

[illegible]

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11097

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

SAMPLE ID: CASA-17-129325

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	NA	02/09/2017	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	↓	1357	MEDIA:	UA	↓
PRS ID:	↓	OK	SAMPLE TECH CODE:	GSP	↓
LOCATION ID:	R-35a	↓	FIELD PREP:	F	↓
LOCATION TYPE:	NA	↓	FIELD QC TYPE:	REG	↓
TOP DEPTH:	↓	↓	SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / NA

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

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

AT 2/9/17

COLLECTED BY (PRINT): D. Hughes

RELINQUISHED BY (Printed Name) Austin Tosh (Signature) <i>Austin Tosh</i>	Date/Time 2/9/17 1440	RECEIVED BY (Printed Name) M. Montoya (Signature) <i>M. Montoya</i>	Date/Time 2/9/17 1440
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 01/18/2017

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11097

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

SAMPLE ID: CASA-17-129331

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	NA	02/09/2017	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):		1357	MEDIA:	UA	
PRS ID:		OK	SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-35a		FIELD PREP:	UF	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / <input checked="" type="checkbox"/> 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: None

LOCATION COMMENTS: sampled 40 ft from running diesel generator

FIELD PARAMETERS:

Dissolved Oxygen	5.07	mg/L	Flow (in gpm)	3.80	GPM	Oxidation-Reduction Potential	245.9	mV
pH	8.08	SU	Specific Conductance	242.8	uS/cm	Temperature	23.6	deg C
Turbidity	0.49	NTU						

COLLECTED BY (PRINT): A. Vigil

RELINQUISHED BY (Printed Name) Austin Tosh (Signature) <i>Austin Tosh</i>	Date/Time 2/9/17 1440	RECEIVED BY (Printed Name) M. Montoya (Signature) <i>M. Montoya</i>	Date/Time 2/9/17 1440
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 01/18/2017

DATA VALIDATION REPORT

Chain Of Custody No. 2017-1003

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
416562	EPA:120.1	1				
416562	EPA:150.1	1				
416562	EPA:160.1	1				
416562	EPA:245.2	2				
416562	EPA:300.0	1				
416562	EPA:310.1	1				
416562	EPA:335.4	1				
416562	EPA:350.1	1				
416562	EPA:351.2	1				
416562	EPA:353.2	1				
416562	EPA:365.4	1				
416562	SM:A2340B	1				
416562	SW-846:6010C	1				
416562	SW-846:6020	1				
416562	SW-846:6850	1				
416562	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
416562	EPA:120.1	1639323	1639323	1										1			1				
416562	EPA:150.1	1639321	1639321	1										1			2				
416562	EPA:160.1	1639401	1639401	1					1					1			2				
416562	EPA:245.2	1639580	1639579	2					1	1				1			1				
416562	EPA:300.0	1640555	1640555	1					1					1			1				
416562	EPA:310.1	1639313	1639313	1						2				1			2				
416562	EPA:335.4	1639328	1639327	1					1	1				1			1				
416562	EPA:350.1	1639241	1639240	1					1	1				1			1				

DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
416562	EPA:351.2	1639245	1639244	1					1	2				1			2				
416562	EPA:353.2	1641424	1641424	1					1					1			2				
416562	EPA:365.4	1639243	1639242	1					1	1				1			1				
416562	SM:A2340B	1646837	1646837	1																	
416562	SW-846:6010C	1639294	1639293	1					1	1				1			1				
416562	SW-846:6020	1639308	1639307	1					1	1				1			1				
416562	SW-846:6850	1640036	1640034	1					1	1	1			1							
416562	SW-846:9060	1639272	1639272	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-17-129297	1203728235	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-17-129325	416562001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203728234	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-129297	1203728233	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-17-129325	416562001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203728231	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	WST09-17-129397	1203728232	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-129294	1203728895	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-17-129325	1203728411	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-17-129325	416562001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203728410	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203728409	MB	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-129325	1203728807	DUP	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-129325	1203728809	MS	0	0	1	0
EPA:245.2	INORGANIC	CASA-17-129325	416562001	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-129331	416562002	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203728806	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203728805	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-129325	1203731278	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-129325	416562001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203731277	LCS	0	0	4	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	MB	1203731276	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-129297	1203728224	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-129297	1203728226	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-129325	416562001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203728222	LCS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	WST09-17-129397	1203728223	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	WST09-17-129397	1203728225	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-129331	1203728257	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-129331	1203728261	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-129331	416562002	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203728256	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203728255	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-129325	1203728032	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-129325	1203728034	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-129325	416562001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203728031	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203728030	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129324	1203728877	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129324	1203728878	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129331	1203728044	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129331	1203728045	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129331	416562002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203728043	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203728042	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-129323	1203733272	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-129325	1203733271	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-129325	416562001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203733270	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203733269	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-129325	1203728038	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-129325	1203728040	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-129325	416562001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203728037	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203728036	MB	1	0	0	0
SM:A2340B	INORGANIC	CASA-17-129325	416562001	REG	1	0	0	0
SW-846:6010C	INORGANIC	CASA-17-129325	1203728152	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CASA-17-129325	1203728153	MS	0	0	17	0
SW-846:6010C	INORGANIC	CASA-17-129325	416562001	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203728151	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203728150	MB	17	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-17-129325	1203728191	DUP	11	0	0	0
SW-846:6020	INORGANIC	CASA-17-129325	1203728192	MS	0	0	11	0
SW-846:6020	INORGANIC	CASA-17-129325	416562001	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203728190	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203728189	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-129323	1203729925	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-129323	1203729926	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-129325	416562001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203729924	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203729923	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-129308	1203728544	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-17-129331	416562002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203728543	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203728542	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	1203728150	METHOD BLANK	SW-846:6010C	W	Potassium	-58.7	J	ug/L	150

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-17-129325	1203728150	METHOD BLANK	SW-846.6010C	Potassium	-58.7	ug/L	3620		150	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-17-129331	1203728045		EPA.351.2	Total Kjeldahl Nitrogen	1639244	02-28-2017	W	80		110	90	10		
CASA-17-129331	1203728045		EPA.351.2	Total Kjeldahl Nitrogen	1639244	02-28-2017	W	80		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.

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Parameter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detect Flag	Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent	Analysis Lot ID	Validation Status Code	Use Flag
R-35a	2017-1003	CASA-17-129331	REG	INIT	GENERAL CHEMISTRY	EPA:351.2	Total Kjeldahl Nitrogen	U	JJ	I6a	N	0.100	mg/L	0.100	mg/L			W	02/09/2017		1639245	VAL	Y

Reason Code

Description

I6a

The associated matrix spike recovery was below the lower acceptance limit (LAL) but >10%. Follow the external laboratory limits located within the associated data package.

J_LAB

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

NQ

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

U_LAB

The analytical laboratory qualified the analyte as not detected.

