

General Engineering

Charleston SC

Chain of Custody/Analysis Request

AOEP

COC/Lab Request #:

2015-2191

Page 1 of 1

Client Contact:

Lab Agreement #:

Site Name: Los Alamos National Laboratory

Project Number: ADEP

Analysis Turnaround Time:

24 Hour - Other -

7 Days -

14 Days -

21 Days -

28 Days -

Rad Screening Info:

Lab Reporting Limit Type:

Sample Quantitation Limit

Field Sample ID

Sample Date

Sample Time

Sample Matrix

MSGP-Hg

WSP-All Metals

WSP-CN(T)

WSP-GENINORG+PerChlorate

WSP-NH3+NO3/NO2+PO4

WSP-TKN+TOC

CASA-15-102640

Aug 18 2015

10:38

W

1

1

1

CASA-15-102654

Aug 18 2015

10:38

W

1

1

1

Special Instructions:

Relinquished by:

Print Name: *M. S. Montoya*

Date/Time: *8/18/15 3:00*

Received by:

Print Name:

Date/Time:

Relinquished by:

Print Name:

Date/Time:

Received by:

Print Name:

Date/Time:

Relinquished by:

Print Name:

Date/Time:

Received by:

Print Name:

Date/Time:

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 10309

EVENT NAME: Mortandad/Sandia (Chromium and General Surveillance)
MY2015 Q4 Watershed Sampling_Sandia

SAMPLE ID: CASA-15-102640

WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	08/18/2015	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1038	↓	MEDIA:	UA	↓
PRS ID:	NA		SAMPLE TECH CODE:	UA	GSP
LOCATION ID:	R-43 S2		FIELD PREP:	UF	OK
LOCATION TYPE:	MON		FIELD QC TYPE:	REG	↓
TOP DEPTH:	NA		SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓		EXCAVATED:		YES / NO / <input checked="" type="radio"/> 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' From running diesel generator

FIELD PARAMETERS:

Dissolved Oxygen	4.26	mg/L	Flow (in gpm)	1.52	GPM	Oxidation-Reduction Potential	125.4	mV
pH	8.46	SU	Specific Conductance	201	uS/cm	Temperature	20.18	deg C
Turbidity	0.2	NTU						

COLLECTED BY (PRINT): T. Bonham

RELINQUISHED BY (Printed Name) Austin Tosh (Signature) <i>Austin Tosh</i>	Date/Time 8/18/15 1655	RECEIVED BY (Printed Name) S. Sherwood (Signature) <i>S. Sherwood</i>	Date/Time 8/18/15 1655
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 10309

EVENT NAME: Mortandad/Sandia (Chromium and General Surveillance)
MY2015 Q4 Watershed Sampling_Sandia

SAMPLE ID: CASA-15-102654

WORK ORDER: NA

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	08/18/2015	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1038	↓	MEDIA:	UA	↓
PRS ID:	NA	↓	SAMPLE TECH CODE:	UA	GSP
LOCATION ID:	R-43 S2	↓	FIELD PREP:	F	OK
LOCATION TYPE:	MON	↓	FIELD QC TYPE:	REG	↓
TOP DEPTH:	NA	↓	SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:	YES / NO / <input checked="" type="radio"/> NA	

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

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

AT 8-18-15

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

COLLECTED BY (PRINT): T. Bonham

RELINQUISHED BY (Printed Name) Austin Tosh (Signature) <i>Austin Tosh</i>	Date/Time 8/18/15 1655	RECEIVED BY (Printed Name) Sherwood (Signature) <i>Sherwood</i>	Date/Time 8/18/15 1655
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

DATA VALIDATION REPORT

Chain Of Custody No. 2015-2191

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
379642	EPA:120.1	1				
379642	EPA:150.1	1				
379642	EPA:160.1	1				
379642	EPA:245.2	2				
379642	EPA:300.0	1				
379642	EPA:310.1	1				
379642	EPA:335.4	1				
379642	EPA:350.1	1				
379642	EPA:351.2	1				
379642	EPA:353.2	1				
379642	EPA:365.4	1				
379642	SM:A2340B	1				
379642	SW-846:6010C	1				
379642	SW-846:6020	1				
379642	SW-846:6850	1				
379642	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	
379642	EPA:120.1	1504613	1504613		1									1				1				
379642	EPA:150.1	1503693	1503693		1									1				1				
379642	EPA:160.1	1502146	1502146		1				1					1				1				
379642	EPA:245.2	1503759	1503758		2				1	1				1				1				
379642	EPA:300.0	1502071	1502071		1				1					1				1				
379642	EPA:310.1	1503701	1503701		1				1	2				1				2				
379642	EPA:335.4	1502152	1502151		1				1	1				1				1				
379642	EPA:350.1	1502507	1502506		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
379642	EPA:351.2	1501128	1501127		1				1	1				1				1			
379642	EPA:353.2	1502318	1502318		1				1					1				1			
379642	EPA:365.4	1501776	1501774		1				1	1				1				1			
379642	SM:A2340B	1503257	1503257		1																
379642	SW-846:6010C	1501962	1501961		1				1	1				1				1			
379642	SW-846:6020	1501973	1501972		1				1	1				1				1			
379642	SW-846:6850	1502487	1502486		1				1	1	1			1							
379642	SW-846:9060	1502561	1502561		1				1					1				2			

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CASA-15-102654	379642002	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-15-102655	1203385407	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203385406	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-15-102596	1203382930	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-15-102654	379642002	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203382926	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CASA-15-102654	1203378786	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-15-102654	379642002	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203378785	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203378783	MB	1	0	0	0
EPA:245.2	INORGANIC	CASA-15-102640	379642001	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-15-102654	379642002	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203383127	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203383126	MB	1	0	0	0
EPA:245.2	INORGANIC	WST60-15-104263	1203383129	DUP	1	0	0	0
EPA:245.2	INORGANIC	WST60-15-104263	1203383131	MS	0	0	1	0
EPA:300.0	GENERAL CHEMISTRY	CASA-15-102654	1203378603	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-15-102654	379642002	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203378602	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203378601	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-15-102600	1203382947	DUP	2	0	0	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:310.1	GENERAL CHEMISTRY	CAMO-15-102600	1203382948	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-15-102653	1203383925	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-15-102653	1203383926	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-15-102654	379642002	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203382943	LCS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	MB	1203382942	MB	2	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-15-102572	1203378800	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-15-102572	1203378803	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CASA-15-102640	379642001	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203378799	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203378798	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-15-102600	1203379798	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-15-102600	1203379799	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CASA-15-102654	379642002	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203379797	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203379796	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-15-102572	1203376185	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-15-102572	1203376187	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CASA-15-102640	379642001	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203376184	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203376183	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-15-102654	1203379265	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-15-102654	379642002	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203379262	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203379261	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-15-102596	1203377851	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-15-102596	1203377852	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CASA-15-102654	379642002	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203377850	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203377849	MB	1	0	0	0
SM:A2340B	INORGANIC	CASA-15-102654	379642002	REG	1	0	0	0
SW-846:6010C	INORGANIC	CASA-15-102649	1203378335	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CASA-15-102649	1203378336	MS	0	0	17	0
SW-846:6010C	INORGANIC	CASA-15-102654	379642002	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203378334	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203378333	MB	17	0	0	0
SW-846:6020	INORGANIC	CASA-15-102649	1203378364	DUP	11	0	0	0
SW-846:6020	INORGANIC	CASA-15-102649	1203378365	MS	0	0	11	0
SW-846:6020	INORGANIC	CASA-15-102654	379642002	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203378363	LCS	0	0	11	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	MB	1203378362	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-15-102600	1203379718	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-15-102600	1203379719	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-15-102654	379642002	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203379717	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203379716	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-15-102557	1203380011	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-15-102640	1203380010	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-15-102640	379642001	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203380009	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203380008	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	1203378362	METHOD BLANK	SW-846:6020	W	Chromium	3.57	J	ug/L	10.0
MB	1203378362	METHOD BLANK	SW-846:6020	W	Uranium	.103	J	ug/L	0.200
MB	1203379796	METHOD BLANK	EPA:350.1	W	Ammonia as Nitrogen	0.0207	J	mg/L	0.050

