

The order of this data package is as follows:

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

Comments:



## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11097

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

SAMPLE ID: CASA-17-129327

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	02/14/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1235		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-36		FIELD PREP:	F	
LOCATION TYPE:	OK		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

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

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

COLLECTED BY (PRINT):

RELINQUISHED BY (Printed Name) (Signature)	Date/Time 2/14/17 1315	RECEIVED BY (Printed Name) (Signature)	Date/Time 2/14/17 1:15
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 01/18/2017



## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11097

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

SAMPLE ID: CASA-17-129333

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	02/17/2017	ok	FIELD MATRIX:	WG	ok
TIME COLLECTED (HH:MM):	1235		MEDIA:	UA	
PRS ID:	ok		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-36		FIELD PREP:	UF	
LOCATION TYPE:	ok		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

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

## SAMPLE COMMENTS:

## LOCATION COMMENTS:

## FIELD PARAMETERS:

Dissolved Oxygen 5.56 mg/L      Flow (in gpm) 03.33 GPM      Oxidation-Reduction Potential 180.3 mV  
 pH 7.43 SU      Specific Conductance 191.3 uS/cm      Temperature 20.0 deg C  
 Turbidity 0.76 NTU

## COLLECTED BY (PRINT):

RELINQUISHED BY (Printed Name) (Signature)	Date/Time 2/14/17 1315	RECEIVED BY (Printed Name) (Signature)	Date/Time 2/14/17 1:15
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 01/18/2017

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11097

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

SAMPLE ID: CASA-17-129661

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	02/14/2017	ok	FIELD MATRIX:	WG	ok
TIME COLLECTED (HH:MM):	1055		MEDIA:	UA	
PRS ID:	ok		SAMPLE TECH CODE:	ok	RSP
LOCATION ID:	SCI-2		FIELD PREP:	F	ok
LOCATION TYPE:	ok		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

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

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

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

COLLECTED BY (PRINT):

RELINQUISHED BY (Printed Name) (Signature)	Date/Time 2/14/17 1315	RECEIVED BY (Printed Name) (Signature)	Date/Time 2/14/17 1:15
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 01/18/2017



## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11097

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

SAMPLE ID: CASA-17-129662

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	02/14/2017	ok	FIELD MATRIX:	WG	ok
TIME COLLECTED (HH:MM):	1055		MEDIA:	UA	
PRS ID:	ok		SAMPLE TECH CODE:	RSP	
LOCATION ID:	SCI-2		FIELD PREP:	UF	
LOCATION TYPE:	ok		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / <u>NO</u> / NA

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

SAMPLE COMMENTS:

NA

LOCATION COMMENTS:

NA

FIELD PARAMETERS:

Dissolved Oxygen	8.01	mg/L	Flow (in gpm)	0.98	GPM	Oxidation-Reduction Potential	188.4	mV
pH	7.06	SU	Specific Conductance	616	uS/cm	Temperature	13.6	deg C
Turbidity	3.5	NTU						

COLLECTED BY (PRINT):

J. Toshi + J. V. 1

RELINQUISHED BY (Printed Name) (Signature)	<i>Andrew Stoker</i> <i>Andrew Stoker</i>	Date/Time 2/14/17 1315	RECEIVED BY (Printed Name) (Signature)	<i>K. Greene</i> <i>[Signature]</i>	Date/Time 2/14/17 1:15
RELINQUISHED BY (Printed Name) (Signature)		Date/Time	RECEIVED BY (Printed Name) (Signature)		Date/Time

Report Date: 01/18/2017

## DATA VALIDATION REPORT

Chain Of Custody No. 2017-1017

### 1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
416771	EPA:120.1	2				
416771	EPA:150.1	2				
416771	EPA:160.1	2				
416771	EPA:245.2	4				
416771	EPA:300.0	2				
416771	EPA:310.1	2				
416771	EPA:335.4	2				
416771	EPA:350.1	2				
416771	EPA:351.2	2				
416771	EPA:353.2	2				
416771	EPA:365.4	2				
416771	SM:A2340B	2				
416771	SW-846:6010C	2				
416771	SW-846:6020	2				
416771	SW-846:6850	2				
416771	SW-846:9060	2				

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
416771	EPA:120.1	1640753	1640753	2										1				2			
416771	EPA:150.1	1641364	1641364	2										1				1			
416771	EPA:160.1	1640261	1640261	2					1					1				1			
416771	EPA:245.2	1643872	1643869	4					1	1				1				1			
416771	EPA:300.0	1640559	1640559	2					1					1				1			
416771	EPA:310.1	1641366	1641366	2						1				1				1			
416771	EPA:335.4	1640007	1640006	2					1	1				1				1			
416771	EPA:350.1	1640304	1640302	2					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
416771	EPA:351.2	1639245	1639244	2					1	2				1			2				
416771	EPA:353.2	1641424	1641424	2					1					1			2				
416771	EPA:365.4	1639607	1639606	2					1	1				1			1				
416771	SM:A2340B	1647164	1647164	2																	
416771	SW-846:6010C	1640064	1640063	2					1	1				1			1				
416771	SW-846:6020	1640178	1640177	2					1	1				1			1				
416771	SW-846:6850	1643139	1643138	2					1	1	1			1							
416771	SW-846:9060	1639822	1639822	2					1					1			1				

### 2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-129294	1203731715	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-129302	1203731716	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-17-129327	416771001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-17-129661	416771003	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203731714	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CASA-17-129327	1203733169	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-17-129327	416771001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-17-129661	416771003	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203733168	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CASA-17-129327	1203730489	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-17-129327	416771001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-17-129661	416771003	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203730486	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203730485	MB	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-129327	1203738957	DUP	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-129327	1203738958	MS	0	0	1	0
EPA:245.2	INORGANIC	CASA-17-129327	416771001	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-129333	416771002	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-129661	416771003	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-129662	416771004	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203738956	LCS	0	0	1	0



# DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:245.2	INORGANIC	MB	1203738955	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-17-129354	1203731282	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-129327	416771001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-129661	416771003	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203731281	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203731280	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-129327	1203733171	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-129327	1203733172	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-129327	416771001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-129661	416771003	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203733170	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-129355	1203729876	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-129355	1203729877	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-129333	416771002	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-129662	416771004	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203729875	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203729874	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-129327	1203730605	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-129327	1203730606	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-129327	416771001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-129661	416771003	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203730604	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203730603	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129324	1203728877	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129324	1203728878	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129331	1203728044	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129331	1203728045	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129333	416771002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-129662	416771004	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203728043	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203728042	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-129323	1203733272	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-129325	1203733271	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-129327	416771001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-129661	416771003	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203733270	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203733269	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-129294	1203728893	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-129294	1203728894	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-129327	416771001	REG	1	0	0	0



## DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:365.4	GENERAL CHEMISTRY	CASA-17-129661	416771003	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203728890	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203728889	MB	1	0	0	0
SM:A2340B	INORGANIC	CASA-17-129327	416771001	REG	1	0	0	0
SM:A2340B	INORGANIC	CASA-17-129661	416771003	REG	1	0	0	0
SW-846:6010C	INORGANIC	CASA-17-129327	1203729960	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CASA-17-129327	1203729961	MS	0	0	17	0
SW-846:6010C	INORGANIC	CASA-17-129327	416771001	REG	17	0	0	0
SW-846:6010C	INORGANIC	CASA-17-129661	416771003	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203729959	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203729958	MB	17	0	0	0
SW-846:6020	INORGANIC	CASA-17-129327	416771001	REG	11	0	0	0
SW-846:6020	INORGANIC	CASA-17-129661	416771003	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203730267	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203730266	MB	11	0	0	0
SW-846:6020	INORGANIC	WST54-17-130534	1203730268	DUP	11	0	0	0
SW-846:6020	INORGANIC	WST54-17-130534	1203730269	MS	0	0	11	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-129294	1203737091	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-129294	1203737092	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-129327	416771001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-129661	416771003	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203737090	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203737089	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-129311	1203731502	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-17-129333	416771002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-17-129662	416771004	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203731501	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203731500	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?



## DATA VALIDATION REPORT

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	1203730266	METHOD BLANK	SW-846.6020	W	Uranium	0.166	U	ug/L	0.200

Field Sample ID	Blank Lab	Blank Type	Analytical Method	Parameter Name	Blank Lab Result	Blank Lab Units	Lab Result	Lab Qualifier	Lab Detection Limit	Detect Flag	Detect to Nondetect Factor	Detect to Estimated Factor	Use Factors
CASA-17-129327	1203730266	METHOD BLANK	SW-846.6020	Uranium	0.166	ug/L	0.294		0.200	Y	5	100	Y
CASA-17-129661	1203730266	METHOD BLANK	SW-846.6020	Uranium	0.166	ug/L	1.96		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
CASA-17-129331	1203728045		EPA.351.2	Total Kjeldahl Nitrogen	1639244	02-28-2017	W	80		110	90	10		
WST54-17-130534	1203730269		SW-846.6020	Antimony	1640177	02-21-2017	W	7.36		125	75	10		
WST54-17-130534	1203730269		SW-846.6020	Arsenic	1640177	02-21-2017	W	65.4		125	75	10		
WST54-17-130534	1203730269		SW-846.6020	Chromium	1640177	02-21-2017	W	263		125	75	10		
WST54-17-130534	1203730269		SW-846.6020	Lead	1640177	02-21-2017	W	281		125	75	10		
WST54-17-130534	1203730269		SW-846.6020	Nickel	1640177	02-21-2017	W	224		125	75	10		

## DATA VALIDATION REPORT

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
WST54-17-130534	1203730269		SW-846.6020	Selenium	1640177	02-21-2017	W	50.9		125	75	10		
WST54-17-130534	1203730269		SW-846.6020	Thallium	1640177	02-21-2017	W	49.3		125	75	10		

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

No.

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

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-36	2017-1017	CASA-17-129327	REG	INIT	INORGANIC	SW-846.6020	Uranium	U	4	N	0.294	ug/L	0.294	ug/L				W	02/14/2017		1640178	VAL	Y
SCI-2	2017-1017	CASA-17-129661	REG	INIT	INORGANIC	SW-846.6020	Uranium	J	4a	Y	1.96	ug/L	1.96	ug/L				W	02/14/2017		1640178	VAL	Y



## DATA VALIDATION REPORT

### Reason Code

### Description

I4	the sample result is $\leq 5 \times$ 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 $> 5 \times$
J_LAB	The analytical laboratory qualified the detected result as estimated (J) because the result was less the PQL but greater than the MDL
NQ	The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualifire. The analyte is detected in the sample.
U_LAB	The analytical laboratory qualified the analyte as not detected.