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-17-129325	R-35a	REG	EPA:120.1	0	1
CASA-17-129325	R-35a	REG	EPA:150.1	0	1
CASA-17-129325	R-35a	REG	EPA:160.1	0	1
CASA-17-129325	R-35a	REG	EPA:245.2	0	1
CASA-17-129325	R-35a	REG	EPA:300.0	0	4
CASA-17-129325	R-35a	REG	EPA:310.1	0	2
CASA-17-129325	R-35a	REG	EPA:350.1	0	1
CASA-17-129325	R-35a	REG	EPA:353.2	0	1
CASA-17-129325	R-35a	REG	EPA:365.4	0	1
CASA-17-129325	R-35a	REG	SM:A2340B	0	1
CASA-17-129325	R-35a	REG	SW-846:6010C	0	17

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:

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-17-129325	R-35a	REG	SW-846:6020	0	11
CASA-17-129325	R-35a	REG	SW-846:6850	0	1
CASA-17-129331	R-35a	REG	EPA:245.2	0	1
CASA-17-129331	R-35a	REG	EPA:335.4	0	1
CASA-17-129331	R-35a	REG	EPA:351.2	0	1
CASA-17-129331	R-35a	REG	SW-846:9060	0	1

March 10, 2017

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

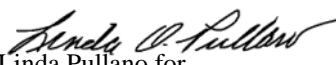
Re: LANL- WQH Water Samples
Work Order: 416562
SDG: 2017-1003

Dear Mr. Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on February 14, 2017, and analyzed for General Chemistry, Metals and Perchlorates by LCMSMS. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,


Linda Pullano for
Valerie Davis
Project Manager

Chain of Custody: 2017-1003
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 416562
SDG: 2017-1003

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 416562
SDG # : 2017-1003**

March 10, 2017

Laboratory Identification:

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

Summary

Sample receipt The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on February 14, 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>
416562001	CASA-17-129325
416562002	CASA-17-129331

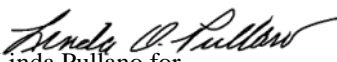
Case Narrative

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

Data Package

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

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


Linda Pullano for
Valerie Davis
Project Manager

List of current GEL Certifications as of 10 March 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Chain of Custody and Supporting Documentation



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: LANL			SDG/AR/COC/Work Order: 416562		
Received By: ZKW			Date Received: 2/14/17		
Suspected Hazard Information		Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
COC/Samples marked as radioactive?			<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0cpm	
Classified Radioactive II or III by RSO?			<input checked="" type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?	
COC/Samples marked containing PCBs?			<input checked="" type="checkbox"/>		
Package, COC, and/or Samples marked as beryllium or asbestos containing?			<input checked="" type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.	
Shipped as a DOT Hazardous?			<input checked="" type="checkbox"/>	Hazard Class Shipped: UN#:	
Samples identified as Foreign Soil?			<input checked="" type="checkbox"/>		

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: Ice bags <u>Blue ice</u> Dry ice None Other (describe) See Below for Temps *all temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): IR3-16
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
7 VOA vials contain acid preservation?			<input checked="" type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?			<input checked="" type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?			<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?			<input checked="" type="checkbox"/>	Sample ID's affected: Collect Time on NOP160 - Samples is 10:03
13 Number of containers received match number indicated on COC?			<input checked="" type="checkbox"/>	Sample ID's affected: We rec'd one cont. for -297 and two for -313
14 Are sample containers identifiable as GEL provided?			<input checked="" type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
16 Carrier and tracking number.				Circle Applicable: <input checked="" type="checkbox"/> FedEx Air FedEx Ground UPS Field Services Courier Other 5908 1781 7198-2'C 5908 1781 7202-4'C 5908 1781 7213-2'C

Comments (Use Continuation Form if needed):
***We rec'd two containers for sample CAMO-17-129298 and one cont. for sample CAMO-17-129314 not on the COC's.**

PM (or PMA) review: Initials

AP

Date

2/14/17

Page

1 of 1

GL-CHL-SR-001 Rev 3

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

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATL 13FEB17
ACTWGT: 44.0 LB MAN
CAD: 0014176/CAFE2916

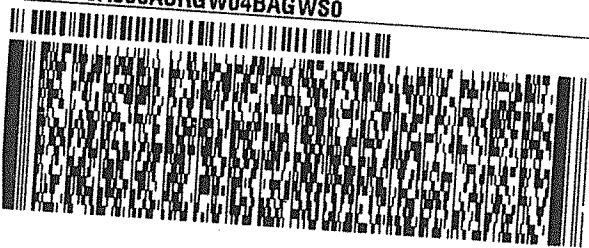
BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 666-8171

REF: 6A000ASRGW04BAGWS0



FedEx
Express



538C1/338B/329B

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

LOS ALAMOS, NM 87545
UNITED STATES US

ACTWGT: 64.0 LB MAN
CAD: 0014176/CAFE2916

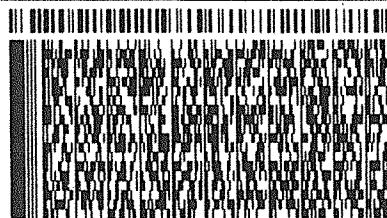
BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 666-8171

REF: 6A000ASRGW04BAGWS0



FedEx
Express



538C1/338B/329B

4c

2c

1 of 3
TRK# 5908 1781 7198
0201
MASTER

TUE - 14 FEB 10:30A
PRIORITY OVERNIGHT

X7 CHSA

29407
SC-US CHS



2 of 3

MPS# 5908 1781 7202
0263

Mstr# 5908 1781 7198

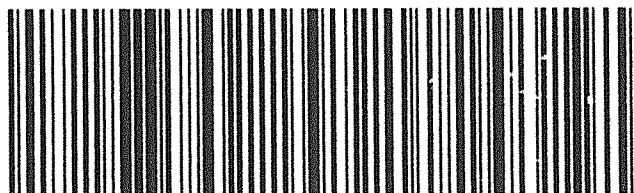
0201

TUE - 14 FEB 10:30A
PRIORITY OVERNIGHT

X7 CHSA

29407
SC-US CHS

Part # 156148V-434 RIT2 03/15



538C1/338B/329B

SHIP DATE: 13FEB17
ACTWGT: 25.0 LB MAN
CAD: 0014176/CAFE2916

BILL SENDER

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

LOS ALAMOS, NM 87545
UNITED STATES US

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

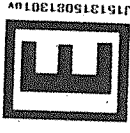
CHARLESTON SC 29407

(843) 666-8171

REF: 6A000ASRGW04BAGWS0



FedEx
Express



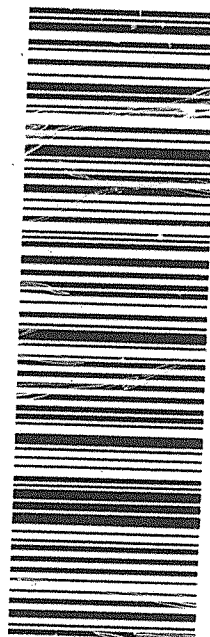
TUE - 14 FEB 10:30A
PRIORITY OVERNIGHT

3 of 3
MPS# 5908 1781 7213
0263
Mstr# 5903 1781 7198

0201

X7 CHSA

29407
SC-US CHS



Part # 156148V-434 RIT2 02/15

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 #: 2017-1003
Work Order #: 416562**

