

General Engineering Laboratories, Inc., Charleston, SC.

2040 Savage Rd  
Charleston SC 29407

## Chain of Custody/Analysis Request

COC/Lab Request #:  
12-1481

Page 1 of 1

Client Contact:

Lab Agreement #: 126310011

Site Name: Los Alamos National Laboratory

Project Number:

Analysis Turnaround Time:

24 Hour - ☐ Other - ☐7 Day - ☐14 Day - ☐21 Day - ☐28 Day - ☒

Rad Screening Info:

Yes, Below Background

Field Sample ID

Sample Date

Sample  
TimeSample  
Matrix

WSP-GENINORG

WSP-GrossA/B

WSP-Met+B+SN+SR+U

WSP-NH3+NO3/NO2+PO4

WSP-RAD

WSP-TKN+TOC

Special Instructions:

CAMO-12-21735

Aug 8 2012

11:00

W

1

1

1

1

1

CAMO-12-21743

Aug 8 2012

11:00

W

1

1

1

1

1

CAMO-12-21736

Aug 8 2012

13:51

W

1

1

1

1

1

CAMO-12-21744

Aug 8 2012

13:51

W

1

1

1

Special Instructions:

Relinquished by:

Relinquished by:

Relinquished by:

Date/Time:

Date/Time:

Date/Time:

Received by:

Received by:

Received by:

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 3955 EVENT NAME: Mortandad (Chromium Monitoring) Q4 Watershed Sampling  
SAMPLE ID: CAMO-12-21735 WORK ORDER: NA

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
DATE COLLECTED (MM/DD/YYYY):		08/08/2012	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):		1100	MEDIA:	UA	OK
PRS ID:		OK	SAMPLE TECH	GSP	GSP
LOCATION ID: R-28			CODE:	UA	
LOCATION TYPE: MON			FIELD PREP:	UF	OK
PORT: SINGLE			FIELD QC TYPE:	REG	
COMPLETION			SAMPLE USAGE:	INV	

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-GrossA/B	1 LITER POLY	1	NONE	Y	NA
	WSP-RAD	1 GAL POLY	1	HNO3		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS: Samples taken within 75 feet of a running diesel generator

LOCATION COMMENTS: NA

## FIELD PARAMETERS:

Dissolved Oxygen 6.72 mg/L      Oxidation-Reduction Potential 220.8 MV      pH 7.56 SU  
Specific Conductance 421 uS/cm      Temperature 21.17 deg C      Turbidity 0.65 NTU

COLLECTED BY (PRINT) A Vigil

RELINQUISHED BY (Printed Name) <u>B. Woody</u> (Signature) <u>B. Woody</u>	Date/Time <u>08/08/12</u> <u>1545</u>	RECEIVED BY (Printed Name) <u>Ally Martin</u> (Signature) <u>[Signature]</u>	Date/Time <u>08/08/12</u> <u>1545</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date 07/30/2012

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 3955 EVENT NAME: Mortandad (Chromium  
Monitoring) Q4 Watershed  
Sampling  
SAMPLE ID: CAMO-12-21743 WORK ORDER: NA

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
DATE COLLECTED (MM/DD/YYYY):		08/08/2012	FIELD MATRIX: WG		OK
TIME COLLECTED (HH:MM):		1100	MEDIA: UA		OK
PRS ID:		OK	SAMPLE TECH GSP		GSP
LOCATION ID: R-28			CODE: UA		
LOCATION TYPE: MON			FIELD PREP: F		OK
PORT: SINGLE COMPLETION			FIELD QC TYPE: REG		
			SAMPLE USAGE: INV		

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-GENINORG	1 LITER POLY	1	ICE	Y	NA
	WSP-Met+B+SN+SR+U	1 LITER POLY	1	HNO3		
	WSP-NH3+NO3/NO2+PO4	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Dissolved Oxygen \_\_\_\_\_ mg/L      Oxidation-Reduction Potential \_\_\_\_\_ MV      pH \_\_\_\_\_ SU  
Specific Conductance \_\_\_\_\_ uS/cm      Temperature \_\_\_\_\_ deg C      Turbidity \_\_\_\_\_ NTU

COLLECTED BY (PRINT) A Vigil

RELINQUISHED BY (Printed Name) D. Woody (Signature) <i>D. Woody</i>	Date/Time 08/08/12 1545	RECEIVED BY (Printed Name) <i>M. Mark</i> (Signature) <i>[Signature]</i>	Date/Time 08/08/12 1545
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date 07/30/2012

See  
CAMO-12-21735

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 3955 EVENT NAME: Mortandad (Chromium Monitoring) Q4 Watershed Sampling

SAMPLE ID: CAMO-12-21744 WORK ORDER: NA

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
DATE COLLECTED (MM/DD/YYYY):		08/08/2012	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):		1351	MEDIA:	UA	OK
PRS ID:		OK	SAMPLE TECH CODE:	GSP UA	GSP
LOCATION ID: R-42			FIELD PREP:	F	OK
LOCATION TYPE: MON			FIELD QC TYPE:	REG	
PORT: SINGLE COMPLETION			SAMPLE USAGE:	INV	

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-GENINORG	1 LITER POLY	1	ICE	Y	NA
	WSP-Met+B+SN+SR+U	1 LITER POLY	1	HNO3		
	WSP-NH3+NO3/NO2+PO4	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Dissolved Oxygen \_\_\_\_\_ mg/L      Oxidation-Reduction Potential \_\_\_\_\_ MV      pH \_\_\_\_\_ SU

Specific Conductance \_\_\_\_\_ uS/cm      Temperature \_\_\_\_\_ deg C      Turbidity \_\_\_\_\_ NTU

COLLECTED BY (PRINT) A Vigil

RELINQUISHED BY (Printed Name) Woody	Date/Time 08/08/12 1545	RECEIVED BY (Printed Name) [Signature]	Date/Time 08/08/12 1545
RELINQUISHED BY (Printed Name) [Signature]	Date/Time	RECEIVED BY (Printed Name)	Date/Time

Report Date 07/30/2012

See

CAMO-12-21736

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 3955 EVENT NAME: Mortandad (Chromium Monitoring) Q4 Watershed Sampling  
 SAMPLE ID: CAMO-12-21736 WORK ORDER: NA

<u>AS PLANNED</u>		<u>AS COLLECTED</u>	<u>AS PLANNED</u>		<u>AS COLLECTED</u>
DATE COLLECTED (MM/DD/YYYY):		08/08/2012	FIELD MATRIX:		WG
TIME COLLECTED (HH:MM):		1351	MEDIA:		UA
PRS ID:		OK	SAMPLE TECH CODE:		GSP UA
LOCATION ID: R-42			FIELD PREP:		UF
LOCATION TYPE: MON			FIELD QC TYPE:		REG
PORT: SINGLE COMPLETION			SAMPLE USAGE:		INV

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-GrossA/B	1 LITER POLY	1	NONE	Y	NA
	WSP-RAD	1 GAL POLY	1	HNO3		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS: Samples taken within 75 feet of a running diesel generator

LOCATION COMMENTS: NA

## FIELD PARAMETERS:

Dissolved Oxygen 6.82 mg/L Oxidation-Reduction Potential 227.0 MV pH 7.36 SU  
 Specific Conductance 488 uS/cm Temperature 21.18 deg C Turbidity 0.66 NTU

COLLECTED BY (PRINT) A Vigil

RELINQUISHED BY (Printed Name) <u>D. Woody</u> (Signature) <u>Daniel Woody</u>	Date/Time <u>08/08/12</u> <u>1545</u>	RECEIVED BY (Printed Name) <u>Mark</u> (Signature) <u>[Signature]</u>	Date/Time <u>08/08/12</u> <u>1545</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date 07/30/2012

## Data Validation Report

Chain Of Custody No. 12-1481

## 1. Distribution Of Samples In EDD.

	Analytical	Regular	Field	Trip	Field	Equipment
SDG	Method	Samples	Duplicates	Blanks	Blanks	Blanks
309454	EPA:120.1	2				
309454	EPA:150.1	2				
309454	EPA:160.1	2				
309454	EPA:245.2	2				
309454	EPA:300.0	2				
309454	EPA:310.1	2				
309454	EPA:350.1	2				
309454	EPA:351.2	2				
309454	EPA:353.2	2				
309454	EPA:365.4	2				
309454	EPA:900	2				
309454	EPA:901.1	2				
309454	EPA:905.0	2				
309454	HASL-300:AM-241	2				
309454	HASL-300:ISOPU	2				
309454	HASL-300:ISOU	2				
309454	SM:A2340B	2				
309454	SW-846:6010B	2				
309454	SW-846:6020	2				
309454	SW-846:6850	2				
309454	SW-846:9060	2				

	Analytical	Analysis	Prep	Regular	Field	Trip	Field	Equipment	Method	Matrix	Matrix
SDG	Method	Lot ID	Lot ID	Samples	Duplicates	Blanks	Blanks	Blanks	Blanks	Spikes	Spike Dups
309454	EPA:120.1	1239221	1239221	2							
309454	EPA:150.1	1239874	1239874	2							
309454	EPA:160.1	1238352	1238352	2						1	
309454	EPA:245.2	1237657	1237654	2						1	2
309454	EPA:300.0	1237343	1237343	2						1	
309454	EPA:310.1	1239254	1239254	2						2	1
309454	EPA:350.1	1237606	1237605	2						1	2
309454	EPA:351.2	1237603	1237601	2						1	1
309454	EPA:353.2	1237559	1237559	2						1	
309454	EPA:365.4	1240581	1240580	2						1	2
309454	EPA:900	1239941	1239941	2						1	1
309454	EPA:901.1	1238310	1238310	2						1	
309454	EPA:905.0	1239939	1239939	2						1	1
309454	HASL-300:AM-241	1237713	1237713	2						1	
309454	HASL-300:ISOPU	1237714	1237714	2						1	
309454	HASL-300:ISOU	1237715	1237715	2						1	
309454	SM:A2340B	1242418	1242418	2							
309454	SW-846:6010B	1237410	1237409	2						1	1
309454	SW-846:6020	1237412	1237411	2						1	1
309454	SW-846:6850	1238723	1238722	2						1	1
309454	SW-846:9060	1237582	1237582	2						1	

## 2. Distribution Of Analytes In EDD.



Analytical Method	Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spikes	TICS
EPA:120.1	GENERAL CHEMISTRY	CAMO-12-21743	1202721941	DUP	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAMO-12-21743	309454002	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	CAMO-12-21744	309454004	REG	1	0	0	0
EPA:120.1	GENERAL CHEMISTRY	LCS	1202721942	LCS	0	0	1	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-12-21743	1202723542	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-12-21743	309454002	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CAMO-12-21744	309454004	REG	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	CASA-12-21649	1202723543	DUP	1	0	0	0
EPA:150.1	GENERAL CHEMISTRY	LCS	1202723544	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-12-21743	1202719898	DUP	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-12-21743	309454002	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	CAMO-12-21744	309454004	REG	1	0	0	0
EPA:160.1	GENERAL CHEMISTRY	LCS	1202719901	LCS	0	0	1	0
EPA:160.1	GENERAL CHEMISTRY	MB	1202719897	MB	1	0	0	0
EPA:245.2	INORGANIC	CAMO-12-21743	309454002	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-12-21744	309454004	REG	1	0	0	0
EPA:245.2	INORGANIC	CAMO-12-21749	1202717966	DUP	1	0	0	0
EPA:245.2	INORGANIC	CAMO-12-21749	1202717967	MS	0	0	1	0
EPA:245.2	INORGANIC	LCS	1202717965	LCS	0	0	1	0
EPA:245.2	INORGANIC	MB	1202717964	MB	1	0	0	0
EPA:245.2	INORGANIC	WTLAP-12-14611	1202717968	DUP	1	0	0	0
EPA:245.2	INORGANIC	WTLAP-12-14611	1202717969	MS	0	0	1	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-12-21743	1202717117	DUP	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-12-21743	309454002	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	CAMO-12-21744	309454004	REG	4	0	0	0
EPA:300.0	GENERAL CHEMISTRY	LCS	1202717119	LCS	0	0	4	0
EPA:300.0	GENERAL CHEMISTRY	MB	1202717116	MB	4	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-12-21743	1202722038	DUP	3	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-12-21743	1202722039	MS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-12-21743	309454002	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	CAMO-12-21744	309454004	REG	2	0	0	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1202722033	LCS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	LCS	1202722103	LCS	0	0	1	0
EPA:310.1	GENERAL CHEMISTRY	MB	1202722032	MB	3	0	0	0
EPA:310.1	GENERAL CHEMISTRY	MB	1202722102	MB	3	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-12-21743	1202717811	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-12-21743	1202717812	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-12-21743	1202717813	MSD	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-12-21743	309454002	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-12-21744	309454004	REG	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-12-21794	1202720910	DUP	1	0	0	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-12-21794	1202720911	MS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	CAMO-12-21794	1202720912	MSD	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	LCS	1202717814	LCS	0	0	1	0
EPA:350.1	GENERAL CHEMISTRY	MB	1202717810	MB	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-12-21735	1202717800	DUP	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-12-21735	1202717801	MS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-12-21735	1202717802	MSD	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-12-21735	309454001	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	CAMO-12-21736	309454003	REG	1	0	0	0
EPA:351.2	GENERAL CHEMISTRY	LCS	1202717803	LCS	0	0	1	0
EPA:351.2	GENERAL CHEMISTRY	MB	1202717799	MB	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-12-21743	1202717658	DUP	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-12-21743	309454002	REG	1	0	0	0
EPA:353.2	GENERAL CHEMISTRY	CAMO-12-21744	309454004	REG	1	0	0	0





EPA:353.2	GENERAL CHEMISTRY	LCS	1202717662	LCS	0	0	1	0
EPA:353.2	GENERAL CHEMISTRY	MB	1202717655	MB	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-12-21743	1202725413	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-12-21743	1202725414	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-12-21743	1202725415	MSD	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-12-21743	309454002	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-12-21744	1202730366	DUP	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-12-21744	1202730367	MS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-12-21744	1202730368	MSD	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	CAMO-12-21744	309454004	REG	1	0	0	0
EPA:365.4	GENERAL CHEMISTRY	LCS	1202725416	LCS	0	0	1	0
EPA:365.4	GENERAL CHEMISTRY	MB	1202725412	MB	1	0	0	0
EPA:900	RAD	CAMO-12-21735	309454001	REG	2	0	0	0
EPA:900	RAD	CAMO-12-21736	1202723793	DUP	2	0	0	0
EPA:900	RAD	CAMO-12-21736	1202723796	MS	0	0	2	0
EPA:900	RAD	CAMO-12-21736	1202723797	MSD	0	0	2	0
EPA:900	RAD	CAMO-12-21736	309454003	REG	2	0	0	0
EPA:900	RAD	LCS	1202723798	LCS	0	0	2	0
EPA:900	RAD	MB	1202723792	MB	2	0	0	0
EPA:901.1	RAD	CAMO-12-21735	309454001	REG	5	0	0	0
EPA:901.1	RAD	CAMO-12-21736	309454003	REG	5	0	0	0
EPA:901.1	RAD	CAMO-12-21785	1202719792	DUP	6	0	0	0
EPA:901.1	RAD	LCS	1202719793	LCS	0	0	3	0
EPA:901.1	RAD	MB	1202719791	MB	6	0	0	0
EPA:905.0	RAD	CAMO-12-21735	309454001	REG	1	0	0	0
EPA:905.0	RAD	CAMO-12-21736	309454003	REG	1	0	0	0
EPA:905.0	RAD	CASA-12-21643	1202723780	DUP	1	0	0	0
EPA:905.0	RAD	CASA-12-21643	1202723781	MS	0	0	1	0
EPA:905.0	RAD	LCS	1202723782	LCS	0	0	1	0
EPA:905.0	RAD	MB	1202723779	MB	1	0	0	0
HASL-300:AM-241	RAD	CAMO-12-21735	309454001	REG	1	0	0	0
HASL-300:AM-241	RAD	CAMO-12-21736	309454003	REG	1	0	0	0
HASL-300:AM-241	RAD	CAMO-12-21741	1202718141	DUP	1	0	0	0
HASL-300:AM-241	RAD	LCS	1202718142	LCS	0	0	1	0
HASL-300:AM-241	RAD	MB	1202718140	MB	1	0	0	0
HASL-300:ISOPU	RAD	CAMO-12-21735	309454001	REG	2	0	0	0
HASL-300:ISOPU	RAD	CAMO-12-21736	309454003	REG	2	0	0	0
HASL-300:ISOPU	RAD	CAMO-12-21741	1202718144	DUP	2	0	0	0
HASL-300:ISOPU	RAD	LCS	1202718145	LCS	0	0	1	0
HASL-300:ISOPU	RAD	MB	1202718143	MB	2	0	0	0
HASL-300:ISOU	RAD	CAMO-12-21735	309454001	REG	3	0	0	0
HASL-300:ISOU	RAD	CAMO-12-21736	309454003	REG	3	0	0	0
HASL-300:ISOU	RAD	CAMO-12-21741	1202718147	DUP	3	0	0	0
HASL-300:ISOU	RAD	LCS	1202718148	LCS	0	0	1	0
HASL-300:ISOU	RAD	MB	1202718146	MB	3	0	0	0
SM:A2340B	INORGANIC	CAMO-12-21743	309454002	REG	1	0	0	0
SM:A2340B	INORGANIC	CAMO-12-21744	309454004	REG	1	0	0	0
SW-846:6010B	INORGANIC	CAMO-12-21743	309454002	REG	17	0	0	0
SW-846:6010B	INORGANIC	CAMO-12-21744	309454004	REG	17	0	0	0
SW-846:6010B	INORGANIC	CAMO-12-21749	1202717281	DUP	17	0	0	0
SW-846:6010B	INORGANIC	CAMO-12-21749	1202717282	MS	0	0	17	0
SW-846:6010B	INORGANIC	LCS	1202717280	LCS	0	0	17	0
SW-846:6010B	INORGANIC	MB	1202717279	MB	17	0	0	0
SW-846:6020	INORGANIC	CAMO-12-21743	309454002	REG	11	0	0	0
SW-846:6020	INORGANIC	CAMO-12-21744	309454004	REG	11	0	0	0
SW-846:6020	INORGANIC	CAMO-12-21749	1202717286	DUP	11	0	0	0
SW-846:6020	INORGANIC	CAMO-12-21749	1202717287	MS	0	0	11	0



SW-846:6020	INORGANIC	LCS	1202717285	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1202717284	MB	11	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-12-21743	309454002	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CAMO-12-21744	309454004	REG	1	0	0	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-12-21649	1202720854	MS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	CASA-12-21649	1202720855	MSD	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	LCS	1202720853	LCS	0	0	1	0
SW-846:6850	LCMS/MS PERCHLORATE	MB	1202720852	MB	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-12-21735	1202717717	DUP	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-12-21735	309454001	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	CAMO-12-21736	309454003	REG	1	0	0	0
SW-846:9060	GENERAL CHEMISTRY	LCS	1202717721	LCS	0	0	1	0
SW-846:9060	GENERAL CHEMISTRY	MB	1202717716	MB	1	0	0	0

**3. Are any analytes missing?**

No.