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-15-102654	1203379796	METHOD BLANK	EPA:350.1	Ammonia as Nitrogen	0.0207	mg/L	0.110		0.050	Y	5	100	Y
CASA-15-102654	1203378362	METHOD BLANK	SW-846:6020	Chromium	3.57	ug/L	8.13	J	10.0	Y	5	100	Y
CASA-15-102654	1203378362	METHOD BLANK	SW-846:6020	Uranium	.103	ug/L	.837		0.200	Y	5	100	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
CAMO-15-102600	1203382948		EPA:310.1	Alkalinity-CO3+HCO3	1503701	08-29-2015	W	321		120	80	10		
CAMO-15-102600	1203379799		EPA:350.1	Ammonia as Nitrogen	1502506	08-24-2015	W	111		110	90	10		
CAMO-15-102572	1203376187		EPA:351.2	Total Kjeldahl Nitrogen	1501127	08-25-2015	W	81.3		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.

DATA VALIDATION REPORT

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

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-43 S2	2015-2191	CASA-15-102654	REG	INIT	GENERAL CHEMISTRY	EPA:350.1	Ammonia as Nitrogen	J		I4a	Y	0.110	mg/L	0.110	mg/L			W	08/18/2015		1502507	VAL	Y
R-43 S2	2015-2191	CASA-15-102654	REG	INIT	INORGANIC	SW-846:6020	Chromium	J	J	I4	N	8.13	ug/L	8.13	ug/L			W	08/18/2015		1501973	VAL	Y
R-43 S2	2015-2191	CASA-15-102654	REG	INIT	INORGANIC	SW-846:6020	Uranium	J		I4a	Y	.837	ug/L	.837	ug/L			W	08/18/2015		1501973	VAL	Y

Reason Code

Description

I4

the sample result is =<5x the concentration of related analyte in the method blank.

I4a

The affected analytes are considered estimated and biased high because this analyte was identified in the method blank but was >5x

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-15-102640	R-43 S2	REG	EPA:245.2	0	1
CASA-15-102640	R-43 S2	REG	EPA:335.4	0	1
CASA-15-102640	R-43 S2	REG	EPA:351.2	0	1
CASA-15-102640	R-43 S2	REG	SW-846:9060	0	1

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-15-102654	R-43 S2	REG	EPA:120.1	0	1
CASA-15-102654	R-43 S2	REG	EPA:150.1	0	1
CASA-15-102654	R-43 S2	REG	EPA:160.1	0	1
CASA-15-102654	R-43 S2	REG	EPA:245.2	0	1
CASA-15-102654	R-43 S2	REG	EPA:300.0	0	4
CASA-15-102654	R-43 S2	REG	EPA:310.1	0	2
CASA-15-102654	R-43 S2	REG	EPA:350.1	0	1
CASA-15-102654	R-43 S2	REG	EPA:353.2	0	1
CASA-15-102654	R-43 S2	REG	EPA:365.4	0	1
CASA-15-102654	R-43 S2	REG	SM:A2340B	0	1
CASA-15-102654	R-43 S2	REG	SW-846:6010C	0	17
CASA-15-102654	R-43 S2	REG	SW-846:6020	0	11
CASA-15-102654	R-43 S2	REG	SW-846:6850	0	1



September 16, 2015

gel.com

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

Re: LANL- WQH Water Samples
Work Order: 379642
SDG: 2015-2191

Dear Mr. Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on August 20, 2015, 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,

Hope Taylor for
Valerie Davis
Project Manager

Chain of Custody: 2015-2191
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 379642
SDG: 2015-2191

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 379642
SDG # : 2015-2191**

September 16, 2015

Laboratory Identification:

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

Summary

Sample receipt The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on August 20, 2015 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>
379642001	CASA-15-102640
379642002	CASA-15-102654

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.

top a d

Hope Taylor for
Valerie Davis
Project Manager

List of current GEL Certifications as of 16 September 2015

State	Certification
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California	2940 Interim
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013-10
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	LA150001
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68-00485
Plant Material Permit	PDEP-12-00260
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-15-10
Utah NELAP	SC000122015-18
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Chain of Custody and Supporting Documentation

SAMPLE RECEIPT & REVIEW FORM

Client: <u>LANL</u>		SDG/AR/COC/Work Order: <u>2015-2191</u>	
Received By: <u>Briele Luthman</u>		Date Received: <u>8/20/15 0845</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
COC/Samples marked as radioactive?	<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area/Background Counts): <u>∅</u>	
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"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Ice bags <u>Blue ice</u> Dry ice None Other (describe) *all temperatures are recorded in Celsius
2a	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): <u>F5032015835</u>
3	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples (EPA 6850) have headspace as required?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7	VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
8	Are Encore containers present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
9	Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
10	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
11	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
12	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13	Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15	Carrier and tracking number.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: <u>FedEx Air</u> FedEx Ground UPS Field Services Courier Other 5908 1779 3521-2° 5908 1779 3500-2° 5908 1779 3510-1°

Comments (Use Continuation Form if needed):

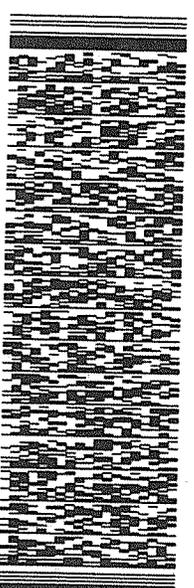
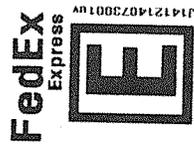
ORIGIN ID: SAFA (505) 665-9966
KEITH GREENE
LOS ALAMOS NATL LAB
TA00 BLDG 1237 DPU 03

SHIP DATE: 19AUG15
ACTWGT: 46.0 LB MAN
CAD: 0014176/CAFE2807

BILL SENDER

LOS ALAMOS, NM 87545
UNITED STATES US
TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407
(843) 566-8171
REF: MRGW04BAGWEO

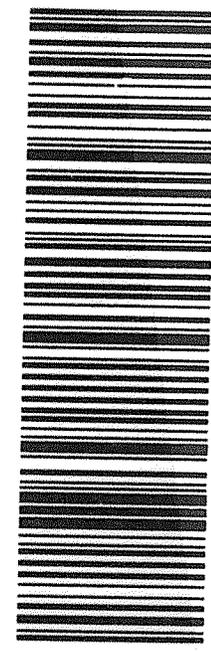


THU - 20 AUG 10:30A
PRIORITY OVERNIGHT

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0263
Mstr# 5908 1779 3500
0201

X7 CHSA 29407
SC-US CHS

Part # 156148-434 R1T2 10/11



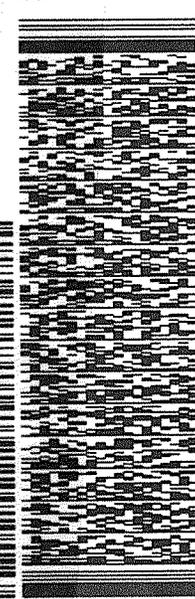
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KEITH GREENE
LOS ALAMOS NATL LAB
TA00 BLDG 1237 DPU 03

SHIP DATE: 19AUG15
ACTWGT: 40.0 LB MAN
CAD: 0014176/CAFE2807

BILL SENDER

LOS ALAMOS, NM 87545
UNITED STATES US
TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407
(843) 566-8171
REF: MRGW04BAGWEO