### 14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-17-129327	R-36	REG	EPA:120.1	0	1
CASA-17-129327	R-36	REG	EPA:150.1	0	1
CASA-17-129327	R-36	REG	EPA:160.1	0	1
CASA-17-129327	R-36	REG	EPA:245.2	0	1
CASA-17-129327	R-36	REG	EPA:300.0	0	4
CASA-17-129327	R-36	REG	EPA:310.1	0	2
CASA-17-129327	R-36	REG	EPA:350.1	0	1
CASA-17-129327	R-36	REG	EPA:353.2	0	1
CASA-17-129327	R-36	REG	EPA:365.4	0	1
CASA-17-129327	R-36	REG	SM:A2340B	0	1
CASA-17-129327	R-36	REG	SW-846:6010C	0	17
CASA-17-129327	R-36	REG	SW-846:6020	0	11
CASA-17-129327	R-36	REG	SW-846:6850	0	1
CASA-17-129333	R-36	REG	EPA:245.2	0	1
CASA-17-129333	R-36	REG	EPA:335.4	0	1
CASA-17-129333	R-36	REG	EPA:351.2	0	1
CASA-17-129333	R-36	REG	SW-846:9060	0	1
CASA-17-129661	SCI-2	REG	EPA:120.1	0	1
CASA-17-129661	SCI-2	REG	EPA:150.1	0	1
CASA-17-129661	SCI-2	REG	EPA:160.1	0	1
CASA-17-129661	SCI-2	REG	EPA:245.2	0	1
CASA-17-129661	SCI-2	REG	EPA:300.0	0	4
CASA-17-129661	SCI-2	REG	EPA:310.1	0	2
CASA-17-129661	SCI-2	REG	EPA:350.1	0	1
CASA-17-129661	SCI-2	REG	EPA:353.2	0	1

# DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-17-129661	SCI-2	REG	EPA:365.4	0	1
CASA-17-129661	SCI-2	REG	SM:A2340B	0	1
CASA-17-129661	SCI-2	REG	SW-846:6010C	0	17
CASA-17-129661	SCI-2	REG	SW-846:6020	0	11
CASA-17-129661	SCI-2	REG	SW-846:6850	0	1
CASA-17-129662	SCI-2	REG	EPA:245.2	0	1
CASA-17-129662	SCI-2	REG	EPA:335.4	0	1
CASA-17-129662	SCI-2	REG	EPA:351.2	0	1
CASA-17-129662	SCI-2	REG	SW-846:9060	0	1



March 10, 2017

[gel.com](http://gel.com)

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

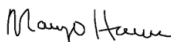
Re: LANL- WQH Water Samples  
Work Order: 416771  
SDG: 2017-1017

Dear Mr. Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on February 16, 2017, and analyzed for General Chemistry, Metals and Perchlorates by LCMSMS. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

  
Margo Herron for  
Valerie Davis  
Project Manager

Chain of Custody: 2017-1017  
Enclosures



**ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)**  
**LANL- WQH Water Samples**  
**Work Order #: 416771**  
**SDG: 2017-1017**



## Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	5
Data Review Qualifier Flag Definition Sheet.....	9
Perchlorates by LCMSMS Analysis.....	12
Case Narrative.....	13
Sample Data Summary.....	19
Quality Control Summary.....	22
Quality Control Data.....	25
Metals Analysis.....	31
Case Narrative.....	32
Sample Data Summary.....	39
Quality Control Summary.....	48
Miscellaneous.....	63
General Chem Analysis.....	66
Case Narrative.....	67
Sample Data Summary.....	97
Quality Control Summary.....	104
Miscellaneous.....	111

# Case Narrative

**Case Narrative for  
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)  
LANL- WQH Water Samples  
Workorder #: 416771  
SDG # : 2017-1017**

**March 10, 2017**

**Laboratory Identification:**

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

**Summary**

**Sample receipt** The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on February 16, 2017 for analysis. The samples were delivered with proper chain of custody documentation and signatures. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. Containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Shipping container temperature was within specification (0 - 6C). Shipping container temperatures were checked, documented, and within specifications. There are no additional comments concerning sample receipt.

**Sample Identification** The laboratory received the following samples:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
416771001	CASA-17-129327
416771002	CASA-17-129333
416771003	CASA-17-129661
416771004	CASA-17-129662

**Case Narrative**

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

**Data Package**

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

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



*Margo Herron*  
Margo Herron for  
Valerie Davis  
Project Manager

**List of current GEL Certifications as of 10 March 2017**

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

# **Chain of Custody and Supporting Documentation**







## SAMPLE RECEIPT &amp; REVIEW FORM

Client: <u>ESHL</u>		SDG/AR/COC/Work Order: <u>416771</u>	
Received By: <u>zkw</u>		Date Received: <u>2/16/17</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
COC/Samples marked as radioactive?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0 gpm</u>	
Classified Radioactive II or III by RSO?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?	
COC/Samples marked containing PCBs?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Package, COC, and/or Samples marked as beryllium or asbestos containing?	Yes <input checked="" type="checkbox"/> No <input 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?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Hazard Class Shipped: UN#:	
Samples identified as Foreign Soil?	Yes <input checked="" type="checkbox"/> No <input 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) <u>See Below For Temps</u> *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 #: <u>IR3-16</u> Secondary Temperature Device Serial # (If Applicable):
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 have headspace as required?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
7 VOA vials contain acid preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's and containers affected: <u>one vial of sample WST-130534 for BTEX only rec'd w/ headspace</u>
9 Are Encore containers present?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
11 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:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16 Carrier and tracking number.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: <input checked="" type="checkbox"/> FedEx Air <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other  <u>5908 1701 7338 - 2<sup>c</sup></u> <u>5908 1701 7349 - 3<sup>c</sup></u> <u>5908 1701 7327 - 2<sup>c</sup></u>

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: 15FEB17  
ACTWGT: 49.0 LB MAN  
CAD: 0014176/CAFE2916

LOS ALAMOS, NM 87545  
UNITED STATES US

BILL SENDER

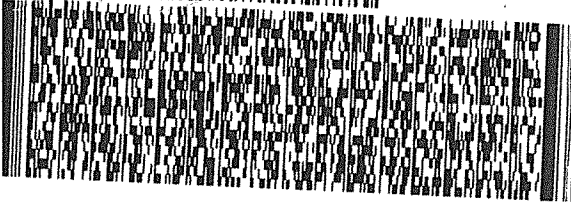
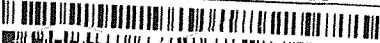
TO VALERIE DAVIS  
GENERAL ENGINEERING LAB  
2040 SAVAGE RD

2c

CHARLESTON SC 29407

(843) 656-8171

REF: 6A000ASRGW04BAGWS0



FedEx  
Express



J1513150813011V

2 of 3

VPS# 5908 1781 7338

Vistr# 5908 1781 7327

THU - 16 FEB 10:30A  
PRIORITY OVERNIGHT

0201

X7 CHSA

29407

SC-US CHS



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

SHIP DATE: 15FEB17  
ACTWGT: 47.0 LB MAN  
CAD: 0014176/CAFE2916

LOS ALAMOS, NM 87545  
UNITED STATES US

BILL SENDER

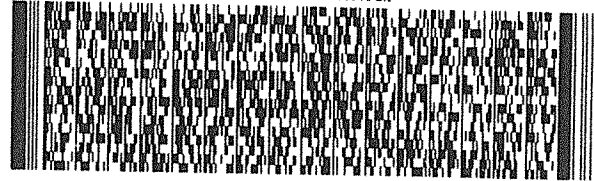
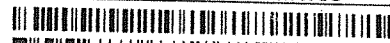
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GENERAL ENGINEERING LAB  
2040 SAVAGE RD

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CHARLESTON SC 29407

(843) 656-8171

REF: 6A000ASRGW04BAGWS0



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1 of 3

TRK# 5908 1781 7327

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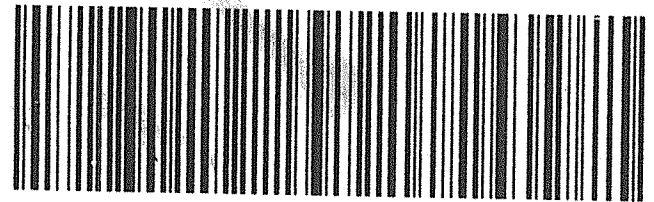
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29407

SC-US CHS

Part # 155143V-434 RIT2 03/15



538CL/33BB/329B

SHIP DATE: 15FEB17  
ACTWGT: 25.0 LB MAN  
CAD: 0014176/CAFE2916

BILL SENDER

ID:SAFA (505) 665-9966

KEITH GREENE  
LOS ALAMOS NATL LAB.  
BLDG 1237 DPU 03

LOS ALAMOS, NM 87545  
UNITED STATES US

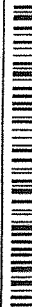
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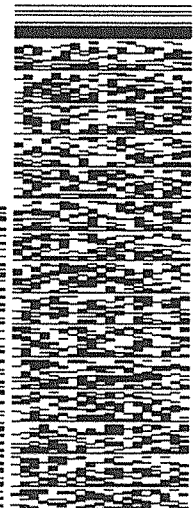
CHARLESTON SC 29407

(843) 656-8171

REF: 6A000ASRGW04BAGWS0



FedEx  
Express



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PRIORITY OVERNIGHT

3 of 3

5908 1781 7349

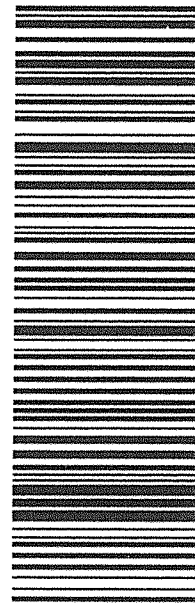
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0201

7 CHSA

29407

SC-US CHS





# **Data Review Qualifier Flag Definition Sheet**

## Data Review Qualifier Definitions

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

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

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

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



# **Perchlorates by LCMSMS Analysis**

# Case Narrative

**Perchlorates by LCMSMS  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2017-1017  
Work Order #: 416771**

**Method/Analysis Information**

**Procedure:** **Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)**

Analytical Method: SW-846:6850

Prep Method: SW-846:6850

Analytical Batch Number: 1643139

Prep Batch Number: 1643138

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
416771001	416771001 (CASA-17-129327)
416771003	416771003 (CASA-17-129661)
1203737093	Interference Check Sample (ICS)
1203737089	Method Blank (MB)
1203737090	Laboratory Control Sample (LCS)
1203737091	416658001(CAMO-17-129294) Matrix Spike (MS)
1203737092	416658001(CAMO-17-129294) Matrix Spike Duplicate (MSD)

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

**Preparation/Analytical Method Verification**

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-067 REV# 14.

## **Calibration Information**

### **Initial Calibration**

All initial calibration requirements have been met for this SDG. Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

### **ICV Requirements**

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

### **CCB Requirements**

All continuing calibration blanks (CCB) bracketing the analyses associated with this batch were within acceptance criteria.

### **CCV Requirements**

All continuing calibration checks (CCV) requirements were met by all bracketing CCV standards.