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: 1640036

Prep Batch Number: 1640034

Sample Analysis

Sample ID	Client ID
416562001	416562001 (CASA-17-129325)
1203729927	Interference Check Sample (ICS)
1203729923	Method Blank (MB)
1203729924	Laboratory Control Sample (LCS)
1203729925	416572001(CASA-17-129323) Matrix Spike (MS)
1203729926	416572001(CASA-17-129323) 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 416572001 (CASA-17-129323) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

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

Internal Standard Area Acceptance

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

Retention Time

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

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

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

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

Manual Integrations

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

Method Comments

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

Additional Comments

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

Perchlorate Isotope Ratio

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

System Configuration

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

Electronic Packaging Comment

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

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

Chromatographic Columns

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

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

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2017-1003 GEL Work Order: 416562

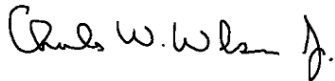
The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Charles Wilson

Date: 24 FEB 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: 1640034Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-129325Date Received: 14-FEB-17GEL Job No (SDG): 2017-1003GEL Sample ID: 416562001Date Filtered: 16-FEB-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	0.427	ug/L		1	16-FEB-17 17:46	per0216016a
	Perchlorate Isotope Ratio			3.07			1	16-FEB-17 17:46	per0216016a
14797-73-0	Perchlorate-101	.05	.2	0.422	ug/L		1	16-FEB-17 17:46	per0216016a
	Perchlorate-O(18)			0.513	ug/L		1	16-FEB-17 17:46	per0216016a

^ 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): 2017-1003

Extract Batch Code: 1640034

Date Filtered: 16-FEB-17

Matrix: WATER

Sample ID: 1203729924

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.207	ug/L	103		85 - 115
Perchlorate Isotope Ratio		2.96				-
Perchlorate-101	0.200	.212	ug/L	106		85 - 115
Perchlorate-O(18)		.482	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): 2017-1003

Extract Batch Code: 1640034

Date Extracted: 16-FEB-17

GEL MS/PS ID: 1203729925

Client ID: CASA-17-129323

GEL MSD/PSD ID: 1203729926

QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	0.780	ug/L	1.00	112	.977	98	3	30	75 - 125
Perchlorate Isotope Ratio	0	3.03		3.04		3.03		1		-
Perchlorate-101	0.200	0.782	ug/L	1.00	109	.98	99	2	30	75 - 125
Perchlorate-O(18)	0	0.520	ug/L	0.502		.515		2		-

^ 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: 1640034Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 16-FEB-17GEL Job No (SDG): 2017-1003GEL Sample ID: 1203729923Date Filtered: 16-FEB-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	16-FEB-17 17:23	per0216013a
	Perchlorate Isotope Ratio						1	16-FEB-17 17:23	per0216013a
14797-73-0	Perchlorate-101	.05	.2	0.200	ug/L	U	1	16-FEB-17 17:23	per0216013a
	Perchlorate-O(18)			0.490	ug/L		1	16-FEB-17 17:23	per0216013a

^ 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: 1640034Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 16-FEB-17GEL Job No (SDG): 2017-1003GEL Sample ID: 1203729924Date Filtered: 16-FEB-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	0.207	ug/L		1	16-FEB-17 17:31	per0216014a
	Perchlorate Isotope Ratio			2.96			1	16-FEB-17 17:31	per0216014a
14797-73-0	Perchlorate-101	.05	.2	0.212	ug/L		1	16-FEB-17 17:31	per0216014a
	Perchlorate-O(18)			0.482	ug/L		1	16-FEB-17 17:31	per0216014a

^ 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: 1640034Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2017-1003GEL Sample ID: 1203729927Date Filtered: 16-FEB-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	0.212	ug/L		1	16-FEB-17 17:38	per0216015a
	Perchlorate Isotope Ratio			3.13			1	16-FEB-17 17:38	per0216015a
14797-73-0	Perchlorate-101	.05	.2	0.206	ug/L		1	16-FEB-17 17:38	per0216015a
	Perchlorate-O(18)			0.521	ug/L		1	16-FEB-17 17:38	per0216015a

^ 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: 1640034Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-129323MSDate Received: 14-FEB-17GEL Job No (SDG): 2017-1003GEL Sample ID: 1203729925Date Filtered: 16-FEB-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	1.00	ug/L		1	16-FEB-17 18:00	per0216018a
	Perchlorate Isotope Ratio			3.04			1	16-FEB-17 18:00	per0216018a
14797-73-0	Perchlorate-101	.05	.2	1.00	ug/L		1	16-FEB-17 18:00	per0216018a
	Perchlorate-O(18)			0.502	ug/L		1	16-FEB-17 18:00	per0216018a

^ 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: 1640034Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-129323MSDDate Received: 14-FEB-17GEL Job No (SDG): 2017-1003GEL Sample ID: 1203729926Date Filtered: 16-FEB-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	0.977	ug/L		1	16-FEB-17 18:08	per0216019a
	Perchlorate Isotope Ratio			3.03			1	16-FEB-17 18:08	per0216019a
14797-73-0	Perchlorate-101	.05	.2	0.980	ug/L		1	16-FEB-17 18:08	per0216019a
	Perchlorate-O(18)			0.515	ug/L		1	16-FEB-17 18:08	per0216019a

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

*Concentration =

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

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2017-1003
Work Order #: 416562

Sample ID	Client ID
416562001	CASA-17-129325
416562002	CASA-17-129331
1203728150	Method Blank (MB) ICP
1203728151	Laboratory Control Sample (LCS)
1203728154	416562001(CASA-17-129325L) Serial Dilution (SD)
1203728152	416562001(CASA-17-129325D) Sample Duplicate (DUP)
1203728153	416562001(CASA-17-129325S) Matrix Spike (MS)
1203728189	Method Blank (MB) ICP-MS
1203728190	Laboratory Control Sample (LCS)
1203728193	416562001(CASA-17-129325L) Serial Dilution (SD)
1203728191	416562001(CASA-17-129325D) Sample Duplicate (DUP)
1203728192	416562001(CASA-17-129325S) Matrix Spike (MS)
1203728805	Method Blank (MB) CVAA
1203728806	Laboratory Control Sample (LCS)
1203728811	416562001(CASA-17-129325L) Serial Dilution (SD)
1203728807	416562001(CASA-17-129325D) Sample Duplicate (DUP)
1203728809	416562001(CASA-17-129325S) Matrix Spike (MS)

Sample Analysis

Samples 416562001 and 002 in this SDG were analyzed for metals and mercury on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1639294, 1639308, 1639580 and 1646837
Prep Batch :	1639293, 1639307 and 1639579
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# 33 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 300X 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. 416562001 (CASA-17-129325)-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 (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: 416562001 (CASA-17-129325)-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 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: 2017-1003 GEL Work Order: 416562