**4. Were any holding times exceeded?**

No.

**5. Any contaminants in blanks?**

Field	Lab	Type Of	Analytical	Sample	Parameter	Lab	Lab		Lab
Sample ID	Sample ID	Blank	Method	Matrix	Name	Result	Qualifier	Units	Detection Limit
MB	1202717284	METHOD BLANK	SW-846:6020	W	Molybdenum	0.204	J	ug/L	0.5
MB	1202717284	METHOD BLANK	SW-846:6020	W	Uranium	0.097	J	ug/L	0.2
MB	1202717964	METHOD BLANK	EPA:245.2	W	Mercury	-0.122	J	ug/L	0.2
MB	1202725412	METHOD BLANK	EPA:365.4	W	Total Phosphate as Phosphorus	0.0454	J	mg/L	0.05

**Any samples affected by the presence of contaminants in blanks?**

Field	Blank Field	Blank Lab	Blank	Analytical	Parameter		Blank	Sample	Lab	Detect	
Sample ID	Sample ID	Sample ID	Type	Method	Name	Units	Result	Result	Qualifier	Limit	Detected
CAMO-12-21743	MB	1202717964	METHOD BLANK	EPA:245.2	Mercury	ug/L	-0.122	0.067	U	0.2	N
CAMO-12-21744	MB	1202717964	METHOD BLANK	EPA:245.2	Mercury	ug/L	-0.122	0.067	U	0.2	N
CAMO-12-21743	MB	1202725412	METHOD BLANK	EPA:365.4	Total Phosphate as Phosphorus	mg/L	0.0454	0.0443	J	0.05	Y
CAMO-12-21744	MB	1202725412	METHOD BLANK	EPA:365.4	Total Phosphate as Phosphorus	mg/L	0.0454	0.071		0.05	Y
CAMO-12-21743	MB	1202717284	METHOD BLANK	SW-846:6020	Molybdenum	ug/L	0.204	0.889		0.5	Y
CAMO-12-21744	MB	1202717284	METHOD BLANK	SW-846:6020	Molybdenum	ug/L	0.204	0.523		0.5	Y

**6. Any surrogate recoveries outside the control limits?**

No.

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



Field	Matrix	Matrix	Analytical	Parameter	Analysis	Analysis	Sample	MS %	MSD %	Upper	Lower
Sample ID	Spike ID	Spike Dup ID	Method	Name	Lot ID	Date	Matrix	Recvry	Recvry	Limit	Limit
CAMO-12-21794	1202720911	1202720912	EPA:350.1	Ammonia as Nitrogen	1237605	8/21/2012	W	105	114	110	90

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

No.

**9. Any Field Duplicate RPDs outside the desired limits?**

No.

**10. Any Lab Duplicate RPDs outside the desired limits?**

Field	Lab	Lab Duplicate	Analytical	Parameter	Sample	Sample	Dup Sample		Detected	Detected	
Sample ID	SampleID	Sample ID	Method	Name	Matrix	Result	Result	Units	In Sample	In Dup	RPD
CAMO-12-21743	309454002	1202717117	EPA:300.0	Bromide	W	0.295	0.241	mg/L	Y	Y	20.1
CAMO-12-21743	309454002	1202717811	EPA:350.1	Ammonia as Nitrogen	W	0.144	0.217	mg/L	Y	Y	40.4

**11. Any required reporting limits exceeded?**

No.

**12. Additional Validator's Comments.**

None.

**13. Display Flagged Data.**

Location ID	Chain Of Custody No	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Parameter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detected
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N
R-28	12-1481	CAMO-12-21735	REG	INIT	RAD	HASL-300:ISOU	Uranium-235/236	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N

Rejection	RPD	RPD Limit
Limit		
10		8      15

RPD  
Limit

20

20

Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent Moisture	Analysis Lot ID	Validation Status Code	Use Flag
0.00612	pCi/L	0.00612	pCi/L	0.0419	0.00749	W	8/8/2012		1237713	VAL	Y
-0.434	pCi/L	-0.434	pCi/L	3.97	1.13	W	8/8/2012		1238310	VAL	Y
0.464	pCi/L	0.464	pCi/L	4.99	1.29	W	8/8/2012		1238310	VAL	Y
1.93	pCi/L	1.93	pCi/L	1.99	0.802	W	8/8/2012		1239941	VAL	Y
0.842	pCi/L	0.842	pCi/L	2.99	0.883	W	8/8/2012		1239941	VAL	Y
-4.36	pCi/L	-4.36	pCi/L	8.4	2.54	W	8/8/2012		1238310	VAL	Y
0	pCi/L	0	pCi/L	0.0171	0.00359	W	8/8/2012		1237714	VAL	Y
0.0127	pCi/L	0.0127	pCi/L	0.0306	0.00672	W	8/8/2012		1237714	VAL	Y
-17.5	pCi/L	-17.5	pCi/L	59.6	15.1	W	8/8/2012		1238310	VAL	Y
0.614	pCi/L	0.614	pCi/L	4.78	1.21	W	8/8/2012		1238310	VAL	Y
-0.083	pCi/L	-0.083	pCi/L	0.486	0.123	W	8/8/2012		1239939	VAL	Y
0.0147	pCi/L	0.0147	pCi/L	0.0343	0.00851	W	8/8/2012		1237715	VAL	Y
0	pCi/L	0	pCi/L	0.0389	0.00568	W	8/8/2012		1237713	VAL	Y
1.31	pCi/L	1.31	pCi/L	5.5	1.37	W	8/8/2012		1238310	VAL	Y
0.257	pCi/L	0.257	pCi/L	5.68	1.4	W	8/8/2012		1238310	VAL	Y
-0.106	pCi/L	-0.106	pCi/L	2.17	0.385	W	8/8/2012		1239941	VAL	Y
1.37	pCi/L	1.37	pCi/L	1.95	0.619	W	8/8/2012		1239941	VAL	Y
-1.32	pCi/L	-1.32	pCi/L	10.4	2.96	W	8/8/2012		1238310	VAL	Y
-0.00259	pCi/L	-0.00259	pCi/L	0.0174	0.00448	W	8/8/2012		1237714	VAL	Y
-0.00258	pCi/L	-0.00258	pCi/L	0.0311	0.00578	W	8/8/2012		1237714	VAL	Y
6.9	pCi/L	6.9	pCi/L	71.1	17.1	W	8/8/2012		1238310	VAL	Y

R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N
R-42	12-1481	CAMO-12-21736	REG	INIT	RAD	HASL-300:ISOU	Uranium-235/236	U	U	R5	N
R-28	12-1481	CAMO-12-21743	REG	INIT	GENERAL CHEMISTRY	EPA:350.1	Ammonia as Nitrogen		J	I10a	Y
R-28	12-1481	CAMO-12-21743	REG	INIT	GENERAL CHEMISTRY	EPA:300.0	Bromide		J	I10a	Y
R-28	12-1481	CAMO-12-21743	REG	INIT	INORGANIC	SW-846:6020	Molybdenum		U	I4	N
R-28	12-1481	CAMO-12-21743	REG	INIT	GENERAL CHEMISTRY	EPA:365.4	Total Phosphate as Phosphorus	J	U	I4	N
R-42	12-1481	CAMO-12-21744	REG	INIT	INORGANIC	SW-846:6020	Molybdenum		U	I4	N
R-42	12-1481	CAMO-12-21744	REG	INIT	GENERAL CHEMISTRY	EPA:365.4	Total Phosphate as Phosphorus		U	I4	N

**Reason Code**

## Description

I10a	The sample and the duplicate sample results were >=5X the RL and the duplicate RPD was >20% for water samples and >35% for soil samples.
I4	the sample result is <=5x the concentration of related analyte in the method blank.
J_LAB	The analytical laboratory qualified the detected result as estimated (J) because the result was less the PQL but greater than the MDL
NQ	The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualifire. The analyte is detected in the sample.
R5	Analyte is not detected because the amount reported is less than the MDC.
U_LAB	The analytical laboratory qualified the analyte as not detected.

**14. Useable Result Count.**

Field	Location	Sample	Analytical	No. Unuseable	Total No. Of
Sample ID	ID	Purpose	Method	Records	Records
CAMO-12-21735	R-28	REG	EPA:351.2	0	1
CAMO-12-21735	R-28	REG	EPA:900	0	2
CAMO-12-21735	R-28	REG	EPA:901.1	0	5
CAMO-12-21735	R-28	REG	EPA:905.0	0	1
CAMO-12-21735	R-28	REG	HASL-300:AM-241	0	1
CAMO-12-21735	R-28	REG	HASL-300:ISOPU	0	2
CAMO-12-21735	R-28	REG	HASL-300:ISOU	0	3
CAMO-12-21735	R-28	REG	SW-846:9060	0	1
CAMO-12-21736	R-42	REG	EPA:351.2	0	1
CAMO-12-21736	R-42	REG	EPA:900	0	2
CAMO-12-21736	R-42	REG	EPA:901.1	0	5
CAMO-12-21736	R-42	REG	EPA:905.0	0	1
CAMO-12-21736	R-42	REG	HASL-300:AM-241	0	1
CAMO-12-21736	R-42	REG	HASL-300:ISOPU	0	2
CAMO-12-21736	R-42	REG	HASL-300:ISOU	0	3
CAMO-12-21736	R-42	REG	SW-846:9060	0	1
CAMO-12-21743	R-28	REG	EPA:120.1	0	1
CAMO-12-21743	R-28	REG	EPA:150.1	0	1
CAMO-12-21743	R-28	REG	EPA:160.1	0	1
CAMO-12-21743	R-28	REG	EPA:245.2	0	1
CAMO-12-21743	R-28	REG	EPA:300.0	0	4
CAMO-12-21743	R-28	REG	EPA:310.1	0	2
CAMO-12-21743	R-28	REG	EPA:350.1	0	1
CAMO-12-21743	R-28	REG	EPA:353.2	0	1
CAMO-12-21743	R-28	REG	EPA:365.4	0	1
CAMO-12-21743	R-28	REG	SM:A2340B	0	1
CAMO-12-21743	R-28	REG	SW-846:6010B	0	17
CAMO-12-21743	R-28	REG	SW-846:6020	0	11



1.61	pCi/L	1.61	pCi/L	6.54	1.61	W	8/8/2012		1238310	VAL	Y
-0.0216	pCi/L	-0.0216	pCi/L	0.479	0.137	W	8/8/2012		1239939	VAL	Y
0.0197	pCi/L	0.0197	pCi/L	0.0393	0.00845	W	8/8/2012		1237715	VAL	Y
0.144	mg/L	0.144	mg/L			W	8/8/2012		1237606	VAL	Y
0.295	mg/L	0.295	mg/L			W	8/8/2012		1237343	VAL	Y
0.889	ug/L	0.889	ug/L			W	8/8/2012		1237412	VAL	Y
0.0443	mg/L	0.0443	mg/L			W	8/8/2012		1240581	VAL	Y
0.523	ug/L	0.523	ug/L			W	8/8/2012		1237412	VAL	Y
0.071	mg/L	0.071	mg/L			W	8/8/2012		1240581	VAL	Y

CAMO-12-21743	R-28	REG	SW-846:6850	0	1
CAMO-12-21744	R-42	REG	EPA:120.1	0	1
CAMO-12-21744	R-42	REG	EPA:150.1	0	1
CAMO-12-21744	R-42	REG	EPA:160.1	0	1
CAMO-12-21744	R-42	REG	EPA:245.2	0	1
CAMO-12-21744	R-42	REG	EPA:300.0	0	4
CAMO-12-21744	R-42	REG	EPA:310.1	0	2
CAMO-12-21744	R-42	REG	EPA:350.1	0	1
CAMO-12-21744	R-42	REG	EPA:353.2	0	1
CAMO-12-21744	R-42	REG	EPA:365.4	0	1
CAMO-12-21744	R-42	REG	SM:A2340B	0	1
CAMO-12-21744	R-42	REG	SW-846:6010B	0	17
CAMO-12-21744	R-42	REG	SW-846:6020	0	11
CAMO-12-21744	R-42	REG	SW-846:6850	0	1



September 04, 2012

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

Keith Greene  
Los Alamos National Laboratory  
PO Box 1663  
TA-03, SM271, Drop Pt. 02U, Rm111  
Los Alamos, New Mexico 87545

Re: LANL-WQH Water Samples  
Work Order: 309454  
SDG: 12-1481

Dear Keith Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on August 10, 2012, and analyzed for General Chemistry, Metals, Perchlorates by LCMSMS and Radiochemistry. 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,

Valerie Davis  
Project Manager

Purchase Order: 63641-10  
Chain of Custody: 12-1481  
Enclosures



**ARS International (63641-10)**  
**LANL-WQH Water Samples**  
**Work Order #: 309454**  
**SDG: 12-1481**

## Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	4
Data Review Qualifier Flag Definition Sheet.....	10
Perchlorates by LCMSMS Analysis.....	12
Case Narrative.....	13
Sample Data Summary.....	19
Quality Control Summary.....	22
Quality Control Data.....	25
Metals Analysis.....	31
Case Narrative.....	32
Sample Data Summary.....	38
Quality Control Summary.....	44
General Chem Analysis.....	61
Case Narrative.....	62
Sample Data Summary.....	90
Quality Control Summary.....	98
Miscellaneous.....	103
Radiological Analysis.....	106
Sample Data Summary.....	118
Quality Control Data.....	123

# Case Narrative

**Case Narrative for  
ARS International (63641-10)  
LANL-WQH Water Samples  
Workorder #: 309454  
SDG # : 12-1481**

**September 04, 2012**

**Laboratory Identification:**

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

**Summary**

**Sample receipt** The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on August 10, 2012 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. The containers for Gross A/B were preserved prior to analysis. Shipping container temperature was within specification (0 - 6C). The containers for radiochemistry were received at a temperature of 21/22C. There are no additional comments concerning sample receipt.

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

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
309454001	CAMO-12-21735
309454002	CAMO-12-21743
309454003	CAMO-12-21736
309454004	CAMO-12-21744

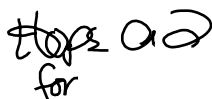
**Case Narrative**

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, Perchlorates by LCMSMS and Radiochemistry.

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.