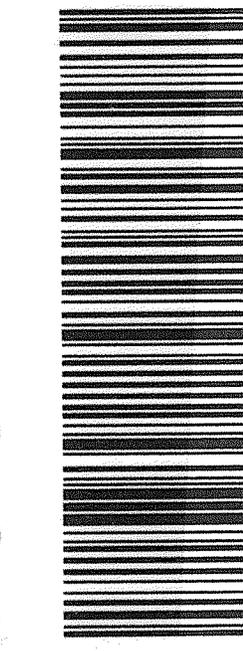


THU - 20 AUG 10:30A
PRIORITY OVERNIGHT

MPS# 5908 1779 3521
0263
Mstr# 5908 1779 3500
0201

X7 CHSA 29407
SC-US CHS

Part # 156148-434 R1T2 10/11



ORIGIN ID: SAFA (505) 665-9866
KEITH GREENE
LOS ALAMOS NATL LAB
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 19AUG15
ACTWGT: 49.0 LB. I/PAN
CAD: 0014178/CAF2807

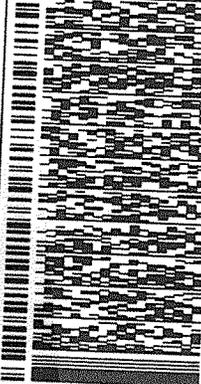
BILL SENDER

TO **VALERIE DAVIS**
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 566-8171

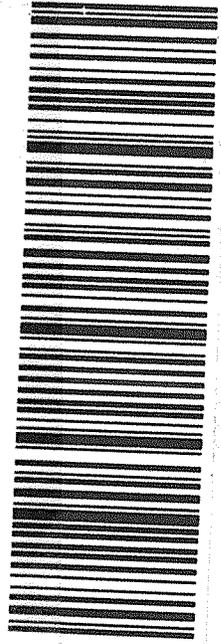
REF: MRGW04BAGWEO



THU - 20 AUG 10:30A
PRIORITY OVERNIGHT

1 of 3
TRK# 5908 1779 3500
0201
MASTER

X7 CHSA 2 29407
SC-US CHS



Part # 155148-434 R1T2 10/11

521C1/FECA/6F03

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 #: 2015-2191
Work Order #: 379642**

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: SW846 6850 Modified
Prep Method: SW846 6850 Modified
Analytical Batch Number: 1502487
Prep Batch Number: 1502486

Sample Analysis

Sample ID	Client ID
379642002	CASA-15-102654
1203379720	Interference Check Sample (ICS)
1203379716	Method Blank (MB)
1203379717	Laboratory Control Sample (LCS)
1203379718	379726005(CAMO-15-102600) Matrix Spike (MS)
1203379719	379726005(CAMO-15-102600) 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# 12.

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

The initial calibration verification standard (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 379726005 (CAMO-15-102600) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD 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.

Retention Time Standard Area Acceptance

The retention time 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 Method 332.0, 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

All samples in this batch were re-analyzed the following day. The initial calibration did not meet all acceptance criteria. However, review of the data provided information for dilutions needed for many samples in this batch.

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 not internally corrected for using Perchlorate-O (18). They are external calibrations.

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: 2015-2191 GEL Work Order: 379642

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, or LOD.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

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

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

Signature: 

Name: Michael Penny

Date: 06 SEP 2015

Title: Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample No.

CASA-15-102654Lab Code: GELDate Received: 20-AUG-15Instrument: LCMSMSGEL Job No (SDG): 2015-2191Method: SW846 6850 ModifiedGEL Sample ID: 379642002Matrix: WATERDate Filtered: 26-AUG-15Extraction Batch ID: 1502486Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.751	ug/L		1	27-AUG-15 15:36	per0827041a
	Perchlorate Isotope Ratio			3.05			1	27-AUG-15 15:36	per0827041a
14797-73-0	Perchlorate-101	.05	.2	0.763	ug/L		1	27-AUG-15 15:36	per0827041a
	Perchlorate-O(18)			0.547	ug/L		1	27-AUG-15 15:36	per0827041a

^ 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 =
Instrument Value X $\frac{\text{Concentrated Extract Volume}}{\text{Aliquot}}$ X $\frac{1}{\% \text{Solids}}$

Quality Control Summary

Perchlorate Laboratory Control Sample

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No. (SDG): 2015-2191

Extract Batch Code: 1502486

Date Filtered: 26-AUG-15

Matrix: WATER

Sample ID: 1203379717

Analyte [^]	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.209	ug/L	104		85 - 115
Perchlorate Isotope Ratio		3.08				-
Perchlorate-101	0.200	.21	ug/L	105		85 - 115
Perchlorate-O(18)		.523	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): 2015-2191

Extract Batch Code: 1502486

Date Extracted: 26-AUG-15

GEL MS/PS ID: 1203379718

Client ID: CAMO-15-102600

GEL MSD/PSD ID: 1203379719

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	0.450	ug/L	0.655	102	.656	103	0	30	75 - 125
Perchlorate Isotope Ratio	0	3.07		3.08		3.12		1		-
Perchlorate-101	0.200	0.456	ug/L	0.659	102	.652	98	1	30	75 - 125
Perchlorate-O(18)	0	0.511	ug/L	0.526		.514		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 LLC

Client Sample No.

MBLab Code: GELDate Received: 26-AUG-15Instrument: LCMSMSGEL Job No (SDG): 2015-2191Method: EPA 6850 ModifiedGEL Sample ID: 1203379716Matrix: WATERDate Filtered: 26-AUG-15Extraction Batch ID: 1502486Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

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	27-AUG-15 12:08	per0827019a
	Perchlorate Isotope Ratio						1	27-AUG-15 12:08	per0827019a
14797-73-0	Perchlorate-101	.05	.2	0.200	ug/L	U	1	27-AUG-15 12:08	per0827019a
	Perchlorate-O(18)			0.493	ug/L		1	27-AUG-15 12:08	per0827019a

^ 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: 1502486Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 26-AUG-15GEL Job No (SDG): 2015-2191GEL Sample ID: 1203379717Date Filtered: 26-AUG-15Injection 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	0.209	ug/L		1	27-AUG-15 12:17	per0827020a
	Perchlorate Isotope Ratio			3.08			1	27-AUG-15 12:17	per0827020a
14797-73-0	Perchlorate-101	.05	.2	0.210	ug/L		1	27-AUG-15 12:17	per0827020a
	Perchlorate-O(18)			0.523	ug/L		1	27-AUG-15 12:17	per0827020a

^ 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: STORM WATERExtraction Batch ID: 1502486Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2015-2191GEL Sample ID: 1203379720Date Filtered: 26-AUG-15Injection 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	0.234	ug/L		1	27-AUG-15 12:27	per0827021a
	Perchlorate Isotope Ratio			3.15			1	27-AUG-15 12:27	per0827021a
14797-73-0	Perchlorate-101	.05	.2	0.230	ug/L		1	27-AUG-15 12:27	per0827021a
	Perchlorate-O(18)			0.551	ug/L		1	27-AUG-15 12:27	per0827021a

^ 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 LLC

Client Sample No.

