

The order of this data package is as follows:

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

Comments:

[illegible]

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11212

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

SAMPLE ID: CASA-17-132320

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/02/2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1333	OK	MEDIA:	UA	
PRS ID:	NA		SAMPLE TECH CODE:	CSP	
LOCATION ID:	R-35a		FIELD PREP:	F	
LOCATION TYPE:	NT		FIELD QC TYPE:	REG	
TOP DEPTH:	↓		SAMPLE USAGE:	INV	
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / (NA)

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
05-2-17 NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NT
↓	WSP- GENINORG+PerChlorat	1 LITER POLY	1	ICE	↓	↓
↓	WSP- NH3+NO3/NO2	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Sample Time _____ HH:MM

COLLECTED BY (PRINT): D. Serrano W. Price

RELINQUISHED BY (Printed Name) Daniel Serrano (Signature) [Signature]	Date/Time 5/2/17 1445	RECEIVED BY (Printed Name) S. Sherwood (Signature) [Signature]	Date/Time 5/2/17 1445
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 04/25/2017

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11212

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

SAMPLE ID: CASA-17-132321

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05-02-2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	11:30		MEDIA:	UA	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-35b		FIELD PREP:	F	
LOCATION TYPE:	NA		FIELD QC TYPE:	REG	
TOP DEPTH:			SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / (NA)

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

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Sample Time _____ HH:MM

COLLECTED BY (PRINT): A. Stanfield

RELINQUISHED BY (Printed Name) Allizyn Stanfield (Signature)	Date/Time 5/2/17 1220	RECEIVED BY (Printed Name) S. Sherwood (Signature)	Date/Time 5/2/17 1220
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 04/25/2017

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11212

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

SAMPLE ID: CASA-17-132329

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/02/2017	ck	FIELD MATRIX:	WG	ck
TIME COLLECTED (HH:MM):	1333	ck	MEDIA:	UA	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-35a		FIELD PREP:	UF	
LOCATION TYPE:	1A		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: Sampled 50 ft from running diesel generator

LOCATION COMMENTS: None

FIELD PARAMETERS: Flow 3.84 gpm SP Cond 242.8 ORP 191.9 Temp 23.6 DO 5.01
PH 8.15 Turbidity 0.45
Sample Time HH:MM

COLLECTED BY (PRINT): Daniel Serrano W. Price

RELINQUISHED BY (Printed Name) Daniel Serrano (Signature)	Date/Time 5/2/17 1445	RECEIVED BY (Printed Name) S. Sherwood (Signature)	Date/Time 5/2/17 1445
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 04/25/2017

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 11212

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

SAMPLE ID: CASA-17-132330

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05-02-2017	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	11:30		MEDIA:	UA	
PRS ID:	NA		SAMPLE TECH CODE:	GSP	
LOCATION ID:	R-35b		FIELD PREP:	UF	
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:

gusty wind during sampling and preservation (215 mph gusts)

LOCATION COMMENTS:

FIELD PARAMETERS:

Sample Time 1504 HH:MM

pH: 7.65 SU DO: 6.54 mg/L Q: 3.19 gpm
 Temp: 21.5°C Turb: 0.58 NTU
 Sp Cond: 168.4 MS/cm ORP: 261.9 mV

COLLECTED BY (PRINT): A. Vigil, A. Stanfield

RELINQUISHED BY (Printed Name) <u>Allison Stanfield</u> (Signature) <u>[Signature]</u>	Date/Time <u>5/2/17</u> <u>1220</u>	RECEIVED BY (Printed Name) <u>S. Sherwood</u> (Signature) <u>[Signature]</u>	Date/Time <u>5/2/17</u> <u>1220</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 04/25/2017

DATA VALIDATION REPORT

Chain Of Custody No. 2017-1471

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
422310	EPA:120.1	2				
422310	EPA:150.1	2				
422310	EPA:160.1	2				
422310	EPA:170.0	4				
422310	EPA:245.2	4				
422310	EPA:300.0	2				
422310	EPA:310.1	2				
422310	EPA:335.4	2				
422310	EPA:350.1	2				
422310	EPA:351.2	2				
422310	EPA:353.2	2				
422310	EPA:365.4	2				
422310	SM:A2340B	2				
422310	SW-846:6010C	2				
422310	SW-846:6020	2				
422310	SW-846:6850	2				
422310	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
422310	EPA:120.1	1662034	1662034	2										1			1				
422310	EPA:150.1	1666995	1666995	2										1			1				
422310	EPA:160.1	1662259	1662259	2					1					1			1				
422310	EPA:170.0	NA	NA	4																	
422310	EPA:245.2	1662385	1662384	4					1	1				1			1				
422310	EPA:300.0	1662746	1662746	2					1					1			1				
422310	EPA:310.1	1665516	1665516	2						1				2			1				

DATA VALIDATION REPORT

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
422310	EPA:335.4	1661857	1661856	2					1	1				1			1				
422310	EPA:350.1	1661776	1661775	2					1	1				1			1				
422310	EPA:351.2	1662576	1662574	2					1	1				1			1				
422310	EPA:353.2	1661895	1661895	2					1					1			1				
422310	EPA:365.4	1662570	1662568	2					1	1				1			1				
422310	SM:A2340B	1669537	1669537	2																	
422310	SW-846:6010C	1661973	1661971	2					1	1				1			1				
422310	SW-846:6020	1661988	1661987	2					1	1				1			1				
422310	SW-846:6850	1662828	1662825	2					1	1	1			1							
422310	SW-846:9060	1663112	1663112	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	CASA-17-132320	1203781957	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-17-132320	422310001	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CASA-17-132321	422310003	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1203781954	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CASA-17-132320	422310001	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-17-132321	422310003	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1203794026	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	WST53-17-133059	1203794028	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-17-132320	1203782546	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-17-132320	422310001	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CASA-17-132321	422310003	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1203782545	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1203782544	MB	1	0	0	0
EPA:170.0	VOC	CASA-17-132320	422310001	REG	1	0	0	0
EPA:170.0	VOC	CASA-17-132321	422310003	REG	1	0	0	0
EPA:170.0	VOC	CASA-17-132329	422310002	REG	1	0	0	0
EPA:170.0	VOC	CASA-17-132330	422310004	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-132320	1203782880	DUP	1	0	0	0

DATA VALIDATION REPORT

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:245.2	INORGANIC	CASA-17-132320	1203782882	MS	0	0	1	0
EPA:245.2	INORGANIC	CASA-17-132320	422310001	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-132321	422310003	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-132329	422310002	REG	1	0	0	0
EPA:245.2	INORGANIC	CASA-17-132330	422310004	REG	1	0	0	0
EPA:245.2	INORGANIC	LCS	1203782873	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1203782872	MB	1	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-132320	1203783870	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-132320	422310001	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CASA-17-132321	422310003	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1203783869	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1203783868	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-132320	1203790519	DUP	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-132320	1203790523	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-132320	422310001	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CASA-17-132321	422310003	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203790515	LCS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1203791267	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-132329	1203782269	DUP	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-132329	1203782270	MS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-132329	422310002	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	CASA-17-132330	422310004	REG	1	0	0	0
EPA:335.4	GENERAL CHEMISTRY	LCS	1203781591	LCS	0	0	1	0
EPA:335.4	GENERAL CHEMISTRY	MB	1203781590	MB	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-132320	1203783330	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-132320	1203783331	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-132320	422310001	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CASA-17-132321	422310003	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1203781426	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1203781425	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-132329	1203783405	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-132329	1203783406	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-132329	422310002	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CASA-17-132330	422310004	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1203783402	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1203783401	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-132320	1203783193	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-132320	422310001	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CASA-17-132321	422310003	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	LCS	1203781710	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:353.2	GENERAL CHEMISTRY	MB	1203781709	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-132320	1203783390	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-132320	1203783392	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-132320	422310001	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CASA-17-132321	422310003	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1203783388	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1203783387	MB	1	0	0	0
SM:A2340B	INORGANIC	CASA-17-132320	422310001	REG	1	0	0	0
SM:A2340B	INORGANIC	CASA-17-132321	422310003	REG	1	0	0	0
SW-846:6010C	INORGANIC	CASA-17-132320	1203781821	DUP	17	0	0	0
SW-846:6010C	INORGANIC	CASA-17-132320	1203781822	MS	0	0	17	0
SW-846:6010C	INORGANIC	CASA-17-132320	422310001	REG	17	0	0	0
SW-846:6010C	INORGANIC	CASA-17-132321	422310003	REG	17	0	0	0
SW-846:6010C	INORGANIC	LCS	1203781820	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203781819	MB	17	0	0	0
SW-846:6020	INORGANIC	CASA-17-132320	1203781846	DUP	11	0	0	0
SW-846:6020	INORGANIC	CASA-17-132320	1203781847	MS	0	0	11	0
SW-846:6020	INORGANIC	CASA-17-132320	422310001	REG	11	0	0	0
SW-846:6020	INORGANIC	CASA-17-132321	422310003	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1203781845	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1203781844	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-132320	1203784063	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-132320	1203784064	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-132320	422310001	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-17-132321	422310003	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1203784062	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1203784061	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-17-132329	1203784882	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-17-132329	422310002	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CASA-17-132330	422310004	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1203784881	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1203784880	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

DATA VALIDATION REPORT

No.

