug/L	5000	5290		106	80-120	P
	Magnesium	ug/L	5000	5130		103	80-120	P
	Manganese	ug/L	500	510		102	80-120	P
	Potassium	ug/L	5000	5090		102	80-120	P
	Silica	ug/L	10700	10400		97	80-120	P
	Sodium	ug/L	5000	4970		99.3	80-120	P
	Strontium	ug/L	500	507		101	80-120	P
	Tin	ug/L	500	504		101	80-120	P
	Vanadium	ug/L	500	511		102	80-120	P
	Zinc	ug/L	500	465		93.1	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2017-1490

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>
1203785301								
	Arsenic	ug/L	50	54.1		108	80-120	MS
	Cadmium	ug/L	50	52.6		105	80-120	MS
	Chromium	ug/L	50	49.4		98.8	80-120	MS
	Lead	ug/L	50	50.7		101	80-120	MS
	Molybdenum	ug/L	50	53.3		107	80-120	MS
	Nickel	ug/L	50	52.2		104	80-120	MS
	Selenium	ug/L	50	53		106	80-120	MS
	Silver	ug/L	50	54.8		110	80-120	MS
	Thallium	ug/L	50	47.5		95	80-120	MS
	Uranium	ug/L	50	47.3		94.7	80-120	MS
	Antimony	ug/L	50	51		102	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2017-1490

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>
1203786029	Mercury	ug/L	2	2.04		102	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2017-1490

Client ID: CASA-17-132322L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 422637001

Serial Dilution ID: 1203785282

<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	34.5		34.1		1.232			P
Beryllium	1	U	5	U				P
Boron	24.1	J	75	U	2.197			P
Calcium	17300		16800		3.114		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	4050		3910		3.407			P
Manganese	2	U	10	U				P
Potassium	1970		2090		6.515			P
Silica	65800		63900		2.963		10	P
Sodium	13900		14000		.851		10	P
Strontium	67.7		69.4		2.466		10	P
Tin	2.76	J	12.5	U	41.678			P
Vanadium	14.2		12.6	J	11.537			P
Zinc	24.6		41	J	66.776			P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2017-1490

Client ID: CASA-17-132322L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 422637001

Serial Dilution ID: 1203785304

<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	3.04	J	10	U	14.032			MS
Cadmium	.3	U	1.5	U				MS
Chromium	5.61	J	15	U	1.213			MS
Lead	.5	U	2.5	U				MS
Molybdenum	1.94		2.11	J	8.651			MS
Nickel	.848	J	3	U	87.5			MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.283		.335	U	4.24			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2017-1490 **Client ID:** CASA-17-132322L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 422637001 **Serial Dilution ID:** 1203786032

<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 #: 2017-1490
Work Order #: 422638**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1665822

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
422638002	CASA-17-132328
1203791230	Method Blank (MB)
1203791231	Laboratory Control Sample (LCS)
1203791710	422637002(CASA-17-132331) Sample Duplicate (DUP)
1203791711	422637002(CASA-17-132331) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

acceptance limits.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422637002 (CASA-17-132331) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an

effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

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

Method/Analysis Information

Product:	Cyanide and Total		
Analytical Batch:	1663020	Method:	WSP-CN(T)
Prep Batch :	1663019	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
422638002	CASA-17-132328
1203784603	Method Blank (MB)
1203784604	Laboratory Control Sample (LCS)
1203785527	422637002(CASA-17-132331) Sample Duplicate (DUP)
1203785529	422637002(CASA-17-132331) 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# 19.

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.