CAMO-15-102600MSLab Code: GELDate Received: 21-AUG-15Instrument: LCMSMSGEL Job No (SDG): 2015-2191Method: SW846 6850 ModifiedGEL Sample ID: 1203379718Matrix: WATERDate Filtered: 26-AUG-15Extraction Batch ID: 1502486Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.655	ug/L		1	27-AUG-15 15:55	per0827043a
	Perchlorate Isotope Ratio			3.08			1	27-AUG-15 15:55	per0827043a
14797-73-0	Perchlorate-101	.05	.2	0.659	ug/L		1	27-AUG-15 15:55	per0827043a
	Perchlorate-O(18)			0.526	ug/L		1	27-AUG-15 15:55	per0827043a

^ 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 =
Instrument Value X $\frac{\text{Concentrated Extract Volume}}{\text{Aliquot}}$ X $\frac{1}{\% \text{Solids}}$

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1502486Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-15-102600MSDDate Received: 21-AUG-15GEL Job No (SDG): 2015-2191GEL Sample ID: 1203379719Date Filtered: 26-AUG-15Injection 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	0.656	ug/L		1	27-AUG-15 16:05	per0827044a
	Perchlorate Isotope Ratio			3.12			1	27-AUG-15 16:05	per0827044a
14797-73-0	Perchlorate-101	.05	.2	0.652	ug/L		1	27-AUG-15 16:05	per0827044a
	Perchlorate-O(18)			0.514	ug/L		1	27-AUG-15 16:05	per0827044a

^ 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 =
Instrument Value X $\frac{\text{Concentrated Extract Volume}}{\text{Aliquot}}$ X $\frac{1}{\% \text{Solids}}$

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2015-2191
Work Order #: 379642

Sample ID	Client ID
379642001	CASA-15-102640
379642002	CASA-15-102654
1203378333	Method Blank (MB)ICP
1203378334	Laboratory Control Sample (LCS)
1203378337	379641011(CASA-15-102649L) Serial Dilution (SD)
1203378335	379641011(CASA-15-102649D) Sample Duplicate (DUP)
1203378336	379641011(CASA-15-102649S) Matrix Spike (MS)
1203378362	Method Blank (MB)ICP-MS
1203378363	Laboratory Control Sample (LCS)
1203378366	379641011(CASA-15-102649L) Serial Dilution (SD)
1203378364	379641011(CASA-15-102649D) Sample Duplicate (DUP)
1203378365	379641011(CASA-15-102649S) Matrix Spike (MS)
1203383126	Method Blank (MB)CVAA
1203383127	Laboratory Control Sample (LCS)
1203383133	380157001(WST60-15-104263L) Serial Dilution (SD)
1203383129	380157001(WST60-15-104263D) Sample Duplicate (DUP)
1203383131	380157001(WST60-15-104263S) Matrix Spike (MS)

Sample Analysis

Method/Analysis Information

Analytical Batch:	1501962, 1501973, 1503759 and 1503257
Prep Batch :	1501961, 1501972 and 1503758
Standard Operating Procedures:	GL-MA-E-013 REV# 24, GL-MA-E-006 REV# 12, GL-MA-E-014 REV# 26, GL-MA-E-010 REV# 30 and GL-GC-E-107 REV# 9
Analytical Method:	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.1/245.2 and SM 2340 B
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 - ICPMS was performed on a Perkin Elmer ELAN 9000 inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum.

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.

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 met the control limits with the exception of potassium, sodium and zinc. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 379642002 (CASA-15-102654)-ICP. The CRDL standard recoveries for SW846 6020A met the advisory control limits with the exception of the uranium. Client sample concentrations were greater than two times the PQL; therefore the data were not adversely affected. ICP-MS.

ICSA/ICSAB Statement

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

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: 379641011 (CASA-15-102649)-ICP and ICP-MS and 380157001 (WST60-15-104263)-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: 2015-2191 GEL Work Order: 379642

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, 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: **16 SEP 2015**

Title: **Data Validator**

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2015-2191

CONTRACT: ESHL00114

METHOD TYPE: EPA

SAMPLE ID:379642001

BASIS: As Received

DATE COLLECTED 18-AUG-15

CLIENT ID: CASA-15-102640

LEVEL: Low

DATE RECEIVED 20-AUG-15

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	MTMI	08/31/15 11:18	083115W1-4	1503759

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1503759	1503758	EPA 245.1/245.2 Prep	20	mL	20	mL	08/28/15	AXS5

***Analytical Methods:**

AV EPA 245.1/245.2

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2015-2191

CONTRACT: ESHL00114

METHOD TYPE: EPA

SAMPLE ID:379642002

BASIS: As Received

DATE COLLECTED 18-AUG-15

CLIENT ID: CASA-15-102654

LEVEL: Low

DATE RECEIVED 20-AUG-15

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	MTMI	08/31/15 11:20	083115W1-4	1503759

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2015-2191

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 379642002

BASIS: As Received

DATE COLLECTED 18-AUG-15

CLIENT ID: CASA-15-102654

LEVEL: Low

DATE RECEIVED 20-AUG-15

MATRIX: W

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	200	ug/L	U	68	200	200	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	BCD1	09/05/15 07:07	150904-2	1501973
7440-38-2	Arsenic	1.77	ug/L	J	1.7	5	5	1	MS	BCD1	09/05/15 07:07	150904-2	1501973
7440-39-3	Barium	22.5	ug/L		1	5	5	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-42-8	Boron	38.3	ug/L	J	15	50	50	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-43-9	Cadmium	1	ug/L	U	0.11	1	1	1	MS	BCD1	09/05/15 07:07	150904-2	1501973
7440-70-2	Calcium	18500	ug/L		50	200	200	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-47-3	Chromium	8.13	ug/L	J	2	10	10	1	MS	BCD1	09/05/15 07:07	150904-2	1501973
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7439-89-6	Iron	100	ug/L	U	30	100	100	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	BCD1	09/05/15 07:07	150904-2	1501973
7439-95-4	Magnesium	4520	ug/L		110	300	300	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7439-98-7	Molybdenum	1.34	ug/L		0.165	0.5	0.5	1	MS	BCD1	09/05/15 07:07	150904-2	1501973
7440-02-0	Nickel	0.627	ug/L	J	0.5	2	2	1	MS	BCD1	09/05/15 07:07	150904-2	1501973
7440-09-7	Potassium	1500	ug/L		50	150	150	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7782-49-2	Selenium	5	ug/L	U	1.5	5	5	1	MS	BCD1	09/05/15 07:07	150904-2	1501973
7631-86-9	Silica	68600	ug/L		53	213	213	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-22-4	Silver	1	ug/L	U	0.2	1	1	1	MS	BCD1	09/05/15 07:07	150904-2	1501973
7440-23-5	Sodium	15600	ug/L		100	300	300	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-24-6	Strontium	96.8	ug/L		1	5	5	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-28-0	Thallium	2	ug/L	U	0.45	2	2	1	MS	BCD1	09/05/15 07:07	150904-2	1501973
7440-31-5	Tin	10	ug/L	U	2.5	10	10	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-61-1	Uranium	0.837	ug/L		0.067	0.2	0.2	1	MS	SKJ	09/04/15 02:56	150903-3	1501973
7440-62-2	Vanadium	7.39	ug/L		1	5	5	1	P	HSC	08/21/15 15:08	082115A-1	1501962
7440-66-6	Zinc	10	ug/L	U	3.3	10	10	1	P	HSC	08/21/15 15:08	082115A-1	1501962

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2015-2191

CONTRACT: ESHL00114

METHOD TYPE:

SAMPLE ID:379642002

BASIS: As Received

DATE COLLECTED 18-AUG-15

CLIENT ID: CASA-15-102654

LEVEL: Low

DATE RECEIVED 20-AUG-15

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	64.8	mg/L		0.453	1.24	1.24	1		JJ2	08/26/15 12:52		1503257

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1501962	1501961	SW846 3005A	50	mL	50	mL	08/20/15	JP1
1501973	1501972	SW846 3005A	50	mL	50	mL	08/20/15	JP1
1503759	1503758	EPA 245.1/245.2 Prep	20	mL	20	mL	08/28/15	AXS5