5. Any contaminants in blanks?

						Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name				
MB	1203781819	METHOD BLANK	SW-846:6010C	W	Calcium	-58.5	U	ug/L	200

Field Sample ID	Blank Lab	Blank Type	Analytical Method	Parameter Name	Blank Lab Result	Blank Lab Units	Lab Result	Lab Qualifier	Lab Detection Limit	Detect Flag	Detect to Nondetect Factor	Detect to Estimated Factor	Use Factors
CASA-17-132320	1203781819	METHOD BLANK	SW-846:6010C	Calcium	-58.5	ug/L	21400		200	Y			
CASA-17-132321	1203781819	METHOD BLANK	SW-846:6010C	Calcium	-58.5	ug/L	14800		200	Y			

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.

DATA VALIDATION REPORT

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
CASA-17-132320	422310001	1203783330	EPA:350.1	Ammonia as	W	0.0617	0.104	mg/L	Y	Y	51.1	20

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Parameter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detect Flag	Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent	Analysis Lot ID	Validation Status Code	Use Flag
R-35a	2017-1471	CASA-17-132320	REG	INIT	GENERAL CHEMISTRY	EPA:350.1	Ammonia as Nitrogen		J	I10b	Y	0.0617	mg/L	0.0617	mg/L			W	05/02/2017		1661776	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 qualify. The analyte is detected in the sample.
U_LAB	The analytical laboratory qualified the analyte as not detected.

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-17-132320	R-35a	REG	EPA:120.1	0	1

DATA VALIDATION REPORT

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CASA-17-132320	R-35a	REG	EPA:150.1	0	1
CASA-17-132320	R-35a	REG	EPA:160.1	0	1
CASA-17-132320	R-35a	REG	EPA:170.0	0	1
CASA-17-132320	R-35a	REG	EPA:245.2	0	1
CASA-17-132320	R-35a	REG	EPA:300.0	0	4
CASA-17-132320	R-35a	REG	EPA:310.1	0	2
CASA-17-132320	R-35a	REG	EPA:350.1	0	1
CASA-17-132320	R-35a	REG	EPA:353.2	0	1
CASA-17-132320	R-35a	REG	EPA:365.4	0	1
CASA-17-132320	R-35a	REG	SM:A2340B	0	1
CASA-17-132320	R-35a	REG	SW-846:6010C	0	17
CASA-17-132320	R-35a	REG	SW-846:6020	0	11
CASA-17-132320	R-35a	REG	SW-846:6850	0	1
CASA-17-132321	R-35b	REG	EPA:120.1	0	1
CASA-17-132321	R-35b	REG	EPA:150.1	0	1
CASA-17-132321	R-35b	REG	EPA:160.1	0	1
CASA-17-132321	R-35b	REG	EPA:170.0	0	1
CASA-17-132321	R-35b	REG	EPA:245.2	0	1
CASA-17-132321	R-35b	REG	EPA:300.0	0	4
CASA-17-132321	R-35b	REG	EPA:310.1	0	2
CASA-17-132321	R-35b	REG	EPA:350.1	0	1
CASA-17-132321	R-35b	REG	EPA:353.2	0	1
CASA-17-132321	R-35b	REG	EPA:365.4	0	1
CASA-17-132321	R-35b	REG	SM:A2340B	0	1
CASA-17-132321	R-35b	REG	SW-846:6010C	0	17
CASA-17-132321	R-35b	REG	SW-846:6020	0	11
CASA-17-132321	R-35b	REG	SW-846:6850	0	1
CASA-17-132329	R-35a	REG	EPA:170.0	0	1
CASA-17-132329	R-35a	REG	EPA:245.2	0	1
CASA-17-132329	R-35a	REG	EPA:335.4	0	1
CASA-17-132329	R-35a	REG	EPA:351.2	0	1
CASA-17-132329	R-35a	REG	SW-846:9060	0	1
CASA-17-132330	R-35b	REG	EPA:170.0	0	1
CASA-17-132330	R-35b	REG	EPA:245.2	0	1
CASA-17-132330	R-35b	REG	EPA:335.4	0	1
CASA-17-132330	R-35b	REG	EPA:351.2	0	1
CASA-17-132330	R-35b	REG	SW-846:9060	0	1

DATA VALIDATION REPORT

May 26, 2017

gel.com

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

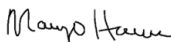
Re: LANL- WQH Water Samples
Work Order: 422310
SDG: 2017-1471

Dear Mr. Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on May 04, 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: 2017-1471
Enclosures



ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Work Order #: 422310
SDG: 2017-1471

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Case Narrative

**Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL- WQH Water Samples
Workorder #: 422310
SDG # : 2017-1471**

May 26, 2017

Laboratory Identification:

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

Summary

Sample receipt The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on May 04, 2017 for analysis. The samples were delivered with proper chain of custody documentation and signatures. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. Containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Shipping container temperature was within specification (0 - 6C). Shipping container temperatures were checked, documented, and within specifications. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
422310001	CASA-17-132320
422310002	CASA-17-132329
422310003	CASA-17-132321
422310004	CASA-17-132330

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 26 May 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122017-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-22
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Chain of Custody and Supporting Documentation



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: <u>LANL</u>		SDG/AR/COC/Work Order: <u>422310</u>	
Received By: <u>LDP</u>		Date Received: <u>5/4/17</u>	
Carrier and Tracking Number		Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <u>5908 1782 0323 3°</u> <u>5908 1782 0312 3°</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.	
Shipped as a DOT Hazardous?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____	
COC/Samples marked or classified as radioactive?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> <input checked="" type="checkbox"/> CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____	

Sample Receipt Criteria	Yes	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet ice <input checked="" type="checkbox"/> Ice Packs <input type="checkbox"/> Dry ice <input type="checkbox"/> None <input type="checkbox"/> Other: _____ *all temperatures are recorded in Celsius TEMP: <u>3°</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>FR3-16</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Yes, Are Encores or Soil Kits present? Yes _____ No _____ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes _____ No _____ N/A _____ (If unknown, select No) VOA vials free of headspace? Yes _____ No _____ N/A _____ Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected: <u>NOP 160 INF 170502 - 2 bottles NO LABEL FOR</u> <u>NOP 160 OUT 170502</u>
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: _____
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's affected: _____
12 Are sample containers identifiable as GEL provided?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Comments (Use Continuation Form if needed):
The 2 bottles of NOP 160 INF 170502 had markings of "F" on one and "O" on the other

PM (or PMA) review: Initials

MEH

Date

5/4/17

Page

1 of 1

GL-CHL-SR-001 Rev 5

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

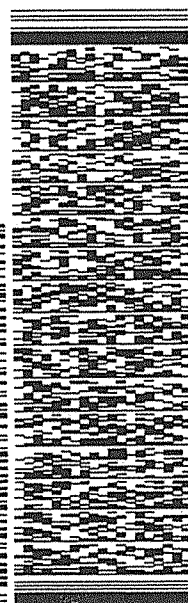
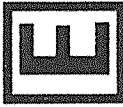
ST F1
RT 257
10:30
0323
05:04

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 566-8171
REF: 21PD0ASRGW04BAGWE0

FedEx
Express



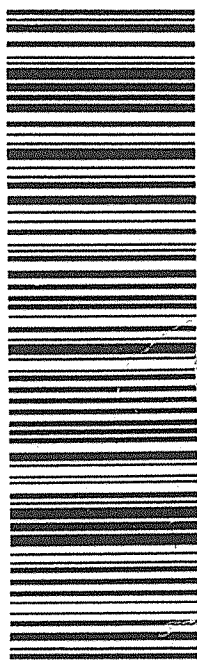
THU - 04 MAY 10:30A
PRIORITY OVERNIGHT

MPS# 5908 1782 0323

Mstr# 5908 1782 0312

X7 RBWA

29407
SC-US CHS



Part # 163024

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

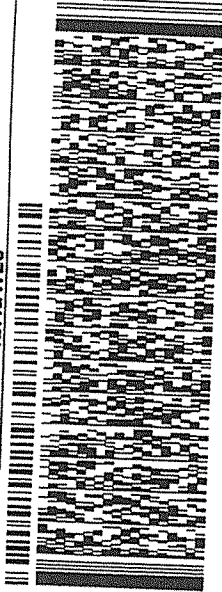
SHIP DATE: 03MAY17
ACTING: S4.0 LB MAN
CAD: 0014178/CAFE2916