### **Low Level Standard (CRI) Requirements**

All low level calibration verification (CRI) requirements were met by all bracketing CRI standards.

## **Quality Control (QC) Information**

### **Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

### **Interference Check Sample (ICS)**

The ICS spike recoveries met the acceptance criteria.

### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

### **QC Sample Designation**

Client sample 416658001 (CAMO-17-129294) was chosen for matrix spike and matrix spike duplicate analysis.

### **Matrix Spike (MS) Recovery Statement**

The MS recoveries were within the established acceptance limits.

### **MS/MSD Relative Percent Difference (RPD) Statement**

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

### **Internal Standard Area Acceptance**

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

### **Retention Time**

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

## **Technical Information**

### **Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based



on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

#### **Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

#### **Sample Dilutions**

The samples in this SDG did not require dilutions.

#### **Sample Re-extraction/Re-analysis**

Sample 416771001 (CASA-17-129327) was re-analyzed to confirm potential carryover from the previous sample analysis. The re-analysis data 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.

##### **Manual Integrations**

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

##### **Method Comments**

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

##### **Additional Comments**

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

##### **Perchlorate Isotope Ratio**

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

#### **System Configuration**

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

##### **Electronic Packaging Comment**

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

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

### **Chromatographic Columns**

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

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

Dionex: IonPac AG-16 2 x 50 mm.

### **Certification Statement**

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

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

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

Client SDG: 2017-1017 GEL Work Order: 416771

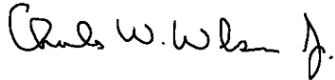
#### The Qualifiers in this report are defined as follows:

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

#### Review/Validation

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

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

Signature: 

Name: Charles Wilson

Date: 09 MAR 2017

Title: Analyst II

# **Sample Data Summary**



## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1643138Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-129327Date Received: 16-FEB-17GEL Job No (SDG): 2017-1017GEL Sample ID: 416771001Date Filtered: 28-FEB-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	1.42	ug/L		1	06-MAR-17 14:27	per0306015a
	Perchlorate Isotope Ratio			3.01			1	06-MAR-17 14:27	per0306015a
14797-73-0	Perchlorate-101	.05	.2	1.45	ug/L		1	06-MAR-17 14:27	per0306015a
	Perchlorate-O(18)			0.551	ug/L		1	06-MAR-17 14:27	per0306015a

^ 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.

CASA-17-129661Lab Code: GELDate Received: 16-FEB-17Instrument: LCMSMSGEL Job No (SDG): 2017-1017Method: SW846 6850 ModifiedGEL Sample ID: 416771003Matrix: WATERDate Filtered: 28-FEB-17Extraction Batch ID: 1643138Injection 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	0.940	ug/L		1	28-FEB-17 18:15	per0228028a
	Perchlorate Isotope Ratio			3.04			1	28-FEB-17 18:15	per0228028a
14797-73-0	Perchlorate-101	.05	.2	0.921	ug/L		1	28-FEB-17 18:15	per0228028a
	Perchlorate-O(18)			0.511	ug/L		1	28-FEB-17 18:15	per0228028a

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

\*Concentration =

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

# **Quality Control Summary**

**Perchlorate Laboratory Control Sample**

**Lab Name:** General Engineering Laboratories

**Lab Code:** GEL

**GEL Job No. (SDG):** 2017-1017

**Extract Batch Code:** 1643138

**Date Filtered:** 28-FEB-17

**Matrix:** WATER

**Sample ID:** 1203737090

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.201	ug/L	101		85 - 115
Perchlorate Isotope Ratio		3.05				-
Perchlorate-101	0.200	.196	ug/L	98		85 - 115
Perchlorate-O(18)		.489	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

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**Lab Name:** General Engineering Laboratories

**Lab Code:** GEL

**GEL Job No (SDG):** 2017-1017

**Extract Batch Code:** 1643138

**Date Extracted:** 28-FEB-17

**GEL MS/PS ID:** 1203737091

**Client ID:** CAMO-17-129294

**GEL MSD/PSD ID:** 1203737092

**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	0.394	ug/L	0.620	113	.618	112	0	30	75 - 125
Perchlorate Isotope Ratio	0	2.98		3.04		3.1		2		-
Perchlorate-101	0.200	0.393	ug/L	0.606	107	.593	100	2	30	75 - 125
Perchlorate-O(18)	0	0.506	ug/L	0.501		.505		1		-

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

# Quality Control Data

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: EPA 6850 ModifiedMatrix: WATERExtraction Batch ID: 1643138Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 28-FEB-17GEL Job No (SDG): 2017-1017GEL Sample ID: 1203737089Date Filtered: 28-FEB-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	28-FEB-17 16:23	per0228013a
	Perchlorate Isotope Ratio						1	28-FEB-17 16:23	per0228013a
14797-73-0	Perchlorate-101	.05	.2	0.200	ug/L	U	1	28-FEB-17 16:23	per0228013a
	Perchlorate-O(18)			0.483	ug/L		1	28-FEB-17 16:23	per0228013a

^ 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: 1643138Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 28-FEB-17GEL Job No (SDG): 2017-1017GEL Sample ID: 1203737090Date Filtered: 28-FEB-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.201	ug/L		1	28-FEB-17 16:31	per0228014a
	Perchlorate Isotope Ratio			3.05			1	28-FEB-17 16:31	per0228014a
14797-73-0	Perchlorate-101	.05	.2	0.196	ug/L	J	1	28-FEB-17 16:31	per0228014a
	Perchlorate-O(18)			0.489	ug/L		1	28-FEB-17 16:31	per0228014a

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

\*Concentration =

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

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1643138Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2017-1017GEL Sample ID: 1203737093Date Filtered: 28-FEB-17Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.218	ug/L		1	28-FEB-17 16:38	per0228015a
	Perchlorate Isotope Ratio			3			1	28-FEB-17 16:38	per0228015a
14797-73-0	Perchlorate-101	.05	.2	0.216	ug/L		1	28-FEB-17 16:38	per0228015a
	Perchlorate-O(18)			0.514	ug/L		1	28-FEB-17 16:38	per0228015a

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

\*Concentration =

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



## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1643138Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-129294MSDate Received: 15-FEB-17GEL Job No (SDG): 2017-1017GEL Sample ID: 1203737091Date Filtered: 28-FEB-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.620	ug/L		1	28-FEB-17 16:53	per0228017a
	Perchlorate Isotope Ratio			3.04			1	28-FEB-17 16:53	per0228017a
14797-73-0	Perchlorate-101	.05	.2	0.606	ug/L		1	28-FEB-17 16:53	per0228017a
	Perchlorate-O(18)			0.501	ug/L		1	28-FEB-17 16:53	per0228017a

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

\*Concentration =

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

## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1643138Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-129294MSDDate Received: 15-FEB-17GEL Job No (SDG): 2017-1017GEL Sample ID: 1203737092Date Filtered: 28-FEB-17Injection Volume (uL): 20%Solids:     

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.618	ug/L		1	28-FEB-17 17:01	per0228018a
	Perchlorate Isotope Ratio			3.1			1	28-FEB-17 17:01	per0228018a
14797-73-0	Perchlorate-101	.05	.2	0.593	ug/L		1	28-FEB-17 17:01	per0228018a
	Perchlorate-O(18)			0.505	ug/L		1	28-FEB-17 17:01	per0228018a

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

\*Concentration =

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

# **Metals Analysis**

# Case Narrative

**Metals**  
**Technical Case Narrative**  
**ARS International, LLC (ARSL)**  
**SDG #: 2017-1017**  
**Work Order #: 416771**

<b>Sample ID</b>	<b>Client ID</b>
416771001	CASA-17-129327
416771002	CASA-17-129333
416771003	CASA-17-129661
416771004	CASA-17-129662
1203729958	Method Blank (MB) <b>ICP</b>
1203729959	Laboratory Control Sample (LCS)
1203729962	416771001(CASA-17-129327L) Serial Dilution (SD)
1203729960	416771001(CASA-17-129327D) Sample Duplicate (DUP)
1203729961	416771001(CASA-17-129327S) Matrix Spike (MS)
1203730266	Method Blank (MB) <b>ICP-MS</b>
1203730267	Laboratory Control Sample (LCS)
1203730270	416795003(WST54-17-130534L) Serial Dilution (SD)
1203730268	416795003(WST54-17-130534D) Sample Duplicate (DUP)
1203730269	416795003(WST54-17-130534S) Matrix Spike (MS)
1203732649	416795003(WST54-17-130534PS) Post Spike (PS)
1203738955	Method Blank (MB) <b>CVAA</b>
1203738956	Laboratory Control Sample (LCS)
1203738959	416771001(CASA-17-129327L) Serial Dilution (SD)
1203738957	416771001(CASA-17-129327D) Sample Duplicate (DUP)
1203738958	416771001(CASA-17-129327S) Matrix Spike (MS)

**Sample Analysis**

Samples 416771001,002,003 and 004 in this SDG were analyzed for metals and mercury on an "as received" basis.

**Method/Analysis Information**

<b>Analytical Batch:</b>	1640064, 1640178, 1643872 and 1647164
<b>Prep Batch :</b>	1640063, 1640177 and 1643869
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 28, GL-MA-E-006 REV# 13, GL-MA-E-014 REV# 29, GL-MA-E-010 REV# 34 and GL-GC-E-107 REV# 10
<b>Analytical Method:</b>	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.2 1974 and SM:A2340B
<b>Prep Method :</b>	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 CaCO<sub>3</sub> is calculated from Calcium and Magnesium results.

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

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

The Metals analysis - ICPMS was performed on a PerkinElmer NexION 300X ICPMS. The instrument is equipped with a ESI PFA-ST nebulizer, quadrupole mass spectrometer, dual mode electron multiplier detector, and Kinetic Energy Discrimination (KED) technology. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum.

## **Calibration Information**

### **Instrument Calibration**

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

### **CRDL/PQL Requirements**

The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 416771001 (CASA-17-129327) and 416771003 (CASA-17-129661)-ICP.

### **ICSA/ICSAB Statement**

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

### **Continuing Calibration Blanks (CCB) Requirements**

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

### **Continuing Calibration Verification (CCV) Requirements**

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

## **Quality Control (QC) Information**

### **Method Blank (MB) Statement**

The MBs analyzed with this SDG met the acceptance criteria.

### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

### **Quality Control (QC) Sample Statement**

The following samples were selected as the quality control (QC) samples for this SDG: 416771001 (CASA-17-129327)-ICP and CVAA and 416795003 (WST54-17-130534)-ICP-MS.

### **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 MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analytes. The post spike also did not meet the required control limits; thus, confirming matrix interferences and/or sample non-homogeneity.

