

The order of this data package is as follows:

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

Comments:



[illegible]



## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11097

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

SAMPLE ID: CAMO-17-129411

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	02/07/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	12:18	OK	MEDIA:	UA	↓
PRS ID:	NA	↓	SAMPLE TECH CODE:	OK	CSP
LOCATION ID:	R-45 S1	↓	FIELD PREP:	F	OK
LOCATION TYPE:	NA	↓	FIELD QC TYPE:	REG	↓
TOP DEPTH:	↓	↓	SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / NA

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

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Dissolved Oxygen \_\_\_\_\_ mg/L  
 pH \_\_\_\_\_ SU  
 Turbidity \_\_\_\_\_ NTU

Daniel Scrubbe 2/7/17  
 Flow (in gpm) \_\_\_\_\_ GPM  
 Specific Conductance \_\_\_\_\_ uS/cm  
 Oxidation-Reduction Potential \_\_\_\_\_ mV  
 Temperature \_\_\_\_\_ deg C

COLLECTED BY (PRINT): D. Hughes

RELINQUISHED BY (Printed Name) Daniel Scrubbe (Signature) <i>[Signature]</i>	Date/Time 2/7/17 1506	RECEIVED BY (Printed Name) M. Mark (Signature) <i>[Signature]</i>	Date/Time 2/7/17 1506
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: CAMO-17-129412

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	02/07/2017	ck	FIELD MATRIX:	WG	ck
TIME COLLECTED (HH:MM):	1419	ck	MEDIA:	UA	↓
PRS ID:	NS	↓	SAMPLE TECH CODE:	ck	GSP
LOCATION ID:	R-45 S2	↓	FIELD PREP:	F	ck
LOCATION TYPE:	M	↓	FIELD QC TYPE:	REG	↓
TOP DEPTH:	↓	↓	SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / NA

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

SAMPLE COMMENTS:

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): D. Hughes

RELINQUISHED BY (Printed Name) Daniel Samli (Signature)	Date/Time 2/7/17 1508	RECEIVED BY (Printed Name) M. Montoya (Signature)	Date/Time 2/7/17 1508
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: CAMO-17-129315

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	02/07/2017	ck	FIELD MATRIX:	WG	ck
TIME COLLECTED (HH:MM):	1218	ck	MEDIA:	UA	↓
PRS ID:	NA		SAMPLE TECH CODE:	ck	GSP
LOCATION ID:	R-45 S1		FIELD PREP:	UF	ck
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	↓
TOP DEPTH:	↓		SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / NA

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

SAMPLE COMMENTS: None

LOCATION COMMENTS: Sampled 50 ft from running diesel generator

## FIELD PARAMETERS:

Dissolved Oxygen	<u>7.16</u>	mg/L	Flow (in gpm)	<u>3.26</u>	GPM	Oxidation-Reduction Potential	<u>167.2</u>	mV
pH	<u>7.91</u>	SU	Specific Conductance	<u>158.8</u>	uS/cm	Temperature	<u>19.8</u>	deg C
Turbidity	<u>1.45</u>	NTU						

COLLECTED BY (PRINT): T. Benke

RELINQUISHED BY (Printed Name) (Signature)	Date/Time 2/7/17 1508	RECEIVED BY (Printed Name) (Signature)	Date/Time 2/7/17 1508
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: CAMO-17-129316

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	02/07/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1419	OK	MEDIA:	UA	↓
PRS ID:	NA	↓	SAMPLE TECH CODE:	OK	CSP
LOCATION ID:	R-45 S2	↓	FIELD PREP:	UF	OK
LOCATION TYPE:	MC	↓	FIELD QC TYPE:	REG	↓
TOP DEPTH:	↓	↓	SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	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: Nae

LOCATION COMMENTS: Sampled 50 ft from running diesel generator

## FIELD PARAMETERS:

Dissolved Oxygen	6.10	mg/L	Flow (in gpm)	3.33	GPM	Oxidation-Reduction Potential	170.7	mV
pH	8.35	SU	Specific Conductance	1730	uS/cm	Temperature	19.8	deg C
Turbidity	0.86	NTU						

COLLECTED BY (PRINT): T. Berken

RELINQUISHED BY (Printed Name) (Signature)	Date/Time 2/7/17 1508	RECEIVED BY (Printed Name) (Signature)	Date/Time 2/7/17 1508
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. 2017-986

### 1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
415984	EPA:120.1	2				
415984	EPA:150.1	2				
415984	EPA:160.1	2				
415984	EPA:245.2	4				
415984	EPA:300.0	2				
415984	EPA:310.1	2				
415984	EPA:335.4	2				
415984	EPA:350.1	2				
415984	EPA:351.2	2				
415984	EPA:353.2	2				
415984	EPA:365.4	2				
415984	SM:A2340B	2				
415984	SW-846:6010C	2				
415984	SW-846:6020	2				
415984	SW-846:6850	2				
415984	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
415984	EPA:120.1	1638832	1638832	2										1				1			
415984	EPA:150.1	1639321	1639321	2										1				2			
415984	EPA:160.1	1637881	1637881	2					1					1				1			
415984	EPA:245.2	1638358	1638357	4					1	1				1				1			
415984	EPA:300.0	1638245	1638245	2					1					1				1			
415984	EPA:310.1	1639313	1639313	2						2				1				2			
415984	EPA:335.4	1638310	1638309	2					1	1				1				1			
415984	EPA:350.1	1638313	1638312	2					1	2				1				2			



## DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
415984	EPA:351.2	1637591	1637590	2					1	1				1			1				
415984	EPA:353.2	1638418	1638418	2					1					1			1				
415984	EPA:365.4	1638315	1638314	2					1	1				1			1				
415984	SM:A2340B	1645320	1645320	2																	
415984	SW-846:6010C	1638041	1638040	2					1	1				1			1				
415984	SW-846:6020	1638022	1638021	2					1	1				1			1				
415984	SW-846:6850	1639267	1639266	2					1	1	1			1							
415984	SW-846:9060	1637938	1637938	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-17-129411	415984002	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAMO-17-129412	415984004	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203727093	LCS	0	0	1	0
EPA:120.1	GENERAL CHEMISTRY	WST09-17-129397	1203727095	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-129297	1203728233	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-129411	415984002	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-17-129412	415984004	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203728231	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	WST09-17-129397	1203728232	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-129293	1203726966	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-129411	415984002	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-17-129412	415984004	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203724669	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203724668	MB	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-129293	1203725978	DUP	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-129293	1203725979	MS	0	0	1	0
EPA:245.2	INORGANIC	CAMO-17-129315	415984001	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-129316	415984003	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-129411	415984002	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-17-129412	415984004	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203725977	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	1203725976	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-17-129322	1203725663	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-17-129411	415984002	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-17-129412	415984004	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203725662	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203725661	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-129297	1203728224	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-129297	1203728226	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-129411	415984002	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-17-129412	415984004	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203728222	LCS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	WST09-17-129397	1203728223	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	WST09-17-129397	1203728225	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-129315	1203725830	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-129315	1203725831	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-129315	415984001	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CAMO-17-129316	415984003	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203725829	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203725828	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-129411	1203725835	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-129411	1203725836	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-129411	415984002	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-129412	1203726128	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-129412	1203726129	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-17-129412	415984004	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203725834	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203725833	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-129309	1203725837	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-129309	1203725839	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-129315	415984001	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-17-129316	415984003	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203723921	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203723920	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-17-129411	1203726123	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-17-129411	415984002	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-17-129412	415984004	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203726121	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1203726120	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-129411	1203725844	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-129411	1203725846	MS	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:365.4	GENERAL CHEMISTRY	CAMO-17-129411	415984002	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-17-129412	415984004	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203725842	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203725841	MB	1	0	0	0
SM:A2340B	INORGANIC	CAMO-17-129411	415984002	REG	1	0	0	0
SM:A2340B	INORGANIC	CAMO-17-129412	415984004	REG	1	0	0	0
SW-846:6010C	INORGANIC	CAMO-17-129293	1203725102	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-17-129293	1203725103	MS	0	0	17	0
SW-846:6010C	INORGANIC	CAMO-17-129411	415984002	REG	17	0	0	0
SW-846:6010C	INORGANIC	CAMO-17-129412	415984004	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203725101	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203725100	MB	17	0	0	0
SW-846:6020	INORGANIC	CAMO-17-129293	1203725061	DUP	11	0	0	0
SW-846:6020	INORGANIC	CAMO-17-129293	1203725062	MS	0	0	11	0
SW-846:6020	INORGANIC	CAMO-17-129411	415984002	REG	11	0	0	0
SW-846:6020	INORGANIC	CAMO-17-129412	415984004	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203725060	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203725059	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-129411	1203728090	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-129411	1203728091	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-129411	415984002	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-17-129412	415984004	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203728089	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203728088	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-129315	415984001	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-129316	415984003	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-17-129321	1203725737	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203725732	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203725731	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.



## DATA VALIDATION REPORT

5. Any contaminants in blanks?

No.

6. Any surrogate recoveries outside the control limits?

No.

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

No.

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

No.