***Analytical Methods:**

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

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2015-2191
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>
1203378333	Aluminum	68	ug/L	+/-200	U	P	68	200
	Barium	1	ug/L	+/-5	U	P	1	5
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Calcium	50	ug/L	+/-200	U	P	50	200
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Copper	3	ug/L	+/-10	U	P	3	10
	Iron	30	ug/L	+/-100	U	P	30	100
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Manganese	2	ug/L	+/-10	U	P	2	10
	Potassium	50	ug/L	+/-150	U	P	50	150
	Silica	53	ug/L	+/-213	U	P	53	213
	Sodium	100	ug/L	+/-300	U	P	100	300
	Strontium	1	ug/L	+/-5	U	P	1	5
	Tin	2.5	ug/L	+/-10	U	P	2.5	10
	Vanadium	1	ug/L	+/-5	U	P	1	5
	Zinc	3.3	ug/L	+/-10	U	P	3.3	10
1203378362	Antimony	1	ug/L	+/-3	U	MS	1	3
	Arsenic	1.7	ug/L	+/-5	U	MS	1.7	5
	Cadmium	0.11	ug/L	+/-1	U	MS	0.11	1
	Chromium	3.57	ug/L	+/-10	J	MS	2	10
	Lead	0.5	ug/L	+/-2	U	MS	0.5	2
	Molybdenum	0.165	ug/L	+/-0.5	U	MS	0.165	0.5
	Nickel	0.5	ug/L	+/-2	U	MS	0.5	2
	Selenium	1.5	ug/L	+/-5	U	MS	1.5	5
	Silver	0.2	ug/L	+/-1	U	MS	0.2	1
	Thallium	0.45	ug/L	+/-2	U	MS	0.45	2
	Uranium	0.103	ug/L	+/-0.2	J	MS	0.067	0.2
1203383126	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. 2015-2191 Client ID: CASA-15-102649S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 379641011 Spike ID: 1203378336

<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	5020		68	U	5000	100		P
Barium	ug/L	75-125	522		11.6		500	102		P
Beryllium	ug/L	75-125	515		1	U	500	103		P
Boron	ug/L	75-125	549		17.6	J	500	106		P
Calcium	ug/L	75-125	22400		17400		5000	101		P
Cobalt	ug/L	75-125	498		1	U	500	99.6		P
Copper	ug/L	75-125	531		3	U	500	106		P
Iron	ug/L	75-125	5180		30	U	5000	104		P
Magnesium	ug/L	75-125	9070		3790		5000	106		P
Manganese	ug/L	75-125	535		29		500	101		P
Potassium	ug/L	75-125	7510		2300		5000	104		P
Silica	ug/L		57200		46800		10700	96.5	N/A	P
Sodium	ug/L	75-125	16000		10800		5000	104		P
Strontium	ug/L	75-125	604		72.7		500	106		P
Tin	ug/L	75-125	520		2.5	U	500	104		P
Vanadium	ug/L	75-125	524		3.87	J	500	104		P
Zinc	ug/L	75-125	492		3.3	U	500	98.1		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2015-2191 Client ID: CASA-15-102649S
 Contract: ESHL00114 Level: Low
 Matrix: WATER % Solids:
 Sample ID: 379641011 Spike ID: 1203378365

<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>
Molybdenum	ug/L	75-125	54.2		1.52		50	105		MS
Nickel	ug/L	75-125	56.2		0.52	J	50	111		MS
Selenium	ug/L	75-125	50.5		1.5	U	50	98.5		MS
Silver	ug/L	75-125	55.1		0.2	U	50	110		MS
Thallium	ug/L	75-125	52.5		0.45	U	50	105		MS
Uranium	ug/L	75-125	54.4		0.485		50	108		MS
Antimony	ug/L	75-125	54.3		1	U	50	108		MS
Arsenic	ug/L	75-125	44.6		1.7	U	50	89.1		MS
Cadmium	ug/L	75-125	52.3		0.11	U	50	105		MS
Chromium	ug/L	75-125	62.1		4.41	J	50	115		MS
Lead	ug/L	75-125	55		0.5	U	50	110		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2015-2191 Client ID: WST60-15-104263S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 380157001 Spike ID: 1203383131

<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	1.8		0.067	U	2	90		AV

*Analytical Methods:

AV EPA 245.1/245.2

Metals
-6-
Duplicate Sample Summary

SDG No.: 2015-2191

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-15-102649D

Matrix: WATER

Level: Low

Sample ID: 379641011

Duplicate ID: 1203378335

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		68 U		68 U				P
Barium	ug/L	+/-5	11.6		11.5		1		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	17.6 J		17.5 J		1.02		P
Calcium	ug/L	+/-20%	17400		17600		1.14		P
Cobalt	ug/L		1 U		1 U				P
Copper	ug/L		3 U		3 U				P
Iron	ug/L		30 U		30 U				P
Magnesium	ug/L	+/-20%	3790		3830		1.07		P
Manganese	ug/L	+/-10	29		29.1		.0379		P
Potassium	ug/L	+/-20%	2300		2320		.898		P
Silica	ug/L	+/-20%	46800		46900		.237		P
Sodium	ug/L	+/-20%	10800		10800		.232		P
Strontium	ug/L	+/-20%	72.7		72.4		.405		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	3.87 J		3.79 J		2.28		P
Zinc	ug/L		3.3 U		3.3 U				P

*Analytical Methods:

P SW846 3005A/6010C

Metals
-6-
Duplicate Sample Summary

SDG No.: 2015-2191

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-15-102649D

Matrix: WATER

Level: Low

Sample ID: 379641011

Duplicate ID: 1203378364

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		1.7 U		1.7 U				MS
Cadmium	ug/L		0.11 U		0.11 U				MS
Chromium	ug/L	+/-10	4.41 J		2.31 J		62.3		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	1.52		1.51		.992		MS
Nickel	ug/L	+/-2	0.52 J		0.559 J		7.23		MS
Selenium	ug/L		1.5 U		1.5 U				MS
Silver	ug/L		0.2 U		0.2 U				MS
Thallium	ug/L		0.45 U		0.45 U				MS
Uranium	ug/L	+/- .2	0.485		0.483		.413		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
-6-
Duplicate Sample Summary

SDG No.: 2015-2191

Lab Code: GEL

Contract: ESHL00114

Client ID: WST60-15-104263D

Matrix: WATER

Level: Low

Sample ID: 380157001

Duplicate ID: 1203383129

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. 2015-2191

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>
1203378334	Aluminum	ug/L	5000	4990		99.7	80-120	P
	Barium	ug/L	500	507		101	80-120	P
	Beryllium	ug/L	500	506		101	80-120	P
	Boron	ug/L	500	518		104	80-120	P
	Calcium	ug/L	5000	5020		100	80-120	P
	Cobalt	ug/L	500	501		100	80-120	P
	Copper	ug/L	500	518		104	80-120	P
	Iron	ug/L	5000	5170		103	80-120	P
	Magnesium	ug/L	5000	5210		104	80-120	P
	Manganese	ug/L	500	498		99.6	80-120	P
	Potassium	ug/L	5000	5140		103	80-120	P
	Silica	ug/L	10700	10400		97	80-120	P
	Sodium	ug/L	5000	5490		110	80-120	P
	Strontium	ug/L	500	537		107	80-120	P
	Tin	ug/L	500	510		102	80-120	P
	Vanadium	ug/L	500	515		103	80-120	P
	Zinc	ug/L	500	489		97.9	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

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Laboratory Control Sample Summary

SDG NO. 2015-2191

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>
1203378363								
	Antimony	ug/L	50	53.2		106	80-120	MS
	Arsenic	ug/L	50	49.9		99.7	80-120	MS
	Cadmium	ug/L	50	53.1		106	80-120	MS
	Chromium	ug/L	50	56		112	80-120	MS
	Lead	ug/L	50	53.5		107	80-120	MS
	Molybdenum	ug/L	50	52.6		105	80-120	MS
	Nickel	ug/L	50	52		104	80-120	MS
	Selenium	ug/L	50	52.5		105	80-120	MS
	Silver	ug/L	50	54.7		109	80-120	MS
	Thallium	ug/L	50	50.6		101	80-120	MS
	Uranium	ug/L	50	51.5		103	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Laboratory Control Sample Summary

SDG NO. 2015-2191

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>
1203383127	Mercury	ug/L	2	1.96		97.9	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

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Serial Dilution Sample Summary