Sample	Analyte	Value
1203730269 (WST54-17-130534MS)	Antimony	7.36* (75%-125%)
	Arsenic	65.4* (75%-125%)
	Selenium	50.9* (75%-125%)
	Thallium	49.3* (75%-125%)

#### 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. Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203730268 (WST54-17-130534DUP)	Silver	55.1* (0%-20%)

#### Serial Dilution % Difference Statement

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

Sample	Analyte	Value
1203729962 (CASA-17-129327SDILT)	Sodium	12.1 *(0%-10%)
1203730270 (WST54-17-130534SDILT)	Molybdenum	72.8 *(0%-10%)
	Silver	92.1 *(0%-10%)
	Uranium	125 *(0%-10%)

#### Post Spike (PS) Recovery Statement

The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS did not meet the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the presence of matrix interferences.

Sample	Analyte	Value
1203732649 (WST54-17-130534PS)	Antimony	77.3* (80%-120%)
	Arsenic	43.9* (80%-120%)
	Selenium	45.6* (80%-120%)
	Thallium	53* (80%-120%)

## **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**

Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range. Sample 416771003 (CASA-17-129661)-ICP-MS was diluted to ensure that the analyte concentration was within the linear calibration range of the instrument.

Analyte	<b>416771</b>
	<b>003</b>
Chromium	10X

### **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 (DER) was generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) 1606591 was generated for sample 1203729962 (CASA-17-129327SDILT) in this SDG/batch. A data exception report (DER) 1606825 was generated for samples 1203730268 (WST54-17-130534DUP), 1203730269 (WST54-17-130534MS), 1203730269 (WST54-17-130534MS), 1203730269 (WST54-17-130534MS), 1203730270 (WST54-17-130534SDILT), 1203730270 (WST54-17-130534SDILT), 1203732649 (WST54-17-130534PS), 1203732649 (WST54-17-130534PS) and 1203732649 (WST54-17-130534PS) in this SDG/batch.

### **Additional Comments**

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

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

Please refer to the Total Ca and Total Mg data to validate results appearing on the Hardness Summary sheet. Both results are in the Inorganic/metals section of the package. There is no Batch QC for calculated results, and

thus no QC Summary for the Hardness by Calculation Batch. The MDLs and PQLs are calculated using the higher of the two calculated values of Ca or Mg.

**Certification Statement**

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

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

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

Client SDG: 2017-1017 GEL Work Order: 416771

#### The Qualifiers in this report are defined as follows:

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

#### Review/Validation

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

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

Signature:



Name: Nik-Cole Elmore

Date: 14 MAR 2017

Title: Data Validator



# **Sample Data Summary**

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**METALS**  
**-1-**  
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** 2017-1017**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 416771001**BASIS:** As Received**DATE COLLECTED** 14-FEB-17**CLIENT ID:** CASA-17-129327**LEVEL:** Low**DATE RECEIVED** 16-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	03/03/17 10:31	030317W1-7	1643872

**METALS**  
**-1-**  
**INORGANICS ANALYSIS DATA PACKAGE**

SDG No: 2017-1017

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 416771001

BASIS: As Received

DATE COLLECTED 14-FEB-17

CLIENT ID: CASA-17-129327

LEVEL: Low

DATE RECEIVED 16-FEB-17

MATRIX: W

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	200	ug/L	U	68	200	200	1	P	HSC	02/17/17 06:40	021717-1	1640064
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	PRB	02/21/17 10:31	170221-4	1640178
7440-38-2	Arsenic	2.54	ug/L	J	1.7	5	5	1	MS	PRB	02/21/17 09:19	170220-3	1640178
7440-39-3	Barium	33.8	ug/L		1	5	5	1	P	HSC	02/17/17 06:40	021717-1	1640064
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	02/17/17 06:40	021717-1	1640064
7440-42-8	Boron	25.8	ug/L	J	15	50	50	1	P	HSC	02/17/17 06:40	021717-1	1640064
7440-43-9	Cadmium	1	ug/L	U	0.3	1	1	1	MS	PRB	02/21/17 09:19	170220-3	1640178
7440-70-2	Calcium	17700	ug/L		50	200	200	1	P	HSC	02/17/17 06:40	021717-1	1640064
7440-47-3	Chromium	5.5	ug/L	J	3	10	10	1	MS	PRB	02/21/17 09:19	170220-3	1640178
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	02/17/17 06:40	021717-1	1640064
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	02/17/17 06:40	021717-1	1640064
7439-89-6	Iron	100	ug/L	U	30	100	100	1	P	HSC	02/17/17 06:40	021717-1	1640064
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	PRB	02/21/17 11:44	170221-5	1640178
7439-95-4	Magnesium	4230	ug/L		110	300	300	1	P	HSC	02/17/17 06:40	021717-1	1640064
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	02/17/17 06:40	021717-1	1640064
7439-98-7	Molybdenum	1.74	ug/L		0.3	0.5	0.5	1	MS	PRB	02/21/17 09:19	170220-3	1640178
7440-02-0	Nickel	0.692	ug/L	J	0.5	2	2	1	MS	PRB	02/21/17 09:19	170220-3	1640178
7440-09-7	Potassium	2030	ug/L		50	150	150	1	P	HSC	02/20/17 12:34	022017-2	1640064
7782-49-2	Selenium	5	ug/L	U	2	5	5	1	MS	PRB	02/21/17 09:19	170220-3	1640178
7631-86-9	Silica	69900	ug/L		53	213	213	1	P	HSC	02/20/17 12:34	022017-2	1640064
7440-22-4	Silver	1	ug/L	U	0.4	1	1	1	MS	PRB	02/21/17 09:19	170220-3	1640178
7440-23-5	Sodium	14500	ug/L	E	100	300	300	1	P	HSC	02/20/17 12:34	022017-2	1640064
7440-24-6	Strontium	65.7	ug/L		1	5	5	1	P	HSC	02/17/17 06:40	021717-1	1640064
7440-28-0	Thallium	2	ug/L	U	0.6	2	2	1	MS	PRB	02/21/17 11:44	170221-5	1640178
7440-31-5	Tin	10	ug/L	U	2.5	10	10	1	P	HSC	02/17/17 06:40	021717-1	1640064
7440-61-1	Uranium	0.294	ug/L		0.067	0.2	0.2	1	MS	PRB	02/21/17 12:39	170221-6	1640178
7440-62-2	Vanadium	14.7	ug/L		1	5	5	1	P	HSC	02/17/17 06:40	021717-1	1640064
7440-66-6	Zinc	28.3	ug/L		3.3	10	10	1	P	HSC	02/17/17 06:40	021717-1	1640064

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**METALS**  
**-1-**  
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** 2017-1017**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 416771001**BASIS:** As Received**DATE COLLECTED** 14-FEB-17**CLIENT ID:** CASA-17-129327**LEVEL:** Low**DATE RECEIVED** 16-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
	Hardness as CaCO3	61.5	mg/L		0.453	1.24	1.24	1		TXT1	03/14/17 11:15		1647164

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1640064	1640063	SW846 3005A	50	mL	50	mL	02/16/17	CXW4
1640178	1640177	SW846 3005A	50	mL	50	mL	02/16/17	CXW4
1643872	1643869	EPA 245.1/245.2 Prep	20	mL	20	mL	03/02/17	JXH5

**\*Analytical Methods:**

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

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**METALS**  
**-1-**  
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** 2017-1017**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 416771002**BASIS:** As Received**DATE COLLECTED** 14-FEB-17**CLIENT ID:** CASA-17-129333**LEVEL:** Low**DATE RECEIVED** 16-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	03/03/17 10:40	030317W1-7	1643872

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1643872	1643869	EPA 245.1/245.2 Prep	20	mL	20	mL	03/02/17	JXH5

**\*Analytical Methods:**

AV EPA 245.1/245.2

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**METALS**  
**-1-**  
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** 2017-1017**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 416771003**BASIS:** As Received**DATE COLLECTED** 14-FEB-17**CLIENT ID:** CASA-17-129661**LEVEL:** Low**DATE RECEIVED** 16-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	03/03/17 10:41	030317W1-7	1643872



**METALS**  
**-1-**  
**INORGANICS ANALYSIS DATA PACKAGE**

SDG No: 2017-1017

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 416771003

BASIS: As Received

DATE COLLECTED 14-FEB-17

CLIENT ID: CASA-17-129661

LEVEL: Low

DATE RECEIVED 16-FEB-17

MATRIX: W

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	200	ug/L	U	68	200	200	1	P	HSC	02/17/17 06:37	021717-1	1640064
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	PRB	02/21/17 10:32	170221-4	1640178
7440-38-2	Arsenic	5	ug/L	U	1.7	5	5	1	MS	PRB	02/21/17 09:21	170220-3	1640178
7440-39-3	Barium	74.2	ug/L		1	5	5	1	P	HSC	02/17/17 06:37	021717-1	1640064
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	02/17/17 06:37	021717-1	1640064
7440-42-8	Boron	21.9	ug/L	J	15	50	50	1	P	HSC	02/17/17 06:37	021717-1	1640064
7440-43-9	Cadmium	1	ug/L	U	0.3	1	1	1	MS	PRB	02/21/17 09:21	170220-3	1640178
7440-70-2	Calcium	70000	ug/L		50	200	200	1	P	HSC	02/17/17 06:37	021717-1	1640064
7440-47-3	Chromium	360	ug/L		30	100	100	10	MS	PRB	02/21/17 08:59	170220-3	1640178
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	02/17/17 06:37	021717-1	1640064
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	02/17/17 06:37	021717-1	1640064
7439-89-6	Iron	100	ug/L	U	30	100	100	1	P	HSC	02/17/17 06:37	021717-1	1640064
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	PRB	02/21/17 11:46	170221-5	1640178
7439-95-4	Magnesium	16700	ug/L		110	300	300	1	P	HSC	02/17/17 06:37	021717-1	1640064
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	02/17/17 06:37	021717-1	1640064
7439-98-7	Molybdenum	0.450	ug/L	J	0.3	0.5	0.5	1	MS	PRB	02/21/17 09:21	170220-3	1640178
7440-02-0	Nickel	15.4	ug/L		0.5	2	2	1	MS	PRB	02/21/17 09:21	170220-3	1640178
7440-09-7	Potassium	3800	ug/L		50	150	150	1	P	HSC	02/20/17 12:31	022017-2	1640064
7782-49-2	Selenium	5	ug/L	U	2	5	5	1	MS	PRB	02/21/17 09:21	170220-3	1640178
7631-86-9	Silica	62900	ug/L		53	213	213	1	P	HSC	02/20/17 12:31	022017-2	1640064
7440-22-4	Silver	1	ug/L	U	0.4	1	1	1	MS	PRB	02/21/17 09:21	170220-3	1640178
7440-23-5	Sodium	22900	ug/L	E	100	300	300	1	P	HSC	02/20/17 12:31	022017-2	1640064
7440-24-6	Strontium	331	ug/L		1	5	5	1	P	HSC	02/17/17 06:37	021717-1	1640064
7440-28-0	Thallium	2	ug/L	U	0.6	2	2	1	MS	PRB	02/21/17 11:46	170221-5	1640178
7440-31-5	Tin	5.84	ug/L	J	2.5	10	10	1	P	HSC	02/17/17 06:37	021717-1	1640064
7440-61-1	Uranium	1.96	ug/L		0.067	0.2	0.2	1	MS	PRB	02/21/17 12:41	170221-6	1640178
7440-62-2	Vanadium	1.48	ug/L	J	1	5	5	1	P	HSC	02/17/17 06:37	021717-1	1640064
7440-66-6	Zinc	10	ug/L	U	3.3	10	10	1	P	HSC	02/17/17 06:37	021717-1	1640064