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: 13 MAR 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1003**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 416562001**BASIS:** As Received**DATE COLLECTED** 09-FEB-17**CLIENT ID:** CASA-17-129325**LEVEL:** Low**DATE RECEIVED** 14-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	02/16/17 11:12	021617W2-9	1639580

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1003

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 416562001

BASIS: As Received

DATE COLLECTED 09-FEB-17

CLIENT ID: CASA-17-129325

LEVEL: Low

DATE RECEIVED 14-FEB-17

MATRIX: W

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	132	ug/L	J	68	200	200	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	PRB	03/09/17 06:18	170308-7	1639308
7440-38-2	Arsenic	3.37	ug/L	J	1.7	5	5	1	MS	PRB	03/08/17 18:11	170308-3	1639308
7440-39-3	Barium	338	ug/L		1	5	5	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7440-42-8	Boron	37.1	ug/L	J	15	50	50	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7440-43-9	Cadmium	1	ug/L	U	0.3	1	1	1	MS	PRB	03/08/17 18:11	170308-3	1639308
7440-70-2	Calcium	21200	ug/L		50	200	200	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7440-47-3	Chromium	4.59	ug/L	J	3	10	10	1	MS	PRB	03/08/17 18:11	170308-3	1639308
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	02/17/17 15:05	021717-1	1639294
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7439-89-6	Iron	33	ug/L	J	30	100	100	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	PRB	03/09/17 01:42	170308-6	1639308
7439-95-4	Magnesium	5690	ug/L		110	300	300	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7439-98-7	Molybdenum	1.14	ug/L		0.3	0.5	0.5	1	MS	PRB	03/08/17 18:11	170308-3	1639308
7440-02-0	Nickel	6.49	ug/L		0.5	2	2	1	MS	PRB	03/08/17 18:11	170308-3	1639308
7440-09-7	Potassium	3620	ug/L		50	150	150	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7782-49-2	Selenium	5	ug/L	U	2	5	5	1	MS	PRB	03/08/17 18:11	170308-3	1639308
7631-86-9	Silica	77300	ug/L		53	213	213	1	P	HSC	02/17/17 15:05	021717-1	1639294
7440-22-4	Silver	1	ug/L	U	0.4	1	1	1	MS	PRB	03/08/17 18:11	170308-3	1639308
7440-23-5	Sodium	18300	ug/L		100	300	300	1	P	HSC	02/17/17 15:05	021717-1	1639294
7440-24-6	Strontium	159	ug/L		1	5	5	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7440-28-0	Thallium	2	ug/L	U	0.6	2	2	1	MS	PRB	03/09/17 01:42	170308-6	1639308
7440-31-5	Tin	2.66	ug/L	J	2.5	10	10	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7440-61-1	Uranium	0.610	ug/L		0.067	0.2	0.2	1	MS	PRB	03/09/17 12:48	170309-8	1639308
7440-62-2	Vanadium	15.2	ug/L		1	5	5	1	P	HSC	02/16/17 14:23	021617B-2	1639294
7440-66-6	Zinc	10	ug/L	U	3.3	10	10	1	P	HSC	02/16/17 14:23	021617B-2	1639294

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1003**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 416562001**BASIS:** As Received**DATE COLLECTED** 09-FEB-17**CLIENT ID:** CASA-17-129325**LEVEL:** Low**DATE RECEIVED** 14-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
	Hardness as CaCO3	76.5	mg/L		0.453	1.24	1.24	1		TXT1	03/13/17 12:50		1646837

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1639294	1639293	SW846 3005A	50	mL	50	mL	02/14/17	CXW4
1639308	1639307	SW846 3005A	50	mL	50	mL	02/14/17	CXW4
1639580	1639579	EPA 245.1/245.2 Prep	20	mL	20	mL	02/15/17	AXS5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1003**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 416562002**BASIS:** As Received**DATE COLLECTED** 09-FEB-17**CLIENT ID:** CASA-17-129331**LEVEL:** Low**DATE RECEIVED** 14-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	02/16/17 11:24	021617W2-9	1639580

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1639580	1639579	EPA 245.1/245.2 Prep	20	mL	20	mL	02/15/17	AXS5

***Analytical Methods:**

AV EPA 245.1/245.2

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2017-1003
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>
1203728150	Aluminum	68	ug/L	+/-200	U	P	68	200
	Barium	1	ug/L	+/-5	U	P	1	5
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Calcium	50	ug/L	+/-200	U	P	50	200
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Copper	3	ug/L	+/-10	U	P	3	10
	Iron	30	ug/L	+/-100	U	P	30	100
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Manganese	2	ug/L	+/-10	U	P	2	10
	Potassium	-58.7	ug/L	+/-150	J	P	50	150
	Silica	53	ug/L	+/-213	U	P	53	213
	Sodium	100	ug/L	+/-300	U	P	100	300
	Strontium	1	ug/L	+/-5	U	P	1	5
	Tin	2.5	ug/L	+/-10	U	P	2.5	10
	Vanadium	1	ug/L	+/-5	U	P	1	5
	Zinc	3.3	ug/L	+/-10	U	P	3.3	10
1203728189	Antimony	1	ug/L	+/-3	U	MS	1	3
	Arsenic	1.7	ug/L	+/-5	U	MS	1.7	5
	Cadmium	0.3	ug/L	+/-1	U	MS	0.3	1
	Chromium	3	ug/L	+/-10	U	MS	3	10
	Lead	0.5	ug/L	+/-2	U	MS	0.5	2
	Molybdenum	0.3	ug/L	+/-0.5	U	MS	0.3	0.5
	Nickel	0.5	ug/L	+/-2	U	MS	0.5	2
	Selenium	2	ug/L	+/-5	U	MS	2	5
	Silver	0.4	ug/L	+/-1	U	MS	0.4	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
1203728805	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. 2017-1003

Client ID: CASA-17-129325S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 416562001

Spike ID: 1203728153

<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	4600		132	J	5000	89.3		P
Barium	ug/L	75-125	787		338		500	89.9		P
Beryllium	ug/L	75-125	464		1	U	500	92.8		P
Boron	ug/L	75-125	522		37.1	J	500	97.1		P
Calcium	ug/L		25900		21200		5000	93	N/A	P
Cobalt	ug/L	75-125	455		1	U	500	90.9		P
Copper	ug/L	75-125	480		3	U	500	95.9		P
Iron	ug/L	75-125	4730		33	J	5000	94		P
Magnesium	ug/L	75-125	10300		5690		5000	91.3		P
Manganese	ug/L	75-125	451		2	U	500	90.1		P
Potassium	ug/L	75-125	8480		3620		5000	97.2		P
Silica	ug/L		86500		77300		10700	86.2	N/A	P
Sodium	ug/L	75-125	22900		18300		5000	91.6		P
Strontium	ug/L	75-125	591		159		500	86.3		P
Tin	ug/L	75-125	464		2.66	J	500	92.2		P
Vanadium	ug/L	75-125	480		15.2		500	93		P
Zinc	ug/L	75-125	443		3.3	U	500	88.6		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-1003 Client ID: CASA-17-129325S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 416562001 Spike ID: 1203728192