Valerie Davis  
Project Manager

**List of current GEL Certifications as of 04 September 2012**

<b>State</b>	<b>Certification</b>
Arizona	AZ0766
Arkansas	88-0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP A2LA ISO 17025	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-09-00191
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA120008
Maryland	270
Massachusetts	M-SC012
Mississippi	SC00012
Nevada	SC000122011-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68-00485
South Carolina Chemistry	10120001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235-12-7
Utah NELAP	SC00012
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
Wisconsin	999887790



# **Chain of Custody and Supporting Documentation**





## SAMPLE RECEIPT &amp; REVIEW FORM

Client: LANL			SDG/AR/COC/Work Order:12-1481
Received By: Patricia Dent			Date Received: AUGUST 10, 2012
Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		X	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0CPM
Classified Radioactive II or III by RSO?		X	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?		X	
Shipped as a DOT Hazardous?		X	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		X	

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	X			Circle Applicable: Seals broken   Damaged container   Leaking container   Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	X			Preservation Method: Ice bags   Blue ice   Dry ice   None   Other (describe) *all temperatures are recorded in Celsius 2,3,21,22C
2a	Daily check performed and passed on IR temperature gun?	X			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable):61524646
3	Chain of custody documents included with shipment?	X			
4	Sample containers intact and sealed?	X			Circle Applicable: Seals broken   Damaged container   Leaking container   Other (describe)
5	Samples requiring chemical preservation at proper pH?			X	Sample ID's, containers affected and observed pH: CAMO-12-21735,21736 for Gross A/B If Preservation added, Lot# L03022
6	VOA vials free of headspace (defined as < 6mm bubble)?		X		Sample ID's and containers affected:
7	Are Encore containers present?			X	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	X			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	X			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	X			Sample ID's affected:
11	Number of containers received match number indicated on COC?	X			Sample ID'S affected:
12	Are sample containers identifiable as GEL provided?			X	CLIENT
13	COC form is properly signed in relinquished/received sections?	X			
14	Carrier and tracking number.	X			Circle Applicable: FedEx Air   FedEx Ground   UPS   Field Services   Courier   Other  7209 7856 8790 2C   7209 7856 8757 3C 7209 7856 8768 3C   7209 7856 8780 3C 7209 7856 8816 3C   7209 7856 8805 21C 7209 7856 8779 22C

Comments (Use Continuation Form if needed):

**Subject:** Re: ISSUES FROM 08/09/2012

**From:** Pat Dent <Pat.Dent@gel.com>

**Date:** 8/10/2012 2:42 PM

**To:** "Keith R. Greene" <kgreene@lanl.gov>

**CC:** LANL@amrad.com, "team.davis" <team.davis@gel.com>

Correction to the 1st E-mail RN#2012-2174 for Ra226+Ra228 WTRO-12-22686 the lab received (1) container COC indicated (4).

Patricia Dent  
Project Manager Assistant  
GEL Laboratories, LLC  
2040 Savage Rd.  
Charleston, S.C. 29407  
Main: 843-556-8171 Ext 4264  
Fax: 843-766-1178  
Email: [pad@gel.com](mailto:pad@gel.com)  
Web: [www.gel.com](http://www.gel.com)

On 8/9/2012 6:34 PM, Pat Dent wrote:

Good Afternoon all listed below are today's Issues

RN#\*\*2012-2168 the lab received (1) Ra226+Ra228 container for WT\_IPLAP-12-13120, COC indicated (2).

\*\*the lab received (1) SW-Metals-Dissolved container for WT\_IPLAP-12-13126, COC indicated (2).

Thanks!! Pat Dent

LOS ALAMOS NATL LAB  
TA00 BLDG 1237 DPU 03

CAD: 0014176/CAFE2511

LOS ALAMOS NATL LAB  
TA00 BLDG 1237 DPU 03

CAD: 0014176/CAFE2511

LOS ALAMOS, NM 87545  
UNITED STATES US

BILL SENDER

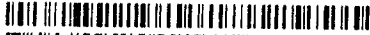
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2040 SAVAGE RD

CHARLESTON SC 29407  
(843) 556-8171  
REF: MROA00205BD0

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1 of 3  
TRK# 7209 7856 8757  
0201  
HH MASTER HH

FRI - 10 AUG A1  
PRIORITY OVERNIGHT

XX CHSA

29407  
SC-US CHS



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

LOS ALAMOS, NM 87545  
UNITED STATES US

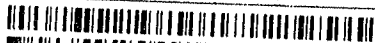
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REF: MR1A015AGWK0

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PRIORITY OVERNIGHT

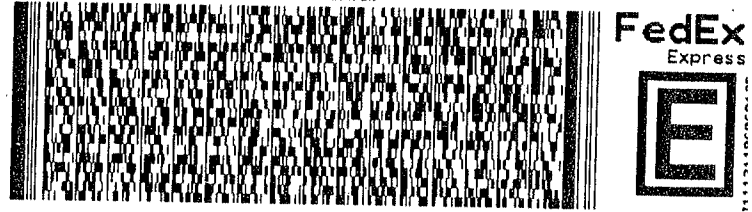
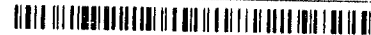
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GENERAL ENGINEERING LAB  
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CHARLESTON SC 29407  
(843) 556-8171  
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FRI - 10 AUG A1  
PRIORITY OVERNIGHT

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SC-US CHS



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

LOS ALAMOS, NM 87545  
UNITED STATES US

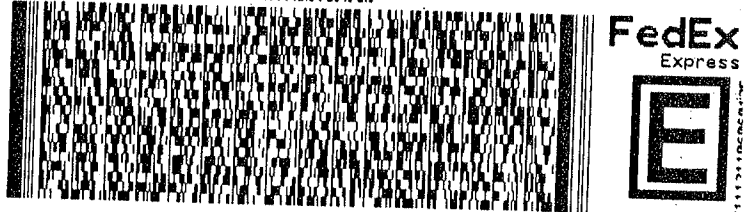
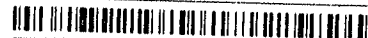
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TO VALERIE DAVIS  
GENERAL ENGINEERING LAB  
2040 SAVAGE RD

CHARLESTON SC 29407  
(843) 556-8171  
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Mstr# 7209 7856 8780  
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PRIORITY OVERNIGHT

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SC-US CHS

LOS ALAMOS NATL LAB  
TA00 BLDG 1237 DPU 03

ACTWGT: 58.0 LB MAN  
CAD: 0014176/CAFE2511

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UNITED STATES US

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GENERAL ENGINEERING LAB  
2040 SAVAGE RD

CHARLESTON SC 29407

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REF: P5B210208403

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LOS ALAMOS NATL LAB  
TA00 BLDG 1237 DPU 03

ACTWGT: 54.0 LB MAN  
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LOS ALAMOS, NM 87545  
UNITED STATES US

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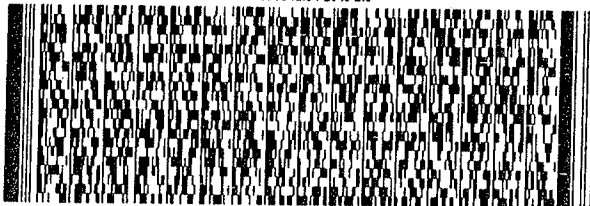
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CHARLESTON SC 29407

(843) 556-8171

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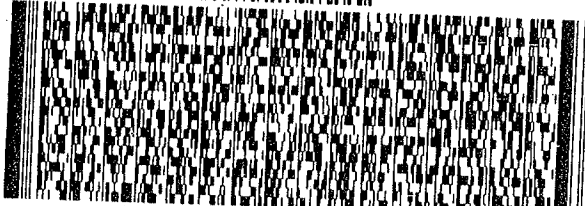
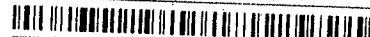
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Part # 156148-434 RIT2 10/11 %

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PRIORITY OVERNIGHT

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Part # 156148-434 RIT2 10/11 %

ORIGIN ID: SAFA (805) 665-9966  
KEITH GREENE  
LOS ALAMOS NATL LAB  
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545  
UNITED STATES US

SHIP DATE: 09AUG12  
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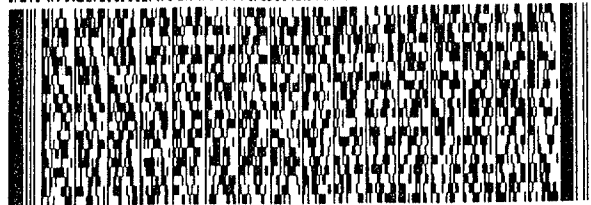
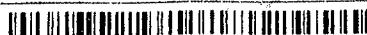
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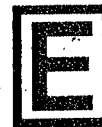
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# **Data Review Qualifier Flag Definition Sheet**

## 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.



# **Perchlorates by LCMSMS Analysis**

# Case Narrative

**Perchlorate by LC/MSMS  
ARS International (ARSL)  
SDG 12-1481**

**Method/Analysis Information**

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

Analytical Method: SW846 6850 Modified

Prep Method: SW846 6850 Modified

Analytical Batch Number: 1238723

Prep Batch Number: 1238722

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
309454002	CAMO-12-21743
309454004	CAMO-12-21744
1202720856	Interference Check Sample (ICS)
1202720852	Method Blank (MB)
1202720853	Laboratory Control Sample (LCS)
1202720854	309669002(CASA-12-21649) Matrix Spike (MS)
1202720855	309669002(CASA-12-21649) 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# 9.

**Calibration Information**

**Initial Calibration**

All initial calibration requirements have been met for this SDG.

Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

**ICV Requirements**

The initial calibration verification standard (ICV) met the acceptance criteria.

**CCB Requirements**

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

**CCV Requirements**

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

**Low Level Standard (CRI) Requirements**

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

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

The MB analyzed with this SDG met the acceptance criteria.

**Interference Check Sample (ICS)**

The interference check sample (ICS) met all recovery acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

**QC Sample Designation**

Client sample 309669002 (CASA-12-21649) from SDG 12-1495 was chosen for matrix spike and matrix spike duplicate analysis.

**Matrix Spike (MS) Recovery Statement**

The MS recoveries were within the established acceptance limits.

**Matrix Spike Duplicate (MSD) Recovery Statement**

The MSD recoveries were within the established acceptance limits.

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

The RPD(s) between the MS and MSD met the acceptance limits.

**Retention Time Standard Area Acceptance**

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

**Retention Time**

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard.

The presence of Perchlorate was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by Method 332.0, has been used.

In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

**Technical Information****Holding Time Specifications**

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

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

Samples 309454002 (CAMO-12-21743) and 309454004 (CAMO-12-21744) were diluted to bring the over range concentrations within the calibration range.

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

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

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

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents.

A data exception report (DER) was not generated for this SDG.

**Manual Integrations**

Some initial calibration standards, continuing calibration standards, and/or samples may require manual integrations due to software limitations.

**Method Comments**

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

**Additional Comments**

The Perchlorate Isotope Ratio on the Form I may differ slightly from the ratio on the corresponding raw data due to rounding rules and/or significant figures or due to software limitations when there are manual integrations, dilutions or other factors. The ratio value of the Form I is the correct value.

The retention time marker, Perchlorate-O (18), is added to all samples, instrument blanks, and standards prior to injection. It is used to verify the retention time of Perchlorate and Perchlorate-101 and to insure an accurate injection occurred.

Due to various anions affecting the recovery of Perchlorate-O (18) and not Perchlorate and Perchlorate-101, the calibration curves of Perchlorate and Perchlorate-101 are not internally corrected for using Perchlorate-O (18). They are external calibrations.

**Perchlorate Isotope Ratio**

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

**System Configuration**

The laboratory utilizes a Waters LC 2795 liquid chromatography instrument for Perchlorate analysis. It is coupled with either a Micromass Quattro Micro Mass Spectrometer/ Mass Spectrometer, or a Micromass Quattro Ultima Mass Spectrometer/ Mass Spectrometer. Each being designated as LCMSMS #1 and LCMSMS #2, respectively. 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**

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**

ARSL001 ARS International (63641-10)

Client SDG: 12-1481 GEL Work Order: 309454

#### **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, 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:** 27 AUG 2012

**Title:** Group Leader

# **Sample Data Summary**



## Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1238722Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-12-21743Date Received: 10-AUG-12GEL Job No (SDG): 12-1481GEL Sample ID: 309454002Date Filtered: 22-AUG-12Injection Volume (uL): 20%Solids:         

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.1	.4	1.02	ug/L		2	22-AUG-12 18:26	per0822039a
	Perchlorate Isotope Ratio			3.29			2	22-AUG-12 18:26	per0822039a
14797-73-0	Perchlorate-101	.1	.4	1.07	ug/L		2	22-AUG-12 18:26	per0822039a
	Perchlorate-O(18)			1.11	ug/L		2	22-AUG-12 18:26	per0822039a

^ 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: 1238722Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CAMO-12-21744Date Received: 10-AUG-12GEL Job No (SDG): 12-1481GEL Sample ID: 309454004Date Filtered: 22-AUG-12Injection Volume (uL): 20%Solids:         

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.1	.4	1.34	ug/L		2	22-AUG-12 18:34	per0822040a
	Perchlorate Isotope Ratio			3.33			2	22-AUG-12 18:34	per0822040a
14797-73-0	Perchlorate-101	.1	.4	1.39	ug/L		2	22-AUG-12 18:34	per0822040a
	Perchlorate-O(18)			1.13	ug/L		2	22-AUG-12 18:34	per0822040a

^ 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):** 12-1481

**Extract Batch Code:** 1238722

**Date Filtered:** 22-AUG-12

**Matrix:** WATER

**Sample ID:** 1202720853

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.196	ug/L	98.0		85 - 115
Perchlorate Isotope Ratio		3.15				-
Perchlorate-101	0.200	.215	ug/L	108		85 - 115
Perchlorate-O(18)		.51	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):** 12-1481

**Extract Batch Code:** 1238722

**Date Extracted:** 22-AUG-12

**GEL MS/PS ID:** 1202720854

**Client ID:** CASA-12-21649

**GEL MSD/PSD ID:** 1202720855

**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	0.497	ug/L	0.684	93.4	.705	104	2.96	30	75 - 125
Perchlorate Isotope Ratio	0	3.25		3.27		3.3		.742		-
Perchlorate-101	0.200	0.529	ug/L	0.723	96.9	.739	105	2.21	30	75 - 125
Perchlorate-O(18)	0	0.556	ug/L	0.550		.558		1.52		-

^ 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: 1238722Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

MBDate Received: 22-AUG-12GEL Job No (SDG): 12-1481GEL Sample ID: 1202720852Date Filtered: 22-AUG-12Injection 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	0.050	ug/L	U	1	22-AUG-12 15:03	per0822012a
	Perchlorate Isotope Ratio						1	22-AUG-12 15:03	per0822012a
14797-73-0	Perchlorate-101	.05	.2	0.050	ug/L	U	1	22-AUG-12 15:03	per0822012a
	Perchlorate-O(18)			0.503	ug/L		1	22-AUG-12 15:03	per0822012a

^ 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: 1238722Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 22-AUG-12GEL Job No (SDG): 12-1481GEL Sample ID: 1202720853Date Filtered: 22-AUG-12Injection 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	0.196	ug/L	J	1	22-AUG-12 15:10	per0822013a
	Perchlorate Isotope Ratio			3.15			1	22-AUG-12 15:10	per0822013a
14797-73-0	Perchlorate-101	.05	.2	0.215	ug/L		1	22-AUG-12 15:10	per0822013a
	Perchlorate-O(18)			0.510	ug/L		1	22-AUG-12 15:10	per0822013a

^ 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: 1238722Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 12-1481GEL Sample ID: 1202720856Date Filtered: 22-AUG-12Injection 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	0.228	ug/L		1	22-AUG-12 15:18	per0822014a
	Perchlorate Isotope Ratio			3.21			1	22-AUG-12 15:18	per0822014a
14797-73-0	Perchlorate-101	.05	.2	0.245	ug/L		1	22-AUG-12 15:18	per0822014a
	Perchlorate-O(18)			0.555	ug/L		1	22-AUG-12 15:18	per0822014a

^ 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: 1238722Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-12-21649MSDate Received: 15-AUG-12GEL Job No (SDG): 12-1481GEL Sample ID: 1202720854Date Filtered: 22-AUG-12Injection 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	0.684	ug/L		1	22-AUG-12 16:41	per0822025a
	Perchlorate Isotope Ratio			3.27			1	22-AUG-12 16:41	per0822025a
14797-73-0	Perchlorate-101	.05	.2	0.723	ug/L		1	22-AUG-12 16:41	per0822025a
	Perchlorate-O(18)			0.550	ug/L		1	22-AUG-12 16:41	per0822025a

^ 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: 1238722Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

CASA-12-21649MSDDate Received: 15-AUG-12GEL Job No (SDG): 12-1481GEL Sample ID: 1202720855Date Filtered: 22-AUG-12Injection 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	0.705	ug/L		1	22-AUG-12 16:48	per0822026a
	Perchlorate Isotope Ratio			3.3			1	22-AUG-12 16:48	per0822026a
14797-73-0	Perchlorate-101	.05	.2	0.739	ug/L		1	22-AUG-12 16:48	per0822026a
	Perchlorate-O(18)			0.558	ug/L		1	22-AUG-12 16:48	per0822026a

^ 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 Fractional Narrative  
ARS International (ARSL)  
SDG 12-1481**

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
309454002	CAMO-12-21743
309454004	CAMO-12-21744
1202717279	Method Blank (MB) <b>ICP</b>
1202717280	Laboratory Control Sample (LCS)
1202717283	309455003(CAMO-12-21749L) Serial Dilution (SD)
1202717281	309455003(CAMO-12-21749D) Sample Duplicate (DUP)
1202717282	309455003(CAMO-12-21749S) Matrix Spike (MS)
1202717284	Method Blank (MB) <b>ICP-MS</b>
1202717285	Laboratory Control Sample (LCS)
1202717288	309455003(CAMO-12-21749L) Serial Dilution (SD)
1202717286	309455003(CAMO-12-21749D) Sample Duplicate (DUP)
1202717287	309455003(CAMO-12-21749S) Matrix Spike (MS)
1202717964	Method Blank (MB) <b>CVAA</b>
1202717965	Laboratory Control Sample (LCS)
1202717970	309440007(WTLAP-12-14611L) Serial Dilution (SD)
1202717971	309455003(CAMO-12-21749L) Serial Dilution (SD)
1202717968	309440007(WTLAP-12-14611D) Sample Duplicate (DUP)
1202717966	309455003(CAMO-12-21749D) Sample Duplicate (DUP)
1202717969	309440007(WTLAP-12-14611S) Matrix Spike (MS)
1202717967	309455003(CAMO-12-21749S) Matrix Spike (MS)

**Method/Analysis Information**

<b>Analytical Batch:</b>	1237410, 1237412, 1237657 and 1242418
<b>Prep Batch :</b>	1237409, 1237411 and 1237654
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 21, GL-MA-E-006 REV# 9, GL-MA-E-014 REV# 24, GL-MA-E-010 REV# 25 and GL-GC-E-107

REV# 7

**Analytical Method:** SW846 3005/6010B, SW846 3005/6020 DOE-AL, EPA 245.1/245.2 and SM 2340 B

**Prep Method :** SW846 3005A and EPA 245.1/245.2 Prep

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

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

### **System Configuration**

The Hardness as CaCO<sub>3</sub> is calculated from Calcium and Magnesium results.