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407

(843) 566-8171
REF: 21PD0ASRGW04BAGWE0

FedEx
Express

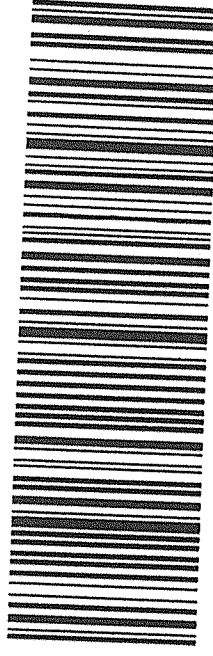


THU - 04 MAY 10:30A
PRIORITY OVERNIGHT

1 of 2
TRK# 5908 1782-0312
MASTER

X7 RBWA

29407
SC-US CHS



Part # 156148V-434 RIT2 06/15

Data Review Qualifier Flag Definition Sheet

Data Review Qualifier Definitions

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

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

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

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

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2017-1471
Work Order #: 422310**

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: 1662828

Prep Batch Number: 1662825

Sample Analysis

Sample ID	Client ID
422310001	422310001 (CASA-17-132320)
422310003	422310003 (CASA-17-132321)
1203784065	Interference Check Sample (ICS)
1203784061	Method Blank (MB)
1203784062	Laboratory Control Sample (LCS)
1203784063	422310001(CASA-17-132320) Matrix Spike (MS)
1203784064	422310001(CASA-17-132320) 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 422310001 (CASA-17-132320) 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

There was a mis-injection of sample 1203784064 (CASA-17-132320MSD). The re-analysis met all acceptance criteria, and the data are reported.

Miscellaneous Information

Data Exception (DER) Documentation

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

Manual Integrations

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

Method Comments

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

Additional Comments

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

Perchlorate Isotope Ratio

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

System Configuration

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

Electronic Packaging Comment

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

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

Chromatographic Columns

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

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

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2017-1471 GEL Work Order: 422310

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Michael Penny

Date: 11 MAY 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: 1662825Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-132320Date Received: 04-MAY-17GEL Job No (SDG): 2017-1471GEL Sample ID: 422310001Date Filtered: 08-MAY-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.398	ug/L		1	08-MAY-17 18:32	per0508016a
	Perchlorate Isotope Ratio			2.87			1	08-MAY-17 18:32	per0508016a
14797-73-0	Perchlorate-101	.05	.2	0.409	ug/L		1	08-MAY-17 18:32	per0508016a
	Perchlorate-O(18)			0.449	ug/L		1	08-MAY-17 18:32	per0508016a

^ 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: 1662825Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-132321Date Received: 04-MAY-17GEL Job No (SDG): 2017-1471GEL Sample ID: 422310003Date Filtered: 08-MAY-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.569	ug/L		1	08-MAY-17 19:01	per0508019a
	Perchlorate Isotope Ratio			3.01			1	08-MAY-17 19:01	per0508019a
14797-73-0	Perchlorate-101	.05	.2	0.558	ug/L		1	08-MAY-17 19:01	per0508019a
	Perchlorate-O(18)			0.452	ug/L		1	08-MAY-17 19:01	per0508019a

^ 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): 2017-1471

Extract Batch Code: 1662825

Date Filtered: 08-MAY-17

Matrix: WATER

Sample ID: 1203784062

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.192	ug/L	96		85 - 115
Perchlorate Isotope Ratio		2.99				-
Perchlorate-101	0.200	.19	ug/L	95		85 - 115
Perchlorate-O(18)		.452	ug/L			-

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

Perchlorate Spike/Spike Duplicate Summary

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No (SDG): 2017-1471

Extract Batch Code: 1662825

Date Extracted: 08-MAY-17

GEL MS/PS ID: 1203784063

Client ID: CASA-17-132320

GEL MSD/PSD ID: 1203784064

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	0.398	ug/L	0.617	110	.616	109	0	30	75 - 125
Perchlorate Isotope Ratio	0	2.87		3.02		3.02		0		-
Perchlorate-101	0.200	0.409	ug/L	0.602	97	.59	90	2	30	75 - 125
Perchlorate-O(18)	0	0.449	ug/L	0.434		.51		16		-

^ 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: 1662825Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 08-MAY-17GEL Job No (SDG): 2017-1471GEL Sample ID: 1203784061Date Filtered: 08-MAY-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	08-MAY-17 18:04	per0508013a
	Perchlorate Isotope Ratio						1	08-MAY-17 18:04	per0508013a
14797-73-0	Perchlorate-101	.05	.2	0.200	ug/L	U	1	08-MAY-17 18:04	per0508013a
	Perchlorate-O(18)			0.462	ug/L		1	08-MAY-17 18:04	per0508013a

^ 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: 1662825Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 08-MAY-17GEL Job No (SDG): 2017-1471GEL Sample ID: 1203784062Date Filtered: 08-MAY-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.192	ug/L	J	1	08-MAY-17 18:13	per0508014a
	Perchlorate Isotope Ratio			2.99			1	08-MAY-17 18:13	per0508014a
14797-73-0	Perchlorate-101	.05	.2	0.190	ug/L	J	1	08-MAY-17 18:13	per0508014a
	Perchlorate-O(18)			0.452	ug/L		1	08-MAY-17 18:13	per0508014a

^ 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: 1662825Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 2017-1471GEL Sample ID: 1203784065Date Filtered: 08-MAY-17Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.199	ug/L	J	1	08-MAY-17 18:23	per0508015a
	Perchlorate Isotope Ratio			2.73			1	08-MAY-17 18:23	per0508015a
14797-73-0	Perchlorate-101	.05	.2	0.215	ug/L		1	08-MAY-17 18:23	per0508015a
	Perchlorate-O(18)			0.485	ug/L		1	08-MAY-17 18:23	per0508015a

^ 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: 1662825Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-132320MSDate Received: 04-MAY-17GEL Job No (SDG): 2017-1471GEL Sample ID: 1203784063Date Filtered: 08-MAY-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.617	ug/L		1	08-MAY-17 18:42	per0508017a
	Perchlorate Isotope Ratio			3.02			1	08-MAY-17 18:42	per0508017a
14797-73-0	Perchlorate-101	.05	.2	0.602	ug/L		1	08-MAY-17 18:42	per0508017a
	Perchlorate-O(18)			0.434	ug/L		1	08-MAY-17 18:42	per0508017a

^ 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: 1662825Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-17-132320MSDDate Received: 04-MAY-17GEL Job No (SDG): 2017-1471GEL Sample ID: 1203784064Date Filtered: 08-MAY-17Injection Volume (uL): 20%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.616	ug/L		1	09-MAY-17 18:35	per0509013a
	Perchlorate Isotope Ratio			3.02			1	09-MAY-17 18:35	per0509013a
14797-73-0	Perchlorate-101	.05	.2	0.590	ug/L		1	09-MAY-17 18:35	per0509013a
	Perchlorate-O(18)			0.510	ug/L		1	09-MAY-17 18:35	per0509013a

^ 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 #: 2017-1471
Work Order #: 422310

Sample ID	Client ID
422310001	CASA-17-132320
422310002	CASA-17-132329
422310003	CASA-17-132321
422310004	CASA-17-132330
1203781819	Method Blank (MB) ICP
1203781820	Laboratory Control Sample (LCS)
1203781823	422310001(CASA-17-132320L) Serial Dilution (SD)
1203781821	422310001(CASA-17-132320D) Sample Duplicate (DUP)
1203781822	422310001(CASA-17-132320S) Matrix Spike (MS)
1203781844	Method Blank (MB) ICP-MS
1203781845	Laboratory Control Sample (LCS)
1203781848	422310001(CASA-17-132320L) Serial Dilution (SD)
1203781846	422310001(CASA-17-132320D) Sample Duplicate (DUP)
1203781847	422310001(CASA-17-132320S) Matrix Spike (MS)
1203782872	Method Blank (MB) CVAA
1203782873	Laboratory Control Sample (LCS)
1203782884	422310001(CASA-17-132320L) Serial Dilution (SD)
1203782880	422310001(CASA-17-132320D) Sample Duplicate (DUP)
1203782882	422310001(CASA-17-132320S) Matrix Spike (MS)

Sample Analysis

Samples 422310001,002,003 and 004 in this SDG were analyzed for metals and mercury on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1661973, 1661988, 1662385 and 1669537
Prep Batch :	1661971, 1661987 and 1662384
Standard Operating Procedures:	GL-MA-E-013 REV# 28, GL-MA-E-006 REV# 13, GL-MA-E-014 REV# 29, GL-MA-E-010 REV# 34 and GL-GC-E-107 REV# 10
Analytical Method:	SW846 3005A/6010C, SW846 3005A/6020A, EPA 245.2 1974 and SM:A2340B
Prep Method :	SW846 3005A and EPA 245.1/245.2 Prep

Preparation/Analytical Method Verification

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

System Configuration

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

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

The Metals analysis-ICP was performed on a PE 7300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard.