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

Field Sample ID	Lab Sample ID	LD Lab Sample ID	Analytical Method	Parameter Name	Sample Matrix	Lab Result	LD Lab Result	Lab Units	Detect Flag	LD Detect Flag	RPD	RPD Limit
CAMO-17-129412	415984004	1203726128	EPA:350.1	Ammonia as	W	0.0648	0.085	mg/L	Y	Y	27	20

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.



## DATA VALIDATION REPORT

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-45 S2	2017-986	CAMO-17-129412	REG	INIT	GENERAL CHEMISTRY	EPA:350.1	Ammonia as Nitrogen	J	I10b		Y	0.0648	mg/L	0.0648	mg/L			W	02/07/2017	1638313	VAL	Y	

### Reason Code

### Description

I10b	The sample and/or the duplicate sample results RPD is not within the acceptance limits. Follow the external laboratory limits located within the associated data package
J_LAB	The analytical laboratory qualified the detected result as estimated (J) because the result was less the PQL but greater than the MDL
NQ	The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualifire. The analyte is detected in the sample.
U_LAB	The analytical laboratory qualified the analyte as not detected.

### 14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-17-129315	R-45 S1	REG	EPA:245.2	0	1
CAMO-17-129315	R-45 S1	REG	EPA:335.4	0	1
CAMO-17-129315	R-45 S1	REG	EPA:351.2	0	1
CAMO-17-129315	R-45 S1	REG	SW-846:9060	0	1
CAMO-17-129316	R-45 S2	REG	EPA:245.2	0	1
CAMO-17-129316	R-45 S2	REG	EPA:335.4	0	1
CAMO-17-129316	R-45 S2	REG	EPA:351.2	0	1
CAMO-17-129316	R-45 S2	REG	SW-846:9060	0	1
CAMO-17-129411	R-45 S1	REG	EPA:120.1	0	1
CAMO-17-129411	R-45 S1	REG	EPA:150.1	0	1
CAMO-17-129411	R-45 S1	REG	EPA:160.1	0	1
CAMO-17-129411	R-45 S1	REG	EPA:245.2	0	1
CAMO-17-129411	R-45 S1	REG	EPA:300.0	0	4
CAMO-17-129411	R-45 S1	REG	EPA:310.1	0	2
CAMO-17-129411	R-45 S1	REG	EPA:350.1	0	1
CAMO-17-129411	R-45 S1	REG	EPA:353.2	0	1
CAMO-17-129411	R-45 S1	REG	EPA:365.4	0	1
CAMO-17-129411	R-45 S1	REG	SM:A2340B	0	1
CAMO-17-129411	R-45 S1	REG	SW-846:6010C	0	17
CAMO-17-129411	R-45 S1	REG	SW-846:6020	0	11



## DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-17-129411	R-45 S1	REG	SW-846:6850	0	1
CAMO-17-129412	R-45 S2	REG	EPA:120.1	0	1
CAMO-17-129412	R-45 S2	REG	EPA:150.1	0	1
CAMO-17-129412	R-45 S2	REG	EPA:160.1	0	1
CAMO-17-129412	R-45 S2	REG	EPA:245.2	0	1
CAMO-17-129412	R-45 S2	REG	EPA:300.0	0	4
CAMO-17-129412	R-45 S2	REG	EPA:310.1	0	2
CAMO-17-129412	R-45 S2	REG	EPA:350.1	0	1
CAMO-17-129412	R-45 S2	REG	EPA:353.2	0	1
CAMO-17-129412	R-45 S2	REG	EPA:365.4	0	1
CAMO-17-129412	R-45 S2	REG	SM:A2340B	0	1
CAMO-17-129412	R-45 S2	REG	SW-846:6010C	0	17
CAMO-17-129412	R-45 S2	REG	SW-846:6020	0	11
CAMO-17-129412	R-45 S2	REG	SW-846:6850	0	1



March 06, 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

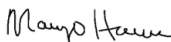
Re: LANL- WQH Water Samples  
Work Order: 415984  
SDG: 2017-986

Dear Mr. Greene:

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

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

Sincerely,

  
Margo Herron for  
Valerie Davis  
Project Manager

Chain of Custody: 2017-986  
Enclosures





**ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)**  
**LANL- WQH Water Samples**  
**Work Order #: 415984**  
**SDG: 2017-986**



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# Case Narrative



**Case Narrative for  
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)  
LANL- WQH Water Samples  
Workorder #: 415984  
SDG # : 2017-986**

**March 06, 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 09, 2017 for analysis. The samples were delivered with proper chain of custody documentation and signatures. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. Containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Shipping container temperature was within specification (0 - 6C). Shipping container temperatures were checked, documented, and within specifications. There are no additional comments concerning sample receipt.

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

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
415984001	CAMO-17-129315
415984002	CAMO-17-129411
415984003	CAMO-17-129316
415984004	CAMO-17-129412

**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 06 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>LANC</u>		SDG/AR/COC/Work Order: <u>415984</u>	
Received By: <u>Elan</u>		Date Received: <u>2/9/17</u>	
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
COC/Samples marked as radioactive?	<input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>Open</u>	
Classified Radioactive II or III by RSO?	<input type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?	
COC/Samples marked containing PCBs?	<input type="checkbox"/>		
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<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?	<input type="checkbox"/>	Hazard Class Shipped: UN#:	
Samples identified as Foreign Soil?	<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>IR3-1c</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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input 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: <u>FedEx Air</u> FedEx Ground UPS Field Services Courier Other  <u>5908 1781 6982-2°C</u> <u>5908 1781 6971-1°C</u>

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials ELPDate 2/10/17Page 1 of 1



ORIGIN ID:SAFA (505) 665-9966  
KEITH GREENE  
LOS ALAMOS NATL LAB.  
TA00 BLDG 1237 DPU 03  
LOS ALAMOS, NM 87545  
UNITED STATES US

SHIP DATE: 08FEB17  
ACTWGT: 47.0 LB MAN  
CAD: 0014176/CAFE2916

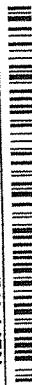
BILL SENDER

TO VALERIE DAVIS  
GENERAL ENGINEERING LAB  
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

REF: WE6L11551000



FedEx  
Express



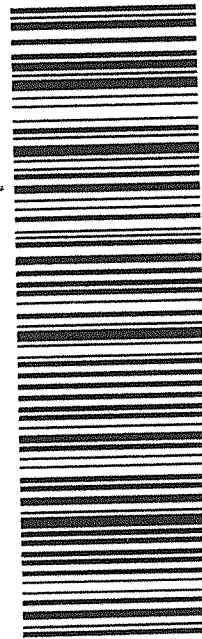
THU - 09 FEB 10:30A  
PRIORITY OVERNIGHT

TRK# 5908 1781 6982

0201

X7 CHSA

29407  
SC-US CHS



Part # 156148V-434 R1T2 06/15

02.09  
6969

ORIGIN ID:SAFA (505) 665-9966  
KEITH GREENE  
LOS ALAMOS NATL LAB.  
TA00 BLDG 1237 DPU 03  
LOS ALAMOS, NM 87545  
UNITED STATES US

SHIP DATE: 08FEB17  
ACTWGT: 52.0 LB MAN  
CAD: 0014176/CAFE2916

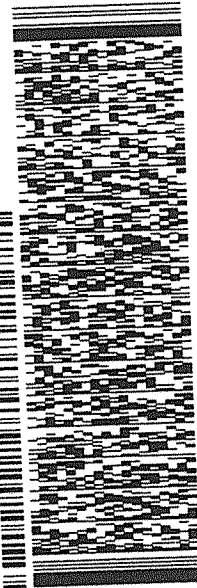
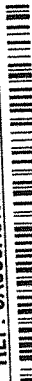
BILL SENDER

TO VALERIE DAVIS  
GENERAL ENGINEERING LAB  
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 556-8171

REF: 6A000ASRGW04BAGWS0



FedEx  
Express



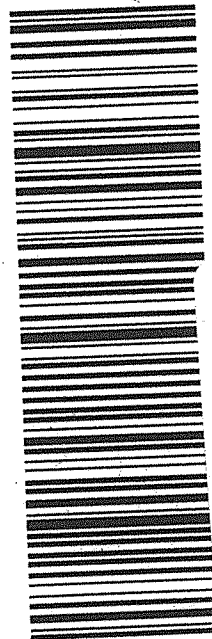
THU - 09 FEB 10:30A  
PRIORITY OVERNIGHT

TRK# 5908 1781 6971

0201

X7 CHSA

29407  
SC-US CHS



Part # 156148V-434 R1T2 06/15

RT 0

6971

02.09

FZ 0



# **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 #: 2017-986  
Work Order #: 415984**

**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: 1639267

Prep Batch Number: 1639266

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
415984002	415984002 (CAMO-17-129411)
415984004	415984004 (CAMO-17-129412)
1203728092	Interference Check Sample (ICS)
1203728088	Method Blank (MB)
1203728089	Laboratory Control Sample (LCS)
1203728090	415984002(CAMO-17-129411) Matrix Spike (MS)
1203728091	415984002(CAMO-17-129411) 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 415984002 (CAMO-17-129411) was chosen for matrix spike and matrix spike duplicate analysis.