SDG NO. 2015-2191 Client ID: CASA-15-102649L

Contract: ESHL00114

Matrix: LIQUID Level: Low

Sample ID: 379641011 Serial Dilution ID: 1203378337

<u>Analyte</u>	<u>Initial Value</u> ug/L	<u>C</u>	<u>Serial Value</u> ug/L	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Aluminum	68	U	340	U				P
Barium	11.6		11.4	J	1.93			P
Beryllium	1	U	5	U				P
Boron	17.6	J	75	U	100			P
Calcium	17400		17300		.773		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	3790		3680		2.93			P
Manganese	29		29	J	.265			P
Potassium	2300		2400		4.69			P
Silica	46800		46200		1.37		10	P
Sodium	10800		10100		6.14		10	P
Strontium	72.7		70.4		3.17		10	P
Tin	2.5	U	12.5	U				P
Vanadium	3.87	J	5	U	100			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. 2015-2191 Client ID: CASA-15-102649L

Contract: ESHL00114

Matrix: LIQUID Level: Low

Sample ID: 379641011 Serial Dilution ID: 1203378366

<u>Analyte</u>	<u>Initial Value</u> ug/L	<u>C</u>	<u>Serial Value</u> ug/L	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Antimony	1	U	5	U				MS
Arsenic	1.7	U	8.5	U				MS
Cadmium	.11	U	.55	U				MS
Chromium	4.41	J	10	U	100			MS
Lead	.5	U	2.5	U				MS
Molybdenum	1.52		1.22	J	19.7			MS
Nickel	.52	J	2.5	U	100			MS
Selenium	1.5	U	7.5	U				MS
Silver	.2	U	1	U				MS
Thallium	.45	U	2.25	U				MS
Uranium	.485		.525	J	8.25			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Serial Dilution Sample Summary

SDG NO. 2015-2191 Client ID: WST60-15-104263L

Contract: ESHL00114

Matrix: LIQUID Level: Low

Sample ID: 380157001 Serial Dilution ID: 1203383133

<u>Analyte</u>	<u>Initial Value</u> ug/L	<u>C</u>	<u>Serial Value</u> ug/L	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
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 #: 2015-2191
Work Order #: 379642**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1502561

Method: SW 9060 Total Organic Carbon

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9060:

Sample ID	Client ID
379642001	CASA-15-102640
1203380008	Method Blank (MB)
1203380009	Laboratory Control Sample (LCS)
1203380010	379642001(CASA-15-102640) Sample Duplicate (DUP)
1203380011	379726018(CAMO-15-102557) Sample Duplicate (DUP)
1203380012	379642001(CASA-15-102640) Post Spike (PS)
1203380013	379726018(CAMO-15-102557) 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# 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 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

Samples 379642001 (CASA-15-102640) and 379726018 (CAMO-15-102557) 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.

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

A 15 mg/L Total Inorganic Carbon check standard is analyzed with each analytical run to prove that the instrument is effectively sparging away the inorganic carbon.

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: 1502152 **Method:** WSP-CN(T)
Prep Batch : 1502151 **Method:** EPA 335.4

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 335.4:

Sample ID	Client ID
379642001	CASA-15-102640
1203378798	Method Blank (MB)
1203378799	Laboratory Control Sample (LCS)
1203378800	379487001(CAMO-15-102572) Sample Duplicate (DUP)
1203378803	379487001(CAMO-15-102572) 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# 17.

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 379487001 (CAMO-15-102572) 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.

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

Samples 1203378798 (MB), 1203378799 (LCS), 1203378800 (Non SDG 379487001DUP), 1203378803 (Non SDG 379487001MS) and 379642001 (CASA-15-102640) were re-analyzed due to instrument failure. The results from the reanalysis are reported.

Miscellaneous Information

Data Exception (DER) Documentation

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

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: 1502071 **Method:** EPA 300.0 Anions Liquid 28 day

Sample Analysis

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

Sample ID	Client ID
379642002	CASA-15-102654
1203378601	Method Blank (MB)
1203378602	Laboratory Control Sample (LCS)
1203378603	379642002(CASA-15-102654) Sample Duplicate (DUP)
1203378604	379642002(CASA-15-102654) 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# 24.

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 379642002 (CASA-15-102654) was selected for QC analysis.

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

The spike recovery falls outside of the GEL acceptance limits but within the client specified limits. 1203378604 (CASA-15-102654PS).

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 1203378603 (CASA-15-102654DUP), 1203378604 (CASA-15-102654PS) and 379642002 (CASA-15-102654) 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: 1502507 **Method:** NH3
Prep Batch : 1502506 **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
379642002	CASA-15-102654
1203379796	Method Blank (MB)
1203379797	Laboratory Control Sample (LCS)
1203379798	379726005(CAMO-15-102600) Sample Duplicate (DUP)
1203379799	379726005(CAMO-15-102600) 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+ 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

Sample 379726005 (CAMO-15-102600) was selected for QC analysis.

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

The matrix spike recovered outside of the established acceptance limits due to matrix interference.

Analyte	Sample	Value
Nitrogen, Ammonia	1203379799 (Non SDG 379726005MS)	111* (90%-110%)

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

A data exception report (DER) 1441718 was generated for sample 1203379799 (Non SDG 379726005MS) in this SDG/batch.

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Total Kjeldahl Nitrogen		
Analytical Batch:	1501128	Method:	TKN
Prep Batch :	1501127	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
379642001	CASA-15-102640
1203376183	Method Blank (MB)
1203376184	Laboratory Control Sample (LCS)
1203376185	379487001(CAMO-15-102572) Sample Duplicate (DUP)
1203376187	379487001(CAMO-15-102572) 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+ 8500 Series.

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

Sample 379487001 (CAMO-15-102572) was selected for QC analysis.

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

The matrix spike recovered outside of the established acceptance limits due to matrix interference.

Analyte	Sample	Value
Nitrogen, Total Kjeldahl	1203376187 (Non SDG 379487001MS)	81.3* (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

Samples 1203376183 (MB) and 1203376184 (LCS) were re-analyzed due to instrument failure. The results from the reanalysis are reported.

Miscellaneous Information

Data Exception (DER) Documentation

A data exception report (DER) 1442298 was generated for sample 1203376187 (Non SDG 379487001MS) 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: 1502318 **Method:** NO3NO2

Sample Analysis

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

Sample ID	Client ID
379642002	CASA-15-102654
1203379261	Method Blank (MB)
1203379262	Laboratory Control Sample (LCS)
1203379265	379642002(CASA-15-102654) Sample Duplicate (DUP)
1203379269	379642002(CASA-15-102654) 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.

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

Sample 379642002 (CASA-15-102654) 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.

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 were diluted because target analyte concentrations exceeded the calibration range. 1203379265 (CASA-15-102654DUP), 1203379269 (CASA-15-102654PS) and 379642002 (CASA-15-102654).

Analyte	379642
	002
Nitrogen, Nitrate/Nitrite	5X

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:	1501776	Method:	EPA 365.4 Phosphorus, Total in
Prep Batch :	1501774	Method:	EPA 365.4 Prep

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 365.4:

Sample ID	Client ID
379642002	CASA-15-102654
1203377849	Method Blank (MB)
1203377850	Laboratory Control Sample (LCS)
1203377851	379487002(CAMO-15-102596) Sample Duplicate (DUP)
1203377852	379487002(CAMO-15-102596) 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+ 8500 Series.

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 379487002 (CAMO-15-102596) 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.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

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

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Solids and Total Dissolved
Analytical Batch: 1502146 **Method:** TDS

Sample Analysis

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

Sample ID	Client ID
379642002	CASA-15-102654
1203378783	Method Blank (MB)
1203378785	Laboratory Control Sample (LCS)
1203378786	379642002(CASA-15-102654) 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.

Quality Control (QC) Designation

Sample 379642002 (CASA-15-102654) 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.

Sample Aliquot

A sufficient amount of sample was provided by the client for 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: 1504613 **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
379642002	CASA-15-102654
1203385406	Laboratory Control Sample (LCS)
1203385407	379861006(CASA-15-102655) 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# 11.