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

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

Calibration Information

Instrument Calibration

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

CRDL/PQL Requirements

The CRDL/PQL standard recoveries met the referenced advisory control limits.

ICSA/ICSAB Statement

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

Continuing Calibration Blanks (CCB) Requirements

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

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 422310001 (CASA-17-132320)-ICP, ICP-MS and CVAA.

Matrix Spike (MS/MSD) Recovery Statement

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

Duplicate Relative Percent Difference (RPD) Statement

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

Serial Dilution % Difference Statement

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Preparation Information

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

Miscellaneous Information

Electronic Packaging Comment

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

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

Data Exception (DER) Documentation

A data exception report was not required for this SDG.

Additional Comments

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

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

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

higher of the two calculated values of Ca or Mg.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

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

Client SDG: 2017-1471 GEL Work Order: 422310

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: 31 MAY 2017

Title: Data Validator

Sample Data Summary

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1471**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 422310001**BASIS:** As Received**DATE COLLECTED** 02-MAY-17**CLIENT ID:** CASA-17-132320**LEVEL:** Low**DATE RECEIVED** 04-MAY-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	05/08/17 10:43	050817W2-5	1662385

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1471

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 422310001

BASIS: As Received

DATE COLLECTED 02-MAY-17

CLIENT ID: CASA-17-132320

LEVEL: Low

DATE RECEIVED 04-MAY-17

MATRIX: W

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	200	ug/L	U	68	200	200	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	BAJ	05/06/17 12:38	170506-4	1661988
7440-38-2	Arsenic	2.48	ug/L	J	2	5	5	1	MS	BAJ	05/05/17 23:24	170505-3	1661988
7440-39-3	Barium	336	ug/L		1	5	5	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7440-42-8	Boron	38.5	ug/L	J	15	50	50	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7440-43-9	Cadmium	1	ug/L	U	0.3	1	1	1	MS	BAJ	05/06/17 12:38	170506-4	1661988
7440-70-2	Calcium	21400	ug/L		50	200	200	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7440-47-3	Chromium	4.25	ug/L	J	3	10	10	1	MS	BAJ	05/05/17 23:24	170505-3	1661988
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7439-89-6	Iron	100	ug/L	U	30	100	100	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	BAJ	05/05/17 23:24	170505-3	1661988
7439-95-4	Magnesium	5540	ug/L		110	300	300	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7439-98-7	Molybdenum	1.19	ug/L		0.2	0.5	0.5	1	MS	BAJ	05/06/17 12:38	170506-4	1661988
7440-02-0	Nickel	5.01	ug/L		0.6	2	2	1	MS	BAJ	05/05/17 23:24	170505-3	1661988
7440-09-7	Potassium	3820	ug/L		50	150	150	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7782-49-2	Selenium	5	ug/L	U	2	5	5	1	MS	BAJ	05/05/17 23:24	170505-3	1661988
7631-86-9	Silica	80100	ug/L		53	213	213	1	P	HSC	05/12/17 08:55	051217-2	1661973
7440-22-4	Silver	1	ug/L	U	0.3	1	1	1	MS	BAJ	05/05/17 23:24	170505-3	1661988
7440-23-5	Sodium	17200	ug/L		100	300	300	1	P	HSC	05/12/17 08:55	051217-2	1661973
7440-24-6	Strontium	178	ug/L		1	5	5	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7440-28-0	Thallium	2	ug/L	U	0.6	2	2	1	MS	BAJ	05/05/17 23:24	170505-3	1661988
7440-31-5	Tin	4.24	ug/L	J	2.5	10	10	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7440-61-1	Uranium	0.636	ug/L		0.067	0.2	0.2	1	MS	BAJ	05/06/17 12:38	170506-4	1661988
7440-62-2	Vanadium	16.1	ug/L		1	5	5	1	P	HSC	05/11/17 15:00	051117A-1	1661973
7440-66-6	Zinc	10	ug/L	U	3.3	10	10	1	P	HSC	05/12/17 08:55	051217-2	1661973

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1471**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 422310001**BASIS:** As Received**DATE COLLECTED** 02-MAY-17**CLIENT ID:** CASA-17-132320**LEVEL:** Low**DATE RECEIVED** 04-MAY-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
	Hardness as CaCO3	76.2	mg/L		0.453	1.24	1.24	1		TXT1	05/30/17 17:03		1669537

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1661973	1661971	SW846 3005A	50	mL	50	mL	05/04/17	CXW4
1661988	1661987	SW846 3005A	50	mL	50	mL	05/04/17	CXW4
1662385	1662384	EPA 245.1/245.2 Prep	20	mL	20	mL	05/05/17	JXH5

***Analytical Methods:**

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

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1471**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 422310002**BASIS:** As Received**DATE COLLECTED** 02-MAY-17**CLIENT ID:** CASA-17-132329**LEVEL:** Low**DATE RECEIVED** 04-MAY-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	05/08/17 10:51	050817W2-5	1662385

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1662385	1662384	EPA 245.1/245.2 Prep	20	mL	20	mL	05/05/17	JXH5

***Analytical Methods:**

AV EPA 245.2 1974

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1471**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 422310003**BASIS:** As Received**DATE COLLECTED** 02-MAY-17**CLIENT ID:** CASA-17-132321**LEVEL:** Low**DATE RECEIVED** 04-MAY-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	05/08/17 10:53	050817W2-5	1662385

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1471

CONTRACT: ESHL00114

METHOD TYPE: SW846

SAMPLE ID: 422310003

BASIS: As Received

DATE COLLECTED 02-MAY-17

CLIENT ID: CASA-17-132321

LEVEL: Low

DATE RECEIVED 04-MAY-17

MATRIX: W

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	200	ug/L	U	68	200	200	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	BAJ	05/06/17 12:47	170506-4	1661988
7440-38-2	Arsenic	2.24	ug/L	J	2	5	5	1	MS	BAJ	05/05/17 23:37	170505-3	1661988
7440-39-3	Barium	35.8	ug/L		1	5	5	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7440-42-8	Boron	23.4	ug/L	J	15	50	50	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7440-43-9	Cadmium	1	ug/L	U	0.3	1	1	1	MS	BAJ	05/06/17 12:47	170506-4	1661988
7440-70-2	Calcium	14800	ug/L		50	200	200	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7440-47-3	Chromium	5.07	ug/L	J	3	10	10	1	MS	BAJ	05/05/17 23:37	170505-3	1661988
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7439-89-6	Iron	100	ug/L	U	30	100	100	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	BAJ	05/05/17 23:37	170505-3	1661988
7439-95-4	Magnesium	4730	ug/L		110	300	300	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7439-98-7	Molybdenum	1.31	ug/L		0.2	0.5	0.5	1	MS	BAJ	05/06/17 12:47	170506-4	1661988
7440-02-0	Nickel	5.27	ug/L		0.6	2	2	1	MS	BAJ	05/05/17 23:37	170505-3	1661988
7440-09-7	Potassium	1950	ug/L		50	150	150	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7782-49-2	Selenium	5	ug/L	U	2	5	5	1	MS	BAJ	05/05/17 23:37	170505-3	1661988
7631-86-9	Silica	74000	ug/L		53	213	213	1	P	HSC	05/12/17 08:46	051217-2	1661973
7440-22-4	Silver	1	ug/L	U	0.3	1	1	1	MS	BAJ	05/05/17 23:37	170505-3	1661988
7440-23-5	Sodium	11000	ug/L		100	300	300	1	P	HSC	05/12/17 08:46	051217-2	1661973
7440-24-6	Strontium	66.9	ug/L		1	5	5	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7440-28-0	Thallium	2	ug/L	U	0.6	2	2	1	MS	BAJ	05/05/17 23:37	170505-3	1661988
7440-31-5	Tin	3.87	ug/L	J	2.5	10	10	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7440-61-1	Uranium	0.296	ug/L		0.067	0.2	0.2	1	MS	BAJ	05/06/17 12:47	170506-4	1661988
7440-62-2	Vanadium	13	ug/L		1	5	5	1	P	HSC	05/11/17 14:51	051117A-1	1661973
7440-66-6	Zinc	12.8	ug/L		3.3	10	10	1	P	HSC	05/12/17 08:46	051217-2	1661973