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

The MS recoveries were within the established acceptance limits.

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

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

### **Internal Standard Area Acceptance**

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

### **Retention Time**

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

## **Technical Information**

### **Holding Time Specifications**

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



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

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

All procedures were performed as stated in the SOP.

#### **Sample Dilutions**

The samples in this SDG did not require dilutions.

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

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

#### **Miscellaneous Information**

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

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

##### **Manual Integrations**

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

##### **Method Comments**

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

##### **Additional Comments**

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

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

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

#### **System Configuration**

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

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

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

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and



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

#### **Chromatographic Columns**

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

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

Dionex: IonPac AG-16 2 x 50 mm.

#### **Certification Statement**

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



## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

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

Client SDG: 2017-986 GEL Work Order: 415984

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

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

#### Review/Validation

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

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

Signature: 

Name: Michael Penny

Date: 21 FEB 2017

Title: Group Leader



# **Sample Data Summary**



## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1639266Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-129411Date Received: 09-FEB-17GEL Job No (SDG): 2017-986GEL Sample ID: 415984002Date Filtered: 14-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	0.603	ug/L		1	14-FEB-17 17:38	per0214016a
	Perchlorate Isotope Ratio			2.94			1	14-FEB-17 17:38	per0214016a
14797-73-0	Perchlorate-101	.05	.2	0.607	ug/L		1	14-FEB-17 17:38	per0214016a
	Perchlorate-O(18)			0.519	ug/L		1	14-FEB-17 17:38	per0214016a

^ 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: 1639266Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-129412Date Received: 09-FEB-17GEL Job No (SDG): 2017-986GEL Sample ID: 415984004Date Filtered: 14-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	0.435	ug/L		1	14-FEB-17 18:01	per0214019a
	Perchlorate Isotope Ratio			3.01			1	14-FEB-17 18:01	per0214019a
14797-73-0	Perchlorate-101	.05	.2	0.428	ug/L		1	14-FEB-17 18:01	per0214019a
	Perchlorate-O(18)			0.507	ug/L		1	14-FEB-17 18:01	per0214019a

^ 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):** 2017-986

**Extract Batch Code:** 1639266

**Date Filtered:** 14-FEB-17

**Matrix:** WATER

**Sample ID:** 1203728089

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.215	ug/L	108		85 - 115
Perchlorate Isotope Ratio		2.98				-
Perchlorate-101	0.200	.214	ug/L	107		85 - 115
Perchlorate-O(18)		.477	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):** 2017-986

**Extract Batch Code:** 1639266

**Date Extracted:** 14-FEB-17

**GEL MS/PS ID:** 1203728090

**Client ID:** CAMO-17-129411

**GEL MSD/PSD ID:** 1203728091

**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	0.603	ug/L	0.818	107	.811	104	1	30	75 - 125
Perchlorate Isotope Ratio	0	2.94		2.98		3.01		1		-
Perchlorate-101	0.200	0.607	ug/L	0.812	102	.798	95	2	30	75 - 125
Perchlorate-O(18)	0	0.519	ug/L	0.510		.513		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: 1639266Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 14-FEB-17GEL Job No (SDG): 2017-986GEL Sample ID: 1203728088Date Filtered: 14-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	14-FEB-17 17:14	per0214013a
	Perchlorate Isotope Ratio						1	14-FEB-17 17:14	per0214013a
14797-73-0	Perchlorate-101	.05	.2	0.200	ug/L	U	1	14-FEB-17 17:14	per0214013a
	Perchlorate-O(18)			0.499	ug/L		1	14-FEB-17 17:14	per0214013a

^ 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: 1639266Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 14-FEB-17GEL Job No (SDG): 2017-986GEL Sample ID: 1203728089Date Filtered: 14-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	0.215	ug/L		1	14-FEB-17 17:22	per0214014a
	Perchlorate Isotope Ratio			2.98			1	14-FEB-17 17:22	per0214014a
14797-73-0	Perchlorate-101	.05	.2	0.214	ug/L		1	14-FEB-17 17:22	per0214014a
	Perchlorate-O(18)			0.477	ug/L		1	14-FEB-17 17:22	per0214014a

^ 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: 1639266Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2017-986GEL Sample ID: 1203728092Date Filtered: 14-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	0.206	ug/L		1	14-FEB-17 17:30	per0214015a
	Perchlorate Isotope Ratio			3.03			1	14-FEB-17 17:30	per0214015a
14797-73-0	Perchlorate-101	.05	.2	0.201	ug/L		1	14-FEB-17 17:30	per0214015a
	Perchlorate-O(18)			0.522	ug/L		1	14-FEB-17 17:30	per0214015a

^ 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: 1639266Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-129411MSDate Received: 09-FEB-17GEL Job No (SDG): 2017-986GEL Sample ID: 1203728090Date Filtered: 14-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	0.818	ug/L		1	14-FEB-17 17:46	per0214017a
	Perchlorate Isotope Ratio			2.98			1	14-FEB-17 17:46	per0214017a
14797-73-0	Perchlorate-101	.05	.2	0.812	ug/L		1	14-FEB-17 17:46	per0214017a
	Perchlorate-O(18)			0.510	ug/L		1	14-FEB-17 17:46	per0214017a

^ 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: 1639266Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-17-129411MSDDate Received: 09-FEB-17GEL Job No (SDG): 2017-986GEL Sample ID: 1203728091Date Filtered: 14-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	0.811	ug/L		1	14-FEB-17 17:54	per0214018a
	Perchlorate Isotope Ratio			3.01			1	14-FEB-17 17:54	per0214018a
14797-73-0	Perchlorate-101	.05	.2	0.798	ug/L		1	14-FEB-17 17:54	per0214018a
	Perchlorate-O(18)			0.513	ug/L		1	14-FEB-17 17:54	per0214018a

^ 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 #: 2017-986**  
**Work Order #: 415984**

<b>Sample ID</b>	<b>Client ID</b>
415984001	CAMO-17-129315
415984002	CAMO-17-129411
415984003	CAMO-17-129316
415984004	CAMO-17-129412
1203725100	Method Blank (MB) <b>ICP</b>
1203725101	Laboratory Control Sample (LCS)
1203725104	415985001(CAMO-17-129293L) Serial Dilution (SD)
1203725102	415985001(CAMO-17-129293D) Sample Duplicate (DUP)
1203725103	415985001(CAMO-17-129293S) Matrix Spike (MS)
1203725059	Method Blank (MB) <b>ICP-MS</b>
1203725060	Laboratory Control Sample (LCS)
1203725063	415985001(CAMO-17-129293L) Serial Dilution (SD)
1203725061	415985001(CAMO-17-129293D) Sample Duplicate (DUP)
1203725062	415985001(CAMO-17-129293S) Matrix Spike (MS)
1203725976	Method Blank (MB) <b>CVAA</b>
1203725977	Laboratory Control Sample (LCS)
1203725980	415985001(CAMO-17-129293L) Serial Dilution (SD)
1203725978	415985001(CAMO-17-129293D) Sample Duplicate (DUP)
1203725979	415985001(CAMO-17-129293S) Matrix Spike (MS)

**Sample Analysis**

Samples 415984001,002,003 and 004 in this SDG were analyzed for metals and mercury on an "as received" basis.

**Method/Analysis Information**

<b>Analytical Batch:</b>	1638041, 1638022, 1638358 and 1645320
<b>Prep Batch :</b>	1638040, 1638021 and 1638357
<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# 33 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. 415984002 (CAMO-17-129411) and 415984004 (CAMO-17-129412)-ICP. The CRDL standard recoveries for SW846 6020A/6020B met the advisory control limits with the exception of uranium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data was not adversely affected. ICP-MS.

### **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: 415985001 (CAMO-17-129293)-ICP, ICP-MS and CVAA.

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

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



control acceptance criteria for percent recoveries for all applicable analytes.

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

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

#### **Serial Dilution % Difference Statement**

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

#### **Technical Information**

##### **Holding Time Specifications**

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

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

All procedures were performed as stated in the SOP.

##### **Sample Dilutions**

The samples in this SDG did not require dilutions.

##### **Preparation Information**

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

#### **Miscellaneous Information**

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

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

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

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

A data exception report was not required for this SDG.

##### **Additional Comments**

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

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

Please refer to the Total Ca and Total Mg data to validate results appearing on the Hardness Summary sheet. Both results are in the Inorganic/metals section of the package. There is no Batch QC for calculated results, and thus no QC Summary for the Hardness by Calculation Batch. The MDLs and PQLs are calculated using the higher of the two calculated values of Ca or Mg.