<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	51.8		1	U	50	103		MS
Arsenic	ug/L	75-125	53.2		3.37	J	50	99.7		MS
Cadmium	ug/L	75-125	51.8		0.3	U	50	104		MS
Chromium	ug/L	75-125	58.5		4.59	J	50	108		MS
Lead	ug/L	75-125	47.9		0.5	U	50	95.7		MS
Molybdenum	ug/L	75-125	53.7		1.14		50	105		MS
Nickel	ug/L	75-125	58.4		6.49		50	104		MS
Selenium	ug/L	75-125	48.4		2	U	50	94.3		MS
Silver	ug/L	75-125	51.5		0.4	U	50	103		MS
Thallium	ug/L	75-125	46.6		0.6	U	50	92.6		MS
Uranium	ug/L	75-125	51.2		0.61		50	101		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-1003 **Client ID:** CASA-17-129325S**Contract:** ESHL00114 **Level:** Low**Matrix:** WATER **% Solids:****Sample ID:** 416562001 **Spike ID:** 1203728809

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Mercury	ug/L	75-125	1.89		0.067	U	2	94.3		AV

*Analytical Methods:

AV EPA 245.1/245.2

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-1003

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-17-129325D

Matrix: WATER

Level: Low

Sample ID: 416562001

Duplicate ID: 1203728152

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		132 J		68 U		200		P
Barium	ug/L	+/-20%	338		336		.428		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	37.1 J		36.8 J		.729		P
Calcium	ug/L	+/-20%	21200		21200		.17		P
Cobalt	ug/L		1 U		1 U				P
Copper	ug/L		3 U		3 U				P
Iron	ug/L		33 J		30 U		200		P
Magnesium	ug/L	+/-20%	5690		5590		1.79		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	3620		3710		2.26		P
Silica	ug/L	+/-20%	77300		78900		2.11		P
Sodium	ug/L	+/-20%	18300		18100		1.34		P
Strontium	ug/L	+/-20%	159		156		2.04		P
Tin	ug/L	+/-10	2.66 J		2.82 J		5.89		P
Vanadium	ug/L	+/-5	15.2		15.2		.0329		P
Zinc	ug/L		3.3 U		3.3 U				P

*Analytical Methods:

P SW846 3005A/6010C

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-1003

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-17-129325D

Matrix: WATER

Level: Low

Sample ID: 416562001

Duplicate ID: 1203728191

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	3.37 J		3.21 J		5.02		MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-10	4.59 J		4.66 J		1.67		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	1.14		1.11		2.67		MS
Nickel	ug/L	+/-2	6.49		6.6		1.73		MS
Selenium	ug/L		2 U		2 U				MS
Silver	ug/L		0.4 U		0.4 U				MS
Thallium	ug/L		0.6 U		0.6 U				MS
Uranium	ug/L	+/- .2	0.61		0.615		.816		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
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Duplicate Sample Summary

SDG No.: 2017–1003**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CASA–17–129325D**Matrix:** WATER**Level:** Low**Sample ID:** 416562001**Duplicate ID:** 1203728807**Percent Solids for Dup:** N/A

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

*Analytical Methods:

AV EPA 245.1/245.2

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-1003

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>
1203728151								
	Aluminum	ug/L	5000	4790		95.8	80-120	P
	Barium	ug/L	500	469		93.8	80-120	P
	Beryllium	ug/L	500	464		92.8	80-120	P
	Boron	ug/L	500	482		96.4	80-120	P
	Calcium	ug/L	5000	4750		94.9	80-120	P
	Cobalt	ug/L	500	479		95.7	80-120	P
	Copper	ug/L	500	476		95.2	80-120	P
	Magnesium	ug/L	5000	4930		98.5	80-120	P
	Manganese	ug/L	500	466		93.2	80-120	P
	Potassium	ug/L	5000	4770		95.4	80-120	P
	Silica	ug/L	10700	10100		94.7	80-120	P
	Sodium	ug/L	5000	5250		105	80-120	P
	Strontium	ug/L	500	468		93.6	80-120	P
	Tin	ug/L	500	469		93.7	80-120	P
	Vanadium	ug/L	500	469		93.7	80-120	P
	Zinc	ug/L	500	461		92.2	80-120	P
	Iron	ug/L	5000	5100		102	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-1003

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>
1203728190								
	Antimony	ug/L	50	50.6		101	80-120	MS
	Arsenic	ug/L	50	50.6		101	80-120	MS
	Cadmium	ug/L	50	53.4		107	80-120	MS
	Chromium	ug/L	50	52.4		105	80-120	MS
	Lead	ug/L	50	51.6		103	80-120	MS
	Molybdenum	ug/L	50	53		106	80-120	MS
	Nickel	ug/L	50	53.2		106	80-120	MS
	Selenium	ug/L	50	49.3		98.7	80-120	MS
	Silver	ug/L	50	55		110	80-120	MS
	Thallium	ug/L	50	49.1		98.3	80-120	MS
	Uranium	ug/L	50	53.5		107	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-1003

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>
1203728806	Mercury	ug/L	2	1.95		97.4	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-1003

Client ID: CASA-17-129325L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 416562001

Serial Dilution ID: 1203728154

<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	132	J	340	U	56.065			P
Barium	338		337		.096		10	P
Beryllium	1	U	5	U				P
Boron	37.1	J	75	U	5.026			P
Calcium	21200		21300		.12		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	33	J	150	U	.858			P
Magnesium	5690		5730		.74		10	P
Manganese	2	U	10	U				P
Potassium	3620		3760		3.929		10	P
Silica	77300		77600		.466		10	P
Sodium	18300		18800		2.49		10	P
Strontium	159		155		2.969		10	P
Tin	2.66	J	12.5	U	31.176			P
Vanadium	15.2		15	J	1.574			P
Zinc	3.3	U	16.5	U				P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-1003

Client ID: CASA-17-129325L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 416562001

Serial Dilution ID: 1203728193

<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	3.37	J	8.5	U	7.683			MS
Cadmium	.3	U	1.5	U				MS
Chromium	4.59	J	15	U	7.719			MS
Lead	.5	U	2.5	U				MS
Molybdenum	1.14		1.5	U	11.687			MS
Nickel	6.49		6.51	J	.386			MS
Selenium	2	U	10	U				MS
Silver	.4	U	2	U				MS
Thallium	.6	U	3	U				MS
Uranium	.61		.675	J	10.656			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-1003 **Client ID:** CASA-17-129325L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 416562001 **Serial Dilution ID:** 1203728811

<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 #: 2017-1003
Work Order #: 416562**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1639272