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1471**CONTRACT:** ESHL00114**METHOD TYPE:****SAMPLE ID:** 422310003**BASIS:** As Received**DATE COLLECTED** 02-MAY-17**CLIENT ID:** CASA-17-132321**LEVEL:** Low**DATE RECEIVED** 04-MAY-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
	Hardness as CaCO3	56.5	mg/L		0.453	1.24	1.24	1		TXT1	05/30/17 17:03		1669537

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1661973	1661971	SW846 3005A	50	mL	50	mL	05/04/17	CXW4
1661988	1661987	SW846 3005A	50	mL	50	mL	05/04/17	CXW4
1662385	1662384	EPA 245.1/245.2 Prep	20	mL	20	mL	05/05/17	JXH5

Analytical Methods:*P** SW846 3005A/6010C**MS** SW846 3005A/6020A**AV** EPA 245.2 1974

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2017-1471**CONTRACT:** ESHL00114**METHOD TYPE:** EPA**SAMPLE ID:** 422310004**BASIS:** As Received**DATE COLLECTED** 02-MAY-17**CLIENT ID:** CASA-17-132330**LEVEL:** Low**DATE RECEIVED** 04-MAY-17**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	AXS5	05/08/17 10:54	050817W2-5	1662385

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1662385	1662384	EPA 245.1/245.2 Prep	20	mL	20	mL	05/05/17	JXH5

***Analytical Methods:**

AV EPA 245.2 1974

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2017-1471

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>
1203781819	Aluminum	68	ug/L	+/-200	U	P	68	200
	Barium	1	ug/L	+/-5	U	P	1	5
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Calcium	-58.5	ug/L	+/-200	J	P	50	200
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Copper	3	ug/L	+/-10	U	P	3	10
	Iron	30	ug/L	+/-100	U	P	30	100
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Manganese	2	ug/L	+/-10	U	P	2	10
	Potassium	50	ug/L	+/-150	U	P	50	150
	Silica	53	ug/L	+/-213	U	P	53	213
	Sodium	100	ug/L	+/-300	U	P	100	300
	Strontium	1	ug/L	+/-5	U	P	1	5
	Tin	2.5	ug/L	+/-10	U	P	2.5	10
	Vanadium	1	ug/L	+/-5	U	P	1	5
	Zinc	3.3	ug/L	+/-10	U	P	3.3	10
1203781844	Antimony	1	ug/L	+/-3	U	MS	1	3
	Arsenic	2	ug/L	+/-5	U	MS	2	5
	Cadmium	0.3	ug/L	+/-1	U	MS	0.3	1
	Chromium	3	ug/L	+/-10	U	MS	3	10
	Lead	0.5	ug/L	+/-2	U	MS	0.5	2
	Molybdenum	0.2	ug/L	+/-0.5	U	MS	0.2	0.5
	Nickel	0.6	ug/L	+/-2	U	MS	0.6	2
	Selenium	2	ug/L	+/-5	U	MS	2	5
	Silver	0.3	ug/L	+/-1	U	MS	0.3	1
	Thallium	0.6	ug/L	+/-2	U	MS	0.6	2
	Uranium	0.067	ug/L	+/-0.2	U	MS	0.067	0.2
1203782872	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. 2017-1471

Client ID: CASA-17-132320S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 422310001

Spike ID: 1203781822

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Aluminum	ug/L	75-125	4750		68	U	5000	94.8		P
Barium	ug/L	75-125	787		336		500	90.2		P
Beryllium	ug/L	75-125	465		1	U	500	93.1		P
Boron	ug/L	75-125	522		38.5	J	500	96.8		P
Calcium	ug/L		26000		21400		5000	92.4	N/A	P
Cobalt	ug/L	75-125	449		1	U	500	89.8		P
Copper	ug/L	75-125	496		3	U	500	99.1		P
Magnesium	ug/L	75-125	10300		5540		5000	94.5		P
Manganese	ug/L	75-125	460		2	U	500	91.9		P
Potassium	ug/L	75-125	8580		3820		5000	95.1		P
Silica	ug/L		89500		80100		10700	88.1	N/A	P
Sodium	ug/L	75-125	22400		17200		5000	103		P
Strontium	ug/L	75-125	685		178		500	101		P
Tin	ug/L	75-125	470		4.24	J	500	93.2		P
Vanadium	ug/L	75-125	491		16.1		500	95		P
Zinc	ug/L	75-125	477		3.3	U	500	94.9		P
Iron	ug/L	75-125	5060		30	U	5000	101		P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-1471

Client ID: CASA-17-132320S

Contract: ESHL00114

Level: Low

Matrix: WATER

% Solids:

Sample ID: 422310001

Spike ID: 1203781847

<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	51.2		1	U	50	101		MS
Arsenic	ug/L	75-125	52.3		2.48	J	50	99.6		MS
Cadmium	ug/L	75-125	50.9		0.3	U	50	102		MS
Chromium	ug/L	75-125	53.5		4.25	J	50	98.4		MS
Lead	ug/L	75-125	49.3		0.5	U	50	98.6		MS
Molybdenum	ug/L	75-125	52.7		1.19		50	103		MS
Nickel	ug/L	75-125	57.2		5.01		50	104		MS
Selenium	ug/L	75-125	49.3		2	U	50	98.5		MS
Silver	ug/L	75-125	52.6		0.3	U	50	105		MS
Thallium	ug/L	75-125	47.7		0.6	U	50	95		MS
Uranium	ug/L	75-125	51.2		0.636		50	101		MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

-5a-

Matrix Spike Summary

SDG NO. 2017-1471 Client ID: CASA-17-132320S

Contract: ESHL00114 Level: Low

Matrix: WATER % Solids:

Sample ID: 422310001 Spike ID: 1203782882

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Mercury	ug/L	75-125	1.93		0.067	U	2	96.4		AV

*Analytical Methods:

AV EPA 245.1/245.2

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-1471

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-17-132320D

Matrix: WATER

Level: Low

Sample ID: 422310001

Duplicate ID: 1203781821

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%	336		342		1.57		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L	+/-50	38.5 J		39 J		1.24		P
Calcium	ug/L	+/-20%	21400		21500		.392		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%	5540		5580		.777		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	3820		3790		.707		P
Silica	ug/L	+/-20%	80100		80400		.383		P
Sodium	ug/L	+/-20%	17200		17500		1.77		P
Strontium	ug/L	+/-20%	178		177		.582		P
Tin	ug/L	+/-10	4.24 J		3.6 J		16.2		P
Vanadium	ug/L	+/-5	16.1		16.5		2.32		P
Zinc	ug/L		3.3 U		3.3 U				P

*Analytical Methods:

P SW846 3005A/6010C

Metals
-6-
Duplicate Sample Summary

SDG No.: 2017-1471

Lab Code: GEL

Contract: ESHL00114

Client ID: CASA-17-132320D

Matrix: WATER

Level: Low

Sample ID: 422310001

Duplicate ID: 1203781846

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	2.48 J		2.53 J		1.95		MS
Cadmium	ug/L		0.3 U		0.3 U				MS
Chromium	ug/L	+/-10	4.25 J		4.52 J		6.18		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	1.19		1.07		11.2		MS
Nickel	ug/L	+/-2	5.01		5.45		8.4		MS
Selenium	ug/L		2 U		2 U				MS
Silver	ug/L		0.3 U		0.3 U				MS
Thallium	ug/L		0.6 U		0.6 U				MS
Uranium	ug/L	+/- .2	0.636		0.613		3.68		MS

*Analytical Methods:

MS SW846 3005A/6020A

Metals
–6–
Duplicate Sample Summary

SDG No.: 2017–1471**Lab Code:** GEL**Contract:** ESHL00114**Client ID:** CASA–17–132320D**Matrix:** WATER**Level:** Low**Sample ID:** 422310001**Duplicate ID:** 1203782880**Percent Solids for Dup:** N/A

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

*Analytical Methods:

AV EPA 245.1/245.2

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-1471

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>
1203781820								
	Aluminum	ug/L	5000	4890		97.9	80-120	P
	Barium	ug/L	500	471		94.3	80-120	P
	Beryllium	ug/L	500	466		93.2	80-120	P
	Boron	ug/L	500	481		96.2	80-120	P
	Calcium	ug/L	5000	4810		96.1	80-120	P
	Cobalt	ug/L	500	460		92.1	80-120	P
	Copper	ug/L	500	488		97.6	80-120	P
	Iron	ug/L	5000	5260		105	80-120	P
	Magnesium	ug/L	5000	4960		99.1	80-120	P
	Manganese	ug/L	500	475		95	80-120	P
	Potassium	ug/L	5000	4900		97.9	80-120	P
	Silica	ug/L	10700	10300		96	80-120	P
	Sodium	ug/L	5000	5110		102	80-120	P
	Strontium	ug/L	500	521		104	80-120	P
	Tin	ug/L	500	467		93.3	80-120	P
	Vanadium	ug/L	500	478		95.6	80-120	P
	Zinc	ug/L	500	467		93.3	80-120	P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 2017-1471

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>
1203781845								
	Antimony	ug/L	50	50.7		101	80-120	MS
	Arsenic	ug/L	50	50.2		100	80-120	MS
	Cadmium	ug/L	50	51.2		102	80-120	MS
	Chromium	ug/L	50	49.8		99.6	80-120	MS
	Lead	ug/L	50	49.4		98.8	80-120	MS
	Molybdenum	ug/L	50	51.5		103	80-120	MS
	Nickel	ug/L	50	51.2		102	80-120	MS
	Selenium	ug/L	50	50.1		100	80-120	MS
	Silver	ug/L	50	53.3		107	80-120	MS
	Thallium	ug/L	50	47.2		94.5	80-120	MS
	Uranium	ug/L	50	50.2		100	80-120	MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Laboratory Control Sample Summary

SDG NO. 2017-1471

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>
1203782873	Mercury	ug/L	2	1.93		96.4	85-115	AV

*Analytical Methods:

AV EPA 245.1/245.2

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-1471

Client ID: CASA-17-132320L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 422310001

Serial Dilution ID: 1203781823

<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	336		332		1.395		10	P
Beryllium	1	U	5	U				P
Boron	38.5	J	75	U	2.045			P
Calcium	21400		21500		.788		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	5540		5750		3.752		10	P
Manganese	2	U	10	U				P
Potassium	3820		3920		2.694		10	P
Silica	80100		79600		.592		10	P
Sodium	17200		17800		3.32		10	P
Strontium	178		179		.834		10	P
Tin	4.24	J	12.5	U	183.362			P
Vanadium	16.1		18.6	J	15.587			P
Zinc	3.3	U	16.5	U				P

*Analytical Methods:

P SW846 3005A/6010C

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 2017-1471

Client ID: CASA-17-132320L

Contract: ESHL00114

Matrix: LIQUID

Level: Low

Sample ID: 422310001

Serial Dilution ID: 1203781848

<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	2.48	J	10	U	6.927			MS
Cadmium	.3	U	1.5	U				MS
Chromium	4.25	J	15	U	3.01			MS
Lead	.5	U	2.5	U				MS
Molybdenum	1.19		1.21	J	1.175			MS
Nickel	5.01		5.39	J	7.528			MS
Selenium	2	U	10	U				MS
Silver	.3	U	1.5	U				MS
Thallium	.6	U	3	U				MS
Uranium	.636		.605	J	4.874			MS

*Analytical Methods:

MS SW846 3005A/6020A

METALS

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Serial Dilution Sample Summary

SDG NO. 2017-1471 **Client ID:** CASA-17-132320L**Contract:** ESHL00114**Matrix:** LIQUID **Level:** Low**Sample ID:** 422310001 **Serial Dilution ID:** 1203782884

<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 #: 2017-1471
Work Order #: 422310**

Method/Analysis Information

Product: Carbon and Total Organic

Analytical Batch: 1663112

Method: SW 9060 Total Organic Carbon

Sample Analysis

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

Sample ID	Client ID
422310002	CASA-17-132329
422310004	CASA-17-132330
1203784880	Method Blank (MB)
1203784881	Laboratory Control Sample (LCS)
1203784882	422310002(CASA-17-132329) Sample Duplicate (DUP)
1203784883	422310002(CASA-17-132329) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422310002 (CASA-17-132329) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Cyanide and Total		
Analytical Batch:	1661857	Method:	WSP-CN(T)
Prep Batch :	1661856	Method:	EPA 335.4

Sample Analysis

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

Sample ID	Client ID
422310002	CASA-17-132329
422310004	CASA-17-132330
1203781590	Method Blank (MB)
1203781591	Laboratory Control Sample (LCS)
1203782269	422310002(CASA-17-132329) Sample Duplicate (DUP)
1203782270	422310002(CASA-17-132329) Matrix Spike (MS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 REV# 19.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422310002 (CASA-17-132329) 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: 1662746

Method: WSP-ANIONS

Sample Analysis

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

Sample ID	Client ID
422310001	CASA-17-132320
422310003	CASA-17-132321
1203783868	Method Blank (MB)
1203783869	Laboratory Control Sample (LCS)
1203783870	422310001(CASA-17-132320) Sample Duplicate (DUP)
1203783871	422310001(CASA-17-132320) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

The Ion Chromatography analysis was performed on a Dionex ICS-5000 Ion Chromatograph.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422310001 (CASA-17-132320) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Manual Integrations

Samples 1203783870 (CASA-17-132320DUP), 1203783871 (CASA-17-132320PS), 422310001 (CASA-17-132320) and 422310003 (CASA-17-132321) 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: 1661776 **Method:** NH3
Prep Batch : 1661775 **Method:** EPA 350.1 Prep

Sample Analysis

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

Sample ID	Client ID
422310001	CASA-17-132320
422310003	CASA-17-132321
1203781425	Method Blank (MB)
1203781426	Laboratory Control Sample (LCS)
1203783330	422310001(CASA-17-132320) Sample Duplicate (DUP)
1203783331	422310001(CASA-17-132320) Matrix Spike (MS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422310001 (CASA-17-132320) 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

Sample1203781425 (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:	Total Kjeldahl Nitrogen		
Analytical Batch:	1662576	Method:	TKN
Prep Batch :	1662574	Method:	EPA 351.2 Prep

Sample Analysis

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

Sample ID	Client ID
422310002	CASA-17-132329
422310004	CASA-17-132330
1203783401	Method Blank (MB)
1203783402	Laboratory Control Sample (LCS)
1203783405	422310002(CASA-17-132329) Sample Duplicate (DUP)
1203783406	422310002(CASA-17-132329) Matrix Spike (MS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422310002 (CASA-17-132329) 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

Samples 1203783401 (MB), 1203783402 (LCS), 1203783405 (CASA-17-132329DUP), 1203783406 (CASA-17-132329MS) and 422310002 (CASA-17-132329) were re-analyzed due to CCV failure. The reanalysis data with passing instrument QC was reported.

Miscellaneous Information

Data Exception (DER) Documentation

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

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: 1661895

Method: NO3NO2

Sample Analysis

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

Sample ID	Client ID
422310001	CASA-17-132320
422310003	CASA-17-132321
1203781709	Method Blank (MB)
1203781710	Laboratory Control Sample (LCS)
1203783193	422310001(CASA-17-132320) Sample Duplicate (DUP)
1203783196	422310001(CASA-17-132320) Post Spike (PS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422310001 (CASA-17-132320) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

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

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product:	Total Phosphorus		
Analytical Batch:	1662570	Method:	PO4
Prep Batch :	1662568	Method:	EPA 365.4 Prep

Sample Analysis

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

Sample ID	Client ID
422310001	CASA-17-132320
422310003	CASA-17-132321
1203783387	Method Blank (MB)
1203783388	Laboratory Control Sample (LCS)
1203783390	422310001(CASA-17-132320) Sample Duplicate (DUP)
1203783392	422310001(CASA-17-132320) Matrix Spike (MS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

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

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422310001 (CASA-17-132320) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

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

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

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

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Solids and Total Dissolved

Analytical Batch: 1662259

Method: TDS

Sample Analysis

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

Sample ID	Client ID
422310001	CASA-17-132320
422310003	CASA-17-132321
1203782544	Method Blank (MB)
1203782545	Laboratory Control Sample (LCS)
1203782546	422310001(CASA-17-132320) Sample Duplicate (DUP)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Consecutive Weight Checks

All consecutive weight checks were met.