**Certification Statement**

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



## **GEL LABORATORIES LLC**

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

### **Qualifier Definition Report for**

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

Client SDG: 2017-986 GEL Work Order: 415984

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

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

#### **Review/Validation**

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

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

**Signature:**



**Name: Nik-Cole Elmore**

**Date: 07 MAR 2017**

**Title: Data Validator**



# **Sample Data Summary**



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

**SDG No:** 2017-986**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 415984001**BASIS:** As Received**DATE COLLECTED** 07-FEB-17**CLIENT ID:** CAMO-17-129315**LEVEL:** Low**DATE RECEIVED** 09-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	02/13/17 10:14	021317W1-8	1638358

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1638358	1638357	EPA 245.1/245.2 Prep	20	mL	20	mL	02/10/17	AXS5

**\*Analytical Methods:**

AV EPA 245.1/245.2



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

**SDG No:** 2017-986**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 415984002**BASIS:** As Received**DATE COLLECTED** 07-FEB-17**CLIENT ID:** CAMO-17-129411**LEVEL:** Low**DATE RECEIVED** 09-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	02/13/17 10:21	021317W1-8	1638358



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

SDG No: 2017-986

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 415984002

BASIS: As Received

DATE COLLECTED 07-FEB-17

CLIENT ID: CAMO-17-129411

LEVEL: Low

DATE RECEIVED 09-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	03/06/17 13:32	030617-1	1638041
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	PRB	02/24/17 08:51	170223-6	1638022
7440-38-2	Arsenic	1.85	ug/L	J	1.7	5	5	1	MS	PRB	02/23/17 18:55	170223-4	1638022
7440-39-3	Barium	29.3	ug/L		1	5	5	1	P	HSC	03/06/17 13:32	030617-1	1638041
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	03/06/17 13:32	030617-1	1638041
7440-42-8	Boron	17.5	ug/L	J	15	50	50	1	P	HSC	03/06/17 13:32	030617-1	1638041
7440-43-9	Cadmium	1	ug/L	U	0.3	1	1	1	MS	PRB	02/22/17 17:57	170222-2	1638022
7440-70-2	Calcium	18300	ug/L		50	200	200	1	P	HSC	03/06/17 13:32	030617-1	1638041
7440-47-3	Chromium	43.4	ug/L		3	10	10	1	MS	PRB	02/22/17 17:57	170222-2	1638022
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	03/06/17 13:32	030617-1	1638041
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	03/06/17 13:32	030617-1	1638041
7439-89-6	Iron	100	ug/L	U	30	100	100	1	P	HSC	03/06/17 13:32	030617-1	1638041
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	PRB	02/22/17 20:20	170222-3	1638022
7439-95-4	Magnesium	4880	ug/L		110	300	300	1	P	HSC	03/06/17 13:32	030617-1	1638041
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	03/06/17 13:32	030617-1	1638041
7439-98-7	Molybdenum	0.963	ug/L		0.3	0.5	0.5	1	MS	PRB	02/24/17 16:21	170224-7	1638022
7440-02-0	Nickel	0.933	ug/L	J	0.5	2	2	1	MS	PRB	02/22/17 17:57	170222-2	1638022
7440-09-7	Potassium	1260	ug/L		50	150	150	1	P	HSC	03/06/17 13:32	030617-1	1638041
7782-49-2	Selenium	5	ug/L	U	2	5	5	1	MS	PRB	02/23/17 18:55	170223-4	1638022
7631-86-9	Silica	69800	ug/L		53	213	213	1	P	HSC	03/06/17 13:32	030617-1	1638041
7440-22-4	Silver	1	ug/L	U	0.4	1	1	1	MS	PRB	02/22/17 17:57	170222-2	1638022
7440-23-5	Sodium	10900	ug/L		100	300	300	1	P	HSC	03/06/17 13:32	030617-1	1638041
7440-24-6	Strontium	80.1	ug/L		1	5	5	1	P	HSC	03/06/17 13:32	030617-1	1638041
7440-28-0	Thallium	2	ug/L	U	0.6	2	2	1	MS	PRB	02/22/17 20:20	170222-3	1638022
7440-31-5	Tin	10	ug/L	U	2.5	10	10	1	P	HSC	03/06/17 13:32	030617-1	1638041
7440-61-1	Uranium	0.769	ug/L		0.067	0.2	0.2	1	MS	PRB	02/22/17 20:20	170222-3	1638022
7440-62-2	Vanadium	4.68	ug/L	J	1	5	5	1	P	HSC	03/06/17 13:32	030617-1	1638041
7440-66-6	Zinc	10	ug/L	U	3.3	10	10	1	P	HSC	03/06/17 13:32	030617-1	1638041



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

**SDG No:** 2017-986**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 415984002**BASIS:** As Received**DATE COLLECTED** 07-FEB-17**CLIENT ID:** CAMO-17-129411**LEVEL:** Low**DATE RECEIVED** 09-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	65.8	mg/L		0.453	1.24	1.24	1		TXT1	03/07/17 15:09		1645320

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1638022	1638021	SW846 3005A	50	mL	50	mL	02/09/17	CXW4
1638041	1638040	SW846 3005A	50	mL	50	mL	02/09/17	CXW4
1638358	1638357	EPA 245.1/245.2 Prep	20	mL	20	mL	02/10/17	AXS5

**\*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:** 2017-986**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 415984003**BASIS:** As Received**DATE COLLECTED** 07-FEB-17**CLIENT ID:** CAMO-17-129316**LEVEL:** Low**DATE RECEIVED** 09-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	02/13/17 10:23	021317W1-8	1638358

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1638358	1638357	EPA 245.1/245.2 Prep	20	mL	20	mL	02/10/17	AXS5

**\*Analytical Methods:**

AV EPA 245.1/245.2



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

**SDG No:** 2017-986**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 415984004**BASIS:** As Received**DATE COLLECTED** 07-FEB-17**CLIENT ID:** CAMO-17-129412**LEVEL:** Low**DATE RECEIVED** 09-FEB-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	MTM1	02/13/17 10:28	021317W1-8	1638358



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

SDG No: 2017-986

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 415984004

BASIS: As Received

DATE COLLECTED 07-FEB-17

CLIENT ID: CAMO-17-129412

LEVEL: Low

DATE RECEIVED 09-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	03/06/17 13:35	030617-1	1638041
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	PRB	02/24/17 08:52	170223-6	1638022
7440-38-2	Arsenic	2.22	ug/L	J	1.7	5	5	1	MS	PRB	02/23/17 18:58	170223-4	1638022
7440-39-3	Barium	30.3	ug/L		1	5	5	1	P	HSC	03/06/17 13:35	030617-1	1638041
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	03/06/17 13:35	030617-1	1638041
7440-42-8	Boron	20.1	ug/L	J	15	50	50	1	P	HSC	03/06/17 13:35	030617-1	1638041
7440-43-9	Cadmium	1	ug/L	U	0.3	1	1	1	MS	PRB	02/22/17 18:00	170222-2	1638022
7440-70-2	Calcium	17000	ug/L		50	200	200	1	P	HSC	03/06/17 13:35	030617-1	1638041
7440-47-3	Chromium	19	ug/L		3	10	10	1	MS	PRB	02/22/17 18:00	170222-2	1638022
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	03/06/17 13:35	030617-1	1638041
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	03/06/17 13:35	030617-1	1638041
7439-89-6	Iron	100	ug/L	U	30	100	100	1	P	HSC	03/06/17 13:35	030617-1	1638041
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	PRB	02/22/17 20:23	170222-3	1638022
7439-95-4	Magnesium	4800	ug/L		110	300	300	1	P	HSC	03/06/17 13:35	030617-1	1638041
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	03/06/17 13:35	030617-1	1638041
7439-98-7	Molybdenum	1.07	ug/L		0.3	0.5	0.5	1	MS	PRB	02/24/17 16:23	170224-7	1638022
7440-02-0	Nickel	1.53	ug/L	J	0.5	2	2	1	MS	PRB	02/22/17 18:00	170222-2	1638022
7440-09-7	Potassium	1320	ug/L		50	150	150	1	P	HSC	03/06/17 13:35	030617-1	1638041
7782-49-2	Selenium	5	ug/L	U	2	5	5	1	MS	PRB	02/23/17 18:58	170223-4	1638022
7631-86-9	Silica	73600	ug/L		53	213	213	1	P	HSC	03/06/17 13:35	030617-1	1638041
7440-22-4	Silver	1	ug/L	U	0.4	1	1	1	MS	PRB	02/22/17 18:00	170222-2	1638022
7440-23-5	Sodium	11300	ug/L		100	300	300	1	P	HSC	03/06/17 13:35	030617-1	1638041
7440-24-6	Strontium	72.7	ug/L		1	5	5	1	P	HSC	03/06/17 13:35	030617-1	1638041
7440-28-0	Thallium	2	ug/L	U	0.6	2	2	1	MS	PRB	02/22/17 20:23	170222-3	1638022
7440-31-5	Tin	10	ug/L	U	2.5	10	10	1	P	HSC	03/06/17 13:35	030617-1	1638041
7440-61-1	Uranium	0.688	ug/L		0.067	0.2	0.2	1	MS	PRB	02/22/17 20:23	170222-3	1638022
7440-62-2	Vanadium	6.65	ug/L		1	5	5	1	P	HSC	03/06/17 13:35	030617-1	1638041
7440-66-6	Zinc	10	ug/L	U	3.3	10	10	1	P	HSC	03/06/17 13:35	030617-1	1638041