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
416562002	CASA-17-129331
1203728542	Method Blank (MB)
1203728543	Laboratory Control Sample (LCS)
1203728544	416111006(CAMO-17-129308) Sample Duplicate (DUP)
1203728546	416111006(CAMO-17-129308) Post Spike (PS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-093 REV# 14.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

acceptance limits.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 416111006 (CAMO-17-129308) 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:	1639328	Method:	WSP-CN(T)
Prep Batch :	1639327	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
416562002	CASA-17-129331
1203728255	Method Blank (MB)
1203728256	Laboratory Control Sample (LCS)
1203728257	416562002(CASA-17-129331) Sample Duplicate (DUP)
1203728261	416562002(CASA-17-129331) Matrix Spike (MS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 REV# 18.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 416562002 (CASA-17-129331) 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: 1640555 **Method:** WSP-ANIONS

Sample Analysis

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

Sample ID	Client ID
416562001	CASA-17-129325
1203731276	Method Blank (MB)
1203731277	Laboratory Control Sample (LCS)
1203731278	416562001(CASA-17-129325) Sample Duplicate (DUP)
1203731279	416562001(CASA-17-129325) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 416562001 (CASA-17-129325) 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.

Manual Integrations

Samples 1203731278 (CASA-17-129325DUP), 1203731279 (CASA-17-129325PS) and 416562001 (CASA-17-129325) 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:	1639241	Method:	NH3
Prep Batch :	1639240	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
416562001	CASA-17-129325
1203728030	Method Blank (MB)
1203728031	Laboratory Control Sample (LCS)
1203728032	416562001(CASA-17-129325) Sample Duplicate (DUP)
1203728034	416562001(CASA-17-129325) 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.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 416562001 (CASA-17-129325) 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:	Total Kjeldahl Nitrogen		
Analytical Batch:	1639245	Method:	TKN
Prep Batch :	1639244	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
416562002	CASA-17-129331
1203728042	Method Blank (MB)
1203728043	Laboratory Control Sample (LCS)
1203728044	416562002(CASA-17-129331) Sample Duplicate (DUP)
1203728877	416572002(CASA-17-129324) Sample Duplicate (DUP)
1203728045	416562002(CASA-17-129331) Matrix Spike (MS)
1203728878	416572002(CASA-17-129324) Matrix Spike (MS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-104 REV# 14.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 416562002 (CASA-17-129331) and 416572002 (CASA-17-129324) were 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	1203728045 (CASA-17-129331MS)	80* (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

Sample1203728042 (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) 1608537 was generated for sample 1203728045 (CASA-17-129331MS) 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: 1641424

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
416562001	CASA-17-129325
1203733269	Method Blank (MB)
1203733270	Laboratory Control Sample (LCS)
1203733271	416562001(CASA-17-129325) Sample Duplicate (DUP)
1203733272	416572001(CASA-17-129323) Sample Duplicate (DUP)
1203733273	416562001(CASA-17-129325) Post Spike (PS)
1203733274	416572001(CASA-17-129323) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

acceptance limits.

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 416562001 (CASA-17-129325) and 416572001 (CASA-17-129323) were selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The following samples 1203733272 (CASA-17-129323DUP) and 1203733274 (CASA-17-129323PS) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Sample Re-analysis

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

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

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

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:	1639243	Method:	PO4
Prep Batch :	1639242	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
416562001	CASA-17-129325
1203728036	Method Blank (MB)
1203728037	Laboratory Control Sample (LCS)
1203728038	416562001(CASA-17-129325) Sample Duplicate (DUP)
1203728040	416562001(CASA-17-129325) Matrix Spike (MS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-103 REV# 10.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 416562001 (CASA-17-129325) 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 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
Phosphorus, Total as P	1203728038 (CASA-17-129325DUP)	abs(.022 - .089)* (+/- .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

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

Miscellaneous Information

Data Exception (DER) Documentation

A data exception report (DER) 1608645 was generated for sample 1203728038 (CASA-17-129325DUP) 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: Solids and Total Dissolved

Analytical Batch: 1639401

Method: TDS

Sample Analysis

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

Sample ID	Client ID
416562001	CASA-17-129325
1203728409	Method Blank (MB)
1203728410	Laboratory Control Sample (LCS)
1203728411	416562001(CASA-17-129325) Sample Duplicate (DUP)
1203728895	416658001(CAMO-17-129294) Sample Duplicate (DUP)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Consecutive Weight Checks

All consecutive weight checks were met.

Quality Control (QC) Designation

Samples 416562001 (CASA-17-129325) and 416658001 (CAMO-17-129294) were selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**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: 1639323

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
416562001	CASA-17-129325
1203728234	Laboratory Control Sample (LCS)
1203728235	416572010(CAMO-17-129297) Sample Duplicate (DUP)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-009 REV# 13.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 416572010 (CAMO-17-129297) 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: 1639321 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
416562001	CASA-17-129325
1203728231	Laboratory Control Sample (LCS)
1203728232	415847001(WST09-17-129397) Sample Duplicate (DUP)
1203728233	416572010(CAMO-17-129297) Sample Duplicate (DUP)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 415847001 (WST09-17-129397) and 416572010 (CAMO-17-129297) were selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

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

Sample	Analyte	Value
1203728232 (WST09-17-129397DUP)	pH	Received 08-FEB-17, out of holding 06-FEB-17
1203728233 (CAMO-17-129297DUP)	pH	Received 14-FEB-17, out of holding 10-FEB-17
416562001 (CASA-17-129325)	pH	Received 14-FEB-17, out of holding 09-FEB-17

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

A data exception report (DER) 1605726 was generated for samples 416562001 (CASA-17-129325), 1203728232 (WST09-17-129397DUP) and 1203728233 (CAMO-17-129297DUP) 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: 1639313 **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
416562001	CASA-17-129325
1203728222	Laboratory Control Sample (LCS)
1203728223	415847001(WST09-17-129397) Sample Duplicate (DUP)
1203728224	416572010(CAMO-17-129297) Sample Duplicate (DUP)
1203728225	415847001(WST09-17-129397) Matrix Spike (MS)
1203728226	416572010(CAMO-17-129297) Matrix Spike (MS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

The Titration and Ion analysis was performed on a manually operated buret.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Samples 415847001 (WST09-17-129397) and 416572010 (CAMO-17-129297) were selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

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

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Certification Statement

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

GEL LABORATORIES LLC

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Qualifier Definition Report for

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

Client SDG: 2017-1003 GEL Work Order: 416562

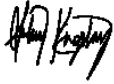
The Qualifiers in this report are defined as follows:

- * 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: 13 MAR 2017

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 13, 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: 2017-1003