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 9000 inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum. Operating conditions are set at 1400W power and combined argon pressures of 360+/-7 kPa for the plasma and auxiliary gases, and 0.85 L/min carrier gas flow, and an initial lens voltage of 5.2.

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. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 80 mL/min.

### **Calibration Information**

#### **Instrument Calibration**

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

#### **CRDL Requirements**

All CRDL standard(s) 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.

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

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

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

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

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

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

The MBs analyzed with this SDG met the acceptance criteria.

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

The LCS spike recoveries met the acceptance limits.

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

The following samples were selected as the quality control (QC) samples for this SDG: 309455003 (CAMO-12-21749)-ICP, ICP-MS and CVAA and 309440007 (WTLAP-12-14611)-CVAA.

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

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. All applicable elements met the acceptance criteria.

##### **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 detection 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. All applicable analytes met these requirements.

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

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations that are 25X the IDL/MDL for CVAA, 50X the IDL/MDL for ICP, and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria of less than 10% difference (%D).

#### **Technical Information**

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

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. All samples in this SDG met the specified holding time.

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

All procedures were performed as stated in the SOP.

#### **Sample Dilutions**

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instruments. Dilutions were required for the samples in order to minimize tin suppression due to matrix interferences. Sample 309454004 (CAMO-12-21744) required a dilution in order to bring over range chromium concentrations within the linear calibration range of the instrument.

#### **Preparation Information**

The samples in this SDG were prepared exactly 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**

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.

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.

### **Review Validation:**

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

**The following data validator verified the information presented in this case narrative:**

**Reviewer:** \_\_\_\_\_ **Date:** \_\_\_\_\_



9/6/12

# **Sample Data Summary**

## GEL LABORATORIES LLC

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

### Qualifier Definition Report for

ARSL001 ARS International (63641-10)

Client SDG: 12-1481 GEL Work Order: 309454

**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, or LOD.

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 Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the detection limit.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Valerie Davis.

Reviewed by



9/6/12

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

SDG No: 12-1481

METHOD TYPE: EPA

SAMPLE ID: 309454002

CLIENT ID: CAMO-12-21743

CONTRACT: ESHL00210

MATRIX:W

DATE RECEIVED 10-AUG-12

LEVEL: Low %SOLIDS:

<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7439-97-6	Mercury	0.067	ug/L	U		AV	0.067	1	MER536	081412W2-5
7631-86-9	Silica	78.2	mg/L			P	0.053	1	OPTIMA3	082212-1
7429-90-5	Aluminum	68	ug/L	U		P	68	1	OPTIMA3	082212-1
7440-36-0	Antimony	1	ug/L	U		MS	1	1	ICPMS5	120824-2
7440-38-2	Arsenic	1.7	ug/L	U		MS	1.7	1	ICPMS5	120827-4
7440-39-3	Barium	70.9	ug/L			P	1	1	OPTIMA3	082212-1
7440-41-7	Beryllium	1	ug/L	U		P	1	1	OPTIMA3	082212-1
7440-42-8	Boron	26.7	ug/L	J		P	15	1	OPTIMA3	082212-1
7440-43-9	Cadmium	0.11	ug/L	U		MS	0.11	1	ICPMS5	120824-2
7440-70-2	Calcium	46200	ug/L			P	50	1	OPTIMA3	082212-1
7440-47-3	Chromium	450	ug/L			MS	2	1	ICPMS5	120827-3
7440-48-4	Cobalt	1	ug/L	U		P	1	1	OPTIMA3	082212-1
7440-50-8	Copper	3	ug/L	U		P	3	1	OPTIMA3	082212-1
7439-89-6	Iron	30	ug/L	U		P	30	1	OPTIMA3	082212-1
7439-92-1	Lead	0.5	ug/L	U		MS	0.5	1	ICPMS5	120827-3
7439-95-4	Magnesium	11700	ug/L			P	110	1	OPTIMA3	082212-1
7439-96-5	Manganese	2.14	ug/L	J		P	2	1	OPTIMA3	082212-1
7439-98-7	Molybdenum	0.889	ug/L			MS	0.165	1	ICPMS5	120824-2
7440-02-0	Nickel	17.8	ug/L			MS	0.5	1	ICPMS5	120827-3
7440-09-7	Potassium	1900	ug/L			P	50	1	OPTIMA3	082212-1
7782-49-2	Selenium	1.5	ug/L	U		MS	1.5	1	ICPMS5	120827-4
7440-22-4	Silver	0.2	ug/L	U		MS	0.2	1	ICPMS5	120824-2
7440-23-5	Sodium	15900	ug/L			P	100	1	OPTIMA3	082212-1
7440-24-6	Strontium	181	ug/L			P	1	1	OPTIMA3	082212-1
7440-28-0	Thallium	0.45	ug/L	U		MS	0.45	1	ICPMS5	120827-3
7440-31-5	Tin	25	ug/L	U		P	25	10	OPTIMA3	082212-1

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

**SDG No:** 12-1481**METHOD TYPE:** EPA**SAMPLE ID:** 309454002**CLIENT ID:** CAMO-12-21743**CONTRACT:** ESHL00210**MATRIX:**W**DATE RECEIVED** 10-AUG-12**LEVEL:** Low **%SOLIDS:**

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<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7440-61-1	Uranium	1.5	ug/L			MS	0.067	1	ICPMS5	120827-3
7440-62-2	Vanadium	5.31	ug/L			P	1	1	OPTIMA3	082212-1
7440-66-6	Zinc	7.55	ug/L	J		P	3.3	1	OPTIMA3	082212-1
	Hardness as CaCO3	164	mg/L				0.453	1	CALC001	

**\*Analytical Methods:**

**MS** SW846 3005/6020 DOE-AL  
**P** SW846 3005/6010B  
**AV** EPA 245.1/245.2  
SM 2340 B

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

SDG No: 12-1481

METHOD TYPE: EPA

SAMPLE ID: 309454004

CLIENT ID: CAMO-12-21744

CONTRACT: ESHL00210

MATRIX:W

DATE RECEIVED 10-AUG-12

LEVEL: Low %SOLIDS:

<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7439-97-6	Mercury	0.067	ug/L	U		AV	0.067	1	MER536	081412W2-5
7631-86-9	Silica	72.5	mg/L			P	0.053	1	OPTIMA3	082212-1
7429-90-5	Aluminum	68	ug/L	U		P	68	1	OPTIMA3	082212-1
7440-36-0	Antimony	1	ug/L	U		MS	1	1	ICPMS5	120824-2
7440-38-2	Arsenic	1.7	ug/L	U		MS	1.7	1	ICPMS5	120827-4
7440-39-3	Barium	87.8	ug/L			P	1	1	OPTIMA3	082212-1
7440-41-7	Beryllium	1	ug/L	U		P	1	1	OPTIMA3	082212-1
7440-42-8	Boron	19	ug/L	J		P	15	1	OPTIMA3	082212-1
7440-43-9	Cadmium	0.11	ug/L	U		MS	0.11	1	ICPMS5	120824-2
7440-70-2	Calcium	48800	ug/L			P	50	1	OPTIMA3	082212-1
7440-47-3	Chromium	1070	ug/L			MS	40	20	ICPMS5	120827-3
7440-48-4	Cobalt	1	ug/L	U		P	1	1	OPTIMA3	082212-1
7440-50-8	Copper	3	ug/L	U		P	3	1	OPTIMA3	082212-1
7439-89-6	Iron	30	ug/L	U		P	30	1	OPTIMA3	082212-1
7439-92-1	Lead	0.5	ug/L	U		MS	0.5	1	ICPMS5	120827-3
7439-95-4	Magnesium	13800	ug/L			P	110	1	OPTIMA3	082212-1
7439-96-5	Manganese	2	ug/L	U		P	2	1	OPTIMA3	082212-1
7439-98-7	Molybdenum	0.523	ug/L			MS	0.165	1	ICPMS5	120824-2
7440-02-0	Nickel	24.4	ug/L			MS	0.5	1	ICPMS5	120827-3
7440-09-7	Potassium	2300	ug/L			P	50	1	OPTIMA3	082212-1
7782-49-2	Selenium	1.5	ug/L	U		MS	1.5	1	ICPMS5	120827-4
7440-22-4	Silver	0.2	ug/L	U		MS	0.2	1	ICPMS5	120824-2
7440-23-5	Sodium	15800	ug/L			P	100	1	OPTIMA3	082212-1
7440-24-6	Strontium	188	ug/L			P	1	1	OPTIMA3	082212-1
7440-28-0	Thallium	0.45	ug/L	U		MS	0.45	1	ICPMS5	120827-3
7440-31-5	Tin	25	ug/L	U		P	25	10	OPTIMA3	082212-1

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

**SDG No:** 12-1481**METHOD TYPE:** EPA**SAMPLE ID:** 309454004**CLIENT ID:** CAMO-12-21744**CONTRACT:** ESHL00210**MATRIX:**W**DATE RECEIVED** 10-AUG-12**LEVEL:** Low **%SOLIDS:**

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<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7440-61-1	Uranium	0.798	ug/L			MS	0.067	1	ICPMS5	120827-3
7440-62-2	Vanadium	5.06	ug/L			P	1	1	OPTIMA3	082212-1
7440-66-6	Zinc	8.64	ug/L	J		P	3.3	1	OPTIMA3	082212-1
	Hardness as CaCO3	179	mg/L				0.453	1	CALC001	

**\*Analytical Methods:**

**MS** SW846 3005/6020 DOE-AL  
**P** SW846 3005/6010B  
**AV** EPA 245.1/245.2  
SM 2340 B



# **Quality Control Summary**

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

**SDG NO.** 12-1481  
**Contract:** ESHL00210  
**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>
1202717279								
	Aluminum	68	ug/L	+/-200	U	P	68	200
	Barium	1	ug/L	+/-5	U	P	1	5
	Beryllium	1	ug/L	+/-5	U	P	1	5
	Boron	15	ug/L	+/-50	U	P	15	50
	Calcium	50	ug/L	+/-200	U	P	50	200
	Cobalt	1	ug/L	+/-5	U	P	1	5
	Copper	3	ug/L	+/-10	U	P	3	10
	Iron	30	ug/L	+/-100	U	P	30	100
	Magnesium	110	ug/L	+/-300	U	P	110	300
	Manganese	2	ug/L	+/-10	U	P	2	10
	Potassium	50	ug/L	+/-150	U	P	50	150
	Silica	0.053	mg/L	+/-0.213	U	P	0.053	0.213
	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
1202717284								
	Antimony	1	ug/L	+/-3	U	MS	1	3
	Arsenic	1.7	ug/L	+/-5	U	MS	1.7	5
	Cadmium	0.11	ug/L	+/-1	U	MS	0.11	1
	Chromium	2	ug/L	+/-10	U	MS	2	10
	Lead	0.5	ug/L	+/-2	U	MS	0.5	2
	Molybdenum	0.204	ug/L	+/-0.5	J	MS	0.165	0.5
	Nickel	0.5	ug/L	+/-2	U	MS	0.5	2
	Selenium	1.5	ug/L	+/-5	U	MS	1.5	5
	Silver	0.2	ug/L	+/-1	U	MS	0.2	1
	Thallium	0.45	ug/L	+/-2	U	MS	0.45	2
	Uranium	0.097	ug/L	+/-0.2	J	MS	0.067	0.2
1202717964								
	Mercury	-0.122	ug/L	+/-0.2	J	AV	0.067	0.2

**\*Analytical Methods:**

MS SW846 3005/6020 DOE-AL  
P SW846 3005/6010B  
AV EPA 245.1/245.2

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 12-1481

Client ID: CAMO-12-21749S

Contract: ESHL00210

Level: Low

Matrix: WATER

% Solids:

Sample ID: 309455003

Spike ID: 1202717282

<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	4930		68	U	5000	98.1		P
Barium	ug/L	75-125	520		23		500	99.4		P
Beryllium	ug/L	75-125	504		1	U	500	101		P
Boron	ug/L	75-125	511		15	U	500	99.5		P
Calcium	ug/L	75-125	21800		16100		5000	115		P
Cobalt	ug/L	75-125	503		1	U	500	101		P
Copper	ug/L	75-125	510		3	U	500	102		P
Iron	ug/L	75-125	5070		30	U	5000	101		P
Magnesium	ug/L	75-125	9600		4400		5000	104		P
Manganese	ug/L	75-125	486		2	U	500	97.1		P
Potassium	ug/L	75-125	6390		1420		5000	99.3		P
Silica	mg/L		73		60.9		10.7	113	N/A	P
Sodium	ug/L	75-125	19000		13300		5000	113		P
Strontium	ug/L	75-125	572		77.5		500	98.8		P
Tin	ug/L	75-125	508		12.5	U	500	102		P
Vanadium	ug/L	75-125	511		2.95	J	500	102		P
Zinc	ug/L	75-125	499		16.8		500	96.4		P

## \*Analytical Methods:

P SW846 3005/6010B

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 12-1481

Client ID: CAMO-12-21749S

Contract: ESHL00210

Level: Low

Matrix: WATER

% Solids:

Sample ID: 309455003

Spike ID: 1202717287

<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	203		1	U	200	101		MS
Arsenic	ug/L	75-125	82.3		1.7	U	80	101		MS
Cadmium	ug/L	75-125	10.4		0.11	U	10	104		MS
Chromium	ug/L	75-125	218		175		50	86.9		MS
Lead	ug/L	75-125	42.6		0.5	U	40	106		MS
Molybdenum	ug/L	75-125	53.7		1.61		50	104		MS
Nickel	ug/L	75-125	55.7		2.15		50	107		MS
Selenium	ug/L	75-125	20.3		1.5	U	20	98.2		MS
Silver	ug/L	75-125	51.6		0.2	U	50	103		MS
Thallium	ug/L	75-125	104		0.45	U	100	104		MS
Uranium	ug/L	75-125	53.8		0.957		50	106		MS

## \*Analytical Methods:

MS SW846 3005/6020 DOE-AL

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 12-1481

Client ID: CAMO-12-21749S

Contract: ESHL00210

Level: Low

Matrix: WATER

% Solids:

Sample ID: 309455003

Spike ID: 1202717967

<u>Analyte</u>	<u>Units</u>	<u>Acceptance Limit</u>	<u>Spiked Result</u>	<u>C</u>	<u>Sample Result</u>	<u>C</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Qual</u>	<u>M*</u>
Mercury	ug/L	75-125	2.11		0.067	U	2	106		AV

## \*Analytical Methods:

AV EPA 245.1/245.2

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 12-1481

Client ID: WTLAP-12-14611S

Contract: ESHL00510

Level: Low

Matrix: STORM WATER

% Solids:

Sample ID: 309440007

Spike ID: 1202717969

<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	1.98		0.067	U	2	98.9		AV

## \*Analytical Methods:

AV EPA 245.1/245.2

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

SDG No.: 12-1481

Lab Code: GEL

Contract: ESHL00210

Client ID: CAMO-12-21749D

Matrix: LIQUID

Level: Low

Sample ID: 309455003

Duplicate ID: 1202717281

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L		68 U		68 U				P
Barium	ug/L	+/-5	23		24.4		5.69		P
Beryllium	ug/L		1 U		1 U				P
Boron	ug/L		15 U		15 U				P
Calcium	ug/L	+/-20%	16100		17000		5.71		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%	4400		4670		5.97		P
Manganese	ug/L		2 U		2 U				P
Potassium	ug/L	+/-20%	1420		1490		4.74		P
Silica	mg/L	+/-20%	60.9		64.3		5.4		P
Sodium	ug/L	+/-20%	13300		14100		5.65		P
Strontium	ug/L	+/-20%	77.5		82		5.57		P
Tin	ug/L		12.5 U		12.5 U				P
Vanadium	ug/L	+/-5	2.95 J		3.4 J		14.3		P
Zinc	ug/L	+/-10	16.8		16.8		.179		P

\*Analytical Methods:

P SW846 3005/6010B

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

SDG No.: 12-1481

Lab Code: GEL

Contract: ESHL00210

Client ID: CAMO-12-21749D

Matrix: LIQUID

Level: Low

Sample ID: 309455003

Duplicate ID: 1202717286

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Antimony	ug/L		1 U		1 U				MS
Arsenic	ug/L		1.7 U		1.7 U				MS
Cadmium	ug/L		0.11 U		0.11 U				MS
Chromium	ug/L	+/-20%	175		171		2.15		MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	1.61		1.57		2.45		MS
Nickel	ug/L	+/-2	2.15		2.07		3.7		MS
Selenium	ug/L		1.5 U		1.5 U				MS
Silver	ug/L		0.2 U		0.2 U				MS
Thallium	ug/L		0.45 U		0.45 U				MS
Uranium	ug/L	+/- .2	0.957		0.928		3.08		MS

\*Analytical Methods:

MS SW846 3005/6020 DOE-AL



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

**SDG No.:** 12-1481**Lab Code:** GEL**Contract:** ESHL00210**Client ID:** CAMO-12-21749D**Matrix:** LIQUID**Level:** Low**Sample ID:** 309455003**Duplicate ID:** 1202717966**Percent Solids for Dup:** N/A

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

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**\*Analytical Methods:**

AV EPA 245.1/245.2

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

**SDG No.:** 12–1481**Lab Code:** GEL**Contract:** ESHL00210**Client ID:** WTLAP–12–14611D**Matrix:** LIQUID**Level:** Low**Sample ID:** 309440007**Duplicate ID:** 1202717968**Percent Solids for Dup:** N/A

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

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**\*Analytical Methods:**

AV EPA 245.1/245.2

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 12-1481

Contract: ESHL00210

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>
1202717280								
	Aluminum	ug/L	5000	4910		98.2	80-120	P
	Barium	ug/L	500	499		99.8	80-120	P
	Beryllium	ug/L	500	502		100	80-120	P
	Boron	ug/L	500	492		98.5	80-120	P
	Calcium	ug/L	5000	4990		99.7	80-120	P
	Cobalt	ug/L	500	511		102	80-120	P
	Copper	ug/L	500	502		100	80-120	P
	Iron	ug/L	5000	4990		99.8	80-120	P
	Magnesium	ug/L	5000	5080		102	80-120	P
	Manganese	ug/L	500	489		97.8	80-120	P
	Potassium	ug/L	5000	4940		98.8	80-120	P
	Silica	mg/L	10.7	10.7		99.9	80-120	P
	Sodium	ug/L	5000	5060		101	80-120	P
	Strontium	ug/L	500	490		98	80-120	P
	Tin	ug/L	500	502		100	80-120	P
	Vanadium	ug/L	500	506		101	80-120	P
	Zinc	ug/L	500	486		97.2	80-120	P

## \*Analytical Methods:

P SW846 3005/6010B

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 12-1481

Contract: ESHL00210

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>
1202717285								
	Antimony	ug/L	50	46		91.9	80-120	MS
	Arsenic	ug/L	50	51.1		102	80-120	MS
	Cadmium	ug/L	50	48.5		97	80-120	MS
	Chromium	ug/L	50	52.4		105	80-120	MS
	Lead	ug/L	50	53.2		106	80-120	MS
	Molybdenum	ug/L	50	46.5		92.9	80-120	MS
	Nickel	ug/L	50	53.2		106	80-120	MS
	Selenium	ug/L	50	52.1		104	80-120	MS
	Silver	ug/L	50	48.5		96.9	80-120	MS
	Thallium	ug/L	50	51.4		103	80-120	MS
	Uranium	ug/L	50	50.7		101	80-120	MS

## \*Analytical Methods:

MS SW846 3005/6020 DOE-AL

## METALS

-7-

## Laboratory Control Sample Summary

SDG NO. 12-1481

Contract: ESHL00210

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>
1202717965	Mercury	ug/L	2	2.04		102	85-115	AV

## \*Analytical Methods:

AV EPA 245.1/245.2

## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 12-1481

Client ID: CAMO-12-21749L

Contract: ESHL00210

Matrix: LIQUID

Level: Low

Sample ID: 309455003

Serial Dilution ID: 1202717283

<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	23		22.7	J	1.34			P
Beryllium	1	U	5	U				P
Boron	15	U	75	U				P
Calcium	16100		15700		2.3		10	P
Cobalt	1	U	5	U				P
Copper	3	U	15	U				P
Iron	30	U	150	U				P
Magnesium	4400		4400		.076			P
Manganese	2	U	10	U				P
Potassium	1420		1490		4.5			P
Silica	60900		57400		5.72		10	P
Sodium	13300		13200		1.04		10	P
Strontium	77.5		75.4		2.77		10	P
Tin	2.5	U	12.5	U				P
Vanadium	2.95	J	5	U	100			P
Zinc	16.8		16.5	U	100			P

## \*Analytical Methods:

P SW846 3005/6010B

## METALS

-9-

## Serial Dilution Sample Summary

SDG NO. 12-1481

Client ID: CAMO-12-21749L

Contract: ESHL00210

Matrix: LIQUID

Level: Low

Sample ID: 309455003

Serial Dilution ID: 1202717288

<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	1.7	U	8.5	U				MS
Cadmium	.11	U	.55	U				MS
Chromium	175		171		2.24			MS
Lead	.5	U	2.5	U				MS
Molybdenum	1.61		1.82	J	13			MS
Nickel	2.15		2.5	U	100			MS
Selenium	1.5	U	7.5	U				MS
Silver	.2	U	1	U				MS
Thallium	.45	U	2.25	U				MS
Uranium	.957		.975	J	1.88			MS

## \*Analytical Methods:

MS SW846 3005/6020 DOE-AL

## METALS

-9-

## Serial Dilution Sample Summary

**SDG NO.** 12-1481 **Client ID:** WTLAP-12-14611L**Contract:** ESHL00210**Matrix:** LIQUID **Level:** Low**Sample ID:** 309440007 **Serial Dilution ID:** 1202717970

<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



## METALS

-9-

## Serial Dilution Sample Summary

**SDG NO.** 12-1481 **Client ID:** CAMO-12-21749L**Contract:** ESHL00210**Matrix:** LIQUID **Level:** Low**Sample ID:** 309455003 **Serial Dilution ID:** 1202717971

<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 Narrative  
ARS International (ARSL)  
SDG 12-1481**

**Method/Analysis Information**

**Product:** Carbon, Total Organic

**Analytical Batch:** 1237582

**Method:** SW 9060 Total Organic Carbon

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
309454001	CAMO-12-21735
309454003	CAMO-12-21736
1202717716	Method Blank (MB)
1202717717	309454001(CAMO-12-21735) Sample Duplicate (DUP)
1202717719	309454001(CAMO-12-21735) Post Spike (PS)
1202717721	Laboratory Control Sample (LCS)

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# 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 Carbon analysis was performed on a O-I Analytical Model 1010 Total Organic Carbon Analyzer.

**Initial Calibration**

All initial calibration requirements have been met for this SDG.

**Continuing Calibration Blanks**

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

**Calibration Verification Information (CCV)**

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

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

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following sample was selected for QC analysis: 309454001 (CAMO-12-21735).

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

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

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

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Preservation/Integrity**

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

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

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

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

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

**Additional Comments**

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

**Electronic Packaging Comment**

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

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

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

### **Method/Analysis Information**

**Product:** Specific Conductivity

**Analytical Batch:** 1239221

**Method:** EPA120.1 Specific Conductivity

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
309454002	CAMO-12-21743
309454004	CAMO-12-21744
1202721941	309454002(CAMO-12-21743) Sample Duplicate (DUP)
1202721942	Laboratory Control Sample (LCS)

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

### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-009 REV# 11.

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

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

### **Calibration Information**

The Conductivity analysis was performed on a Orion 160 Conductivity Meter.

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

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

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

The LCS spike recovery met the acceptance limits.

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

The following sample was selected for QC analysis: 309454002 (CAMO-12-21743).

### **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:** 1239874    **Method:** EPA 150.1 pH

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
309454002	CAMO-12-21743
309454004	CAMO-12-21744
1202723542	309454002(CAMO-12-21743) Sample Duplicate (DUP)
1202723543	309669002(CASA-12-21649) Sample Duplicate (DUP)
1202723544	Laboratory Control Sample (LCS)

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

### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-008 REV# 21.

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

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

### **Calibration Information**

The Electrode analysis was performed on a PerpHect pH Meter Orion 370.

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **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**

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

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following samples were selected for QC analysis: 309454002 (CAMO-12-21743) and 309669002 (CASA-12-21649).

**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**

The following samples from this sample group were received by the lab outside of the method specified holding time: 309454002 (CAMO-12-21743) and 309454004 (CAMO-12-21744).

**Sample Re-analysis**

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

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

The following DER was generated for this SDG: 1112791 309454002 (CAMO-12-21743) and 309454004 (CAMO-12-21744).

**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:** 1237343

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

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
309454002	CAMO-12-21743
309454004	CAMO-12-21744
1202717116	Method Blank (MB)
1202717117	309454002(CAMO-12-21743) Sample Duplicate (DUP)
1202717118	309454002(CAMO-12-21743) Post Spike (PS)
1202717119	Laboratory Control Sample (LCS)

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# 21.

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

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **Continuing Calibration Blanks**

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

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

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

**Y Intercept Rule**

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

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

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following sample was selected for QC analysis: 309454002 (CAMO-12-21743).

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

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

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

One or more of the values for the sample and/or duplicate are less than 5 times the Practical Quantitation Limit (PQL), and the difference is within one PQL value; therefore, the RPD is not applicable. 1202717117 (CAMO-12-21743) and 309454002 (CAMO-12-21743).

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The following samples in this sample group were diluted due to high concentration: 1202717117 (CAMO-12-21743), 1202717118 (CAMO-12-21743), 309454002 (CAMO-12-21743) and 309454004 (CAMO-12-21744).

**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**

The following samples from this sample group had to be manually integrated due to errors in the instrument software peak integration: 1202717117 (CAMO-12-21743), 1202717118 (CAMO-12-21743), 309454002 (CAMO-12-21743) and 309454004 (CAMO-12-21744).

**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:** 1237606      **Method:** EPA 350.1 Nitrogen and Ammonia L

**Prep Batch :** 1237605      **Method:** EEPA 350.2 Prep

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
309454002	CAMO-12-21743
309454004	CAMO-12-21744
1202717810	Method Blank (MB)
1202717811	309454002(CAMO-12-21743) Sample Duplicate (DUP)
1202717812	309454002(CAMO-12-21743) Matrix Spike (MS)
1202717813	309454002(CAMO-12-21743) Matrix Spike Duplicate (MSD)
1202717814	Laboratory Control Sample (LCS)
1202720910	309548002(CAMO-12-21794) Sample Duplicate (DUP)
1202720911	309548002(CAMO-12-21794) Matrix Spike (MS)
1202720912	309548002(CAMO-12-21794) Matrix Spike Duplicate (MSD)

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# 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+ 8000 Series.

### **Continuing Calibration Blanks**

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

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

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

**Y Intercept Rule**

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

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following samples were selected for QC analysis: 309454002 (CAMO-12-21743) and 309548002 (CAMO-12-21794).

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

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

**Matrix Spike Duplicate (MSD) Recovery Statement**

The spike duplicate recovery falls outside of the established acceptance limits. Since both the spike recovery and the RPD between the spike and spike duplicate fall within acceptance limits, the data is reported. 1202720912 (CAMO-12-21794).

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

The RPDs between the spike and spike duplicate met the acceptance limits.

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

The Relative Percent Difference (RPD) between the sample and duplicate falls outside of the established acceptance limits because of the heterogeneous matrix of the sample: 1202717811 (CAMO-12-21743). The values for the sample and duplicate are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable. 1202720910 (CAMO-12-21794).

**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 following samples were re-analyzed to verify the results: 1202717811 (CAMO-12-21743), 1202717812

(CAMO-12-21743), 1202717813 (CAMO-12-21743) and 309454002 (CAMO-12-21743).

### **Miscellaneous Information**

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

The following DER was generated for this SDG: 1112653 1202717811 (CAMO-12-21743) and 1202720912 (CAMO-12-21794).

#### **Additional Comments**

Additional comments were not required for this SDG.

#### **Electronic Packaging Comment**

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

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



### **Method/Analysis Information**

<b>Product:</b>	<b>Total Kjeldahl Nitrogen</b>		
<b>Analytical Batch:</b>	1237603	<b>Method:</b>	Nitrogen and Total Kjeldahl (TKN)
<b>Prep Batch :</b>	1237601	<b>Method:</b>	EEPA 351.2 Prep

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
309454001	CAMO-12-21735
309454003	CAMO-12-21736
1202717799	Method Blank (MB)
1202717800	309454001(CAMO-12-21735) Sample Duplicate (DUP)
1202717801	309454001(CAMO-12-21735) Matrix Spike (MS)
1202717802	309454001(CAMO-12-21735) Matrix Spike Duplicate (MSD)
1202717803	Laboratory Control Sample (LCS)

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# 12.

### **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.

### **Continuing Calibration Blanks**

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

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

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

**Y Intercept Rule**

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

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

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following sample was selected for QC analysis: 309454001 (CAMO-12-21735).

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

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

**Matrix Spike Duplicate (MSD) Recovery Statement**

The MSD recovery for this sample set was within the required acceptance limits.

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

The RPD between the spike and spike duplicate met the acceptance limits.

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

The values for the sample and duplicate are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable. 1202717800 (CAMO-12-21735).

**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 following sample was re-analyzed due to instrument failure: 309454003 (CAMO-12-21736). The following samples were re-analyzed due to CCV failure: 1202717799 (MB), 1202717803 (LCS) and 309454001 (CAMO-12-21735).

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

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

### **Method/Analysis Information**

<b>Product:</b>	<b>Nitrate Nitrite by Cadmium Reduction</b>		
<b>Analytical Batch:</b>	1237559	<b>Method:</b>	EPA 353.2 Nitrogen and Nitrate/Nitrite

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
309454002	CAMO-12-21743
309454004	CAMO-12-21744
1202717655	Method Blank (MB)
1202717658	309454002(CAMO-12-21743) Sample Duplicate (DUP)
1202717661	309454002(CAMO-12-21743) Post Spike (PS)
1202717662	Laboratory Control Sample (LCS)

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# 7.

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

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

### **Calibration Information**

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

### **Continuing Calibration Blanks**

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

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

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

**Y Intercept Rule**

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

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

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following sample was selected for QC analysis: 309454002 (CAMO-12-21743).

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

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

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

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Preservation/Integrity**

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

**Sample Dilutions**

The following samples in this sample group were diluted due to high concentration: 1202717658 (CAMO-12-21743), 1202717661 (CAMO-12-21743), 309454002 (CAMO-12-21743) and 309454004 (CAMO-12-21744).

**Sample Re-analysis**

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

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

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages

electronically. The following change from traditional packages should be noted:

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

### **Method/Analysis Information**

<b>Product:</b>	<b>Total Phosphorus</b>		
<b>Analytical Batch:</b>	1240581	<b>Method:</b>	EPA 365.4 Phosphorus and Total in
<b>Prep Batch :</b>	1240580	<b>Method:</b>	EEPA 365.4 Prep

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
309454002	CAMO-12-21743
309454004	CAMO-12-21744
1202725412	Method Blank (MB)
1202725413	309454002(CAMO-12-21743) Sample Duplicate (DUP)
1202725414	309454002(CAMO-12-21743) Matrix Spike (MS)
1202725415	309454002(CAMO-12-21743) Matrix Spike Duplicate (MSD)
1202725416	Laboratory Control Sample (LCS)
1202730366	309454004(CAMO-12-21744) Sample Duplicate (DUP)
1202730367	309454004(CAMO-12-21744) Matrix Spike (MS)
1202730368	309454004(CAMO-12-21744) Matrix Spike Duplicate (MSD)

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# 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+ 8000 Series.

### **Continuing Calibration Blanks**

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

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

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

**Y Intercept Rule**

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

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following samples were selected for QC analysis: 309454002 (CAMO-12-21743) and 309454004 (CAMO-12-21744).

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

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

**Matrix Spike Duplicate (MSD) Recovery Statement**

The MSD recoveries for this sample set were within the required acceptance limits.

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

The RPDs between the spike and spike duplicate met the acceptance limits.

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

One or more of the values for the sample and/or duplicate are less than 5 times the Practical Quantitation Limit (PQL), and the difference is within one PQL value; therefore, the RPD is not applicable. 1202730366 (CAMO-12-21744).

**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, Total Dissolved

**Analytical Batch:** 1238352

**Method:** EPA 160.1 Solids and Dissolved-F

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
309454002	CAMO-12-21743
309454004	CAMO-12-21744
1202719897	Method Blank (MB)
1202719898	309454002(CAMO-12-21743) Sample Duplicate (DUP)
1202719901	Laboratory Control Sample (LCS)

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# 12.

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

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

### **Calibration Information**

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

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

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

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

The MB analyzed with this SDG met the acceptance criteria.

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

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following sample was selected for QC analysis: 309454002 (CAMO-12-21743).

**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 Re-analysis**

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

**Sample Aliquot**

A sufficient amount of sample was provided by the client for analysis.