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 422637002 (CASA-17-132331) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an

effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

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

Method/Analysis Information

Product: Ion Chromatography

Analytical Batch: 1664539

Method: WSP-ANIONS

Sample Analysis

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

Sample ID	Client ID
422638001	CASA-17-132319
1203788153	Method Blank (MB)
1203788154	Laboratory Control Sample (LCS)
1203788155	422570003(CAMO-17-132213) Sample Duplicate (DUP)
1203788157	422570003(CAMO-17-132213) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Designation

Sample 422570003 (CAMO-17-132213) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

Samples 1203788153 (MB), 1203788154 (LCS), 1203788155 (CAMO-17-132213DUP), 1203788157 (CAMO-17-132213PS) and 422638001 (CASA-17-132319) were re-analyzed due to CCV failure. The reanalysis data with passing instrument QC was reported.

Miscellaneous Information

Data Exception (DER) Documentation

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

Manual Integrations

Samples 1203788155 (CAMO-17-132213DUP), 1203788157 (CAMO-17-132213PS) and 422638001 (CASA-17-132319) 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:	1663540	Method:	NH3
Prep Batch :	1663539	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
422638001	CASA-17-132319
1203785833	Method Blank (MB)
1203785834	Laboratory Control Sample (LCS)
1203785837	422637001(CASA-17-132322) Sample Duplicate (DUP)
1203785838	422637001(CASA-17-132322) 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

Sample 422637001 (CASA-17-132322) was selected for QC analysis.

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

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

Analyte	Sample	Value
Nitrogen, Ammonia	1203785838 (CASA-17-132322MS)	88.4* (90%-110%)

Duplicate Relative Percent Difference (RPD) Statement

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

Analyte	Sample	Value
Nitrogen, Ammonia	1203785837 (CASA-17-132322DUP)	abs(.129 - .0392)* (+/- .05 mg/L)

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

Sample 1203785833 (MB) was re-analyzed due to instrument failure. The results from the reanalysis are reported.

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

A data exception report (DER) 1630666 was generated for samples 1203785837 (CASA-17-132322DUP) and 1203785838 (CASA-17-132322MS) in this SDG/batch.

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Total Kjeldahl Nitrogen		
Analytical Batch:	1663542	Method:	TKN
Prep Batch :	1663541	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
422638002	CASA-17-132328
1203785839	Method Blank (MB)
1203785840	Laboratory Control Sample (LCS)
1203785841	422637002(CASA-17-132331) Sample Duplicate (DUP)
1203785842	422637002(CASA-17-132331) 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

Sample 422637002 (CASA-17-132331) was selected for QC analysis.

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

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

Analyte	Sample	Value
Nitrogen, Total Kjeldahl	1203785842 (CASA-17-132331MS)	113* (90%-110%)

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

Sample 1203785840 (LCS) was re-analyzed due to instrument failure. The results from the reanalysis are reported. Samples 1203785840 (LCS) and 1203785841 (CASA-17-132331DUP) were re-analyzed due to CCV failure. The reanalysis data with passing instrument QC was reported.

Miscellaneous Information

Data Exception (DER) Documentation

A data exception report (DER) 1632256 was generated for sample 1203785842 (CASA-17-132331MS) in this SDG/batch.

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Nitrate Nitrite by Cadmium Reduction

Analytical Batch: 1664158

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
422638001	CASA-17-132319
1203787255	Method Blank (MB)
1203787256	Laboratory Control Sample (LCS)
1203787269	422637001(CASA-17-132322) Sample Duplicate (DUP)
1203787271	422637001(CASA-17-132322) Post Spike (PS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-128 REV# 8.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample 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 422637001 (CASA-17-132322) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The following samples 1203787269 (CASA-17-132322DUP), 1203787271 (CASA-17-132322PS) and 422638001 (CASA-17-132319) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	422638
	001
Nitrogen, Nitrate/Nitrite	25X