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

**SDG No:** 2017-986**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 415984004**BASIS:** As Received**DATE COLLECTED** 07-FEB-17**CLIENT ID:** CAMO-17-129412**LEVEL:** Low**DATE RECEIVED** 09-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	62.3	mg/L		0.453	1.24	1.24	1		TXT1	03/07/17 15:09		1645320

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1638022	1638021	SW846 3005A	50	mL	50	mL	02/09/17	CXW4
1638041	1638040	SW846 3005A	50	mL	50	mL	02/09/17	CXW4
1638358	1638357	EPA 245.1/245.2 Prep	20	mL	20	mL	02/10/17	AXS5

**\*Analytical Methods:****P** SW846 3005A/6010C**MS** SW846 3005A/6020A**AV** EPA 245.1/245.2



# **Quality Control Summary**



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

**SDG NO.** 2017-986  
**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>
1203725059	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
	Molybdenum	0.3	ug/L	+/-0.5	U	MS	0.3	0.5
	Lead	0.5	ug/L	+/-2	U	MS	0.5	2
	Chromium	3	ug/L	+/-10	U	MS	3	10
	Nickel	0.5	ug/L	+/-2	U	MS	0.5	2
	Silver	0.4	ug/L	+/-1	U	MS	0.4	1
	Uranium	0.067	ug/L	+/-0.2	U	MS	0.067	0.2
	Thallium	0.6	ug/L	+/-2	U	MS	0.6	2
	Selenium	2	ug/L	+/-5	U	MS	2	5
1203725100	Cobalt	1	ug/L	+/-5	U	P	1	5
	Copper	3	ug/L	+/-10	U	P	3	10
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Manganese	2	ug/L	+/-10	U	P	2	10
	Potassium	50	ug/L	+/-150	U	P	50	150
	Silica	53	ug/L	+/-213	U	P	53	213
	Calcium	50	ug/L	+/-200	U	P	50	200
	Boron	15	ug/L	+/-50	U	P	15	50
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Barium	1	ug/L	+/-5	U	P	1	5
	Aluminum	68	ug/L	+/-200	U	P	68	200
	Sodium	100	ug/L	+/-300	U	P	100	300
	Iron	30	ug/L	+/-100	U	P	30	100
	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
1203725976	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. 2017-986 Client ID CAMO-17-129293S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 415985001 Spike ID: 1203725062

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Antimony	ug/L	75-125	51.6		1	U	50	103		MS
Arsenic	ug/L	75-125	52.7		2.71	J	50	100		MS
Cadmium	ug/L	75-125	51.2		0.3	U	50	102		MS
Chromium	ug/L		589		545		50	87.1	N/A	MS
Lead	ug/L	75-125	49.1		0.5	U	50	98.2		MS
Molybdenum	ug/L	75-125	56.5		0.723		50	112		MS
Nickel	ug/L	75-125	61.6		14.7		50	94		MS
Selenium	ug/L	75-125	48.7		2	U	50	96.6		MS
Silver	ug/L	75-125	51.2		0.4	U	50	102		MS
Thallium	ug/L	75-125	46.4		0.6	U	50	92.8		MS
Uranium	ug/L	75-125	51.4		1.33		50	100		MS

## \*Analytical Methods:

MS SW846 3005A/6020A



## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2017-986 Client ID CAMO-17-129293S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 415985001 Spike ID: 1203725103

<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>
Zinc	ug/L	75-125	455		3.3	U	500	90.5		P
Aluminum	ug/L	75-125	4860		68	U	5000	97.1		P
Barium	ug/L	75-125	557		78.1		500	95.7		P
Beryllium	ug/L	75-125	486		1	U	500	97.1		P
Boron	ug/L	75-125	532		22.7	J	500	102		P
Calcium	ug/L		52200		46900		5000	106	N/A	P
Cobalt	ug/L	75-125	462		1	U	500	92.4		P
Copper	ug/L	75-125	490		3	U	500	97.9		P
Iron	ug/L	75-125	4800		30	U	5000	95.7		P
Magnesium	ug/L	75-125	16400		11500		5000	97.7		P
Manganese	ug/L	75-125	471		2	U	500	93.9		P
Potassium	ug/L	75-125	7010		2150		5000	97.2		P
Silica	ug/L		84600		73100		10700	107	N/A	P
Sodium	ug/L	75-125	23700		19400		5000	85.8		P
Strontium	ug/L	75-125	653		184		500	93.8		P
Tin	ug/L	75-125	486		2.5	U	500	97		P
Vanadium	ug/L	75-125	494		4.72	J	500	97.9		P

\*Analytical Methods:

P SW846 3005A/6010C



## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2017-986

Client ID: CAMO-17-129293S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 415985001

Spike ID: 1203725979

<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		0.067	U	2	99.9		AV

## \*Analytical Methods:

AV EPA 245.1/245.2



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

SDG No.: 2017-986

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-17-129293D

Matrix: WATER

Level: Low

Sample ID: 415985001

Duplicate ID: 1203725061

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Antimony	ug/L		1 U		1 U				MS
Arsenic	ug/L	+/-5	2.71 J		2.67 J		1.71		MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-20%	545		539		1.13		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	0.723		0.67		7.61		MS
Nickel	ug/L	+/-20%	14.7		14		4.45		MS
Selenium	ug/L		2 U		2 U				MS
Silver	ug/L		0.4 U		0.4 U				MS
Thallium	ug/L		0.6 U		0.6 U				MS
Uranium	ug/L	+/-20%	1.33		1.34		1.2		MS

\*Analytical Methods:

MS SW846 3005A/6020A



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

SDG No.: 2017-986

Lab Code: GEL

Contract: ESHL00114

Client ID: CAMO-17-129293D

Matrix: WATER

Level: Low

Sample ID: 415985001

Duplicate ID: 1203725102

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%	78.1		79		1.15		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	22.7 J		23.2 J		1.88		P
Calcium	ug/L	+/-20%	46900		47500		1.22		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%	11500		11600		.39		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	2150		2170		.681		P
Silica	ug/L	+/-20%	73100		73900		1.1		P
Sodium	ug/L	+/-20%	19400		19000		2.06		P
Strontium	ug/L	+/-20%	184		184		.429		P
Tin	ug/L		2.5 U		2.5 U				P
Vanadium	ug/L	+/-5	4.72 J		4.6 J		2.58		P
Zinc	ug/L		3.3 U		3.3 U				P

\*Analytical Methods:

P SW846 3005A/6010C



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

**SDG No.:** 2017–986**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CAMO–17–129293D**Matrix:** WATER**Level:** Low**Sample ID:** 415985001**Duplicate ID:** 1203725978**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. 2017-986

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>
1203725060								
	Antimony	ug/L	50	52.3		105	80-120	MS
	Arsenic	ug/L	50	52		104	80-120	MS
	Cadmium	ug/L	50	51.2		102	80-120	MS
	Chromium	ug/L	50	50.1		100	80-120	MS
	Lead	ug/L	50	51.4		103	80-120	MS
	Molybdenum	ug/L	50	55.4		111	80-120	MS
	Nickel	ug/L	50	50.2		100	80-120	MS
	Selenium	ug/L	50	50.4		101	80-120	MS
	Silver	ug/L	50	53.5		107	80-120	MS
	Thallium	ug/L	50	47.6		95.3	80-120	MS
	Uranium	ug/L	50	51.1		102	80-120	MS

## \*Analytical Methods:

MS SW846 3005A/6020A



## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2017-986

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>
1203725101								
	Aluminum	ug/L	5000	5000		99.9	80-120	P
	Barium	ug/L	500	489		97.9	80-120	P
	Beryllium	ug/L	500	487		97.3	80-120	P
	Boron	ug/L	500	501		100	80-120	P
	Calcium	ug/L	5000	4940		98.8	80-120	P
	Cobalt	ug/L	500	482		96.3	80-120	P
	Copper	ug/L	500	493		98.7	80-120	P
	Iron	ug/L	5000	5040		101	80-120	P
	Magnesium	ug/L	5000	4960		99.2	80-120	P
	Manganese	ug/L	500	489		97.7	80-120	P
	Potassium	ug/L	5000	4960		99.2	80-120	P
	Silica	ug/L	10700	10400		97.6	80-120	P
	Sodium	ug/L	5000	5220		104	80-120	P
	Strontium	ug/L	500	497		99.4	80-120	P
	Tin	ug/L	500	488		97.6	80-120	P
	Vanadium	ug/L	500	491		98.2	80-120	P
	Zinc	ug/L	500	462		92.4	80-120	P

## \*Analytical Methods:

P SW846 3005A/6010C



## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 2017-986

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>
1203725977	Mercury	ug/L	2	2.02		101	85-115	AV

## \*Analytical Methods:

AV EPA 245.1/245.2



## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 2017-986

Client ID: CAMO-17-129293L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 415985001