Quality Control (QC) Designation

Sample 422310001 (CASA-17-132320) 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: 1662034

Method: EPA120.1 Specific Conductivity

Sample Analysis

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

Sample ID	Client ID
422310001	CASA-17-132320
422310003	CASA-17-132321
1203781954	Laboratory Control Sample (LCS)
1203781957	422310001(CASA-17-132320) Sample Duplicate (DUP)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-009 REV# 14.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Calibration Verification Information

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

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422310001 (CASA-17-132320) 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: 1666995 **Method:** PH

Sample Analysis

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

Sample ID	Client ID
422310001	CASA-17-132320
422310003	CASA-17-132321
1203794026	Laboratory Control Sample (LCS)
1203794028	423224002(WST53-17-133059) Sample Duplicate (DUP)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 423224002 (WST53-17-133059) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

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

Sample	Analyte	Value
1203794028 (WST53-17-133059DUP)	pH	Received 16-MAY-17, out of holding 11-MAY-17
422310001 (CASA-17-132320)	pH	Received 04-MAY-17, out of holding 02-MAY-17
422310003 (CASA-17-132321)	pH	Received 04-MAY-17, out of holding 02-MAY-17

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

A data exception report (DER) 1636062 was generated for samples 422310001 (CASA-17-132320), 422310003 (CASA-17-132321) and 1203794028 (WST53-17-133059DUP) 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: 1665516 **Method:** EPA 310.1 Total Alkalinity

Sample Analysis

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

Sample ID	Client ID
422310001	CASA-17-132320
422310003	CASA-17-132321
1203790515	Laboratory Control Sample (LCS)
1203790519	422310001(CASA-17-132320) Sample Duplicate (DUP)
1203790523	422310001(CASA-17-132320) Matrix Spike (MS)

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

SOP Reference

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

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample Duplicate (LCSD)

An LCSD was not used in place of matrix QC.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

Sample 422310001 (CASA-17-132320) was selected for QC analysis.

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

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

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Certification Statement

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

GEL LABORATORIES LLC

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Qualifier Definition Report for

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

Client SDG: 2017-1471 GEL Work Order: 422310


The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: 

Name: Aubrey Kingsbury

Date: 30 MAY 2017

Title: Analyst I

Sample Data Summary

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Certificate of Analysis

Report Date: May 30, 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: 2017-1471

Client Sample ID: CASA-17-132320
Sample ID: 422310001
Matrix: W
Collect Date: 02-MAY-17 13:33
Receive Date: 04-MAY-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide	U	ND	0.067	0.200	mg/L		1	MXL2	05/07/17	0122	1662746	1
Chloride		6.73	0.067	0.200	mg/L		1					
Fluoride		0.311	0.033	0.100	mg/L		1					
Sulfate		5.83	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia		0.0617	0.017	0.050	mg/L	1.00	1	KLP1	05/08/17	1259	1661776	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		0.431	0.017	0.050	mg/L		1	AXH3	05/09/17	1206	1661895	3
PO4 "As Received"												
Phosphorus, Total as P	U	ND	0.020	0.050	mg/L	1.00	1	KLP1	05/18/17	1012	1662570	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		207	3.40	14.3	mg/L			KLP1	05/09/17	1455	1662259	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		119	1.45	4.00	mg/L			RXB5	05/16/17	1734	1665516	6
Carbonate alkalinity (CaCO3)	J	2.00	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		283	1.00	1.00	umhos/cm		1	VH1	05/09/17	1404	1662034	7
PH "As Received"												
pH at Temp 16.1C	H	8.14	0.010	0.100	SU		1	RXB5	05/25/17	1922	1666995	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	KLP1	05/08/17	1155	1661775
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	05/17/17	1500	1662568

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: May 30, 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: 2017-1471

Client Sample ID: CASA-17-132320
Sample ID: 422310001

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 30, 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: 2017-1471

Client Sample ID: CASA-17-132329
Sample ID: 422310002
Matrix: W
Collect Date: 02-MAY-17 13:33
Receive Date: 04-MAY-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	J	0.357	0.330	1.00	mg/L		1	TSM	05/11/17	0905	1663112	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	05/08/17	1103	1661857	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	05/09/17	1115	1662576	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	05/08/17	0926	1661856
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	05/08/17	1700	1662574

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: May 30, 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: 2017-1471

Client Sample ID: CASA-17-132321
Sample ID: 422310003
Matrix: W
Collect Date: 02-MAY-17 11:30
Receive Date: 04-MAY-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
WSP-ANIONS "As Received"												
Bromide	U	ND	0.067	0.200	mg/L		1	MXL2	05/07/17	0249	1662746	1
Chloride		3.04	0.067	0.200	mg/L		1					
Fluoride		0.472	0.033	0.100	mg/L		1					
Sulfate		3.79	0.133	0.400	mg/L		1					
Nutrient Analysis												
NH3 "As Received"												
Nitrogen, Ammonia	J	0.0373	0.017	0.050	mg/L	1.00	1	KLP1	05/08/17	1306	1661776	2
NO3NO2 "As Received"												
Nitrogen, Nitrate/Nitrite		1.11	0.017	0.050	mg/L		1	AXH3	05/09/17	1209	1661895	3
PO4 "As Received"												
Phosphorus, Total as P	U	ND	0.020	0.050	mg/L	1.00	1	KLP1	05/18/17	1014	1662570	4
Solids Analysis												
TDS "As Received"												
Total Dissolved Solids		164	3.40	14.3	mg/L			KLP1	05/09/17	1455	1662259	5
Titration and Ion Analysis												
EPA 310.1 Total Alkalinity "As Received"												
Alkalinity, Total as CaCO3		75.4	1.45	4.00	mg/L			RXB5	05/16/17	1742	1665516	6
Carbonate alkalinity (CaCO3)	U	ND	1.45	4.00	mg/L							
EPA120.1 Specific Conductivity "As Received"												
Conductivity		197	1.00	1.00	umhos/cm		1	VH1	05/09/17	1405	1662034	7
PH "As Received"												
pH at Temp 16.6C	H	7.90	0.010	0.100	SU		1	RXB5	05/25/17	1923	1666995	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.1 Prep	EPA 350.1 Ammonia Nitrogen Prep	KLP1	05/08/17	1155	1661775
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	05/17/17	1500	1662568

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Certificate of Analysis

Report Date: May 30, 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: 2017-1471

Client Sample ID: CASA-17-132321
Sample ID: 422310003

Project: ESHL00114
Client ID: ARSL004

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

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 30, 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: 2017-1471

Client Sample ID: CASA-17-132330
Sample ID: 422310004
Matrix: W
Collect Date: 02-MAY-17 11:30
Receive Date: 04-MAY-17
Collector: Client

Project: ESHL00114
Client ID: ARSL004

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis												
SW 9060 Total Organic Carbon "As Received"												
Total Organic Carbon Average	U	ND	0.330	1.00	mg/L		1	TSM	05/11/17	1117	1663112	1
Flow Injection Analysis												
WSP-CN(T) "As Received"												
Cyanide, Total	U	ND	1.67	5.00	ug/L	1.00	1	AXH3	05/08/17	1110	1661857	2
Nutrient Analysis												
TKN "As Received"												
Nitrogen, Total Kjeldahl	U	ND	0.033	0.100	mg/L	1.00	1	KLP1	05/09/17	1122	1662576	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 335.4	EPA 335.4 Total Cyanide	AXH3	05/08/17	0926	1661856
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	05/08/17	1700	1662574

The following Analytical Methods were performed:

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

Notes:

Column headers are defined as follows:

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

Quality Control Summary

GEL LABORATORIES LLC

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QC Summary

Report Date: May 30, 2017

Page 1 of 6

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

Contact: Mr. Keith Greene

Workorder: 422310

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Carbon Analysis											
Batch	1663112										
QC1203784882	422310002	DUP									
Total Organic Carbon Average		J	0.357	J	0.359	mg/L	0.559 ^	(+/-1.00)	TSM	05/11/17	09:49
QC1203784881	LCS										
Total Organic Carbon Average	10.0				9.58	mg/L		95.8 (80%-120%)		05/11/17	08:52
QC1203784880	MB										
Total Organic Carbon Average			U		ND	mg/L				05/11/17	08:41
QC1203784883	422310002	PS									
Total Organic Carbon Average	10.0	J	0.357		9.10	mg/L		87.5 (75%-125%)		05/11/17	10:33
Flow Injection Analysis											
Batch	1661857										
QC1203782269	422310002	DUP									
Cyanide, Total		U	ND	U	ND	ug/L	N/A		AXH3	05/08/17	11:04
QC1203781591	LCS										
Cyanide, Total	50.0				48.3	ug/L		96.6 (90%-110%)		05/08/17	10:42
QC1203781590	MB										
Cyanide, Total			U		ND	ug/L				05/08/17	10:41
QC1203782270	422310002	MS									
Cyanide, Total	100	U	ND		100	ug/L		100 (90%-110%)		05/08/17	11:05
Ion Chromatography											
Batch	1662746										
QC1203783870	422310001	DUP									
Bromide		U	ND	U	ND	mg/L	N/A		MXL2	05/07/17	01:51