Client Sample ID: CASA-17-129325
Sample ID: 416562001
Matrix: W
Collect Date: 09-FEB-17 13:57
Receive Date: 14-FEB-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide	U	ND	0.067	0.200	mg/L		1	MXL2	02/17/17	1649	1640555	1
Chloride		6.32	0.067	0.200	mg/L		1					
Fluoride		0.249	0.033	0.100	mg/L		1					
Sulfate		5.43	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.0724	0.017	0.050	mg/L	1.00	1	KLP1	03/01/17	1304	1639241	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		0.438	0.017	0.050	mg/L		1	KLP1	02/27/17	1329	1641424	3
PO4 "As Received"												
Phosphorus, Total as P		0.089	0.020	0.050	mg/L	1.00	1	KLP1	02/28/17	1217	1639243	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		196	3.40	14.3	mg/L			KLP1	02/16/17	0924	1639401	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		107	1.45	4.00	mg/L			RXB5	02/16/17	1323	1639313	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		236	1.00	1.00	umhos/cm		1	RXB5	02/28/17	1200	1639323	7
PH "As Received"												
pH at Temp 18.3C	H	8.15	0.010	0.100	SU		1	RXB5	02/16/17	1321	1639321	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	02/28/17	1430	1639240
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	02/27/17	1900	1639242

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 13, 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: 2017-1003

Client Sample ID: CASA-17-129325
Sample ID: 416562001

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

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

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 13, 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: 2017-1003

Client Sample ID: CASA-17-129331
Sample ID: 416562002
Matrix: W
Collect Date: 09-FEB-17 13:57
Receive Date: 14-FEB-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	J	0.389	0.330	1.00	mg/L		1	TSM	02/16/17	0314	1639272	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	02/15/17	0913	1639328	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	02/28/17	1018	1639245	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	02/15/17	0842	1639327
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	02/27/17	1900	1639244

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

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

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: March 13, 2017

Page 1 of 7

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

Contact: Mr. Keith Greene

Workorder: 416562

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1639272										
QC1203728544	416111006	DUP									
Total Organic Carbon Average		J	0.355	U	ND	mg/L	200	^	TSM	02/16/17	01:44
QC1203728543	LCS										
Total Organic Carbon Average	10.0				10.2	mg/L	102	(80%-120%)		02/15/17	23:17
QC1203728542	MB										
Total Organic Carbon Average			U	ND	mg/L					02/15/17	23:02
QC1203728546	416111006	PS									
Total Organic Carbon Average	10.0	J	0.355		10.8	mg/L	104	(75%-125%)		02/16/17	02:29
Flow Injection Analysis											
Batch	1639328										
QC1203728257	416562002	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	02/15/17	09:14
QC1203728256	LCS										
Cyanide, Total	50.0				48.7	ug/L	97.4	(90%-110%)		02/15/17	09:09
QC1203728255	MB										
Cyanide, Total			U	ND	ug/L					02/15/17	09:08
QC1203728261	416562002	MS									
Cyanide, Total	100	U	ND		99.8	ug/L	99.8	(90%-110%)		02/15/17	09:15
Ion Chromatography											
Batch	1640555										
QC1203731278	416562001	DUP									
Bromide		U	ND	U	ND	mg/L	N/A		MXL2	02/17/17	17:18

GEL LABORATORIES LLC

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QC Summary

Workorder: 416562

Page 2 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1640555										
Chloride		6.32		6.32	mg/L	0.0317		(0%-20%)	MXL2	02/17/17	17:18
Fluoride		0.249		0.250	mg/L	0.4	^	(+/-0.100)			
Sulfate		5.43		5.38	mg/L	0.969		(0%-20%)			
QC1203731277 LCS											
Bromide	1.25			1.18	mg/L		94.4	(80%-120%)		02/17/17	16:19
Chloride	5.00			4.89	mg/L		97.8	(80%-120%)			
Fluoride	2.50			2.54	mg/L		102	(80%-120%)			
Sulfate	10.0			9.80	mg/L		98	(80%-120%)			
QC1203731276 MB											
Bromide			U	ND	mg/L					02/17/17	15:50
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203731279 416562001 PS											
Bromide	1.25	U	ND	1.25	mg/L		94.9	(75%-125%)		02/17/17	17:47
Chloride	5.00		6.32	11.7	mg/L		108	(75%-125%)			
Fluoride	2.50		0.249	2.59	mg/L		93.8	(75%-125%)			
Sulfate	10.0		5.43	15.2	mg/L		97.9	(75%-125%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1639241										
QC1203728032	416562001	DUP									
Nitrogen, Ammonia		0.0724	J	0.0257	mg/L	95.2	^	(+/-0.050)	KLP1	03/01/17	13:05
QC1203728031	LCS										
Nitrogen, Ammonia	1.00			0.993	mg/L			99.3	(90%-110%)	03/01/17	13:03
QC1203728030	MB										
Nitrogen, Ammonia			U	ND	mg/L					03/01/17	13:02
QC1203728034	416562001	MS									
Nitrogen, Ammonia	1.00	0.0724		1.00	mg/L			92.8	(90%-110%)	03/01/17	13:05
Batch	1639243										
QC1203728038	416562001	DUP									
Phosphorus, Total as P		0.089	J	0.022	mg/L	121	*^	(+/-0.050)	KLP1	02/28/17	12:18
QC1203728037	LCS										
Phosphorus, Total as P	1.00			1.01	mg/L			101	(80%-124%)	02/28/17	12:16
QC1203728036	MB										
Phosphorus, Total as P			U	ND	mg/L					02/28/17	12:15
QC1203728040	416562001	MS									
Phosphorus, Total as P	1.00	0.089		1.06	mg/L			97.1	(63%-139%)	02/28/17	12:19
Batch	1639245										
QC1203728044	416562002	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A		KLP1	02/28/17	10:19
QC1203728877	416572002	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A			02/28/17	10:21
QC1203728043	LCS										
Nitrogen, Total Kjeldahl	1.00			1.08	mg/L			108	(90%-110%)	02/28/17	10:17

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1639245										
QC1203728042	MB										
Nitrogen, Total Kjeldahl			U	ND	mg/L				KLP1	02/28/17	10:42
QC1203728045	416562002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND	0.800	mg/L		80 *	(90%-110%)		02/28/17	10:20
QC1203728878	416572002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND	0.909	mg/L		90.9	(90%-110%)		02/28/17	10:22
Batch	1641424										
QC1203733271	416562001	DUP									
Nitrogen, Nitrate/Nitrite		0.438		0.434	mg/L	0.917		(0%-20%)	KLP1	02/27/17	13:31
QC1203733272	416572001	DUP									
Nitrogen, Nitrate/Nitrite		5.81		5.30	mg/L	9.18		(0%-20%)		02/27/17	13:34
QC1203733270	LCS										
Nitrogen, Nitrate/Nitrite	1.00			0.937	mg/L		93.7	(90%-110%)		02/27/17	13:28
QC1203733269	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					02/27/17	13:27
QC1203733273	416562001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.438		1.39	mg/L		95.2	(90%-110%)		02/27/17	13:32
QC1203733274	416572001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.581		1.49	mg/L		90.9	(90%-110%)		02/27/17	13:35
Solids Analysis											
Batch	1639401										
QC1203728411	416562001	DUP									
Total Dissolved Solids		196		199	mg/L	1.43		(0%-5%)	KLP1	02/16/17	09:24