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

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

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

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

### **Method/Analysis Information**

**Product:** Alkalinity

**Analytical Batch:** 1239254      **Method:** EPA 310.1 Total Alkalinity

### **Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
309454002	CAMO-12-21743
309454004	CAMO-12-21744
1202722033	Laboratory Control Sample (LCS)
1202722038	309454002(CAMO-12-21743) Sample Duplicate (DUP)
1202722039	309454002(CAMO-12-21743) 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# 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 Titration analysis was performed on a Manually operated buret.

### **Initial Standardization**

The titrant was properly standardized

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

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

The LCS spike recovery met the acceptance limits.

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

The following sample was selected for QC analysis: 309454002 (CAMO-12-21743).

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

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

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

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

**Technical Information**

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

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample 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**

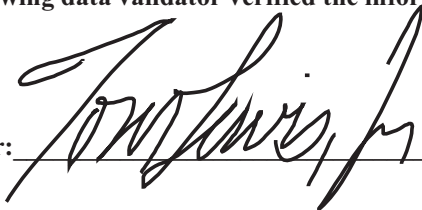
Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

**Review Validation:**

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

**The following data validator verified the information presented in this case narrative:**

Reviewer:



Date:

06Sep12

# **Sample Data Summary**

## GEL LABORATORIES LLC

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

### Certificate of Analysis Report for

ARSL001 ARS International (63641-10)

Client SDG: 12-1481 GEL Work Order: 309454

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

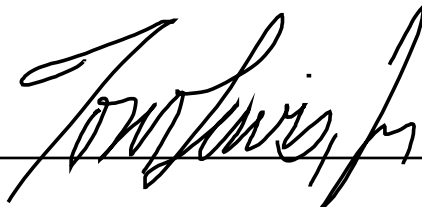
- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a surrogate compound
- H Analytical holding time was exceeded
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

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 Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the detection limit.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Valerie Davis.

Reviewed by





# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: September 6, 2012

Company : Los Alamos National Laboratory  
Address : PO Box 1663  
TA-03, SM271, Drop Pt. 02U, Rm111  
Los Alamos, New Mexico 87545

Contact: Keith Greene  
Project: LANL-WQH Water Samples

Client SDG: 12-1481

Client Sample ID: CAMO-12-21735  
Sample ID: 309454001  
Matrix: W  
Collect Date: 08-AUG-12 11:00  
Receive Date: 10-AUG-12  
Collector: Client

Project: ESHL00210  
Client ID: ARSL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis											
SW 9060 Total Organic Carbon "As Received"											
Total Organic Carbon Average		1.10	0.330	1.00	mg/L	1	TSM	08/13/12	2026	1237582	1
Nutrient Analysis											
Nitrogen, Total Kjeldahl (TKN) "As Received"											
Nitrogen, Total Kjeldahl	U	ND	0.035	0.100	mg/L	1	KLP1	08/30/12	1453	1237603	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	08/29/12	1630	1237601

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9060	
2	EPA 351.2	

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Los Alamos, New Mexico 87545

Contact: Keith Greene  
Project: LANL-WQH Water Samples

Client SDG: 12-1481

Client Sample ID: CAMO-12-21743  
Sample ID: 309454002  
Matrix: W  
Collect Date: 08-AUG-12 11:00  
Receive Date: 10-AUG-12  
Collector: Client

Project: ESHL00210  
Client ID: ARSL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Conductivity Analysis											
EPA120.1 Specific Conductivity "As Received"											
Conductivity		415	1.00	1.00	umhos/cm	1	TXT1	08/17/12	1433	1239221	1
Electrode Analysis											
EPA 150.1 pH "As Received"											
pH at Temp 10.4C	H	7.77	0.010	0.100	SU	1	LXA1	08/21/12	1123	1239874	2
Ion Chromatography											
EPA 300.0 Anions Liquid 28 day "As Received"											
Bromide		0.295	0.067	0.200	mg/L	1	VH1	08/14/12	0006	1237343	3
Fluoride		0.271	0.033	0.100	mg/L	1					
Chloride		32.9	0.670	2.00	mg/L	10	VH1	08/14/12	1948	1237343	4
Sulfate		47.3	1.33	4.00	mg/L	10					
Nutrient Analysis											
EPA 350.1 Nitrogen, Ammonia L "As Received"											
Nitrogen, Ammonia		0.144	0.017	0.050	mg/L	1	KLP1	08/21/12	1239	1237606	5
EPA 353.2 Nitrogen, Nitrate/Nitrite "As Received"											
Nitrogen, Nitrate/Nitrite		3.74	0.085	0.250	mg/L	5	AXH3	08/16/12	1419	1237559	6
EPA 365.4 Phosphorus, Total in "As Received"											
Phosphorus, Total as P	J	0.0443	0.017	0.050	mg/L	1	KLP1	09/05/12	1050	1240581	7
Solids Analysis											
EPA 160.1 Solids, Dissolved-F "As Received"											
Total Dissolved Solids		287	3.40	14.3	mg/L		LYG1	08/15/12	0943	1238352	8
Titration Analysis											
EPA 310.1 Total Alkalinity "As Received"											
Alkalinity, Total as CaCO3		78.3	0.725	1.00	mg/L		LXA1	08/17/12	1409	1239254	9
Carbonate alkalinity (CaCO3)	U	ND	0.725	1.00	mg/L						

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.2 Prep	EPA 350.1 Ammonia Nitrogen Prep	KLP1	08/20/12	1645	1237605
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	09/04/12	1700	1240580

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

Client SDG: 12-1481

Client Sample ID: CAMO-12-21743  
Sample ID: 309454002

Project: ESHL00210  
Client ID: ARSL001

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

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Los Alamos, New Mexico 87545

Contact: Keith Greene  
Project: LANL-WQH Water Samples

Client SDG: 12-1481

Client Sample ID: CAMO-12-21736

Sample ID: 309454003

Matrix: W

Collect Date: 08-AUG-12 13:51

Receive Date: 10-AUG-12

Collector: Client

Project: ESHL00210

Client ID: ARSL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Carbon Analysis											
SW 9060 Total Organic Carbon "As Received"											
Total Organic Carbon Average		1.10	0.330	1.00	mg/L	1	TSM	08/13/12	2128	1237582	1
Nutrient Analysis											
Nitrogen, Total Kjeldahl (TKN) "As Received"											
Nitrogen, Total Kjeldahl	U	ND	0.035	0.100	mg/L	1	KLP1	08/30/12	1459	1237603	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 351.2 Prep	EPA 351.2 Total Kjeldahl Nitrogen Prep	KLP1	08/29/12	1630	1237601

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9060	
2	EPA 351.2	

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

Client SDG: 12-1481

Client Sample ID: CAMO-12-21744  
Sample ID: 309454004  
Matrix: W  
Collect Date: 08-AUG-12 13:51  
Receive Date: 10-AUG-12  
Collector: Client

Project: ESHL00210  
Client ID: ARSL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Conductivity Analysis											
EPA120.1 Specific Conductivity "As Received"											
Conductivity		478	1.00	1.00	umhos/cm	1	TXT1	08/17/12	1434	1239221	1
Electrode Analysis											
EPA 150.1 pH "As Received"											
pH at Temp 8.80C	H	7.74	0.010	0.100	SU	1	LXA1	08/21/12	1128	1239874	2
Ion Chromatography											
EPA 300.0 Anions Liquid 28 day "As Received"											
Bromide		0.215	0.067	0.200	mg/L	1	VH1	08/14/12	0130	1237343	3
Fluoride		0.268	0.033	0.100	mg/L	1					
Chloride		37.8	0.670	2.00	mg/L	10	VH1	08/14/12	2112	1237343	4
Sulfate		71.6	1.33	4.00	mg/L	10					
Nutrient Analysis											
EPA 350.1 Nitrogen, Ammonia L "As Received"											
Nitrogen, Ammonia		0.0631	0.017	0.050	mg/L	1	KLP1	08/21/12	1118	1237606	5
EPA 353.2 Nitrogen, Nitrate/Nitrite "As Received"											
Nitrogen, Nitrate/Nitrite		5.55	0.085	0.250	mg/L	5	AXH3	08/16/12	1425	1237559	6
EPA 365.4 Phosphorus, Total in "As Received"											
Phosphorus, Total as P		0.071	0.017	0.050	mg/L	1	KLP1	09/05/12	1054	1240581	7
Solids Analysis											
EPA 160.1 Solids, Dissolved-F "As Received"											
Total Dissolved Solids		321	3.40	14.3	mg/L		LYG1	08/15/12	0943	1238352	8
Titration Analysis											
EPA 310.1 Total Alkalinity "As Received"											
Alkalinity, Total as CaCO3		76.7	0.725	1.00	mg/L		LXA1	08/17/12	1419	1239254	9
Carbonate alkalinity (CaCO3)	U	ND	0.725	1.00	mg/L						

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 350.2 Prep	EPA 350.1 Ammonia Nitrogen Prep	KLP1	08/20/12	1645	1237605
EPA 365.4 Prep	EPA 365.4 Phosphorus, Total in liquid PR	KLP1	09/04/12	1700	1240580

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## Certificate of Analysis

Report Date: September 6, 2012

Company : Los Alamos National Laboratory  
Address : PO Box 1663  
TA-03, SM271, Drop Pt. 02U, Rm111  
Los Alamos, New Mexico 87545  
Contact: Keith Greene  
Project: LANL-WQH Water Samples

Client SDG: 12-1481

Client Sample ID: CAMO-12-21744  
Sample ID: 309454004

Project: ESHL00210  
Client ID: ARSL001

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

# **Quality Control Summary**

# GEL LABORATORIES LLC

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## QC Summary

Report Date: September 6, 2012

Page 1 of 4

Los Alamos National Laboratory  
PO Box 1663  
TA-03, SM271, Drop Pt. 02U, Rm111  
Los Alamos, New Mexico

Contact: Keith Greene

Workorder: 309454

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Carbon Analysis</b>											
Batch	1237582										
QC1202717717	309454001	DUP									
Total Organic Carbon Average		1.10		1.08	mg/L	1.01	^	(+/-1.00)	TSM	08/13/12	21:00
QC1202717721	LCS										
Total Organic Carbon Average	10.0			9.60	mg/L			96	(85%-115%)	08/13/12	20:18
QC1202717716	MB										
Total Organic Carbon Average			U	ND	mg/L					08/13/12	20:09
QC1202717719	309454001	PS									
Total Organic Carbon Average	10.0	1.10		9.80	mg/L			87	(65%-120%)	08/13/12	21:20
<b>Conductivity Analysis</b>											
Batch	1239221										
QC1202721941	309454002	DUP									
Conductivity		415		416	umhos/cm	0.241		(0%-10%)	TXT1	08/17/12	14:34
QC1202721942	LCS										
Conductivity	1410			1420	umhos/cm			100	(95%-105%)	08/17/12	14:30
<b>Electrode Analysis</b>											
Batch	1239874										
QC1202723542	309454002	DUP									
pH		H	7.77	H	7.80	SU	0.385	(0%-10%)	LXA1	08/21/12	11:26
QC1202723543	309669002	DUP									
pH		H	8.71	H	8.73	SU	0.229	(0%-10%)		08/21/12	12:05
QC1202723544	LCS										
pH	7.00			7.02	SU			100	(99%-101%)	08/21/12	11:12
<b>Ion Chromatography</b>											
Batch	1237343										
QC1202717117	309454002	DUP									
Bromide		0.295		0.241	mg/L	20.1	^	(+/-0.200)	VH1	08/14/12	00:34
Chloride		32.9		33.2	mg/L	0.974		(0%-20%)		08/14/12	20:16
Fluoride		0.271		0.279	mg/L	2.73	^	(+/-0.100)		08/14/12	00:34
Sulfate		47.3		48.4	mg/L	2.31		(0%-20%)		08/14/12	20:16
QC1202717119	LCS										
Bromide	2.50			2.59	mg/L			103	(90%-110%)	08/13/12	23:38
Chloride	10.0			9.68	mg/L			96.8	(90%-110%)		
Fluoride	5.00			5.03	mg/L			101	(90%-110%)		
Sulfate	20.0			19.5	mg/L			97.6	(90%-110%)		
QC1202717116	MB										
Bromide			U	ND	mg/L					08/13/12	23:10
Chloride			U	ND	mg/L						
Fluoride			U	ND	mg/L						
Sulfate			U	ND	mg/L						
QC1202717118	309454002	PS									
Bromide	2.50	0.295		2.83	mg/L			101	(90%-110%)	08/14/12	01:02



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## QC Summary

Workorder: 309454

Page 2 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1237343										
Chloride	10.0	3.29		13.7	mg/L		104	(90%-110%)		08/14/12	20:44
Fluoride	5.00	0.271		5.08	mg/L		96.2	(90%-110%)	VH1	08/14/12	01:02
Sulfate	20.0	4.73		24.7	mg/L		99.8	(90%-110%)		08/14/12	20:44
<b>Nutrient Analysis</b>											
Batch	1237559										
QC1202717658 309454002	DUP										
Nitrogen, Nitrate/Nitrite		3.74		3.57	mg/L	4.66		(0%-20%)	AXH3	08/16/12	14:20
QC1202717662 LCS											
Nitrogen, Nitrate/Nitrite	1.00			0.996	mg/L		99.6	(90%-110%)		08/16/12	13:45
QC1202717655 MB											
Nitrogen, Nitrate/Nitrite			U	ND	mg/L					08/16/12	13:43
QC1202717661 309454002	PS										
Nitrogen, Nitrate/Nitrite	1.00	0.747		1.71	mg/L		96.3	(90%-110%)		08/16/12	14:22
Batch	1237603										
QC1202717800 309454001	DUP										
Nitrogen, Total Kjeldahl		U	ND	U	ND	mg/L	N/A		KLP1	08/30/12	14:54
QC1202717803 LCS											
Nitrogen, Total Kjeldahl	1.00			1.03	mg/L		103	(90%-110%)		08/30/12	14:49
QC1202717799 MB											
Nitrogen, Total Kjeldahl			U	ND	mg/L					08/30/12	14:48
QC1202717801 309454001	MS										
Nitrogen, Total Kjeldahl	1.00	U	ND	1.02	mg/L		102	(90%-110%)		08/30/12	14:55
QC1202717802 309454001	MSD										
Nitrogen, Total Kjeldahl	1.00	U	ND	1.02	mg/L	0.00	102	(0%-20%)		08/30/12	14:56
Batch	1237606										
QC1202717811 309454002	DUP										
Nitrogen, Ammonia			0.144	0.217	mg/L	40.4* ^		(+/-0.050)	KLP1	08/21/12	12:40
QC1202720910 309548002	DUP										
Nitrogen, Ammonia		J	0.0328	J	0.0235	mg/L	33.0 ^	(+/-0.050)		08/21/12	11:25
QC1202717814 LCS											
Nitrogen, Ammonia	1.00			1.09	mg/L		109	(90%-110%)		08/21/12	11:14
QC1202717810 MB											
Nitrogen, Ammonia			U	ND	mg/L					08/21/12	11:13
QC1202717812 309454002	MS										
Nitrogen, Ammonia	1.00		0.144	1.13	mg/L		98.6	(90%-110%)		08/21/12	12:41
QC1202720911 309548002	MS										
Nitrogen, Ammonia	1.00	J	0.0328	1.08	mg/L		105	(90%-110%)		08/21/12	11:26
QC1202717813 309454002	MSD										
Nitrogen, Ammonia	1.00		0.144	1.07	mg/L	5.45	92.6	(0%-15%)		08/21/12	12:42
QC1202720912 309548002	MSD										
Nitrogen, Ammonia	1.00	J	0.0328	1.17	mg/L	8.00	114 *	(0%-15%)		08/21/12	11:26
Batch	1240581										
QC1202725413 309454002	DUP										
Phosphorus, Total as P		J	0.0443	J	0.0428	mg/L	3.44 ^	(+/-0.050)	KLP1	09/05/12	10:51
QC1202730366 309454004	DUP										
Phosphorus, Total as P			0.071	J	0.0419	mg/L	51.6 ^	(+/-0.050)		09/05/12	10:55
QC1202725416 LCS											

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## QC Summary

Workorder: 309454

Page 3 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Nutrient Analysis</b>											
Batch	1240581										
Phosphorus, Total as P	1.00			1.11	mg/L		111	(84%-122%)		09/05/12	10:50
QC1202725412 MB											
Phosphorus, Total as P			J	0.0454	mg/L				KLP1	09/05/12	10:49
QC1202725414 309454002 MS											
Phosphorus, Total as P	1.00	J	0.0443	1.07	mg/L		103	(46%-146%)		09/05/12	10:52
QC1202730367 309454004 MS											
Phosphorus, Total as P	1.00		0.071	1.13	mg/L		106	(46%-146%)		09/05/12	10:55
QC1202725415 309454002 MSD											
Phosphorus, Total as P	1.00	J	0.0443	1.10	mg/L	2.76	106	(0%-21%)		09/05/12	10:53
QC1202730368 309454004 MSD											
Phosphorus, Total as P	1.00		0.071	1.11	mg/L	1.79	104	(0%-21%)		09/05/12	10:56
<b>Solids Analysis</b>											
Batch	1238352										
QC1202719898 309454002 DUP											
Total Dissolved Solids			287	284	mg/L	1.00		(0%-10%)	LYG1	08/15/12	09:43
QC1202719901 LCS											
Total Dissolved Solids	300			286	mg/L		95.2	(95%-105%)		08/15/12	09:43
QC1202719897 MB											
Total Dissolved Solids			U	ND	mg/L					08/15/12	09:43
<b>Titration Analysis</b>											
Batch	1239254										
QC1202722038 309454002 DUP											
Alkalinity, Total as CaCO3			78.3	78.3	mg/L	0.00		(0%-20%)	LXA1	08/17/12	14:12
Carbonate alkalinity (CaCO3)		U	ND	ND	mg/L	N/A					
QC1202722033 LCS											
Alkalinity, Total as CaCO3	50.0			52.9	mg/L		106	(90%-110%)		08/17/12	13:30
QC1202722039 309454002 MS											
Alkalinity, Total as CaCO3	50.0		78.3	131	mg/L		105	(80%-120%)		08/17/12	14:15

### Notes:

RER is calculated at the 95% confidence level (2-sigma).