Serial Dilution ID: 1203725063

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Antimony	1	U	5	U				MS
Arsenic	2.71	J	8.5	U	56.964			MS
Cadmium	.3	U	1.5	U				MS
Chromium	545		559		2.435		10	MS
Lead	.5	U	2.5	U				MS
Molybdenum	.723		1.5	U	3.181			MS
Nickel	14.7		15.3		4.441			MS
Selenium	2	U	10	U				MS
Silver	.4	U	2	U				MS
Thallium	.6	U	3	U				MS
Uranium	1.33		1.55		16.805			MS

## \*Analytical Methods:

MS SW846 3005A/6020A



## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 2017-986

Client ID: CAMO-17-129293L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 415985001

Serial Dilution ID: 1203725104

<u>Analyte</u>	<u>Initial Value ug/L</u>	<u>C</u>	<u>Serial Value ug/L</u>	<u>C</u>	<u>% Difference</u>	<u>Qual</u>	<u>Acceptance Limit</u>	<u>M*</u>
Aluminum	68	U	340	U				P
Barium	78.1		80.5		2.956		10	P
Beryllium	1	U	5	U				P
Boron	22.7	J	75	U	8.996			P
Calcium	46900		48000		2.288		10	P
Cobalt	1	U	5	U				P
Copper	3	U	28.2	J				P
Iron	30	U	150	U				P
Magnesium	11500		11800		2.733		10	P
Manganese	2	U	10	U				P
Potassium	2150		2160		.677			P
Silica	73100		72600		.729		10	P
Sodium	19400		18700		3.8		10	P
Strontium	184		188		1.724		10	P
Tin	2.5	U	12.5	U				P
Vanadium	4.72	J	5	U	17.629			P
Zinc	3.3	U	16.5	U				P

## \*Analytical Methods:

P SW846 3005A/6010C



## METALS

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## Serial Dilution Sample Summary

**SDG NO.** 2017-986 **Client ID:** CAMO-17-129293L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 415985001 **Serial Dilution ID:** 1203725980

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

## \*Analytical Methods:

AV EPA 245.1/245.2



# **General Chem Analysis**



# Case Narrative



**General Chemistry  
Technical Case Narrative  
ARS International, LLC (ARSL)  
SDG #: 2017-986  
Work Order #: 415984**

**Method/Analysis Information**

**Product:** Carbon and Total Organic

**Analytical Batch:** 1637938

**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>
415984001	CAMO-17-129315
415984003	CAMO-17-129316
1203725731	Method Blank (MB)
1203725732	Laboratory Control Sample (LCS)
1203725737	415985003(CAMO-17-129321) Sample Duplicate (DUP)
1203725742	415985003(CAMO-17-129321) 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 415985003 (CAMO-17-129321) 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>	1638310	<b>Method:</b>	WSP-CN(T)
<b>Prep Batch :</b>	1638309	<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>
415984001	CAMO-17-129315
415984003	CAMO-17-129316
1203725828	Method Blank (MB)
1203725829	Laboratory Control Sample (LCS)
1203725830	415984001(CAMO-17-129315) Sample Duplicate (DUP)
1203725831	415984001(CAMO-17-129315) Matrix Spike (MS)

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

### **SOP Reference**

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

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

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Continuing Calibration Blanks**

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

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

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



**Y Intercept Rule**

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

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

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Sample 415984001 (CAMO-17-129315) 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:** 1638245

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

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
415984002	CAMO-17-129411
415984004	CAMO-17-129412
1203725661	Method Blank (MB)
1203725662	Laboratory Control Sample (LCS)
1203725663	415985004(CAMO-17-129322) Sample Duplicate (DUP)
1203725664	415985004(CAMO-17-129322) Post Spike (PS)

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

### **SOP Reference**

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

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

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Continuing Calibration Blanks**

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

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

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

### **Y Intercept Rule**

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



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

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

The MB analyzed with this SDG met the acceptance criteria.

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

The LCS spike recovery met the acceptance limits.

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

Sample 415985004 (CAMO-17-129322) was selected for QC analysis.

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

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

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

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

### **Technical Information**

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

#### **Holding Times**

All samples in this SDG met the specified holding time.

#### **Sample Dilutions**

The following samples 1203725663 (CAMO-17-129322DUP) and 1203725664 (CAMO-17-129322PS) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

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

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

### **Miscellaneous Information**

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

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

#### **Manual Integrations**

Samples 1203725663 (CAMO-17-129322DUP), 1203725664 (CAMO-17-129322PS), 415984002 (CAMO-17-129411) and 415984004 (CAMO-17-129412) were manually integrated to correctly position the baseline as set in the calibration standards.

#### **Additional Comments**

Additional comments were not required for this SDG.

#### **Electronic Packaging Comment**

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



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

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



### **Method/Analysis Information**

**Product:** Ammonia Nitrogen  
**Analytical Batch:** 1638313 **Method:** NH3  
**Prep Batch :** 1638312 **Method:** 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>
415984002	CAMO-17-129411
415984004	CAMO-17-129412
1203725833	Method Blank (MB)
1203725834	Laboratory Control Sample (LCS)
1203725835	415984002(CAMO-17-129411) Sample Duplicate (DUP)
1203726128	415984004(CAMO-17-129412) Sample Duplicate (DUP)
1203725836	415984002(CAMO-17-129411) Matrix Spike (MS)
1203726129	415984004(CAMO-17-129412) 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**

Samples 415984002 (CAMO-17-129411) and 415984004 (CAMO-17-129412) were selected for QC analysis.

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

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

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

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Preservation/Integrity**

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

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

**Miscellaneous Information****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>	1637591	<b>Method:</b>	TKN
<b>Prep Batch :</b>	1637590	<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>
415984001	CAMO-17-129315
415984003	CAMO-17-129316
1203723920	Method Blank (MB)
1203723921	Laboratory Control Sample (LCS)
1203725837	415985002(CAMO-17-129309) Sample Duplicate (DUP)
1203725839	415985002(CAMO-17-129309) 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**

Sample 415985002 (CAMO-17-129309) 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**

Sample1203723920 (MB) was re-analyzed due to instrument failure. The results from the reanalysis are reported. Samples1203723920 (MB), 1203725837 (CAMO-17-129309DUP), 1203725839 (CAMO-17-129309MS), 415984001 (CAMO-17-129315) and 415984003 (CAMO-17-129316) were re-analyzed due to CCB failure. The reanalysis data with passing instrument QC was reported. Sample1203723920 (MB) was re-analyzed to verify the result.

**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:** Nitrate Nitrite by Cadmium Reduction

**Analytical Batch:** 1638418

**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>
415984002	CAMO-17-129411
415984004	CAMO-17-129412
1203726120	Method Blank (MB)
1203726121	Laboratory Control Sample (LCS)
1203726123	415984002(CAMO-17-129411) Sample Duplicate (DUP)
1203726126	415984002(CAMO-17-129411) 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**

Sample 415984002 (CAMO-17-129411) was selected for QC analysis.

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

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

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

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Preservation/Integrity**

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

**Sample Dilutions**

The following samples 1203726123 (CAMO-17-129411DUP), 1203726126 (CAMO-17-129411PS) and 415984002 (CAMO-17-129411) 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	<b>415984</b>
	<b>002</b>
Nitrogen, Nitrate/Nitrite	5X

**Sample Re-analysis**

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

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

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



**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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



### **Method/Analysis Information**

<b>Product:</b>	<b>Total Phosphorus</b>		
<b>Analytical Batch:</b>	1638315	<b>Method:</b>	EPA 365.4 Phosphorus, Total in
<b>Prep Batch :</b>	1638314	<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>
415984002	CAMO-17-129411
415984004	CAMO-17-129412
1203725841	Method Blank (MB)
1203725842	Laboratory Control Sample (LCS)
1203725844	415984002(CAMO-17-129411) Sample Duplicate (DUP)
1203725846	415984002(CAMO-17-129411) 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 415984002 (CAMO-17-129411) 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**

Sample 1203725841 (MB) was re-analyzed due to instrument failure. The results from the reanalysis are reported.

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

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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



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



### **Method/Analysis Information**

**Product:** Solids and Total Dissolved

**Analytical Batch:** 1637881

**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>
415984002	CAMO-17-129411
415984004	CAMO-17-129412
1203724668	Method Blank (MB)
1203724669	Laboratory Control Sample (LCS)
1203726966	415985001(CAMO-17-129293) 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 415985001 (CAMO-17-129293) 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:** 1638832

**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>
415984002	CAMO-17-129411
415984004	CAMO-17-129412
1203727093	Laboratory Control Sample (LCS)
1203727095	415847001(WST09-17-129397) Sample Duplicate (DUP)

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

### **SOP Reference**

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

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

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Initial Standardization**

The titrant was properly standardized

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

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

The LCS spike recovery met the acceptance limits.

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

Sample 415847001 (WST09-17-129397) was selected for QC analysis.

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



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

#### **Technical Information**

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

#### **Holding Times**

All samples in this SDG met the specified holding time.

#### **Sample Dilutions**

The samples in this SDG did not require dilutions.

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

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

#### **Miscellaneous Information**

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

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

#### **Additional Comments**

Additional comments were not required for this SDG.

