

2040 Savage Rd  
Charleston SC 29407

## Chain of Custody/Analysis Request

Page 1 of 1

[illegible]

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 4164 EVENT NAME: Pajarito (General Surveillance Monitoring Group) MY2013 Q3  
 SAMPLE ID: CAPA-13-29670 WORK ORDER: NA Sampling Event\_Pajarito Canyon

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
DATE COLLECTED (MM/DD/YYYY):		04/16/2013	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):		1026	MEDIA:	UA	
PRS ID:		OK	SAMPLE TECH CODE:	WES	
LOCATION ID: R-19 S3			FIELD PREP:	UF	
LOCATION TYPE: MON			FIELD QC TYPE:	REG	
PORT: MP3A			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	↓	↓

SAMPLE COMMENTS: NA

LOCATION COMMENTS: NA

## FIELD PARAMETERS:

Dissolved Oxygen 5.19 mg/L      Oxidation-Reduction Potential NA MV      pH 7.89 SU  
 Specific Conductance 134 uS/cm      Temperature 19.17 deg C      Turbidity 2.5 NTU

COLLECTED BY (PRINT) A. Vigil

RELINQUISHED BY (Printed Name) <u>meagan green</u> (Signature) <u>[Signature]</u>	Date/Time <u>4/16/13</u> <u>1305</u>	RECEIVED BY (Printed Name) <u>S. Sheppard</u> (Signature) <u>[Signature]</u>	Date/Time <u>4/16/13</u> <u>1305</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date 04/03/2013

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 4164 EVENT NAME: Pajarito (General Surveillance  
Monitoring Group) MY2013 Q3  
Sampling Event\_Pajarito Canyon

SAMPLE ID: CAPA-13-29681 WORK ORDER: NA

<u>AS</u> <u>PLANNED</u>	<u>AS COLLECTED</u>	<u>AS</u> <u>PLANNED</u>	<u>AS COLLECTED</u>
DATE COLLECTED (MM/DD/YYYY):	04/16/2013	FIELD MATRIX:	WG
TIME COLLECTED (HH:MM):	1026	MEDIA:	UA
PRS ID:	OK	SAMPLE TECH CODE:	WES
LOCATION ID: R-19 S3		FIELD PREP:	F
LOCATION TYPE: MON		FIELD QC TYPE: REG	
PORT: MP3A		SAMPLE USAGE: INV	

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-Met+B+SN+SR+U	1 LITER POLY	1	HNO3	Y	NA

SAMPLE COMMENTS:

NA

LOCATION COMMENTS:

NA

FIELD PARAMETERS:

Dissolved Oxygen NA mg/L  
Specific Conductance NA uS/cm

Oxidation-Reduction Potential NA MV  
Temperature NA deg C  
pH NA SU  
Turbidity NA NTU

COLLECTED BY (PRINT) D. Fellenz

RELINQUISHED BY (Printed Name) <u>Meg Green</u> (Signature) <u>[Signature]</u>	Date/Time <u>4/16/13</u> <u>1305</u>	RECEIVED BY (Printed Name) <u>B. Sherwood</u> (Signature) <u>[Signature]</u>	Date/Time <u>4/16/13</u> <u>1305</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date 04/03/2013

## Data Validation Report

Chain Of Custody No. 2013-735

## 1. Distribution Of Samples In EDD.

	Analytical	Regular	Field	Trip	Field	Equipment
SDG	Method	Samples	Duplicates	Blanks	Blanks	Blanks
	324095 EPA:245.2		1			
	324095 EPA:900		1			
	324095 EPA:901.1		1			
	324095 EPA:905.0		1			
	324095 HASL-300:AM-241		1			
	324095 HASL-300:ISOPU		1			
	324095 HASL-300:ISOU		1			
	324095 SM:A2340B		1			
	324095 SW-846:6010B		1			
	324095 SW-846:6020		1			