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**METALS**  
**-1-**  
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** 2017-1017**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 416771003**BASIS:** As Received**DATE COLLECTED** 14-FEB-17**CLIENT ID:** CASA-17-129661**LEVEL:** Low**DATE RECEIVED** 16-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
	Hardness as CaCO3	244	mg/L		0.453	1.24	1.24	1		TXT1	03/14/17 11:15		1647164

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1640064	1640063	SW846 3005A	50	mL	50	mL	02/16/17	CXW4
1640178	1640177	SW846 3005A	50	mL	50	mL	02/16/17	CXW4
1643872	1643869	EPA 245.1/245.2 Prep	20	mL	20	mL	03/02/17	JXH5

**\*Analytical Methods:**

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

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**METALS**  
**-1-**  
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** 2017-1017**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 416771004**BASIS:** As Received**DATE COLLECTED** 14-FEB-17**CLIENT ID:** CASA-17-129662**LEVEL:** Low**DATE RECEIVED** 16-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	03/03/17 10:43	030317W1-7	1643872

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1643872	1643869	EPA 245.1/245.2 Prep	20	mL	20	mL	03/02/17	JXH5

**\*Analytical Methods:**

AV EPA 245.1/245.2

# **Quality Control Summary**

**METALS**  
**-3b-**  
**PREPARATION BLANK SUMMARY**

SDG NO. 2017-1017

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>
1203729958	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
	Aluminum	68	ug/L	+/-200	U	P	68	200
	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
1203730266	Antimony	1	ug/L	+/-3	U	MS	1	3
	Arsenic	1.7	ug/L	+/-5	U	MS	1.7	5
	Cadmium	0.3	ug/L	+/-1	U	MS	0.3	1
	Chromium	3	ug/L	+/-10	U	MS	3	10
	Lead	0.5	ug/L	+/-2	U	MS	0.5	2
	Molybdenum	0.3	ug/L	+/-0.5	U	MS	0.3	0.5
	Nickel	0.5	ug/L	+/-2	U	MS	0.5	2
	Selenium	2	ug/L	+/-5	U	MS	2	5
	Silver	0.4	ug/L	+/-1	U	MS	0.4	1
	Thallium	0.6	ug/L	+/-2	U	MS	0.6	2
	Uranium	0.166	ug/L	+/-0.2	J	MS	0.067	0.2
1203738955	Mercury	0.067	ug/L	+/-0.2	U	AV	0.067	0.2

## \*Analytical Methods:

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

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2017-1017 Client ID: CASA-17-129327S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 416771001 Spike ID: 1203729961

<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	4730		68	U	5000	94.2		P
Barium	ug/L	75-125	524		33.8		500	98		P
Beryllium	ug/L	75-125	498		1	U	500	99.7		P
Boron	ug/L	75-125	545		25.8	J	500	104		P
Calcium	ug/L	75-125	22100		17700		5000	88.7		P
Cobalt	ug/L	75-125	489		1	U	500	97.8		P
Copper	ug/L	75-125	510		3	U	500	102		P
Iron	ug/L	75-125	5140		30	U	5000	103		P
Magnesium	ug/L	75-125	9200		4230		5000	99.3		P
Manganese	ug/L	75-125	488		2	U	500	97.2		P
Potassium	ug/L	75-125	7080		2030		5000	101		P
Silica	ug/L		81600		69900		10700	109	N/A	P
Sodium	ug/L	75-125	19300		14500		5000	96.3		P
Strontium	ug/L	75-125	536		65.7		500	94		P
Tin	ug/L	75-125	502		2.5	U	500	100		P
Vanadium	ug/L	75-125	512		14.7		500	99.5		P
Zinc	ug/L	75-125	504		28.3		500	95.1		P

## \*Analytical Methods:

P SW846 3005A/6010C

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2017-1017 Client ID: WST54-17-130534S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 416795003 Spike ID: 1203730269

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Antimony	ug/L	75-125	4.93		1.25	J	50	7.36	N	MS
Arsenic	ug/L	75-125	113		80.6		50	65.4	N	MS
Cadmium	ug/L	75-125	43.3		4.64		50	77.3		MS
Chromium	ug/L		1060		925		50	263	N/A	MS
Lead	ug/L		976		835		50	281	N/A	MS
Molybdenum	ug/L	75-125	128		82		50	92.5		MS
Nickel	ug/L		1040		930		50	224	N/A	MS
Selenium	ug/L	75-125	78.2		52.8		50	50.9	N	MS
Silver	ug/L	75-125	112		69.1		50	85.9		MS
Thallium	ug/L	75-125	26.8		2.14		50	49.3	N	MS
Uranium	ug/L	75-125	144		104		50	80.3		MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-5a-

## Spike Summary

**SDG NO.** 2017-1017 **Client ID:** WST54-17-130534PS

**Contract:** ESHL00114 **Level:** Low

**Matrix:** WATER **% Solids:**

**Sample ID:** 416795003 **Spike ID:** 1203732649

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Antimony	ug/L	80-120	39.9		1.25	J	50	77.3	N	MS
Arsenic	ug/L	80-120	103		80.6		50	43.9	N	MS
Selenium	ug/L	80-120	75.6		52.8		50	45.6	N	MS
Thallium	ug/L	80-120	28.6		2.14		50	53	N	MS

## \*Analytical Methods:

MS SW846 3005A/6020A



## METALS

-5a-

## Matrix Spike Summary

**SDG NO.** 2017-1017 **Client ID:** CASA-17-129327S**Contract:** ESHL00114 **Level:** Low**Matrix:** WATER **% Solids:****Sample ID:** 416771001 **Spike ID:** 1203738958

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Mercury	ug/L	75-125	2.03		0.067	U	2	101		AV

## \*Analytical Methods:

AV EPA 245.1/245.2

**Metals**  
**-6-**  
**Duplicate Sample Summary**

SDG No.: 2017-1017

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-17-129327D

Matrix: WATER

Level: Low

Sample ID: 416771001

Duplicate ID: 1203729960

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		68 U		68 U				P
Barium	ug/L	+/-20%	33.8		33.4		1.19		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	25.8 J		24.6 J		4.48		P
Calcium	ug/L	+/-20%	17700		17500		.739		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%	4230		4250		.455		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	2030		2030		.079		P
Silica	ug/L	+/-20%	69900		69700		.332		P
Sodium	ug/L	+/-20%	14500		14500		.138		P
Strontium	ug/L	+/-20%	65.7		65.1		1.03		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	14.7		14.7		.0272		P
Zinc	ug/L	+/-10	28.3		26.6		6.17		P

\*Analytical Methods:

P SW846 3005A/6010C

**Metals**  
**-6-**  
**Duplicate Sample Summary**

SDG No.: 2017-1017

Lab Code: GEL

Contract: ESHL00114

Client ID: WST54-17-130534D

Matrix: WATER

Level: Low

Sample ID: 416795003

Duplicate ID: 1203730268

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Antimony	ug/L	+/-3	1.25	J	1.27	J	1.9		MS
Arsenic	ug/L	+/-20%	80.6		85.8		6.19		MS
Cadmium	ug/L	+/-1	4.64		5.15		10.4		MS
Chromium	ug/L	+/-20%	925		951		2.81		MS
Lead	ug/L	+/-20%	835		939		11.7		MS
Molybdenum	ug/L	+/-20%	82		85		3.7		MS
Nickel	ug/L	+/-20%	930		982		5.5		MS
Selenium	ug/L	+/-20%	52.8		51.8		1.86		MS
Silver	ug/L	+/-20%	69.1		122		55.1	*	MS
Thallium	ug/L	+/-2	2.14		2.28		6.24		MS
Uranium	ug/L	+/-20%	104		110		5.67		MS

\*Analytical Methods:

MS SW846 3005A/6020A

**Metals**  
**–6–**  
**Duplicate Sample Summary**

**SDG No.:** 2017–1017**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CASA–17–129327D**Matrix:** WATER**Level:** Low**Sample ID:** 416771001**Duplicate ID:** 1203738957**Percent Solids for Dup:** N/A

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

\*Analytical Methods:

AV EPA 245.1/245.2

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2017-1017

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>
1203729959								
	Aluminum	ug/L	5000	5030		101	80-120	P
	Barium	ug/L	500	511		102	80-120	P
	Beryllium	ug/L	500	509		102	80-120	P
	Boron	ug/L	500	530		106	80-120	P
	Calcium	ug/L	5000	5120		102	80-120	P
	Cobalt	ug/L	500	512		102	80-120	P
	Copper	ug/L	500	516		103	80-120	P
	Iron	ug/L	5000	5380		108	80-120	P
	Magnesium	ug/L	5000	5390		108	80-120	P
	Manganese	ug/L	500	509		102	80-120	P
	Potassium	ug/L	5000	4920		98.3	80-120	P
	Silica	ug/L	10700	10600		98.9	80-120	P
	Sodium	ug/L	5000	5540		111	80-120	P
	Strontium	ug/L	500	500		100	80-120	P
	Tin	ug/L	500	515		103	80-120	P
	Vanadium	ug/L	500	510		102	80-120	P
	Zinc	ug/L	500	495		99	80-120	P

## \*Analytical Methods:

P SW846 3005A/6010C

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2017-1017

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>
1203730267								
	Antimony	ug/L	50	48.4		96.7	80-120	MS
	Arsenic	ug/L	50	48		96	80-120	MS
	Cadmium	ug/L	50	49.6		99.2	80-120	MS
	Chromium	ug/L	50	50.3		101	80-120	MS
	Lead	ug/L	50	51		102	80-120	MS
	Molybdenum	ug/L	50	50.1		100	80-120	MS
	Nickel	ug/L	50	50.1		100	80-120	MS
	Selenium	ug/L	50	48.8		97.6	80-120	MS
	Silver	ug/L	50	51.5		103	80-120	MS
	Thallium	ug/L	50	49.3		98.7	80-120	MS
	Uranium	ug/L	50	50.5		101	80-120	MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2017-1017

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>
1203738956	Mercury	ug/L	2	2.1		105	85-115	AV

## \*Analytical Methods:

AV EPA 245.1/245.2

## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 2017-1017

Client ID: CASA-17-129327L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 416771001