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QC Summary

Workorder: 422310

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1662746										
Chloride		6.73		6.72	mg/L	0.0758		(0%-20%)	MXL2	05/07/17	01:51
Fluoride		0.311		0.312	mg/L	0.193	^	(+/-0.100)			
Sulfate		5.83		5.82	mg/L	0.129		(0%-20%)			
QC1203783869 LCS											
Bromide	1.25			1.25	mg/L		99.8	(80%-120%)		05/07/17	00:53
Chloride	5.00			4.87	mg/L		97.4	(80%-120%)			
Fluoride	2.50			2.52	mg/L		101	(80%-120%)			
Sulfate	10.0			10.1	mg/L		101	(80%-120%)			
QC1203783868 MB											
Bromide			U	ND	mg/L					05/07/17	00:24
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1203783871 422310001 PS											
Bromide	0.625	U	ND	0.693	mg/L		101	(75%-125%)		05/07/17	02:20
Chloride	2.50		6.73	9.53	mg/L		112	(75%-125%)			
Fluoride	1.25		0.311	1.55	mg/L		99.1	(75%-125%)			
Sulfate	5.00		5.83	11.1	mg/L		105	(75%-125%)			

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QC Summary

Workorder: 422310

Page 3 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1661776										
QC1203783330	422310001	DUP									
Nitrogen, Ammonia		0.0617		0.104	mg/L	51.1	^	(+/-0.050)	KLP1	05/08/17	13:05
QC1203781426	LCS										
Nitrogen, Ammonia	1.00			1.03	mg/L			103	(90%-110%)		05/08/17 12:52
QC1203781425	MB										
Nitrogen, Ammonia			U	ND	mg/L						05/08/17 13:16
QC1203783331	422310001	MS									
Nitrogen, Ammonia	1.00	0.0617		1.09	mg/L			103	(90%-110%)		05/08/17 13:05
Batch	1661895										
QC1203783193	422310001	DUP									
Nitrogen, Nitrate/Nitrite		0.431		0.430	mg/L	0.232		(0%-20%)	AXH3	05/09/17	12:07
QC1203781710	LCS										
Nitrogen, Nitrate/Nitrite	1.00			0.963	mg/L			96.3	(90%-110%)		05/09/17 11:34
QC1203781709	MB										
Nitrogen, Nitrate/Nitrite			U	ND	mg/L						05/09/17 11:32
QC1203783196	422310001	PS									
Nitrogen, Nitrate/Nitrite	1.00	0.431		1.36	mg/L			92.9	(90%-110%)		05/09/17 12:08
Batch	1662570										
QC1203783390	422310001	DUP									
Phosphorus, Total as P		U	ND	U	ND	mg/L	N/A		KLP1	05/18/17	10:12
QC1203783388	LCS										
Phosphorus, Total as P	1.00			1.07	mg/L			107	(80%-124%)		05/18/17 09:59
QC1203783387	MB										
Phosphorus, Total as P			U	ND	mg/L						05/18/17 09:58

GEL LABORATORIES LLC

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QC Summary

Workorder: 422310

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Nutrient Analysis											
Batch	1662570										
QC1203783392	422310001	MS									
Phosphorus, Total as P	1.00	U	ND		1.18	mg/L	116	(63%-139%)	KLP1	05/18/17	10:13
Batch	1662576										
QC1203783405	422310002	DUP									
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A		KLP1	05/09/17	11:16
QC1203783402	LCS										
Nitrogen, Total Kjeldahl	1.00				1.09	mg/L	109	(90%-110%)		05/09/17	11:14
QC1203783401	MB										
Nitrogen, Total Kjeldahl			J		0.0517	mg/L				05/09/17	11:13
QC1203783406	422310002	MS									
Nitrogen, Total Kjeldahl	1.00	U	ND		1.10	mg/L	110	(90%-110%)		05/09/17	11:17
Solids Analysis											
Batch	1662259										
QC1203782546	422310001	DUP									
Total Dissolved Solids			207		197	mg/L	4.95	(0%-5%)	KLP1	05/09/17	14:55
QC1203782545	LCS										
Total Dissolved Solids	300				301	mg/L	100	(95%-105%)		05/09/17	14:55
QC1203782544	MB										
Total Dissolved Solids			U		ND	mg/L				05/09/17	14:55
Titration and Ion Analysis											
Batch	1662034										
QC1203781957	422310001	DUP									
Conductivity			283		289	umhos/cm	2.1	(0%-10%)	VH1	05/09/17	14:04
QC1203781954	LCS										
Conductivity	1410				1410	umhos/cm	99.4	(95%-105%)		05/09/17	13:57

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch	1665516										
QC1203790519	422310001	DUP									
Alkalinity, Total as CaCO3		119		119	mg/L	0.336		(0%-20%)	RXB5	05/16/17	17:36
Carbonate alkalinity (CaCO3)	J	2.00	J	2.40	mg/L	18.2	^	(0%-20%)			
QC1203790515	LCS										
Alkalinity, Total as CaCO3	100			106	mg/L		106	(90%-110%)		05/16/17	16:57
QC1203790523	422310001	MS									
Alkalinity, Total as CaCO3	100	119		215	mg/L		95.6	(80%-120%)		05/16/17	17:38
Batch	1666995										
QC1203794028	423224002	DUP									
pH	H	9.00	H	8.93	SU	0.781		(0%-5%)	RXB5	05/25/17	18:49
QC1203794026	LCS										
pH	7.00			7.00	SU		100	(99%-101%)		05/25/17	17:38

Notes:

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

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QC Summary

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

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

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

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

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

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

Miscellaneous

DATA EXCEPTION REPORT

Mo.Day Yr. 26-MAY-17	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ELECTRODE	Test / Method: EPA 150.1, SW846 9040C	Matrix Type: Liquid	Client Code: BVPS, ESHL
Batch ID: 1666995	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 422310(2017-1471),423194(2017-1529),423213(2017-1526),423220(2017-1522),423224(2017-1524),423289 Application Issues: Sample received out of holding			
Specification and Requirements		DER Disposition:	
Exception Description: 1. Sample received out of holding: 422310 001,003 423194 001,006 423213 001 423220 001,006,007,009 423224 001,002 423289 001,002,003,004,005,006,007 QC 1203794028DUP,1203797889DUP		1. Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified. 1203794028 (WST53-17-133059DUP) [Received 16-MAY-17, out of holding 11-MAY-17]. 1203797889 (FRACK TANK #J 500mlDUP) [Received 16-MAY-17, out of holding 12-MAY-17]. 422310001 (CASA-17-132320) [Received 04-MAY-17, out of holding 02-MAY-17]. 422310003 (CASA-17-132321) [Received 04-MAY-17, out of holding 02-MAY-17]. 423194001 (CAMO-17-132200) [Received 16-MAY-17, out of holding 11-MAY-17]. 423194006 (CAMO-17-132308) [Received 16-MAY-17, out of holding 11-MAY-17]. 423213001 (CAMO-17-132462) [Received 16-MAY-17, out of holding 11-MAY-17]. 423220001 (CASA-17-132339) [Received 16-MAY-17, out of holding 12-MAY-17]. 423220006 (CASA-17-132346) [Received 16-MAY-17, out of holding 12-MAY-17]. 423220007 (CASA-17-133063) [Received 16-MAY-17, out of holding 12-MAY-17]. 423220009 (CAMO-17-132463) [Received 16-MAY-17, out of holding 12-MAY-17]. 423224001 (WST53-17-133056) [Received 16-MAY-17, out of holding 11-MAY-17]. 423224002 (WST53-17-133059) [Received 16-MAY-17, out of holding 11-MAY-17]. 423289001 (FRACK TANK #A 500ml) [Received 16-MAY-17, out of holding 12-MAY-17]. 423289002 (FRACK TANK #B 500ml) [Received 16-MAY-17, out of holding 12-MAY-17]. 423289003 (FRACK TANK #C 500ml) [Received 16-MAY-17, out of holding 12-MAY-17]. 423289004 (FRACK TANK #D 500ml IN 1 LITER CONTAINER) [Received 16-MAY-17, out of holding 12-MAY-17]. 423289005 (FRACK TANK #E 500ml) [Received 16-MAY-17, out of holding 12-MAY-17]. 423289006 (FRACK TANK #F 500ml) [Received 16-MAY-17, out of holding 12-MAY-17]. 423289007 (FRACK TANK #J 500ml) [Received 16-MAY-17, out of holding 12-MAY-17].	

Originator's Name:

Rachael Bell 26-MAY-17

Data Validator/Group Leader:

Elzbieta Szulc 26-MAY-17

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Rachael Bell 26-MAY-17

Data Validator/Group Leader:

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