Sample Re-analysis

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

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

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Total Phosphorus		
Analytical Batch:	1663545	Method:	PO4
Prep Batch :	1663543	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
422638001	CASA-17-132319
1203785845	Method Blank (MB)
1203785846	Laboratory Control Sample (LCS)
1203785851	422637001(CASA-17-132322) Sample Duplicate (DUP)
1203785852	422637001(CASA-17-132322) 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 422637001 (CASA-17-132322) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an

effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

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

Method/Analysis Information

Product: Solids and Total Dissolved

Analytical Batch: 1664155

Method: TDS

Sample Analysis

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

Sample ID	Client ID
422638001	CASA-17-132319
1203787277	Method Blank (MB)
1203787278	Laboratory Control Sample (LCS)
1203787280	422570003(CAMO-17-132213) 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 422570003 (CAMO-17-132213) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Specific Conductivity

Analytical Batch: 1663499

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
422638001	CASA-17-132319
1203785786	Laboratory Control Sample (LCS)
1203785788	422436001(CAMO-17-132216) 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

Calibration Verification Information

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

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 422436001 (CAMO-17-132216) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

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

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: pH

Analytical Batch: 1665849 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
422638001	CASA-17-132319
1203791298	Laboratory Control Sample (LCS)
1203791299	422436001(CAMO-17-132216) Sample Duplicate (DUP)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422436001 (CAMO-17-132216) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

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

Sample	Analyte	Value
1203791299 (CAMO-17-132216DUP)	pH	Received 05-MAY-17, out of holding 03-MAY-17
422638001 (CASA-17-132319)	pH	Received 09-MAY-17, out of holding 05-MAY-17

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

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

A data exception report (DER) 1633320 was generated for samples 422638001 (CASA-17-132319) and 1203791299 (CAMO-17-132216DUP) in this SDG/batch.

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Alkalinity

Analytical Batch: 1665848 **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
422638001	CASA-17-132319
1203791289	Laboratory Control Sample (LCS)
1203791292	422436001(CAMO-17-132216) Sample Duplicate (DUP)
1203791295	422436001(CAMO-17-132216) Matrix Spike (MS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422436001 (CAMO-17-132216) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Certification Statement

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

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Qualifier Definition Report for

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

Client SDG: 2017-1490 GEL Work Order: 422638


The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Aubrey Kingsbury

Date: 31 MAY 2017

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: May 31, 2017

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

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

Client SDG: 2017-1490

Client Sample ID: CASA-17-132319
Sample ID: 422638001
Matrix: W
Collect Date: 05-MAY-17 11:01
Receive Date: 09-MAY-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"												
Chloride		4.61	0.067	0.200	mg/L		1	MXL2	05/11/17	2244	1664539	1
Fluoride		0.403	0.033	0.100	mg/L		1					
Sulfate		11.6	0.133	0.400	mg/L		1					
Bromide	J	0.0768	0.067	0.200	mg/L		1	MXL2	05/13/17	0111	1664539	2
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	J	0.0217	0.017	0.050	mg/L	1.00	1	KLP1	05/10/17	1131	1663540	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		5.20	0.425	1.25	mg/L		25	AXH3	05/17/17	0724	1664158	4
PO4 "As Received"												
Phosphorus, Total as P	J	0.0317	0.020	0.050	mg/L	1.00	1	KLP1	05/16/17	1354	1663545	5
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		193	3.40	14.3	mg/L			KLP1	05/11/17	1624	1664155	6
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		77.4	1.45	4.00	mg/L			RXB5	05/17/17	2021	1665848	7
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		226	1.00	1.00	umhos/cm		1	VH1	05/12/17	1343	1663499	8
PH "As Received"												
pH at Temp 14.9C	H	8.28	0.010	0.100	SU		1	RXB5	05/17/17	2020	1665849	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	05/10/17	0757	1663539
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	05/15/17	1700	1663543

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Certificate of Analysis

Report Date: May 31, 2017

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

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

Client SDG: 2017-1490

Client Sample ID: CASA-17-132319
Sample ID: 422638001

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: May 31, 2017

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

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

Client SDG: 2017-1490

Client Sample ID: CASA-17-132328
Sample ID: 422638002
Matrix: W
Collect Date: 05-MAY-17 11:01
Receive Date: 09-MAY-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	U	ND	0.330	1.00	mg/L		1	TSM	05/20/17	0400	1665822	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	05/11/17	0902	1663020	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	05/16/17	1203	1663542	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	05/11/17	0752	1663019
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	05/15/17	1700	1663541