Serial Dilution ID: 1203729962

<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	33.8		34.9		3.421			P
Beryllium	1	U	5	U				P
Boron	25.8	J	75	U	16.61			P
Calcium	17700		18000		2.207		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	4230		4250		.383			P
Manganese	2	U	10	U				P
Potassium	2030		1970		2.884			P
Silica	69900		72800		4.089		10	P
Sodium	14500		16300		12.145	E	10	P
Strontium	65.7		64.7		1.539		10	P
Tin	2.5	U	12.5	U				P
Vanadium	14.7		14.8	J	.456			P
Zinc	28.3		53.1		87.666			P

## \*Analytical Methods:

P SW846 3005A/6010C



## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 2017-1017 Client ID: WST54-17-130534L

Contract: ESHL00114

Matrix: LIQUID Level: Low

Sample ID: 416795003 Serial Dilution ID: 1203730270

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Antimony	1.25	J	5	U	244.275			MS
Arsenic	80.6		188		132.887			MS
Cadmium	4.64		8.99		93.792			MS
Chromium	92.5		91.2		1.395			MS
Lead	83.5		87.9		5.212		10	MS
Molybdenum	82		142		72.835	E	10	MS
Nickel	93		93.9		1.022		10	MS
Selenium	52.8		132		149.924			MS
Silver	69.1		133		92.091	E	10	MS
Thallium	2.14		5.48	J	155.716			MS
Uranium	104		234		125.27	E	10	MS

## \*Analytical Methods:

MS SW846 3005A/6020A

## METALS

-9-

## Serial Dilution Sample Summary

**SDG NO.** 2017-1017 **Client ID:** CASA-17-129327L

**Contract:** ESHL00114

**Matrix:** LIQUID **Level:** Low

**Sample ID:** 416771001 **Serial Dilution ID:** 1203738959

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Mercury	.067	U	.335	U				AV

## \*Analytical Methods:

AV EPA 245.1/245.2

# Miscellaneous

DATA EXCEPTION REPORT			
<b>Mo.Day Yr.</b> 21-FEB-17	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> ICP	<b>Test / Method:</b> SW846 3005A/6010C	<b>Matrix Type:</b> Liquid	<b>Client Code:</b> ESHL
<b>Batch ID:</b> 1640064	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 416771(2017-1017)</b> <b>Application Issues:</b> Failed difference for SDILT			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
1. Failed difference for SDILT:  QC 1203729962SDILT		1. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified. 1203729962 (CASA-17-129327SDILT) Sodium [12.1 *(0%-10%)].	

**Originator's Name:**  
Helen Camello 21-FEB-17

**Data Validator/Group Leader:**  
Travis Tola 14-MAR-17

### DATA EXCEPTION REPORT

<b>Mo.Day Yr.</b> 21-FEB-17	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> ICP/MS	<b>Test / Method:</b> SW846 3005A/6020A	<b>Matrix Type:</b> Liquid	<b>Client Code:</b> ESHL
<b>Batch ID:</b> 1640178	<b>Sample Numbers:</b> See Below		

**Potentially affected work order(s)(SDG): 416771(2017-1017),416795(2017-1025)**

**Application Issues:**

Failed Recovery for MS/MSD, or PS/PSD

Failed RPD for DUP

Failed Recovery for PS/PSD

Failed difference for SDILT

**Specification and Requirements  
Exception Description:**

1. Failed RPD for DUP:  
QC 1203730268DUP
2. Failed Recovery for MS/MSD, or PS/PSD:  
QC 1203730269MS
3. Failed Recovery for PS/PSD:  
QC 1203732649PS
4. Failed difference for SDILT:  
QC 1203730270SDILT

**DER Disposition:**

1. Not all the applicable analyte RPD values were within the acceptance criteria.  
1203730268 (WST54-17-130534DUP) Silver [55.1\* (0%-20%)].
2. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike also did not meet the required control limits; thus, confirming matrix interferences and/or sample non-homogeneity.  
1203730269 (WST54-17-130534MS) Antimony [7.36\* (75%-125%)], Arsenic [65.4\* (75%-125%)], Selenium [50.9\* (75%-125%)] and Thallium [49.3\* (75%-125%)].
3. The PS did not meet the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the presence of matrix interferences.  
1203732649 (WST54-17-130534PS) Antimony [77.3\* (80%-120%)], Arsenic [43.9\* (80%-120%)], Selenium [45.6\* (80%-120%)] and Thallium [53\* (80%-120%)].
4. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified.  
1203730270 (WST54-17-130534SDILT) Molybdenum [72.8 \*(0%-10%)], Silver [92.1 \*(0%-10%)] and Uranium [125 \*(0%-10%)].

**Originator's Name:**

Paul Boyd 21-FEB-17

**Data Validator/Group Leader:**

Elizabeth Janssen 21-FEB-17

# **General Chem Analysis**

# Case Narrative

**General Chemistry  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2017-1017  
Work Order #: 416771**

**Method/Analysis Information**

**Product:** Carbon and Total Organic

**Analytical Batch:** 1639822

**Method:** SW 9060 Total Organic Carbon

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
416771002	CASA-17-129333
416771004	CASA-17-129662
1203731500	Method Blank (MB)
1203731501	Laboratory Control Sample (LCS)
1203731502	416658004(CAMO-17-129311) Sample Duplicate (DUP)
1203731504	416658004(CAMO-17-129311) Post Spike (PS)

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

**SOP Reference**

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

**Preparation/Analytical Method Verification**

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

**Calibration Information**

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

**Initial Calibration**

All initial calibration requirements have been met for this SDG.

**Continuing Calibration Blanks**

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

**Calibration Verification Information (CCV)**



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

#### **Quality Control (QC) Information**

##### **Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

##### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

##### **Quality Control (QC) Designation**

Sample 416658004 (CAMO-17-129311) was selected for QC analysis.

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

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

##### **Duplicate Relative Percent Difference (RPD) Statement**

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

#### **Technical Information**

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

##### **Holding Times**

All samples in this SDG met the specified holding time.

##### **Sample Preservation/Integrity**

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

##### **Sample Dilutions**

The samples in this SDG did not require dilutions.

##### **Sample Re-analysis**

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

#### **Miscellaneous Information**

##### **Data Exception (DER) Documentation**

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

##### **Additional Comments**

Additional comments were not required for this SDG.

##### **Electronic Packaging Comment**

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

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

### **Method/Analysis Information**

<b>Product:</b>	<b>Cyanide and Total</b>		
<b>Analytical Batch:</b>	1640007	<b>Method:</b>	WSP-CN(T)
<b>Prep Batch :</b>	1640006	<b>Method:</b>	EPA 335.4

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA 335.4 1993:

<b>Sample ID</b>	<b>Client ID</b>
416771002	CASA-17-129333
416771004	CASA-17-129662
1203729874	Method Blank (MB)
1203729875	Laboratory Control Sample (LCS)
1203729876	416765002(CAMO-17-129355) Sample Duplicate (DUP)
1203729877	416765002(CAMO-17-129355) Matrix Spike (MS)

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

### **SOP Reference**

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

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Continuing Calibration Blanks**

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

### **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 416765002 (CAMO-17-129355) was selected for QC analysis.

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

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

**Duplicate Relative Percent Difference (RPD) Statement**

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Preservation/Integrity**

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

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

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

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

### **Method/Analysis Information**

**Product:** Ion Chromatography

**Analytical Batch:** 1640559

**Method:** WSP-ANIONS

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
416771001	CASA-17-129327
416771003	CASA-17-129661
1203731280	Method Blank (MB)
1203731281	Laboratory Control Sample (LCS)
1203731282	416868001(CAMO-17-129354) Sample Duplicate (DUP)
1203731283	416868001(CAMO-17-129354) Post Spike (PS)

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

### **SOP Reference**

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

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

The Ion Chromatography analysis was performed on a Dionex ICS-5000 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 416868001 (CAMO-17-129354) was selected for QC analysis.

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

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

#### **Duplicate Relative Percent Difference (RPD) Statement**

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

### **Technical Information**

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

#### **Holding Times**

All samples in this SDG met the specified holding time.

#### **Sample Dilutions**

The following sample 416771003 (CASA-17-129661) was diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	<b>416771</b>
	<b>003</b>
Chloride	10X
Sulfate	10X

#### **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 1203731282 (CAMO-17-129354DUP), 1203731283 (CAMO-17-129354PS), 416771001 (CASA-17-129327) and 416771003 (CASA-17-129661) 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**

<b>Product:</b>	<b>Ammonia Nitrogen</b>		
<b>Analytical Batch:</b>	1640304	<b>Method:</b>	NH3
<b>Prep Batch :</b>	1640302	<b>Method:</b>	EPA 350.1 Prep

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA:350.1:

<b>Sample ID</b>	<b>Client ID</b>
416771001	CASA-17-129327
416771003	CASA-17-129661
1203730603	Method Blank (MB)
1203730604	Laboratory Control Sample (LCS)
1203730605	416771001(CASA-17-129327) Sample Duplicate (DUP)
1203730606	416771001(CASA-17-129327) Matrix Spike (MS)

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

### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-106 REV# 9.

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Calibration Verification Information**

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

### **Continuing Calibration Blanks**

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

### **Calibration Verification Information (CCV)**



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

**Y Intercept Rule**

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

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Sample 416771001 (CASA-17-129327) was selected for QC analysis.

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

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

**Duplicate Relative Percent Difference (RPD) Statement**

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Preservation/Integrity**

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

**Sample Dilutions**

The 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**

<b>Product:</b>	<b>Total Kjeldahl Nitrogen</b>		
<b>Analytical Batch:</b>	1639245	<b>Method:</b>	TKN
<b>Prep Batch :</b>	1639244	<b>Method:</b>	EPA 351.2 Prep

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA:351.2:

<b>Sample ID</b>	<b>Client ID</b>
416771002	CASA-17-129333
416771004	CASA-17-129662
1203728042	Method Blank (MB)
1203728043	Laboratory Control Sample (LCS)
1203728044	416562002(CASA-17-129331) Sample Duplicate (DUP)
1203728877	416572002(CASA-17-129324) Sample Duplicate (DUP)
1203728045	416562002(CASA-17-129331) Matrix Spike (MS)
1203728878	416572002(CASA-17-129324) Matrix Spike (MS)

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

### **SOP Reference**

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

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Calibration Verification Information**

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

### **Continuing Calibration Blanks**

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

**Calibration Verification Information (CCV)**

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

**Y Intercept Rule**

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

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

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Samples 416562002 (CASA-17-129331) and 416572002 (CASA-17-129324) were selected for QC analysis.

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

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

Analyte	Sample	Value
Nitrogen, Total Kjeldahl	1203728045 (CASA-17-129331MS)	80* (90%-110%)

**Duplicate Relative Percent Difference (RPD) Statement**

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Preservation/Integrity**

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

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

Sample1203728042 (MB) was re-analyzed due to instrument failure. The results from the reanalysis are reported.