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 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 379861006 (CASA-15-102655) 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: 1503693 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
379642002	CASA-15-102654
1203382926	Laboratory Control Sample (LCS)
1203382930	379487002(CAMO-15-102596) 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# 21.

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 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 379487002 (CAMO-15-102596) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

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

Sample	Analyte	Value
1203382930 (Non SDG 379487002DUP)		Received 18-AUG-15, out of holding 14-AUG-15
379642002 (CASA-15-102654)		Received 20-AUG-15, out of holding 18-AUG-15

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) 1443859 was generated for samples 379642002 (CASA-15-102654) and 1203382930 (Non SDG 379487002DUP) 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: 1503701 **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
379642002	CASA-15-102654
1203382942	Method Blank (MB)
1203382943	Laboratory Control Sample (LCS)
1203383925	379728002(CASA-15-102653) Sample Duplicate (DUP)
1203383926	379728002(CASA-15-102653) 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# 11.

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 Standardization

The titrant was properly standardized

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 379728002 (CASA-15-102653) was selected for QC analysis.

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

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

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:

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Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2015-2191 GEL Work Order: 379642

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, 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: Thomas Lewis

Date: 16 SEP 2015

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 16, 2015

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: 2015-2191

Client Sample ID: CASA-15-102640
 Sample ID: 379642001
 Matrix: W
 Collect Date: 18-AUG-15 10:38
 Receive Date: 20-AUG-15
 Collector: Client

Project: ESHL00114
 Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis											
SW 9060 Total Organic Carbon "As Received"											
Total Organic Carbon Average		1.21	0.330	1.00	mg/L	1	TSM	08/26/15	1317	1502561	1
Flow Injection Analysis											
WSP-CN(T) "As Received"											
Cyanide, Total	U	ND	1.67	5.00	ug/L	1	AXH3	08/27/15	1242	1502152	2
Nutrient Analysis											
TKN "As Received"											
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1	KLP1	08/25/15	1401	1501128	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	08/27/15	0900	1502151
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	08/24/15	2000	1501127

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9060	
2	EPA 335.4	
3	EPA 351.2	

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 16, 2015

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: 2015-2191

Client Sample ID: CASA-15-102654
Sample ID: 379642002
Matrix: W
Collect Date: 18-AUG-15 10:38
Receive Date: 20-AUG-15
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 300.0 Anions Liquid 28 day "As Received"											
Bromide	U	ND	0.067	0.200	mg/L	1	RXB5	08/20/15	2101	1502071	1
Chloride		4.66	0.067	0.200	mg/L	1					
Fluoride		0.278	0.033	0.100	mg/L	1					
Sulfate		5.87	0.133	0.400	mg/L	1					
Nutrient Analysis											
EPA 365.4 Phosphorus, Total in "As Received"											
Phosphorus, Total as P	U	ND	0.017	0.050	mg/L	1	KLP1	08/24/15	1518	1501776	2
NH3 "As Received"											
Nitrogen, Ammonia		0.110	0.017	0.050	mg/L	1	KLP1	08/24/15	1301	1502507	3
NO3NO2 "As Received"											
Nitrogen, Nitrate/Nitrite		2.28	0.085	0.250	mg/L	5	AXH3	08/26/15	0948	1502318	4
Solids Analysis											
TDS "As Received"											
Total Dissolved Solids		170	3.40	14.3	mg/L		MXB3	08/21/15	1323	1502146	5
Titration and Ion Analysis											
EPA 310.1 Total Alkalinity "As Received"											
Alkalinity, Total as CaCO3		77.3	0.725	1.00	mg/L		AMB	08/29/15	1347	1503701	6
Carbonate alkalinity (CaCO3)		4.15	0.725	1.00	mg/L						
EPA120.1 Specific Conductivity "As Received"											
Conductivity		196	1.00	1.00	umhos/cm	1	AMB	09/02/15	1558	1504613	7
PH "As Received"											
pH at Temp 21.5C	H	8.43	0.010	0.100	SU	1	AMB	08/29/15	1632	1503693	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	KLP1	08/24/15	1157	1502506
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	08/24/15	1430	1501774

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 16, 2015

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: 2015-2191

Client Sample ID: CASA-15-102654
Sample ID: 379642002

Project: ESHL00114
Client ID: ARSL004

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 300.0	
2	EPA 365.4	
3	EPA 350.1	
4	EPA 353.2	
5	EPA 160.1	
6	EPA 310.1	
7	EPA 120.1	
8	EPA 150.1	

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: September 16, 2015

Page 1 of 5

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

Contact: Mr. Keith Greene

Workorder: 379642

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1502561										
QC1203380010	379642001	DUP									
Total Organic Carbon Average		1.21		1.22	mg/L	0.578	^	(+/-1.00)	TSM	08/26/15	13:59
QC1203380011	379726018	DUP									
Total Organic Carbon Average	J	0.474	J	0.450	mg/L	5.19	^	(+/-1.00)		08/26/15	17:56
QC1203380009	LCS										
Total Organic Carbon Average	10.0			9.94	mg/L			(85%-115%)		08/26/15	12:22
QC1203380008	MB										
Total Organic Carbon Average			U	ND	mg/L					08/26/15	12:08
QC1203380012	379642001	PS									
Total Organic Carbon Average	10.0	1.21		10.9	mg/L			(65%-120%)		08/26/15	14:42
QC1203380013	379726018	PS									
Total Organic Carbon Average	10.0	J	0.474	10.5	mg/L			(65%-120%)		08/26/15	18:37
Flow Injection Analysis											
Batch	1502152										
QC1203378800	379487001	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	08/27/15	12:39
QC1203378799	LCS										
Cyanide, Total	50.0			51.9	ug/L			(90%-110%)		08/27/15	12:11
QC1203378798	MB										
Cyanide, Total			U	ND	ug/L					08/27/15	12:11
QC1203378803	379487001	MS									
Cyanide, Total	100	U	ND	106	ug/L			(90%-110%)		08/27/15	12:45
Ion Chromatography											
Batch	1502071										
QC1203378603	379642002	DUP									
Bromide		U	ND	J	0.0684	mg/L	200		RXB5	08/20/15	21:32
Chloride			4.66	4.68	mg/L	0.383		(0%-20%)			
Fluoride			0.278	0.278	mg/L	0.144	^	(+/-0.100)			
Sulfate			5.87	5.85	mg/L	0.218		(0%-20%)			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch 1502071											
QC1203378602 LCS											
Bromide	1.25			1.24	mg/L		99.2	(90%-110%)	RXB5	08/20/15	20:00
Chloride	5.00			4.76	mg/L		95.3	(90%-110%)			
Fluoride	2.50			2.46	mg/L		98.4	(90%-110%)			
Sulfate	10.0			9.67	mg/L		96.7	(90%-110%)			
QC1203378601 MB											
Bromide			U	ND	mg/L					08/20/15	19:29
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203378604 379642002 PS											
Bromide	1.25	U	ND	1.37	mg/L		104	(90%-110%)		08/20/15	22:03
Chloride	5.00		4.66	10.4	mg/L		115 *	(90%-110%)			
Fluoride	2.50		0.278	2.89	mg/L		104	(90%-110%)			
Sulfate	10.0		5.87	16.7	mg/L		108	(90%-110%)			
Nutrient Analysis											
Batch 1501128											
QC1203376185 379487001 DUP											
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A		KLP1	08/25/15	13:49
QC1203376184 LCS											
Nitrogen, Total Kjeldahl	1.00			0.990	mg/L		99	(90%-110%)		08/25/15	13:36
QC1203376183 MB											
Nitrogen, Total Kjeldahl			U	ND	mg/L					08/25/15	13:35
QC1203376187 379487001 MS											
Nitrogen, Total Kjeldahl	1.00	U	ND	0.813	mg/L		81.3 *	(90%-110%)		08/25/15	13:50
Batch 1501776											
QC1203377851 379487002 DUP											
Phosphorus, Total as P		J	0.0424	J	0.0375	mg/L	12.3 ^	(+/-0.050)	KLP1	08/24/15	14:54
QC1203377850 LCS											