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

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

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: May 31, 2017

Page 1 of 6

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

Contact: Mr. Keith Greene

Workorder: 422638

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1665822										
QC1203791710	422637002	DUP									
Total Organic Carbon Average		J	0.332	U	ND	mg/L	200	^	TSM	05/20/17	02:26
QC1203791231	LCS										
Total Organic Carbon Average	10.0				9.84	mg/L		98.4	(80%-120%)	05/20/17	01:27
QC1203791230	MB										
Total Organic Carbon Average			U	ND	mg/L					05/20/17	01:16
QC1203791711	422637002	PS									
Total Organic Carbon Average	10.0	J	0.332		9.82	mg/L		94.9	(75%-125%)	05/20/17	03:13
Flow Injection Analysis											
Batch	1663020										
QC1203785527	422637002	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	05/11/17	08:56
QC1203784604	LCS										
Cyanide, Total	50.0				50.5	ug/L		101	(90%-110%)	05/11/17	08:53
QC1203784603	MB										
Cyanide, Total			U	ND	ug/L					05/11/17	08:52
QC1203785529	422637002	MS									
Cyanide, Total	100	U	ND		101	ug/L		101	(90%-110%)	05/11/17	08:57
Ion Chromatography											
Batch	1664539										
QC1203788155	422570003	DUP									
Bromide		U	ND	U	ND	mg/L	N/A		MXL2	05/12/17	23:16

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QC Summary

Workorder: 422638

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1664539										
Chloride		1.85		1.85	mg/L	0.211		(0%-20%)	MXL2	05/11/17	20:49
Fluoride		0.129		0.125	mg/L	3.15	^	(+/-0.100)			
Sulfate		2.06		2.01	mg/L	2.43		(0%-20%)			
QC1203788154 LCS											
Bromide	1.25			1.26	mg/L		101	(80%-120%)		05/12/17	22:18
Chloride	5.00			5.10	mg/L		102	(80%-120%)		05/11/17	19:51
Fluoride	2.50			2.68	mg/L		107	(80%-120%)			
Sulfate	10.0			10.5	mg/L		105	(80%-120%)			
QC1203788153 MB											
Bromide			U	ND	mg/L					05/12/17	21:49
Chloride			U	ND	mg/L					05/11/17	19:22
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203788157 422570003 PS											
Bromide	1.25	U	ND	1.26	mg/L		97.7	(75%-125%)		05/12/17	23:45
Chloride	5.00		1.85	7.20	mg/L		107	(75%-125%)		05/11/17	21:18
Fluoride	2.50		0.129	2.74	mg/L		104	(75%-125%)			
Sulfate	10.0		2.06	12.8	mg/L		107	(75%-125%)			

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QC Summary

Workorder: 422638

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1663540										
QC1203785837	422637001	DUP									
Nitrogen, Ammonia	J	0.0392		0.129	mg/L	107* ^		(+/-0.050)	KLP1	05/10/17	11:29
QC1203785834	LCS										
Nitrogen, Ammonia	1.00			0.913	mg/L		91.3	(90%-110%)		05/10/17	11:15
QC1203785833	MB										
Nitrogen, Ammonia			U	ND	mg/L					05/10/17	11:38
QC1203785838	422637001	MS									
Nitrogen, Ammonia	1.00	J	0.0392	0.923	mg/L		88.4*	(90%-110%)		05/10/17	11:30
Batch	1663542										
QC1203785841	422637002	DUP									
Nitrogen, Total Kjeldahl	U	ND	U	ND	mg/L	N/A			KLP1	05/16/17	11:57
QC1203785840	LCS										
Nitrogen, Total Kjeldahl	1.00			1.07	mg/L		107	(90%-110%)		05/16/17	11:51
QC1203785839	MB										
Nitrogen, Total Kjeldahl			U	ND	mg/L					05/16/17	10:44
QC1203785842	422637002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND	1.13	mg/L		113*	(90%-110%)		05/16/17	11:58
Batch	1663545										
QC1203785851	422637001	DUP									
Phosphorus, Total as P	J	0.0276	J	0.0257	mg/L	7.13 ^		(+/-0.050)	KLP1	05/16/17	13:53
QC1203785846	LCS										
Phosphorus, Total as P	1.00			0.914	mg/L		91.4	(80%-124%)		05/16/17	13:51
QC1203785845	MB										
Phosphorus, Total as P			U	ND	mg/L					05/16/17	13:50