**Miscellaneous Information**

**Data Exception (DER) Documentation**

A data exception report (DER) 1608537 was generated for sample 1203728045 (CASA-17-129331MS) in this SDG/batch.

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

### **Method/Analysis Information**

**Product:** Nitrate Nitrite by Cadmium Reduction

**Analytical Batch:** 1641424

**Method:** NO3NO2

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
416771001	CASA-17-129327
416771003	CASA-17-129661
1203733269	Method Blank (MB)
1203733270	Laboratory Control Sample (LCS)
1203733271	416562001(CASA-17-129325) Sample Duplicate (DUP)
1203733272	416572001(CASA-17-129323) Sample Duplicate (DUP)
1203733273	416562001(CASA-17-129325) Post Spike (PS)
1203733274	416572001(CASA-17-129323) Post Spike (PS)

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

### **SOP Reference**

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

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

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

#### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

#### **Calibration Verification Information**

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

#### **Continuing Calibration Blanks**

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

#### **Calibration Verification Information (CCV)**

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

**Y Intercept Rule**

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

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

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

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

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

**Duplicate Relative Percent Difference (RPD) Statement**

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Preservation/Integrity**

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

**Sample Dilutions**

The following samples 1203733272 (CASA-17-129323DUP), 1203733274 (CASA-17-129323PS), 416771001 (CASA-17-129327) and 416771003 (CASA-17-129661) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	416771	
	001	003
Nitrogen, Nitrate/Nitrite	10X	10X

**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**

<b>Product:</b>	<b>Total Phosphorus</b>		
<b>Analytical Batch:</b>	1639607	<b>Method:</b>	PO4
<b>Prep Batch :</b>	1639606	<b>Method:</b>	EPA 365.4 Prep

### **Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA 365.4 1974:

<b>Sample ID</b>	<b>Client ID</b>
416771001	CASA-17-129327
416771003	CASA-17-129661
1203728889	Method Blank (MB)
1203728890	Laboratory Control Sample (LCS)
1203728893	416658001(CAMO-17-129294) Sample Duplicate (DUP)
1203728894	416658001(CAMO-17-129294) Matrix Spike (MS)

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

### **SOP Reference**

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

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Continuing Calibration Blanks**

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

### **Calibration Verification Information (CCV)**

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

**Y Intercept Rule**

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

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

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Sample 416658001 (CAMO-17-129294) was selected for QC analysis.

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

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

**Duplicate Relative Percent Difference (RPD) Statement**

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Preservation/Integrity**

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

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

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

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

### **Method/Analysis Information**

**Product:** Solids and Total Dissolved

**Analytical Batch:** 1640261

**Method:** TDS

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
416771001	CASA-17-129327
416771003	CASA-17-129661
1203730485	Method Blank (MB)
1203730486	Laboratory Control Sample (LCS)
1203730489	416771001(CASA-17-129327) Sample Duplicate (DUP)

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

### **SOP Reference**

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

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Quality Control (QC) Information**

#### **Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

#### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

#### **Consecutive Weight Checks**

All consecutive weight checks were met.

**Quality Control (QC) Designation**

Sample 416771001 (CASA-17-129327) was selected for QC analysis.

**Duplicate Relative Percent Difference (RPD) Statement**

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

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

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

### **Method/Analysis Information**

**Product:** Specific Conductivity

**Analytical Batch:** 1640753

**Method:** EPA120.1 Specific Conductivity

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
416771001	CASA-17-129327
416771003	CASA-17-129661
1203731714	Laboratory Control Sample (LCS)
1203731715	416658001(CAMO-17-129294) Sample Duplicate (DUP)
1203731716	416958001(CAMO-17-129302) Sample Duplicate (DUP)

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

### **SOP Reference**

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

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Initial Standardization**

The titrant was properly standardized

### **Quality Control (QC) Information**

#### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

#### **Quality Control (QC) Designation**

Samples 416658001 (CAMO-17-129294) and 416958001 (CAMO-17-129302) were selected for QC analysis.

**Duplicate Relative Percent Difference (RPD) Statement**

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

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

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

### **Method/Analysis Information**

**Product:** pH

**Analytical Batch:** 1641364 **Method:** PH

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
416771001	CASA-17-129327
416771003	CASA-17-129661
1203733168	Laboratory Control Sample (LCS)
1203733169	416771001(CASA-17-129327) Sample Duplicate (DUP)

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

### **SOP Reference**

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

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Initial Standardization**

The titrant was properly standardized

### **Quality Control (QC) Information**

#### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

#### **Quality Control (QC) Designation**

Sample 416771001 (CASA-17-129327) 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
1203733169 (CASA-17-129327DUP)	pH	Received 16-FEB-17, out of holding 14-FEB-17
416771001 (CASA-17-129327)	pH	Received 16-FEB-17, out of holding 14-FEB-17
416771003 (CASA-17-129661)	pH	Received 16-FEB-17, out of holding 14-FEB-17

#### **Sample Dilutions**

The samples in this SDG did not require dilutions.

#### **Sample Re-analysis**

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

#### **Miscellaneous Information**

##### **Data Exception (DER) Documentation**

A data exception report (DER) 1607567 was generated for samples 416771001 (CASA-17-129327), 416771003 (CASA-17-129661) and 1203733169 (CASA-17-129327DUP) 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:** 1641366      **Method:** EPA 310.1 Total Alkalinity

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
416771001	CASA-17-129327
416771003	CASA-17-129661
1203733170	Laboratory Control Sample (LCS)
1203733171	416771001(CASA-17-129327) Sample Duplicate (DUP)
1203733172	416771001(CASA-17-129327) Matrix Spike (MS)

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

### **SOP Reference**

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

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

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

#### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

#### **Initial Standardization**

The titrant was properly standardized

### **Quality Control (QC) Information**

#### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

#### **Quality Control (QC) Designation**

Sample 416771001 (CASA-17-129327) was selected for QC analysis.

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

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

**Duplicate Relative Percent Difference (RPD) Statement**

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

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

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

**Certification Statement**

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

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

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

Client SDG: 2017-1017 GEL Work Order: 416771

**The Qualifiers in this report are defined as follows:**

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

**Review/Validation**

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

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

**Signature:** 

**Name:** Kristen Mizzell

**Date:** 14 MAR 2017

**Title:** Analyst I

# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: March 14, 2017

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

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

Client SDG: 2017-1017

Client Sample ID: CASA-17-129327  
Sample ID: 416771001  
Matrix: W  
Collect Date: 14-FEB-17 12:35  
Receive Date: 16-FEB-17  
Collector: Client

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide	J	0.0943	0.067	0.200	mg/L		1	MXL2	02/18/17	0010	1640559	1
Chloride		6.05	0.067	0.200	mg/L		1					
Fluoride		0.406	0.033	0.100	mg/L		1					
Sulfate		7.17	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.0578	0.017	0.050	mg/L	1.00	1	KLP1	02/21/17	0922	1640304	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		2.64	0.170	0.500	mg/L		10	KLP1	02/27/17	1400	1641424	3
PO4 "As Received"												
Phosphorus, Total as P		0.136	0.020	0.050	mg/L	1.00	1	KLP1	02/28/17	1350	1639607	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		211	3.40	14.3	mg/L			KLP1	02/17/17	1246	1640261	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		70.0	1.45	4.00	mg/L			RXB5	02/22/17	1633	1641366	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		187	1.00	1.00	umhos/cm		1	VH1	02/22/17	1105	1640753	7
PH "As Received"												
pH at Temp 15.4C	H	7.64	0.010	0.100	SU		1	RXB5	02/22/17	1631	1641364	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	02/20/17	1620	1640302
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	02/27/17	1900	1639606

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: March 14, 2017

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

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

Client SDG: 2017-1017

Client Sample ID: CASA-17-129327  
Sample ID: 416771001

Project: ESHL00114  
Client ID: ARSL004

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

### Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: March 14, 2017

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

Los Alamos, New Mexico 87545

Contact: Mr. Keith Greene  
Project: LANL- WQH Water Samples

Client SDG: 2017-1017

Client Sample ID: CASA-17-129333  
Sample ID: 416771002  
Matrix: W  
Collect Date: 14-FEB-17 12:35  
Receive Date: 16-FEB-17  
Collector: Client

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	U	ND	0.330	1.00	mg/L		1	TSM	02/25/17	0728	1639822	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	02/16/17	1054	1640007	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	J	0.0845	0.033	0.100	mg/L	1.00	1	KLP1	02/28/17	1044	1639245	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	02/16/17	1042	1640006
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	02/27/17	1900	1639244

The following Analytical Methods were performed:

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

### Notes:

Column headers are defined as follows:

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



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## Certificate of Analysis

Report Date: March 14, 2017

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

Client SDG: 2017-1017

Client Sample ID: CASA-17-129661  
Sample ID: 416771003  
Matrix: W  
Collect Date: 14-FEB-17 10:55  
Receive Date: 16-FEB-17  
Collector: Client

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide		0.650	0.067	0.200	mg/L		1	MXL2	02/18/17	0036	1640559	1
Fluoride	J	0.0887	0.033	0.100	mg/L		1					
Chloride		70.6	0.670	2.00	mg/L		10	MXL2	02/21/17	0905	1640559	2
Sulfate		90.1	1.33	4.00	mg/L		10					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.137	0.017	0.050	mg/L	1.00	1	KLP1	02/21/17	0925	1640304	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		4.10	0.170	0.500	mg/L		10	KLP1	02/27/17	1401	1641424	4
PO4 "As Received"												
Phosphorus, Total as P		0.162	0.020	0.050	mg/L	1.00	1	KLP1	02/28/17	1351	1639607	5
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		467	3.40	14.3	mg/L			KLP1	02/17/17	1246	1640261	6
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		90.0	1.45	4.00	mg/L			RXB5	02/22/17	1641	1641366	7
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		648	1.00	1.00	umhos/cm		1	VH1	02/22/17	1106	1640753	8
PH "As Received"												
pH at Temp 15.1C	H	7.66	0.010	0.100	SU		1	RXB5	02/22/17	1639	1641364	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	KLP1	02/20/17	1620	1640302
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	02/27/17	1900	1639606

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## Certificate of Analysis

Report Date: March 14, 2017

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

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

Client SDG: 2017-1017

Client Sample ID: CASA-17-129661  
Sample ID: 416771003

Project: ESHL00114  
Client ID: ARSL004

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

### Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: March 14, 2017

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

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

Client SDG: 2017-1017

Client Sample ID: CASA-17-129662  
Sample ID: 416771004  
Matrix: W  
Collect Date: 14-FEB-17 10:55  
Receive Date: 16-FEB-17  
Collector: Client