The Qualifiers in this report are defined as follows:

\*\* Analyte is a surrogate compound

< Result is less than value reported

> Result is greater than value reported

A The TIC is a suspected aldol-condensation product

B For General Chemistry and Organic analysis the target analyte was detected in the associated blank.

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

E General Chemistry--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

E Organics--Concentration of the target analyte exceeds the instrument calibration range

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## QC Summary

Workorder: 309454

Page 4 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
F	Estimated Value										
FB	Mercury was found present at quantifiable concentrations in field blanks received with these samples. Data associated with the blank are deemed invalid for reporting to regulatory agencies										
H	Analytical holding time was exceeded										
J	Value is estimated										
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.										
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.										
M	M if above MDC and less than LLD										
M	Matrix Related Failure										
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	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										
P	Organics--The concentrations between the primary and confirmation columns/detectors is >40% different. For HPLC, difference is also <70%										
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.										
R	Sample results are rejected										
U	Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.										
UI	Gamma Spectroscopy--Uncertain identification										
UJ	Gamma Spectroscopy--Uncertain identification										
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.										
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.										
^	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										
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.

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

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

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

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

# Miscellaneous

DATA EXCEPTION REPORT			
<b>Mo.Day Yr.</b> 21-AUG-12	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> LACHAT Flow Injection Analyzer	<b>Test / Method:</b> EPA 350.1	<b>Matrix Type:</b> Liquid	<b>Client Code:</b> ESHL, ORNL, UDSL
<b>Batch ID:</b> 1237606	<b>Sample Numbers:</b> See below.		
<b>Potentially affected work order(s)(SDG):</b> 309454(12-1481),309455(12-1482),309477,309548(12-1492),309643,309669(12-1495),309704(12-1496),309709(12-1498) <b>Application Issues:</b> Failed RPD for DUP Failed Recovery for MSD/PSD			
<b>Specification and Requirements</b>		<b>DER Disposition:</b>	
<b>Exception Description:</b>			
1. Failed RPD for DUP: QC 1202717811DUP  2. Failed Recovery for MSD: QC 1202720912MSD		1. The Relative Percent Difference (RPD) between the sample and duplicate falls outside of the established acceptance limits because of the heterogeneous matrix of the sample.  2. The spike duplicate recovery falls outside of the established acceptance limits. Since both the spike recovery and the RPD between the spike and spike duplicate fall within acceptance limits, the data is reported.	

**Originator's Name:**  
Kristen Parson 21-AUG-12

**Data Validator/Group Leader:**  
Julia Hamilton 21-AUG-12

### DATA EXCEPTION REPORT

<b>Mo.Day Yr.</b> 21-AUG-12	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> ELECTRODE	<b>Test / Method:</b> EPA 150.1	<b>Matrix Type:</b> Liquid	<b>Client Code:</b> BRKL, DMAX, ESHL, FDAN
<b>Batch ID:</b> 1239874	<b>Sample Numbers:</b> See below.		
<b>Potentially affected work order(s)(SDG):</b> 309321,309454(12-1481),309455(12-1482),309497(2012-2174),309548(12-1492),309550(2012-2188),309641(32181),309648(32182),309669(12-1495),309704(12-1496),309709(12-1498),309866 <b>Application Issues:</b> Sample received out of holding			
<b>Specification and Requirements</b>		<b>DER Disposition:</b>	
<b>Exception Description:</b>			
1. Sample received out of holding: 309321 006,007,008,009 309454 002,004 309455 003 309497 006 309548 002,005 309550 006,016 309641 001 309648 001 309669 002,004,006 309704 002 309709 002 309866 001		1. Samples were received out of holding.	

**Originator's Name:**

Lindsey Jensen 21-AUG-12

**Data Validator/Group Leader:**

Julia Hamilton 24-AUG-12

# **Radiological Analysis**

**Radiochemistry Case Narrative  
ARS International (ARSL)  
SDG 12-1481  
Work Order 309454**

**Method/Analysis Information**

**Product:** Alphaspec Am241 Liquid  
**Analytical Method:** DOE EML HASL-300, Am-05-RC Modified  
**Analytical Batch Number:** 1237713

<b>Sample ID</b>	<b>Client ID</b>
309454001	CAMO-12-21735
309454003	CAMO-12-21736
1202718140	Method Blank (MB)
1202718141	309455001(CAMO-12-21741) Sample Duplicate (DUP)
1202718142	Laboratory Control Sample (LCS)

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-RAD-A-011 REV# 22.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met. Calibrations are performed monthly using mixed alpha standards comprised of the following: Gd-148, Np-237, and Cm-244.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

Aliquots for samples 1202718140 (MB) and 1202718142 (LCS) were changed to 1.0 per client request.

**Designated QC**

The following sample was used for QC: 309455001 (CAMO-12-21741). The QC was from ARSL work order 309455.



**QC Information**

All of the QC samples met the required acceptance limits.

**CSU**

The blank result is less than 1.65 times the CSU.

**Technical Information:****Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

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

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

**Manual Integration**

No manual integrations were performed on data in this batch.

**Additional Comments**

The MDCs are calculated using a blank population.

**Blank Decision Level**

The blank result is less than the decision level.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

<b>Product:</b>	<b>Alphaspec Pu, Liquid</b>
Analytical Method:	DOE EML HASL-300, Pu-11-RC Modified
Analytical Batch Number:	1237714

<b>Sample ID</b>	<b>Client ID</b>
309454001	CAMO-12-21735
309454003	CAMO-12-21736
1202718143	Method Blank (MB)
1202718144	309455001(CAMO-12-21741) Sample Duplicate (DUP)
1202718145	Laboratory Control Sample (LCS)

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-RAD-A-011 REV# 22.

**Calibration Information:****Calibration Information**

All initial and continuing calibration requirements have been met. Calibrations are performed monthly using mixed alpha standards comprised of the following: Gd-148, Np-237, and Cm-244.

**Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:****Blank Information**

Aliquots for samples 1202718143 (MB) and 1202718145 (LCS) were changed to 1.0 per client request.

**Designated QC**

The following sample was used for QC: 309455001 (CAMO-12-21741). The QC was from ARSL work order 309455.

**QC Information**

All of the QC samples met the required acceptance limits.

**CSU**

The blank result for Plutonium-239 is greater than 1.65 times the CSU but less than the MDC.

**Technical Information:****Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

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

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

**Manual Integration**

No manual integrations were performed on data in this batch.

**Additional Comments**

The MDCs are calculated using a blank population.

**Blank Decision Level**

The blank result for Plutonium-239 is greater than the decision level but less than the MDC.

### **Qualifier Information**

Manual qualifiers were not required.

### **Method/Analysis Information**

**Product:** Alphaspec U, Liquid  
**Analytical Method:** DOE EML HASL-300, U-02-RC Modified  
**Analytical Batch Number:** 1237715

<b>Sample ID</b>	<b>Client ID</b>
309454001	CAMO-12-21735
309454003	CAMO-12-21736
1202718146	Method Blank (MB)
1202718147	309455001(CAMO-12-21741) Sample Duplicate (DUP)
1202718148	Laboratory Control Sample (LCS)

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-RAD-A-011 REV# 22.

### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met. Calibrations are performed monthly using mixed alpha standards comprised of the following: Gd-148, Np-237, and Cm-244.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

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

#### **Blank Information**

Aliquots for samples 1202718146 (MB) and 1202718148 (LCS) were changed to 1.0 per client request.

#### **Designated QC**

The following sample was used for QC: 309455001 (CAMO-12-21741). The QC was from ARSL work order 309455.

#### **QC Information**

All of the QC samples met the required acceptance limits.

**CSU**

The blank result for Uranium-238 is greater than 1.65 times the CSU but less than the MDC.

**Technical Information:****Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

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

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

**Manual Integration**

No manual integrations were performed on data in this batch.

**Additional Comments**

The MDCs are calculated using a blank population.

**Blank Decision Level**

The blank result is less than the decision level.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:**                      **Gammasec**

Analytical Method:            EPA 901.1

Analytical Batch Number:    1238310

<b>Sample ID</b>	<b>Client ID</b>
309454001	CAMO-12-21735
309454003	CAMO-12-21736
1202719791	Method Blank (MB)
1202719792	309548001(CAMO-12-21785) Sample Duplicate (DUP)
1202719793	Laboratory Control Sample (LCS)

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-RAD-A-013 REV# 24.

#### **Calibration Information:**

##### **Calibration Information**

All initial and continuing calibration requirements have been met. The initial Calibrations were performed in June 2012, July 2012 and August 2012.

##### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

##### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

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

##### **Blank Information**

The blank volume is representative of the sample volume in this batch.

##### **Designated QC**

The following sample was used for QC: 309548001 (CAMO-12-21785). The QC was from ARSL work order 309548.

##### **QC Information**

All of the QC samples met the required acceptance limits.

##### **CSU**

The blank result is less than 1.65 times the CSU.

#### **Technical Information:**

##### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

##### **Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

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

Data exception reports are generated to document any 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 sample set.

##### **Blank Decision Level**

The blank result is less than the decision level.

#### **Qualifier Information**

Manual qualifiers were not required.

### **Method/Analysis Information**

**Product:** GFPC, Sr90, liquid

Analytical Method: EPA 905.0 Modified

Analytical Batch Number: 1239939

<b>Sample ID</b>	<b>Client ID</b>
309454001	CAMO-12-21735
309454003	CAMO-12-21736
1202723779	Method Blank (MB)
1202723780	309911001(CASA-12-21643) Sample Duplicate (DUP)
1202723781	309911001(CASA-12-21643) Matrix Spike (MS)
1202723782	Laboratory Control Sample (LCS)

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-RAD-A-004 REV# 16.

### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met. The initial Calibration was performed in April 2012.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

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

#### **Blank Information**

Aliquots for samples 1202723779 (MB) and 1202723782 (LCS) were changed to 1.0 per client request.

#### **Designated QC**

The following sample was used for QC: 309911001 (CASA-12-21643). The QC was from ARSL work order 309911.

#### **QC Information**

All of the QC samples met the required acceptance limits.

#### **CSU**

The blank result is less than 1.65 times the CSU.

**Technical Information:****Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Sample Re-prep/Re-analysis**

Sample 1202723780 (CASA-12-21643) was recounted due to high MDC. The recount is reported.

**Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

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

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

**Additional Comments**

The matrix spike, 1202723781 (CASA-12-21643), aliquot was reduced to conserve sample volume.

**Blank Decision Level**

The blank result is less than the decision level.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

<b>Product:</b>	<b>WSP-GrossA/B</b>
Analytical Method:	EPA 900.0/SW846 9310
Analytical Batch Number:	1239941

<b>Sample ID</b>	<b>Client ID</b>
309454001	CAMO-12-21735
309454003	CAMO-12-21736
1202723792	Method Blank (MB)
1202723793	309454003(CAMO-12-21736) Sample Duplicate (DUP)
1202723796	309454003(CAMO-12-21736) Matrix Spike (MS)
1202723797	309454003(CAMO-12-21736) Matrix Spike Duplicate (MSD)
1202723798	Laboratory Control Sample (LCS)

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-RAD-A-001 REV# 15.

### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met. The initial Calibration was performed in September 2011. The discrimination settings are calibrated in beta discriminating mode to reduce beta to alpha crosstalk.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

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

#### **Blank Information**

Aliquots for samples 1202723792 (MB) and 1202723798 (LCS) were changed to 1.0 per client request.

#### **Designated QC**

The following sample was used for QC: 309454003 (CAMO-12-21736). The QC was from ARSL work order 309454.

#### **QC Information**

All of the QC samples met the required acceptance limits.

#### **CSU**

The blank result is less than 1.65 times the CSU.

### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### **Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### **Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating, especially to a dull red heat. For this sample set, the prepared planchet was counted for beta activity before being flamed. After flaming, the planchet was counted for alpha activity.

### **Miscellaneous Information:**

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

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

#### **Additional Comments**



The matrix spike and matrix spike duplicate, 1202723796 (CAMO-12-21736) and 1202723797 (CAMO-12-21736), aliquots were reduced to conserve sample volume.

**Blank Decision Level**

The blank result is less than the decision level.

**Qualifier Information**

Manual qualifiers were not required.

**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**

ARSL001 ARS International (63641-10)

Client SDG: 12-1481 GEL Work Order: 309454

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

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

**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: Kate Gellatly**

**Date: 06 SEP 2012**

**Title: Analyst I**

# **Sample Data Summary**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Company : Los Alamos National Laboratory  
Address : PO Box 1663  
TA-03, SM271, Drop Pt. 02U, Rm111  
Los Alamos, New Mexico 87545

Contact: Keith Greene  
Project: LANL-WQH Water Samples

Report Date: September 6, 2012

Client Sample ID: CAMO-12-21735  
Sample ID: 309454001  
Matrix: W  
Collect Date: 08-AUG-12  
Receive Date: 10-AUG-12  
Collector: Client

Project: ESHL00210  
Client ID: ARSL001

Parameter	Qualifier	Result	Uncertainty	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
<b>Rad Alpha Spec Analysis</b>													
<i>Alphaspec Am241 Liquid "As Received"</i>													
Americium-241	U	0.00612	+/-0.00749	0.0419	+/-0.0075	0.050	pCi/L		NXP2	08/17/12	1003	1237713	1
<i>Alphaspec Pu, Liquid "As Received"</i>													
Plutonium-238	U	0.00	+/-0.00359	0.0171	+/-0.0036	0.050	pCi/L		NXP2	08/17/12	1003	1237714	2
Plutonium-239/240	U	0.0127	+/-0.00672	0.0306	+/-0.00675	0.050	pCi/L						
<i>Alphaspec U, Liquid "As Received"</i>													
Uranium-234		1.14	+/-0.0486	0.0531	+/-0.0868	1.00	pCi/L		NXP2	08/17/12	1505	1237715	3
Uranium-235/236	U	0.0147	+/-0.00851	0.0343	+/-0.00856	1.00	pCi/L						
Uranium-238		0.433	+/-0.0297	0.0269	+/-0.0402	0.500	pCi/L						
<b>Rad Gamma Spec Analysis</b>													
<i>Gammasepec "As Received"</i>													
Cesium-137	U	-0.434	+/-1.13	3.97	+/-1.13	8.00	pCi/L		KXG3	08/24/12	0931	1238310	4
Cobalt-60	U	0.464	+/-1.29	4.99	+/-1.29	8.00	pCi/L						
Neptunium-237	U	-4.36	+/-2.54	8.40	+/-2.54	10.0	pCi/L						
Potassium-40	U	-17.5	+/-15.1	59.6	+/-15.1	10.0	pCi/L						
Sodium-22	U	0.614	+/-1.21	4.78	+/-1.21	10.0	pCi/L						
<b>Rad Gas Flow Proportional Counting</b>													
<i>GFPC, Sr90, liquid "As Received"</i>													
Strontium-90	U	-0.083	+/-0.123	0.486	+/-0.123	0.500	pCi/L		VXC2	08/29/12	2321	1239939	5
<i>WSP-GrossA/B "As Received"</i>													
Beta	U	0.842	+/-0.883	2.99	+/-0.887	3.00	pCi/L		DYT1	08/31/12	0953	1239941	6
Alpha	U	1.93	+/-0.802	1.99	+/-0.819	3.00	pCi/L		DYT1	09/01/12	1927	1239941	7

### The following Analytical Methods were performed

Method	Description
1	DOE EML HASL-300, Am-05-RC Modified
2	DOE EML HASL-300, Pu-11-RC Modified
3	DOE EML HASL-300, U-02-RC Modified
4	EPA 901.1
5	EPA 905.0 Modified
6	EPA 900.0/SW846 9310
7	EPA 900.0/SW846 9310

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Am241 Liquid "As Received"	1237713	70.5	(50%-105%)
Plutonium-242 Tracer	Alphaspec Pu, Liquid "As Received"	1237714	87.1	(50%-105%)
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"	1237715	84.3	(50%-105%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1239939	70.0	(50%-105%)

# GEL LABORATORIES LLC

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## Certificate of Analysis

Company : Los Alamos National Laboratory  
Address : PO Box 1663  
TA-03, SM271, Drop Pt. 02U, Rm111  
Los Alamos, New Mexico 87545

Report Date: September 6, 2012

Contact: Keith Greene

Project: LANL-WQH Water Samples

Client Sample ID: CAMO-12-21735

Sample ID: 309454001

Project: ESHL00210

Client ID: ARSL001

Parameter	Qualifier	Result	Uncertainty	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test									Batch ID	Recovery%	Acceptable Limits	

Notes:

TPU and Uncertainty are calculated at the 67% confidence level (1-sigma).