#### **Electronic Packaging Comment**

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

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



### **Method/Analysis Information**

**Product:** pH

**Analytical Batch:** 1639321 **Method:** PH

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
415984002	CAMO-17-129411
415984004	CAMO-17-129412
1203728231	Laboratory Control Sample (LCS)
1203728232	415847001(WST09-17-129397) Sample Duplicate (DUP)
1203728233	416572010(CAMO-17-129297) Sample Duplicate (DUP)

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

### **SOP Reference**

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

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

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

### **Calibration Information**

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

#### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

#### **Initial Standardization**

The titrant was properly standardized

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

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

The LCS spike recovery met the acceptance limits.

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

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



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

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

**Technical Information**

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

**Holding Times**

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

Sample	Analyte	Value
1203728232 (WST09-17-129397DUP)	pH	Received 08-FEB-17, out of holding 06-FEB-17
1203728233 (CAMO-17-129297DUP)	pH	Received 14-FEB-17, out of holding 10-FEB-17
415984002 (CAMO-17-129411)	pH	Received 09-FEB-17, out of holding 07-FEB-17
415984004 (CAMO-17-129412)	pH	Received 09-FEB-17, out of holding 07-FEB-17

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

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

A data exception report (DER) 1605726 was generated for samples 415984002 (CAMO-17-129411), 415984004 (CAMO-17-129412), 1203728232 (WST09-17-129397DUP) and 1203728233 (CAMO-17-129297DUP) in this SDG/batch.

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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



### **Method/Analysis Information**

**Product:** Alkalinity

**Analytical Batch:** 1639313      **Method:** EPA 310.1 Total Alkalinity

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
415984002	CAMO-17-129411
415984004	CAMO-17-129412
1203728222	Laboratory Control Sample (LCS)
1203728223	415847001(WST09-17-129397) Sample Duplicate (DUP)
1203728224	416572010(CAMO-17-129297) Sample Duplicate (DUP)
1203728225	415847001(WST09-17-129397) Matrix Spike (MS)
1203728226	416572010(CAMO-17-129297) Matrix Spike (MS)

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

### **SOP Reference**

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

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

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Initial Standardization**

The titrant was properly standardized

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

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

The LCS spike recovery met the acceptance limits.

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



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

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

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

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

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

**Miscellaneous Information**

**Data Exception (DER) Documentation**

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

**Certification Statement**

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



## GEL LABORATORIES LLC

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### Qualifier Definition Report for

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

Client SDG: 2017-986 GEL Work Order: 415984

#### 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: 23 FEB 2017

Title: Analyst I



# **Sample Data Summary**



# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: February 23, 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: 2017-986

Client Sample ID: CAMO-17-129315  
Sample ID: 415984001  
Matrix: W  
Collect Date: 07-FEB-17 12:18  
Receive Date: 09-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	0.767	0.330	1.00	mg/L		1	TSM	02/12/17	1828	1637938	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	02/14/17	1042	1638310	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	02/14/17	1118	1637591	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	02/14/17	0930	1638309
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	02/13/17	1700	1637590

The following Analytical Methods were performed:

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

### Notes:

Column headers are defined as follows:

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



# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: February 23, 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: 2017-986

Client Sample ID: CAMO-17-129411  
Sample ID: 415984002  
Matrix: W  
Collect Date: 07-FEB-17 12:18  
Receive Date: 09-FEB-17  
Collector: Client

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
EPA 300.0 Anions Liquid 28 day "As Received"												
Bromide	J	0.0767	0.067	0.200	mg/L		1	MXL2	02/10/17	1325	1638245	1
Chloride		5.30	0.067	0.200	mg/L		1					
Fluoride		0.242	0.033	0.100	mg/L		1					
Sulfate		8.15	0.133	0.400	mg/L		1					
Nutrient Analysis												
EPA 365.4 Phosphorus, Total in "As Received"												
Phosphorus, Total as P		0.199	0.020	0.050	mg/L	1.00	1	KLP1	02/14/17	1325	1638315	2
NH3 "As Received"												
Nitrogen, Ammonia		0.0832	0.017	0.050	mg/L	1.00	1	KLP1	02/13/17	1155	1638313	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		2.93	0.085	0.250	mg/L		5	AXH3	02/13/17	1347	1638418	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		163	3.40	14.3	mg/L			KLP1	02/14/17	1408	1637881	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		67.0	1.45	4.00	mg/L			RXB5	02/16/17	1238	1639313	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		185	1.00	1.00	umhos/cm		1	VH1	02/14/17	1007	1638832	7
PH "As Received"												
pH at Temp 16.3C	H	7.93	0.010	0.100	SU		1	RXB5	02/16/17	1237	1639321	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	02/13/17	1000	1638312
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	02/13/17	1700	1638314



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## Certificate of Analysis

Report Date: February 23, 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: 2017-986

Client Sample ID: CAMO-17-129411  
Sample ID: 415984002

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 365.4 1974											
3	EPA:350.1											
4	EPA:353.2											
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: February 23, 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: 2017-986

Client Sample ID: CAMO-17-129316  
Sample ID: 415984003  
Matrix: W  
Collect Date: 07-FEB-17 14:19  
Receive Date: 09-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	0.679	0.330	1.00	mg/L		1	TSM	02/12/17	1912	1637938	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	02/14/17	1045	1638310	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	02/14/17	1119	1637591	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	02/14/17	0930	1638309
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	02/13/17	1700	1637590

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: February 23, 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: 2017-986

Client Sample ID: CAMO-17-129412  
Sample ID: 415984004  
Matrix: W  
Collect Date: 07-FEB-17 14:19  
Receive Date: 09-FEB-17  
Collector: Client

Project: ESHL00114  
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
EPA 300.0 Anions Liquid 28 day "As Received"												
Bromide	U	ND	0.067	0.200	mg/L		1	MXL2	02/10/17	1400	1638245	1
Chloride		4.00	0.067	0.200	mg/L		1					
Fluoride		0.325	0.033	0.100	mg/L		1					
Sulfate		4.64	0.133	0.400	mg/L		1					
Nutrient Analysis												
EPA 365.4 Phosphorus, Total in "As Received"												
Phosphorus, Total as P		0.215	0.020	0.050	mg/L	1.00	1	KLP1	02/14/17	1327	1638315	2
NH3 "As Received"												
Nitrogen, Ammonia		0.0648	0.017	0.050	mg/L	1.00	1	KLP1	02/13/17	1157	1638313	3
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		0.814	0.017	0.050	mg/L		1	AXH3	02/13/17	1307	1638418	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		159	3.40	14.3	mg/L			KLP1	02/14/17	1408	1637881	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		78.0	1.45	4.00	mg/L			RXB5	02/16/17	1241	1639313	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		171	1.00	1.00	umhos/cm		1	VH1	02/14/17	1007	1638832	7
PH "As Received"												
pH at Temp 15.4C	H	8.27	0.010	0.100	SU		1	RXB5	02/16/17	1240	1639321	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	AXH3	02/13/17	1000	1638312
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	02/13/17	1700	1638314



# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: February 23, 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: 2017-986

Client Sample ID: CAMO-17-129412  
Sample ID: 415984004

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 365.4 1974											
3	EPA:350.1											
4	EPA:353.2											
5	EPA:160.1											
6	EPA:310.1											
7	EPA:120.1											
8	EPA 150.1 1982											

### Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit



# **Quality Control Summary**



# GEL LABORATORIES LLC

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## QC Summary

Report Date: February 23, 2017

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

Contact: Mr. Keith Greene

Workorder: 415984

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Carbon Analysis</b>											
Batch	1637938										
QC1203725737	415985003	DUP									
Total Organic Carbon Average		1.33		1.29	mg/L	2.44	^	(+/-1.00)	TSM	02/12/17	21:51
QC1203725732	LCS										
Total Organic Carbon Average	10.0			10.5	mg/L			(80%-120%)		02/12/17	07:58
QC1203725731	MB										
Total Organic Carbon Average			U	ND	mg/L					02/12/17	07:44
QC1203725742	415985003	PS									
Total Organic Carbon Average	10.0	1.33		12.0	mg/L			(75%-125%)		02/12/17	22:36
<b>Flow Injection Analysis</b>											
Batch	1638310										
QC1203725830	415984001	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	02/14/17	10:43
QC1203725829	LCS										
Cyanide, Total	50.0			48.3	ug/L			(90%-110%)		02/14/17	10:41
QC1203725828	MB										
Cyanide, Total			U	ND	ug/L					02/14/17	10:40
QC1203725831	415984001	MS									
Cyanide, Total	100	U	ND	106	ug/L			(90%-110%)		02/14/17	10:44
<b>Ion Chromatography</b>											
Batch	1638245										
QC1203725663	415985004	DUP									
Bromide		0.300		0.298	mg/L	0.602	^	(+/-0.200)	MXL2	02/10/17	16:52