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	J	0.856	0.330	1.00	mg/L		1	TSM	02/25/17	0813	1639822	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total		5.08	1.67	5.00	ug/L	1.00	1	AXH3	02/16/17	1055	1640007	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl		0.209	0.033	0.100	mg/L	1.00	1	KLP1	02/28/17	1045	1639245	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	02/16/17	1042	1640006
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	02/27/17	1900	1639244

The following Analytical Methods were performed:

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

### Notes:

Column headers are defined as follows:

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

# **Quality Control Summary**

# GEL LABORATORIES LLC

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## QC Summary

Report Date: March 14, 2017

Page 1 of 6

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

Contact: Mr. Keith Greene

Workorder: 416771

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Carbon Analysis</b>											
Batch	1639822										
QC1203731502	416658004	DUP									
Total Organic Carbon Average		U	ND	U	ND	mg/L	N/A		TSM	02/24/17	20:30
QC1203731501	LCS										
Total Organic Carbon Average	10.0				10.8	mg/L	108	(80%-120%)		02/24/17	18:15
QC1203731500	MB										
Total Organic Carbon Average			U	ND	mg/L					02/24/17	17:28
QC1203731504	416658004	PS									
Total Organic Carbon Average	10.0	U	ND		11.0	mg/L	108	(75%-125%)		02/24/17	21:14
<b>Flow Injection Analysis</b>											
Batch	1640007										
QC1203729876	416765002	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	02/16/17	10:52
QC1203729875	LCS										
Cyanide, Total	50.0				47.1	ug/L	94.2	(90%-110%)		02/16/17	10:49
QC1203729874	MB										
Cyanide, Total			U	ND	ug/L					02/16/17	10:48
QC1203729877	416765002	MS									
Cyanide, Total	100	U	ND		97.9	ug/L	97.9	(90%-110%)		02/16/17	10:53
<b>Ion Chromatography</b>											
Batch	1640559										
QC1203731282	416868001	DUP									
Bromide		U	ND	U	ND	mg/L	N/A		MXL2	02/18/17	02:51

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## QC Summary

Workorder: 416771

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1640559										
Chloride		2.46		2.40	mg/L	2.66		(0%-20%)	MXL2	02/18/17	02:51
Fluoride		0.215		0.211	mg/L	1.74	^	(+/-0.100)			
Sulfate		2.82		2.80	mg/L	0.743		(0%-20%)			
QC1203731281 LCS											
Bromide	1.25			1.19	mg/L		94.9	(80%-120%)		02/17/17	21:28
Chloride	5.00			4.94	mg/L		98.8	(80%-120%)			
Fluoride	2.50			2.53	mg/L		101	(80%-120%)			
Sulfate	10.0			10.1	mg/L		101	(80%-120%)			
QC1203731280 MB											
Bromide			U	ND	mg/L					02/17/17	21:01
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203731283 416868001 PS											
Bromide	1.25	U	ND	1.24	mg/L		95.7	(75%-125%)		02/18/17	03:18
Chloride	5.00		2.46	7.20	mg/L		94.8	(75%-125%)			
Fluoride	2.50		0.215	2.40	mg/L		87.2	(75%-125%)			
Sulfate	10.0		2.82	12.5	mg/L		96.7	(75%-125%)			

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## QC Summary

Workorder: 416771

Page 3 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Nutrient Analysis</b>											
Batch	1639245										
QC1203728044	416562002	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A		KLP1	02/28/17	10:19
QC1203728877	416572002	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A			02/28/17	10:21
QC1203728043	LCS										
Nitrogen, Total Kjeldahl	1.00				1.08	mg/L		108 (90%-110%)		02/28/17	10:17
QC1203728042	MB										
Nitrogen, Total Kjeldahl			U		ND	mg/L				02/28/17	10:42
QC1203728045	416562002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND		0.800	mg/L		80* (90%-110%)		02/28/17	10:20
QC1203728878	416572002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND		0.909	mg/L		90.9 (90%-110%)		02/28/17	10:22
Batch	1639607										
QC1203728893	416658001	DUP									
Phosphorus, Total as P			0.171		0.158	mg/L	7.9 ^	(+/-0.050)	KLP1	02/28/17	13:38
QC1203728890	LCS										
Phosphorus, Total as P	1.00				1.01	mg/L		101 (80%-124%)		02/28/17	13:24
QC1203728889	MB										
Phosphorus, Total as P			U		ND	mg/L				02/28/17	13:24
QC1203728894	416658001	MS									
Phosphorus, Total as P	1.00		0.171		1.33	mg/L		116 (63%-139%)		02/28/17	13:39
Batch	1640304										
QC1203730605	416771001	DUP									
Nitrogen, Ammonia			0.0578	J	0.048	mg/L	18.5 ^	(+/-0.050)	KLP1	02/21/17	09:23

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## QC Summary

Workorder: 416771

Page 4 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Nutrient Analysis</b>											
Batch	1640304										
QC1203730604	LCS										
Nitrogen, Ammonia	1.00			1.03	mg/L		103	(90%-110%)	KLP1	02/21/17	09:10
QC1203730603	MB										
Nitrogen, Ammonia			U	ND	mg/L					02/21/17	09:09
QC1203730606	416771001	MS									
Nitrogen, Ammonia	1.00	0.0578		1.04	mg/L		98.2	(90%-110%)		02/21/17	09:24
Batch	1641424										
QC1203733271	416562001	DUP									
Nitrogen, Nitrate/Nitrite		0.438		0.434	mg/L	0.917		(0%-20%)	KLP1	02/27/17	13:31
QC1203733272	416572001	DUP									
Nitrogen, Nitrate/Nitrite		5.81		5.30	mg/L	9.18		(0%-20%)		02/27/17	13:34
QC1203733270	LCS										
Nitrogen, Nitrate/Nitrite	1.00			0.937	mg/L		93.7	(90%-110%)		02/27/17	13:28
QC1203733269	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					02/27/17	13:27
QC1203733273	416562001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.438		1.39	mg/L		95.2	(90%-110%)		02/27/17	13:32
QC1203733274	416572001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.581		1.49	mg/L		90.9	(90%-110%)		02/27/17	13:35
<b>Solids Analysis</b>											
Batch	1640261										
QC1203730489	416771001	DUP									
Total Dissolved Solids		211		204	mg/L	3.44		(0%-5%)	KLP1	02/17/17	12:46



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## QC Summary

Workorder: 416771

Page 5 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Solids Analysis</b>											
Batch	1640261										
QC1203730486	LCS										
Total Dissolved Solids	300			300	mg/L		100	(95%-105%)	KLP1	02/17/17	12:46
QC1203730485	MB										
Total Dissolved Solids			U	ND	mg/L					02/17/17	12:46
<b>Titration and Ion Analysis</b>											
Batch	1640753										
QC1203731715	416658001	DUP									
Conductivity			142	142	umhos/cm	0.0704		(0%-10%)	VH1	02/22/17	11:02
QC1203731716	416958001	DUP									
Conductivity			135	135	umhos/cm	0.445		(0%-10%)		02/22/17	11:07
QC1203731714	LCS										
Conductivity	1410			1410	umhos/cm		99.4	(95%-105%)		02/22/17	11:02
Batch	1641364										
QC1203733169	416771001	DUP									
pH		H	7.64	H	7.67	SU	0.392	(0%-5%)	RXB5	02/22/17	16:34
QC1203733168	LCS										
pH	7.00			6.99	SU		99.9	(99%-101%)		02/22/17	16:09
Batch	1641366										
QC1203733171	416771001	DUP									
Alkalinity, Total as CaCO3			70.0		72.0	mg/L	2.82	(0%-20%)	RXB5	02/22/17	16:36
Carbonate alkalinity (CaCO3)		U	ND	U	ND	mg/L	N/A				
QC1203733170	LCS										
Alkalinity, Total as CaCO3	100			109	mg/L		109	(90%-110%)		02/22/17	16:11

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## QC Summary

Workorder: 416771

Page 6 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Titration and Ion Analysis</b>											
Batch	1641366										
QC1203733172	416771001	MS									
Alkalinity, Total as CaCO3	100	70.0		178	mg/L		108	(80%-120%)	RXB5	02/22/17	16:36

### Notes:

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

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

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

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

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

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

# Miscellaneous

DATA EXCEPTION REPORT			
<b>Mo.Day Yr.</b> 23-FEB-17	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> ELECTRODE	<b>Test / Method:</b> EPA 150.1	<b>Matrix Type:</b> Liquid	<b>Client Code:</b> ESHL
<b>Batch ID:</b> 1641364	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG):</b> 416771(2017-1017),416862(2017-1031),416868(2017-1029),416958(2017-1050) <b>Application Issues:</b> Sample received out of holding			
<b>Specification and Requirements</b>		<b>DER Disposition:</b>	
<b>Exception Description:</b>			
1. Sample received out of holding:  416771 001,003  416862 001  416868 001  416958 001,003  QC 1203733169DUP		1. Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified. 1203733169 (CASA-17-129327DUP) [Received 16-FEB-17, out of holding 14-FEB-17]. 416771001 (CASA-17-129327) [Received 16-FEB-17, out of holding 14-FEB-17]. 416771003 (CASA-17-129661) [Received 16-FEB-17, out of holding 14-FEB-17]. 416862001 (CAMO-17-129304) [Received 17-FEB-17, out of holding 15-FEB-17]. 416868001 (CAMO-17-129354) [Received 17-FEB-17, out of holding 15-FEB-17]. 416958001 (CAMO-17-129302) [Received 18-FEB-17, out of holding 16-FEB-17]. 416958003 (CASA-17-129341) [Received 18-FEB-17, out of holding 16-FEB-17].	

**Originator's Name:**  
Rachael Bell      23-FEB-17

**Data Validator/Group Leader:**  
Elzbieta Szulc      07-MAR-17

DATA EXCEPTION REPORT			
<b>Mo.Day Yr.</b> 28-FEB-17	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> LACHAT Flow Injection Analyzer	<b>Test / Method:</b> EPA 351.2, EPA 351.2 SC	<b>Matrix Type:</b> Liquid	<b>Client Code:</b> ESHL
<b>Batch ID:</b> 1639245	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG):</b> 416562(2017-1003),416572(2017-1005),416657(2017-1012),416658(2017-1011),416767(2017-1018),416771(2017-1017),416862(2017-1031),417067(2017-1053) <b>Application Issues:</b> Failed Recovery for MS/MSD, or PS/PSD			
<b>Specification and Requirements</b>		<b>DER Disposition:</b>	
<b>Exception Description:</b>			
1. Failed Recovery for MS/MSD, or PS/PSD: QC 1203728045MS		1. The matrix spike recovered outside of the established acceptance limits due to matrix interference and/or non-homogeneity. Nitrogen, Total Kjeldahl 1203728045 (CASA-17-129331MS) [80* (90%-110%)].	

**Originator's Name:**

Kristen Mizzell 28-FEB-17

**Data Validator/Group Leader:**

Aubrey Kingsbury 28-FEB-17