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Solids Analysis											
Batch	1639401										
QC1203728895	416658001	DUP									
Total Dissolved Solids		129		126	mg/L	2.25		(0%-5%)	KLP1	02/16/17	09:24
QC1203728410	LCS										
Total Dissolved Solids	300			294	mg/L		98.1	(95%-105%)		02/16/17	09:24
QC1203728409	MB										
Total Dissolved Solids			U	ND	mg/L					02/16/17	09:24
Titration and Ion Analysis											
Batch	1639313										
QC1203728223	415847001	DUP									
Alkalinity, Total as CaCO3		88.0		86.0	mg/L	2.3		(0%-20%)	RXB5	02/16/17	12:24
Carbonate alkalinity (CaCO3)		U	ND	U	ND	mg/L	N/A				
QC1203728224	416572010	DUP									
Alkalinity, Total as CaCO3		58.0		59.0	mg/L	1.71		(0%-20%)		02/16/17	13:45
Carbonate alkalinity (CaCO3)		U	ND	U	ND	mg/L	N/A				
QC1203728222	LCS										
Alkalinity, Total as CaCO3	100			110	mg/L		110	(90%-110%)		02/16/17	12:12
QC1203728225	415847001	MS									
Alkalinity, Total as CaCO3	100	88.0		177	mg/L		89	(80%-120%)		02/16/17	12:26
QC1203728226	416572010	MS									
Alkalinity, Total as CaCO3	100	58.0		165	mg/L		107	(80%-120%)		02/16/17	13:47
Batch	1639321										
QC1203728232	415847001	DUP									
pH		H	7.82	H	7.81	SU	0.128	(0%-5%)	RXB5	02/16/17	12:20

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1639321										
QC1203728233	416572010	DUP									
pH		H	7.99	H	7.97	SU	0.251	(0%-5%)	RXB5	02/16/17	13:44
QC1203728231	LCS										
pH	7.00			6.97	SU		99.6	(99%-101%)		02/16/17	12:03
Batch	1639323										
QC1203728235	416572010	DUP									
Conductivity			133	134	umhos/cm	0.749		(0%-10%)	RXB5	02/28/17	12:15
QC1203728234	LCS										
Conductivity	1410			1380	umhos/cm		97.7	(95%-105%)		02/28/17	11:58

Notes:

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

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
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. 16-FEB-17	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ELECTRODE	Test / Method: EPA 150.1	Matrix Type: Liquid	Client Code: ESHL
Batch ID: 1639321	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 415847(2017-978),415848(2017-977),415984(2017-986),415985(2017-985),416111(2017-993),416562(2017-1003),416572(2017-1005),416765(2017-1019) Application Issues: Sample received out of holding			
Specification and Requirements		DER Disposition:	
Exception Description:			
1. Sample received out of holding: 415847 001,005 415848 005 415984 002,004 415985 001,004 416111 001,003,005 416562 001 416572 001,004,005,006,008,010 416765 001 QC 1203728232DUP,1203728233DUP		1. Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified. 1203728232 (WST09-17-129397DUP) [Received 08-FEB-17, out of holding 06-FEB-17]. 1203728233 (CAMO-17-129297DUP) [Received 14-FEB-17, out of holding 10-FEB-17]. 415847001 (WST09-17-129397) [Received 08-FEB-17, out of holding 06-FEB-17]. 415847005 (WST09-17-129398) [Received 08-FEB-17, out of holding 06-FEB-17]. 415848005 (CTU6A-17-130110) [Received 08-FEB-17, out of holding 06-FEB-17]. 415984002 (CAMO-17-129411) [Received 09-FEB-17, out of holding 07-FEB-17]. 415984004 (CAMO-17-129412) [Received 09-FEB-17, out of holding 07-FEB-17]. 415985001 (CAMO-17-129293) [Received 09-FEB-17, out of holding 07-FEB-17]. 415985004 (CAMO-17-129322) [Received 09-FEB-17, out of holding 07-FEB-17]. 416111001 (CAMO-17-129289) [Received 10-FEB-17, out of holding 08-FEB-17]. 416111003 (CAMO-17-129290) [Received 10-FEB-17, out of holding 08-FEB-17]. 416111005 (CAMO-17-129292) [Received 10-FEB-17, out of holding 08-FEB-17]. 416562001 (CASA-17-129325) [Received 14-FEB-17, out of holding 09-FEB-17]. 416572001 (CASA-17-129323) [Received 14-FEB-17, out of holding 09-FEB-17]. 416572004 (CASA-17-129339) [Received 14-FEB-17, out of holding 09-FEB-17]. 416572005 (CAMO-17-129578) [Received 14-FEB-17, out of holding 09-FEB-17]. 416572006 (CAMO-17-129291) [Received 14-FEB-17, out of holding 10-FEB-17]. 416572008 (CASA-17-129326) [Received 14-FEB-17, out of holding 09-FEB-17]. 416572010 (CAMO-17-129297) [Received 14-FEB-17, out of holding 10-FEB-17]. 416765001 (CAMO-17-129353) [Received 16-FEB-17, out of holding 14-FEB-17].	

Originator's Name:

Rachael Bell

16-FEB-17

Data Validator/Group Leader:

Elzbieta Szulc

23-FEB-17

Originator's Name:

Rachael Bell 16-FEB-17

Data Validator/Group Leader:

Elzbieta Szulc 23-FEB-17

DATA EXCEPTION REPORT			
Mo.Day Yr. 28-FEB-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: ESHL
Batch ID: 1639245	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 416562(2017-1003),416572(2017-1005),416657(2017-1012),416658(2017-1011),416767(2017-1018),416771(2017-1017),416862(2017-1031),417067(2017-1053) 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 1203728045MS		1. The matrix spike recovered outside of the established acceptance limits due to matrix interference and/or non-homogeneity. Nitrogen, Total Kjeldahl 1203728045 (CASA-17-129331MS) [80* (90%-110%)].	

Originator's Name:
Kristen Mizzell 28-FEB-17

Data Validator/Group Leader:
Aubrey Kingsbury 28-FEB-17

DATA EXCEPTION REPORT			
Mo.Day Yr. 28-FEB-17	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: LACHAT Flow Injection Analyzer	Test / Method: EPA 365.4	Matrix Type: Liquid	Client Code: ESHL
Batch ID: 1639243	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 416562(2017-1003),416572(2017-1005),416958(2017-1050) Application Issues: Failed RPD for DUP			
Specification and Requirements Exception Description:		DER Disposition:	
1. Failed RPD for DUP: QC 1203728038DUP		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: Phosphorus, Total as P 1203728038 (CASA-17-129325DUP) [abs(.022 - .089)* (+/- .05 mg/L)].	

Originator's Name:
Kristen Mizzell 28-FEB-17

Data Validator/Group Leader:
Aubrey Kingsbury 28-FEB-17