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1663545										
QC1203785852	422637001	MS									
Phosphorus, Total as P	1.00	J	0.0276	1.02	mg/L		99.2	(63%-139%)	KLP1	05/16/17	13:53
Batch	1664158										
QC1203787269	422637001	DUP									
Nitrogen, Nitrate/Nitrite			2.30	2.28	mg/L	0.873	^	(+/-0.500)	AXH3	05/17/17	07:22
QC1203787256	LCS										
Nitrogen, Nitrate/Nitrite	1.00			1.01	mg/L		101	(90%-110%)		05/17/17	07:05
QC1203787255	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					05/17/17	07:04
QC1203787271	422637001	PS									
Nitrogen, Nitrate/Nitrite	1.00		0.230	1.26	mg/L		103	(90%-110%)		05/17/17	07:23
Solids Analysis											
Batch	1664155										
QC1203787280	422570003	DUP									
Total Dissolved Solids			114	114	mg/L	0		(0%-5%)	KLP1	05/11/17	16:24
QC1203787278	LCS										
Total Dissolved Solids	300			289	mg/L		96.2	(95%-105%)		05/11/17	16:24
QC1203787277	MB										
Total Dissolved Solids			U	ND	mg/L					05/11/17	16:24
Titration and Ion Analysis											
Batch	1663499										
QC1203785788	422436001	DUP									
Conductivity			254	255	umhos/cm	0.393		(0%-10%)	VH1	05/12/17	13:41
QC1203785786	LCS										
Conductivity	1410			1400	umhos/cm		98.9	(95%-105%)		05/12/17	13:36

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1665848										
QC1203791292	422436001	DUP									
Alkalinity, Total as CaCO3		60.0		60.6	mg/L	0.995		(0%-20%)	RXB5	05/17/17	19:54
Carbonate alkalinity (CaCO3)	U	ND	U	ND	mg/L	N/A					
QC1203791289	LCS										
Alkalinity, Total as CaCO3	100			108	mg/L		108	(90%-110%)		05/17/17	19:38
QC1203791295	422436001	MS									
Alkalinity, Total as CaCO3	100	60.0		164	mg/L		104	(80%-120%)		05/17/17	19:55
Batch	1665849										
QC1203791299	422436001	DUP									
pH	H	8.26	H	8.28	SU	0.242		(0%-5%)	RXB5	05/17/17	19:53
QC1203791298	LCS										
pH	7.00			6.98	SU		99.7	(99%-101%)		05/17/17	19:38

Notes:

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

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Z	Paint Filter Test--Particulates passed through the filter, however no free liquids were observed.										
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.										
d	5-day BOD--The 2:1 depletion requirement was not met for this sample										
e	5-day BOD--Test replicates show more than 30% difference between high and low values. The data is qualified per the method and can be used for reporting purposes										
h	Preparation or preservation holding time was exceeded										