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Company : Los Alamos National Laboratory  
Address : PO Box 1663  
TA-03, SM271, Drop Pt. 02U, Rm111  
Los Alamos, New Mexico 87545

Report Date: September 6, 2012

Contact: Keith Greene  
Project: LANL-WQH Water Samples

Client Sample ID: CAMO-12-21736  
Sample ID: 309454003  
Matrix: W  
Collect Date: 08-AUG-12  
Receive Date: 10-AUG-12  
Collector: Client

Project: ESHL00210  
Client ID: ARSL001

Parameter	Qualifier	Result	Uncertainty	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
<b>Rad Alpha Spec Analysis</b>													
<i>Alphaspec Am241 Liquid "As Received"</i>													
Americium-241	U	0.00	+/-0.00568	0.0389	+/-0.00568	0.050	pCi/L		NXP2	08/17/12	1003	1237713	1
<i>Alphaspec Pu, Liquid "As Received"</i>													
Plutonium-238	U	-0.00259	+/-0.00448	0.0174	+/-0.00448	0.050	pCi/L		NXP2	08/17/12	1003	1237714	2
Plutonium-239/240	U	-0.00258	+/-0.00578	0.0311	+/-0.00578	0.050	pCi/L						
<i>Alphaspec U, Liquid "As Received"</i>													
Uranium-234		0.591	+/-0.0387	0.0609	+/-0.0543	1.00	pCi/L		NXP2	08/17/12	1505	1237715	3
Uranium-235/236	U	0.0197	+/-0.00845	0.0393	+/-0.00854	1.00	pCi/L						
Uranium-238		0.251	+/-0.0241	0.0309	+/-0.0289	0.500	pCi/L						
<b>Rad Gamma Spec Analysis</b>													
<i>Gammasespec "As Received"</i>													
Cesium-137	U	1.31	+/-1.37	5.50	+/-1.37	8.00	pCi/L		KXG3	08/24/12	0946	1238310	4
Cobalt-60	U	0.257	+/-1.40	5.68	+/-1.40	8.00	pCi/L						
Neptunium-237	U	-1.32	+/-2.96	10.4	+/-2.96	10.0	pCi/L						
Potassium-40	U	6.90	+/-17.1	71.1	+/-17.1	10.0	pCi/L						
Sodium-22	U	1.61	+/-1.61	6.54	+/-1.61	10.0	pCi/L						
<b>Rad Gas Flow Proportional Counting</b>													
<i>GFPC, Sr90, liquid "As Received"</i>													
Strontium-90	U	-0.0216	+/-0.137	0.479	+/-0.137	0.500	pCi/L		VXC2	08/29/12	2321	1239939	5
<i>WSP-GrossA/B "As Received"</i>													
Beta	U	1.37	+/-0.619	1.95	+/-0.630	3.00	pCi/L		DYT1	08/31/12	0935	1239941	6
Alpha	U	-0.106	+/-0.385	2.17	+/-0.386	3.00	pCi/L		DYT1	09/01/12	1936	1239941	7

### The following Analytical Methods were performed

Method	Description
1	DOE EML HASL-300, Am-05-RC Modified
2	DOE EML HASL-300, Pu-11-RC Modified
3	DOE EML HASL-300, U-02-RC Modified
4	EPA 901.1
5	EPA 905.0 Modified
6	EPA 900.0/SW846 9310
7	EPA 900.0/SW846 9310

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Am241 Liquid "As Received"	1237713	76.0	(50%-105%)
Plutonium-242 Tracer	Alphaspec Pu, Liquid "As Received"	1237714	84.7	(50%-105%)
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"	1237715	82.3	(50%-105%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1239939	79.9	(50%-105%)

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## Certificate of Analysis

Company : Los Alamos National Laboratory  
Address : PO Box 1663  
TA-03, SM271, Drop Pt. 02U, Rm111  
Los Alamos, New Mexico 87545

Report Date: September 6, 2012

Contact: Keith Greene

Project: LANL-WQH Water Samples

Client Sample ID: CAMO-12-21736

Sample ID: 309454003

Project: ESHL00210

Client ID: ARSL001

Parameter	Qualifier	Result	Uncertainty	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test									Batch ID	Recovery%	Acceptable Limits	

Notes:

TPU and Uncertainty are calculated at the 67% confidence level (1-sigma).

# Quality Control Data



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## QC Summary

Report Date: September 6, 2012

Page 1 of 6

**Client :** Los Alamos National Laboratory  
**PO Box 1663**  
**TA-03, SM271, Drop Pt. 02U, Rm**  
**Los Alamos, New Mexico**  
**Contact:** Keith Greene  
**Workorder:** 309454

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time			
Rad Alpha Spec														
Batch	1237713													
QC1202718141	309455001	DUP												
Americium-241	U	0.00885	U	0.00269	pCi/L	0.247		(0-1)	NXP2	08/17/12	10:03			
	Uncert:	+/-0.0078		+/-0.00466										
	TPU:	+/-0.00781		+/-0.00466										
**Americium-243 Tracer	2.67	1.98		2.18	pCi/L		81.6	(50%-105%)						
	Uncert:	+/-0.089		+/-0.0849										
	TPU:	+/-0.148		+/-0.143										
QC1202718142	LCS													
Americium-241	1.42			1.31	pCi/L		92.5	(80%-120%)						
	Uncert:			+/-0.0532										
	TPU:			+/-0.0777										
**Americium-243 Tracer	2.14			1.73	pCi/L		80.8	(50%-105%)						
	Uncert:			+/-0.0677										
	TPU:			+/-0.115										
QC1202718140	MB													
Americium-241			U	0.00235	pCi/L									
	Uncert:			+/-0.00408										
	TPU:			+/-0.00408										
**Americium-243 Tracer	2.14			1.60	pCi/L		74.9	(50%-105%)						
	Uncert:			+/-0.0711										
	TPU:			+/-0.119										
Batch	1237714													
QC1202718144	309455001	DUP												
Plutonium-238	U	0.00	U	-0.0026	pCi/L	0.130		(0-1)	NXP2	08/17/12	10:03			
	Uncert:	+/-0.00414		+/-0.00581										
	TPU:	+/-0.00415		+/-0.00581										
Plutonium-239/240	U	0.0117	U	0.0104	pCi/L	0.0378		(0-1)						
	Uncert:	+/-0.00926		+/-0.00822										
	TPU:	+/-0.00928		+/-0.00823										
**Plutonium-242 Tracer	2.41	1.73		2.00	pCi/L		82.9	(50%-105%)						
	Uncert:	+/-0.0842		+/-0.0793										
	TPU:	+/-0.138		+/-0.132										
QC1202718145	LCS													
Plutonium-238			U	0.00215	pCi/L			(80%-120%)						
	Uncert:			+/-0.00373										
	TPU:			+/-0.00373										
Plutonium-239/240	2.03			2.02	pCi/L		99.9	(80%-120%)						
	Uncert:			+/-0.066										
	TPU:			+/-0.111										
**Plutonium-242 Tracer	1.93			1.53	pCi/L		79.5	(50%-105%)						
	Uncert:			+/-0.0646										
	TPU:			+/-0.107										
QC1202718143	MB													

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## QC Summary

Workorder: 309454

Page 2 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Alpha Spec</b>											
Batch	1237714										
Plutonium-238			U	-0.0062	pCi/L						
	Uncert:			+/-0.00547							
	TPU:			+/-0.00547							
Plutonium-239/240			U	0.0124	pCi/L						
	Uncert:			+/-0.00654							
	TPU:			+/-0.00656							
**Plutonium-242 Tracer	1.93			1.62	pCi/L		83.9	(50%-105%)			
	Uncert:			+/-0.0636							
	TPU:			+/-0.106							
Batch	1237715										
QC1202718147	309455001	DUP									
Uranium-234		0.605		0.615	pCi/L	0.0459		(0-1)	NXP2	08/17/12	12:18
	Uncert:	+/-0.0359		+/-0.0353							
	TPU:	+/-0.0526		+/-0.0524							
Uranium-235/236		U	0.00995	U	0.0211	pCi/L	0.330	(0-1)			
	Uncert:	+/-0.00609		+/-0.0108							
	TPU:	+/-0.00612		+/-0.0108							
Uranium-238		0.268		0.264	pCi/L	0.0302		(0-1)			
	Uncert:	+/-0.0236		+/-0.023							
	TPU:	+/-0.0289		+/-0.0283							
**Uranium-232 Tracer	2.74	2.41		2.42	pCi/L		88.2	(50%-105%)			
	Uncert:	+/-0.0748		+/-0.0726							
	TPU:	+/-0.187		+/-0.185							
QC1202718148	LCS										
Uranium-234				2.53	pCi/L						
	Uncert:			+/-0.0605							
	TPU:			+/-0.168							
Uranium-235/236				0.138	pCi/L						
	Uncert:			+/-0.016							
	TPU:			+/-0.0181							
Uranium-238	2.67			2.49	pCi/L		93.5	(80%-120%)			
	Uncert:			+/-0.0598							
	TPU:			+/-0.166							
**Uranium-232 Tracer	2.19			1.97	pCi/L		89.9	(50%-105%)			
	Uncert:			+/-0.0562							
	TPU:			+/-0.147							
QC1202718146	MB										
Uranium-234			U	-0.00487	pCi/L					08/20/12	12:01
	Uncert:			+/-0.00625							
	TPU:			+/-0.00625							
Uranium-235/236			U	0.00233	pCi/L						
	Uncert:			+/-0.00404							
	TPU:			+/-0.00404							
Uranium-238			U	0.00943	pCi/L						
	Uncert:			+/-0.00566							
	TPU:			+/-0.00569							
**Uranium-232 Tracer	2.19			2.05	pCi/L		93.4	(50%-105%)			
	Uncert:			+/-0.0648							

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## QC Summary

Workorder: 309454

Page 3 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	1237715										
		TPU:		+/-0.154							
Rad Gamma Spec											
Batch	1238310										
QC1202719792	309548001	DUP									
Cesium-137	U	-0.869	U	1.93	pCi/L	0.435		(0-1)	KXG3	08/25/12	10:29
	Uncert:	+/-1.62		+/-1.60							
	TPU:	+/-1.62		+/-1.60							
Cobalt-60	U	-2.42	U	-1.15	pCi/L	0.200		(0-1)			
	Uncert:	+/-1.62		+/-1.55							
	TPU:	+/-1.62		+/-1.55							
Neptunium-237	U	0.880	U	-3.39	pCi/L	0.348		(0-1)			
	Uncert:	+/-3.18		+/-2.96							
	TPU:	+/-3.18		+/-2.96							
Potassium-40	U	6.77	U	-13.6	pCi/L	0.220		(0-1)			
	Uncert:	+/-23.4		+/-22.8							
	TPU:	+/-23.4		+/-22.8							
Sodium-22	U	1.04	U	1.50	pCi/L	0.0733		(0-1)			
	Uncert:	+/-1.56		+/-1.55							
	TPU:	+/-1.56		+/-1.55							
QC1202719793	LCS										
Americium-241	2780			2760	pCi/L		99.1	(80%-120%)		08/24/12	11:46
	Uncert:			+/-156							
	TPU:			+/-156							
Cesium-137	6120			6240	pCi/L		102	(80%-120%)			
	Uncert:			+/-258							
	TPU:			+/-258							
Cobalt-60	5830			5670	pCi/L		97.1	(80%-120%)			
	Uncert:			+/-237							
	TPU:			+/-237							
Neptunium-237			U	47.1	pCi/L						
	Uncert:			+/-20.3							
	TPU:			+/-20.3							
Potassium-40			U	28.9	pCi/L						
	Uncert:			+/-37.8							
	TPU:			+/-37.8							
Sodium-22			U	-1.49	pCi/L						
	Uncert:			+/-6.05							
	TPU:			+/-6.05							
QC1202719791	MB										
Cesium-137			U	-1.69	pCi/L						
	Uncert:			+/-1.16							
	TPU:			+/-1.16							
Cobalt-60			U	-1.49	pCi/L						
	Uncert:			+/-1.09							
	TPU:			+/-1.09							
Neptunium-237			U	-4.41	pCi/L						
	Uncert:			+/-2.42							
	TPU:			+/-2.42							

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## QC Summary

Workorder: 309454

Page 4 of 6

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Gamma Spec</b>											
Batch	1238310										
Potassium-40			U	7.75	pCi/L						
		Uncert:		+/-15.4							
		TPU:		+/-15.4							
Sodium-22			U	0.0894	pCi/L						
		Uncert:		+/-1.04							
		TPU:		+/-1.04							
<b>Rad Gas Flow</b>											
Batch	1239939										
QC1202723780	309911001	DUP									
Strontium-90		U	0.149	U	0.293	pCi/L	0.251	(0-1)	VXC2	09/05/12	13:07
		Uncert:	+/-0.135		+/-0.149						
		TPU:	+/-0.135		+/-0.151						
**Strontium Carrier	8.14		6.30		6.80	mg		83.5	(50%-105%)		
QC1202723782	LCS										
Strontium-90		25.0			27.5	pCi/L		110	(80%-120%)	08/30/12	17:07
		Uncert:			+/-0.613						
		TPU:			+/-2.37						
**Strontium Carrier	8.14				6.70	mg		82.3	(50%-105%)		
QC1202723779	MB										
Strontium-90			U	-0.0406	pCi/L					08/30/12	17:06
		Uncert:		+/-0.0673							
		TPU:		+/-0.0673							
**Strontium Carrier	8.14				6.70	mg		82.3	(50%-105%)		
QC1202723781	309911001	MS									
Strontium-90		125	U	0.149	130	pCi/L		104	(75%-125%)	08/30/12	17:07
		Uncert:		+/-0.135	+/-2.96						
		TPU:		+/-0.135	+/-10.8						
**Strontium Carrier	8.14				6.90	mg		84.8	(50%-105%)		
Batch	1239941										
QC1202723793	309454003	DUP									
Alpha		U	-0.106	U	0.181	pCi/L	0.177	(0-1)	DYT1	09/01/12	19:27
		Uncert:	+/-0.385		+/-0.423						
		TPU:	+/-0.386		+/-0.424						
Beta		U	1.37	U	1.70	pCi/L	0.129	(0-1)		08/31/12	09:35
		Uncert:	+/-0.619		+/-0.637						
		TPU:	+/-0.630		+/-0.652						
QC1202723798	LCS										
Alpha		12.0			11.2	pCi/L		92.9	(80%-120%)	09/01/12	19:17
		Uncert:			+/-0.627						
		TPU:			+/-1.23						
Beta		49.9			47.7	pCi/L		95.5	(80%-120%)	08/31/12	09:48
		Uncert:			+/-0.865						
		TPU:			+/-4.03						
QC1202723792	MB										
Alpha			U	0.0052	pCi/L					09/01/12	19:17
		Uncert:		+/-0.0545							
		TPU:		+/-0.0546							
Beta			U	0.189	pCi/L					08/31/12	09:33

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## QC Summary

Workorder: 309454

Page 5 of 6

Parmname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Gas Flow										
Batch	1239941									
		Uncert:	+/-0.180							
		TPU:	+/-0.180							
QC1202723796	309454003	MS								
Alpha	481	U	-0.106	448	pCi/L	93	(75%-125%)		09/01/12	19:17
		Uncert:	+/-0.385	+/-25.5						
		TPU:	+/-0.386	+/-45.6						
Beta	2000	U	1.37	2020	pCi/L	101	(75%-125%)		08/31/12	09:48
		Uncert:	+/-0.619	+/-37.0						
		TPU:	+/-0.630	+/-171						
QC1202723797	309454003	MSD								
Alpha	481	U	-0.106	456	pCi/L	0.0453	94.7	(0-1)	09/01/12	19:17
		Uncert:	+/-0.385	+/-26.1						
		TPU:	+/-0.386	+/-46.6						
Beta	2000	U	1.37	2140	pCi/L	0.174	107	(0-1)	08/31/12	09:48
		Uncert:	+/-0.619	+/-37.6						
		TPU:	+/-0.630	+/-181						

### Notes:

The Qualifiers in this report are defined as follows:

- \*\* Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
- 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
- E General Chemistry--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
- E Organics--Concentration of the target analyte exceeds the instrument calibration range
- F Estimated Value
- FB Mercury was found present at quantifiable concentrations in field blanks received with these samples. Data associated with the blank are deemed invalid for reporting to regulatory agencies
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M M if above MDC and less than LLD
- M Matrix Related Failure
- 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 RPD or %Recovery limits do not apply.
- N1 See case narrative

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## QC Summary

Workorder: 309454

Page 6 of 6

Parmname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
ND	Analyte concentration is not detected above the detection limit									
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
P	Organics--The concentrations between the primary and confirmation columns/detectors is >40% different. For HPLC, difference is also <70%									
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.									
R	Sample results are rejected									
U	Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.									
UI	Gamma Spectroscopy--Uncertain identification									
UJ	Gamma Spectroscopy--Uncertain identification									
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.									
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.									
^	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									
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.

\*\* Indicates analyte is a surrogate/tracer compound.

^ 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.

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.