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## QC Summary

Workorder: 415984

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1638245										
Chloride		39.3		39.0	mg/L	0.883		(0%-20%)	MXL2	02/15/17	22:02
Fluoride		0.203		0.207	mg/L	2.15	^	(+/-0.100)		02/10/17	16:52
Sulfate		59.1		59.2	mg/L	0.0203		(0%-20%)		02/15/17	22:02
QC1203725662 LCS											
Bromide	1.25			1.24	mg/L		99.6	(80%-120%)		02/10/17	10:56
Chloride	5.00			4.79	mg/L		95.7	(80%-120%)			
Fluoride	2.50			2.48	mg/L		99.1	(80%-120%)			
Sulfate	10.0			9.79	mg/L		97.9	(80%-120%)			
QC1203725661 MB											
Bromide			U	ND	mg/L					02/10/17	10:22
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203725664 415985004 PS											
Bromide	1.25	0.300		1.51	mg/L		97.2	(75%-125%)		02/10/17	17:26
Chloride	5.00	3.93		9.13	mg/L		104	(75%-125%)		02/15/17	22:31
Fluoride	2.50	0.203		2.54	mg/L		93.5	(75%-125%)		02/10/17	17:26
Sulfate	10.0	5.91		15.8	mg/L		99.2	(75%-125%)		02/15/17	22:31



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## QC Summary

Workorder: 415984

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1637591										
QC1203725837	415985002	DUP									
Nitrogen, Total Kjeldahl		0.112		0.128	mg/L	13.3	^	(+/-0.100)	KLP1	02/14/17	11:21
QC1203723921	LCS										
Nitrogen, Total Kjeldahl	1.00			0.994	mg/L			99.4 (90%-110%)		02/14/17	10:23
QC1203723920	MB										
Nitrogen, Total Kjeldahl			U	ND	mg/L					02/14/17	11:27
QC1203725839	415985002	MS									
Nitrogen, Total Kjeldahl	1.00	0.112		1.13	mg/L			102 (90%-110%)		02/14/17	11:21
Batch	1638313										
QC1203725835	415984002	DUP									
Nitrogen, Ammonia		0.0832		0.081	mg/L	2.68	^	(+/-0.050)	KLP1	02/13/17	11:55
QC1203726128	415984004	DUP									
Nitrogen, Ammonia		0.0648		0.085	mg/L	27	^	(+/-0.050)		02/13/17	11:58
QC1203725834	LCS										
Nitrogen, Ammonia	1.00			0.990	mg/L			99 (90%-110%)		02/13/17	11:53
QC1203725833	MB										
Nitrogen, Ammonia			U	ND	mg/L					02/13/17	11:48
QC1203725836	415984002	MS									
Nitrogen, Ammonia	1.00	0.0832		1.06	mg/L			97.7 (90%-110%)		02/13/17	11:56
QC1203726129	415984004	MS									
Nitrogen, Ammonia	1.00	0.0648		1.04	mg/L			97.5 (90%-110%)		02/13/17	11:59
Batch	1638315										
QC1203725844	415984002	DUP									
Phosphorus, Total as P		0.199		0.206	mg/L	3.46	^	(+/-0.050)	KLP1	02/14/17	13:26



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## QC Summary

Workorder: 415984

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Nutrient Analysis</b>											
Batch	1638315										
QC1203725842	LCS										
Phosphorus, Total as P	1.00			0.918	mg/L		91.8	(80%-124%)	KLP1	02/14/17	13:24
QC1203725841	MB										
Phosphorus, Total as P			U	ND	mg/L					02/14/17	13:49
QC1203725846	415984002	MS									
Phosphorus, Total as P	1.00	0.199		1.24	mg/L		104	(63%-139%)		02/14/17	13:27
Batch	1638418										
QC1203726123	415984002	DUP									
Nitrogen, Nitrate/Nitrite		2.93		2.96	mg/L	0.85		(0%-20%)	AXH3	02/13/17	13:48
QC1203726121	LCS										
Nitrogen, Nitrate/Nitrite	1.00			1.01	mg/L		101	(90%-110%)		02/13/17	13:03
QC1203726120	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					02/13/17	13:02
QC1203726126	415984002	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.586		1.59	mg/L		100	(90%-110%)		02/13/17	13:49
<b>Solids Analysis</b>											
Batch	1637881										
QC1203726966	415985001	DUP									
Total Dissolved Solids		323		340	mg/L	0		(0%-5%)	KLP1	02/14/17	14:08
QC1203724669	LCS										
Total Dissolved Solids	300			297	mg/L		99	(95%-105%)		02/14/17	14:08
QC1203724668	MB										
Total Dissolved Solids			U	ND	mg/L					02/14/17	14:08



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## QC Summary

Workorder: 415984

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Titration and Ion Analysis</b>											
Batch	1638832										
QC1203727095	415847001	DUP									
Conductivity		257		256	umhos/cm	0.39		(0%-10%)	VH1	02/14/17	10:06
QC1203727093	LCS										
Conductivity	1410			1390	umhos/cm		98.3	(95%-105%)		02/14/17	10:04
Batch	1639313										
QC1203728223	415847001	DUP									
Alkalinity, Total as CaCO3		88.0		86.0	mg/L	2.3		(0%-20%)	RXB5	02/16/17	12:24
Carbonate alkalinity (CaCO3)	U	ND	U	ND	mg/L	N/A					
QC1203728224	416572010	DUP									
Alkalinity, Total as CaCO3		58.0		59.0	mg/L	1.71		(0%-20%)		02/16/17	13:45
Carbonate alkalinity (CaCO3)	U	ND	U	ND	mg/L	N/A					
QC1203728222	LCS										
Alkalinity, Total as CaCO3	100			110	mg/L		110	(90%-110%)		02/16/17	12:12
QC1203728225	415847001	MS									
Alkalinity, Total as CaCO3	100	88.0		177	mg/L		89	(80%-120%)		02/16/17	12:26
QC1203728226	416572010	MS									
Alkalinity, Total as CaCO3	100	58.0		165	mg/L		107	(80%-120%)		02/16/17	13:47
Batch	1639321										
QC1203728232	415847001	DUP									
pH		H	7.82	H	7.81	SU	0.128	(0%-5%)	RXB5	02/16/17	12:20
QC1203728233	416572010	DUP									
pH		H	7.99	H	7.97	SU	0.251	(0%-5%)		02/16/17	13:44



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## QC Summary

Workorder: 415984

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1639321										
QC1203728231	LCS										
pH	7.00			6.97	SU		99.6	(99%-101%)	RXB5	02/16/17	12:03

### 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> 16-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> 1639321	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG):</b> 415847(2017-978),415848(2017-977),415984(2017-986),415985(2017-985),416111(2017-993),416562(2017-1003),416572(2017-1005),416765(2017-1019) <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:  415847 001,005  415848 005  415984 002,004  415985 001,004  416111 001,003,005  416562 001  416572 001,004,005,006,008,010  416765 001  QC 1203728232DUP,1203728233DUP		1. Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified. 1203728232 (WST09-17-129397DUP) [Received 08-FEB-17, out of holding 06-FEB-17]. 1203728233 (CAMO-17-129297DUP) [Received 14-FEB-17, out of holding 10-FEB-17]. 415847001 (WST09-17-129397) [Received 08-FEB-17, out of holding 06-FEB-17]. 415847005 (WST09-17-129398) [Received 08-FEB-17, out of holding 06-FEB-17]. 415848005 (CTU6A-17-130110) [Received 08-FEB-17, out of holding 06-FEB-17]. 415984002 (CAMO-17-129411) [Received 09-FEB-17, out of holding 07-FEB-17]. 415984004 (CAMO-17-129412) [Received 09-FEB-17, out of holding 07-FEB-17]. 415985001 (CAMO-17-129293) [Received 09-FEB-17, out of holding 07-FEB-17]. 415985004 (CAMO-17-129322) [Received 09-FEB-17, out of holding 07-FEB-17]. 416111001 (CAMO-17-129289) [Received 10-FEB-17, out of holding 08-FEB-17]. 416111003 (CAMO-17-129290) [Received 10-FEB-17, out of holding 08-FEB-17]. 416111005 (CAMO-17-129292) [Received 10-FEB-17, out of holding 08-FEB-17]. 416562001 (CASA-17-129325) [Received 14-FEB-17, out of holding 09-FEB-17]. 416572001 (CASA-17-129323) [Received 14-FEB-17, out of holding 09-FEB-17]. 416572004 (CASA-17-129339) [Received 14-FEB-17, out of holding 09-FEB-17]. 416572005 (CAMO-17-129578) [Received 14-FEB-17, out of holding 09-FEB-17]. 416572006 (CAMO-17-129291) [Received 14-FEB-17, out of holding 10-FEB-17]. 416572008 (CASA-17-129326) [Received 14-FEB-17, out of holding 09-FEB-17]. 416572010 (CAMO-17-129297) [Received 14-FEB-17, out of holding 10-FEB-17]. 416765001 (CAMO-17-129353) [Received 16-FEB-17, out of holding 14-FEB-17].	

**Originator's Name:**

Rachael Bell 16-FEB-17

**Data Validator/Group Leader:**

Elzbieta Szulc 23-FEB-17



**Originator's Name:**

Rachael Bell 16-FEB-17

**Data Validator/Group Leader:**

Elzbieta Szulc 23-FEB-17