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Miscellaneous

DATA EXCEPTION REPORT

Mo.Day Yr. 10-MAY-17	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: LACHAT Flow Injection Analyzer	Test / Method: EPA 350.1, EPA 350.1 SC	Matrix Type: Liquid	Client Code: DSMN, ESHL, OLAB, STOL
Batch ID: 1663540	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 422626,422637(2017-1489),422638(2017-1490),422649(Y705110),422703(17048463),422716 Application Issues: Failed Recovery for MS/MSD, or PS/PSD Failed RPD for DUP			
Specification and Requirements Exception Description:		DER Disposition:	
1. Failed RPD for DUP: QC 1203785837DUP 2. Failed Recovery for MS/MSD, or PS/PSD: QC 1203785836MS, 1203785838MS		1. The Relative Percent Difference (RPD) between the sample and duplicate falls outside of the established acceptance limits because of the heterogeneous matrix of the sample: Nitrogen, Ammonia 1203785837 (CASA-17-132322DUP) [abs(.129 - .0392)* (+/- .05 mg/L)]. 2. The matrix spike recovered outside of the established acceptance limits due to matrix interference and/or non-homogeneity. Nitrogen, Ammonia 1203785836 (PFU 703/0687MS) [87* (90%-110%)] and 1203785838 (CASA-17-132322MS) [88.4* (90%-110%)].	

Originator's Name:

Kristen Mizzell 10-MAY-17

Data Validator/Group Leader:

Aubrey Kingsbury 11-MAY-17

DATA EXCEPTION REPORT			
Mo.Day Yr. 16-MAY-17	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: LACHAT Flow Injection Analyzer	Test / Method: EPA 351.2, EPA 351.2 SC	Matrix Type: Liquid	Client Code: DSMN, ESHL, THUT
Batch ID: 1663542	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 422626,422637(2017-1489),422638(2017-1490),422716,422982 Application Issues: Failed Recovery for MS/MSD, or PS/PSD			
Specification and Requirements		DER Disposition:	
Exception Description:			
1. Failed Recovery for MS/MSD, or PS/PSD: QC 1203785842MS,1203785844MS		1. The matrix spike recovered outside of the established acceptance limits due to matrix interference and/or non-homogeneity. Nitrogen, Total Kjeldahl 1203785842 (CASA-17-132331MS) [113* (90%-110%)] and 1203785844 (MW-12MS) [125* (90%-110%)].	

Originator's Name:

Kristen Mizzell 16-MAY-17

Data Validator/Group Leader:

Aubrey Kingsbury 16-MAY-17

DATA EXCEPTION REPORT			
Mo.Day Yr. 18-MAY-17	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ELECTRODE	Test / Method: EPA 150.1	Matrix Type: Liquid	Client Code: ESHL
Batch ID: 1665849	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 422436(2017-1476),422570(2017-1486),422637(2017-1489),422638(2017-1490) Application Issues: Sample received out of holding			
Specification and Requirements		DER Disposition:	
Exception Description:			
1. Sample received out of holding: 422436 001,005,008 422570 003,006 422637 001 422638 001 QC 1203791299DUP		1. Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified. 1203791299 (CAMO-17-132216DUP) [Received 05-MAY-17, out of holding 03-MAY-17]. 422436001 (CAMO-17-132216) [Received 05-MAY-17, out of holding 03-MAY-17]. 422436005 (CAMO-17-132325) [Received 05-MAY-17, out of holding 03-MAY-17]. 422436008 (CAMO-17-132338) [Received 05-MAY-17, out of holding 03-MAY-17]. 422570003 (CAMO-17-132213) [Received 06-MAY-17, out of holding 04-MAY-17]. 422570006 (CASA-17-132327) [Received 06-MAY-17, out of holding 04-MAY-17]. 422637001 (CASA-17-132322) [Received 09-MAY-17, out of holding 05-MAY-17]. 422638001 (CASA-17-132319) [Received 09-MAY-17, out of holding 05-MAY-17].	

Originator's Name:

Rachael Bell 18-MAY-17

Data Validator/Group Leader:

Elzbieta Szulc 25-MAY-17