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1501776										
Phosphorus, Total as P	1.00			1.06	mg/L		106	(83%-123%)		08/24/15	14:51
QC1203377849	MB										
Phosphorus, Total as P			U	ND	mg/L				KLP1	08/24/15	14:50
QC1203377852	379487002	MS									
Phosphorus, Total as P	1.00	J	0.0424	1.09	mg/L		105	(59%-141%)		08/24/15	14:55
Batch	1502318										
QC1203379265	379642002	DUP									
Nitrogen, Nitrate/Nitrite			2.28	2.28	mg/L	0		(0%-20%)	AXH3	08/26/15	09:49
QC1203379262	LCS										
Nitrogen, Nitrate/Nitrite	1.00			1.07	mg/L		107	(90%-110%)		08/26/15	09:30
QC1203379261	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					08/26/15	09:24
QC1203379269	379642002	PS									
Nitrogen, Nitrate/Nitrite	1.00		0.456	1.51	mg/L		105	(90%-110%)		08/26/15	09:50
Batch	1502507										
QC1203379798	379726005	DUP									
Nitrogen, Ammonia			0.0633	J	0.0281	mg/L	77 ^	(+/-0.050)	KLP1	08/24/15	13:17
QC1203379797	LCS										
Nitrogen, Ammonia	1.00			1.06	mg/L		106	(90%-110%)		08/24/15	12:59
QC1203379796	MB										
Nitrogen, Ammonia			J	0.0207	mg/L					08/24/15	12:58
QC1203379799	379726005	MS									
Nitrogen, Ammonia	1.00		0.0633	1.17	mg/L		111 *	(90%-110%)		08/24/15	13:18
Solids Analysis											
Batch	1502146										
QC1203378786	379642002	DUP									
Total Dissolved Solids			170	170	mg/L	0		(0%-5%)	MXB3	08/21/15	13:23
QC1203378785	LCS										
Total Dissolved Solids	300			300	mg/L		100	(95%-105%)		08/21/15	13:23
QC1203378783	MB										
Total Dissolved Solids			U	ND	mg/L					08/21/15	13:23
Titration and Ion Analysis											
Batch	1503693										

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1503693										
QC1203382930	379487002	DUP									
pH	H	8.42	H	8.44	SU	0.237		(0%-5%)	AMB	08/29/15	16:07
QC1203382926	LCS										
pH	7.00			7.04	SU		101	(99%-101%)		08/29/15	15:57
Batch	1503701										
QC1203383925	379728002	DUP									
Alkalinity, Total as CaCO3		42.0		41.5	mg/L	1.24		(0%-20%)	AMB	08/29/15	15:06
Carbonate alkalinity (CaCO3)	U	ND	U	ND	mg/L	N/A					
QC1203382943	LCS										
Alkalinity, Total as CaCO3	50.0			52.4	mg/L		105	(90%-110%)		08/29/15	13:14
QC1203382942	MB										
Alkalinity, Total as CaCO3			U	ND	mg/L					08/29/15	13:12
Carbonate alkalinity (CaCO3)			U	ND	mg/L						
QC1203383926	379728002	MS									
Alkalinity, Total as CaCO3	50.0	42.0		94.4	mg/L		105	(80%-120%)		08/29/15	15:08
Batch	1504613										
QC1203385407	379861006	DUP									
Conductivity		443		443	umhos/cm	0		(0%-10%)	AMB	09/02/15	16:05
QC1203385406	LCS										
Conductivity	1410			1420	umhos/cm		101	(95%-105%)		09/02/15	15:44

- 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

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Q											
Q											
R											
R											
U											
X											
Z											
^											
d											
e											
h											

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. 24-AUG-15	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: LACHAT Flow Injection Analyzer	Test / Method: EPA 350.1, EPA 350.1 SC	Matrix Type: Liquid	Client Code: ESHL
Batch ID: 1502507	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 379641(2015-2192),379642(2015-2191),379726(2015-2208),379728(2015-2207)			
Application Issues: Failed Recovery for MS/MSD, or PS/PSD			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. Failed Recovery for MS/MSD, or PS/PSD: QC 1203379799MS</p>		<p>1. The matrix spike recovered outside of the established acceptance limits due to matrix interference. Nitrogen, Ammonia 1203379799 (CAMO-15-102600MS) [111* (90%-110%)].</p>	

Originator's Name:
Kristen Mizzell 24-AUG-15

Data Validator/Group Leader:
Aubrey Kingsbury 24-AUG-15

DATA EXCEPTION REPORT

Mo.Day Yr. 25-AUG-15	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: 1501128	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 379487(2015-2166),379608(2015-2185),379641(2015-2192),379642(2015-2191)			
Application Issues: Failed Recovery for MS/MSD, or PS/PSD			
Specification and Requirements Exception Description:		DER Disposition:	
<p>1. Failed Recovery for MS/MSD, or PS/PSD:</p> <p>QC 1203376187MS</p>		<p>1. The matrix spike recovered outside of the established acceptance limits due to matrix interference. Nitrogen, Total Kjeldahl 1203376187 (CAMO-15-102572MS) [81.3* (90%-110%)].</p>	

Originator's Name:

Kristen Mizzell 25-AUG-15

Data Validator/Group Leader:

Aubrey Kingsbury 25-AUG-15

DATA EXCEPTION REPORT

Mo.Day Yr. 29-AUG-15	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ELECTRODE	Test / Method: EPA 150.1, SM 4500-H B, SW846 9040C	Matrix Type: Liquid	Client Code: ENRG, ESHL, HNLK, UCOR
Batch ID: 1503693	Sample Numbers: See Below		

Potentially affected work order(s)(SDG): 379487(2015-2166),379490(2015-2168),379502,379641(2015-2192),379642(2015-2191),379728(2015-2207),379759,379914,380157(2015-2266),380164(2015-2269)

Application Issues:

Container scanning event for custody missed
Sample received out of holding

Specification and Requirements Exception Description:	DER Disposition:
<p>1. Sample received out of holding:</p> <p>379487 002,007</p> <p>379490 001</p> <p>379502 004,007,010</p> <p>379641 011</p> <p>379642 002</p> <p>379728 002</p> <p>379759 001</p> <p>379914 001</p> <p>380157 001</p> <p>380164 001</p> <p>QC 1203382927DUP,1203382930DUP, 1203383945DUP</p> <p>2.Container scanning event for custody missed : 379759001</p>	<p>1. Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified. 1203382927 (EMWSW5250DUP) [See applicable report]. 1203382930 (CAMO-15-102596DUP) [See applicable report]. 1203383945 (MEBOT0100DUP) [See applicable report]. 379487002 (CAMO-15-102596) [See applicable report]. 379487007 (CAMO-15-102602) [See applicable report]. 379490001 (Urban-15-102336) [See applicable report]. 379502004 (EMWSW5250) [See applicable report]. 379502007 (EMWSW5256) [See applicable report]. 379502010 (EMWSW5261) [See applicable report]. 379641011 (CASA-15-102649) [See applicable report]. 379642002 (CASA-15-102654) [See applicable report]. 379728002 (CASA-15-102653) [See applicable report]. 379759001 (MEBOT0100) [See applicable report]. 379914001 (Weir at Water Front Drive) [See applicable report]. 380157001 (WST60-15-104263) [See applicable report]. 380164001 (WST16-15-104269) [See applicable report].</p> <p>2.The analyst did not scan samples into his/her custody. The analyst had physical custody of the sample during the analysis.</p>

Originator's Name:

Alyson Boltz 29-AUG-15

Data Validator/Group Leader:

Elzbieta Szulc 01-SEP-15