	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
	324095 EPA:245.2	1298962	1298950		1					1	1
	324095 EPA:900	1296612	1296612		1					1	1
	324095 EPA:901.1	1296138	1296138		1					1	
	324095 EPA:905.0	1296601	1296601		1					1	1
	324095 HASL-300:AM-241	1296310	1296310		1					1	
	324095 HASL-300:ISOPU	1296308	1296308		1					1	
	324095 HASL-300:ISOU	1296306	1296306		1					1	
	324095 SM:A2340B	1301128	1301128		1						
	324095 SW-846:6010B	1296991	1296990		1					1	1
	324095 SW-846:6020	1296993	1296992		1					1	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:245.2	INORGANIC	CAPA-13-29681	1202868626	DUP		1	0	0
EPA:245.2	INORGANIC	CAPA-13-29681	1202868627	MS		0	0	1
EPA:245.2	INORGANIC	CAPA-13-29681	324095002	REG		1	0	0
EPA:245.2	INORGANIC	LCS	1202868625	LCS		0	0	1
EPA:245.2	INORGANIC	MB	1202868624	MB		1	0	0
EPA:900	RAD	CAPA-13-29670	1202862849	DUP		2	0	0
EPA:900	RAD	CAPA-13-29670	1202862850	MS		0	0	2
EPA:900	RAD	CAPA-13-29670	1202862851	MSD		0	0	2
EPA:900	RAD	CAPA-13-29670	324095001	REG		2	0	0
EPA:900	RAD	LCS	1202862852	LCS		0	0	2
EPA:900	RAD	MB	1202862848	MB		2	0	0
EPA:901.1	RAD	CAPA-13-29669	1202861666	DUP		5	0	0
EPA:901.1	RAD	CAPA-13-29670	324095001	REG		5	0	0
EPA:901.1	RAD	LCS	1202861667	LCS		0	0	3
EPA:901.1	RAD	MB	1202861665	MB		5	0	0
EPA:905.0	RAD	CAPA-13-29669	1202862828	DUP		1	0	0
EPA:905.0	RAD	CAPA-13-29669	1202862829	MS		0	0	1
EPA:905.0	RAD	CAPA-13-29670	324095001	REG		1	0	0
EPA:905.0	RAD	LCS	1202862830	LCS		0	0	1
EPA:905.0	RAD	MB	1202862827	MB		1	0	0

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HASL-300:AM-241	RAD	CAPA-13-29669	1202862070	DUP	1	0	0	0
HASL-300:AM-241	RAD	CAPA-13-29670	324095001	REG	1	0	0	0
HASL-300:AM-241	RAD	LCS	1202862071	LCS	0	0	1	0
HASL-300:AM-241	RAD	MB	1202862069	MB	1	0	0	0
HASL-300:ISOPU	RAD	CAPA-13-29669	1202862067	DUP	2	0	0	0
HASL-300:ISOPU	RAD	CAPA-13-29670	324095001	REG	2	0	0	0
HASL-300:ISOPU	RAD	LCS	1202862068	LCS	0	0	1	0
HASL-300:ISOPU	RAD	MB	1202862066	MB	2	0	0	0
HASL-300:ISOU	RAD	CAPA-13-29669	1202862064	DUP	3	0	0	0
HASL-300:ISOU	RAD	CAPA-13-29670	324095001	REG	3	0	0	0
HASL-300:ISOU	RAD	LCS	1202862065	LCS	0	0	1	0
HASL-300:ISOU	RAD	MB	1202862063	MB	3	0	0	0
SM-A2340B	INORGANIC	CAPA-13-29681	324095002	REG	1	0	0	0
SW-846:6010B	INORGANIC	CAPA-13-29681	324095002	REG	16	0	0	0
SW-846:6010B	INORGANIC	LCS	1202863773	LCS	0	0	16	0
SW-846:6010B	INORGANIC	MB	1202863772	MB	16	0	0	0
SW-846:6010B	INORGANIC	WST36-13-30956	1202863774	DUP	16	0	0	0
SW-846:6010B	INORGANIC	WST36-13-30956	1202863775	MS	0	0	16	0
SW-846:6020	INORGANIC	CAPA-13-29680	1202863779	DUP	11	0	0	0
SW-846:6020	INORGANIC	CAPA-13-29680	1202863780	MS	0	0	11	0
SW-846:6020	INORGANIC	CAPA-13-29681	324095002	REG	11	0	0	0
SW-846:6020	INORGANIC	LCS	1202863778	LCS	0	0	11	0
SW-846:6020	INORGANIC	MB	1202863777	MB	11	0	0	0

## 3. Are any analytes missing?

No.

## 4. Were any holding times exceeded?

No.

## 5. Any contaminants in blanks?

No.

Any samples affected by the presence of contaminants in blanks?

No.

## 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
WST36-13-30956	1202863775		SW-846:6010B	Boron	1296990	5/8/2013	W	626		125	75
WST36-13-30956	1202863775		SW-846:6010B	Potassium	1296990	5/8/2013	W	2870		125	75
WST36-13-30956	1202863775		SW-846:6010B	Sodium	1296990	5/8/2013	W	1110		125	75

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

No.

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

Rejection
Limit
10
10
10

RPD

RPD  
Limit

No.

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

No.

## 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-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	HASL-300:AM-241	Americium-241	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	EPA:901.1	Cesium-137	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	EPA:901.1	Cobalt-60	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	EPA:900	Gross alpha	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	EPA:900	Gross beta	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	EPA:901.1	Neptunium-237	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-238	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	HASL-300:ISOPU	Plutonium-239/240	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	EPA:901.1	Potassium-40	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	EPA:901.1	Sodium-22	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	EPA:905.0	Strontium-90	U	U	R5	N
R-19 S3	2013-735	CAPA-13-29670	REG	INIT	RAD	HASL-300:ISOU	Uranium-235/236	U	U	R5	N

## Reason Code

Description

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
CAPA-13-29670	R-19 S3	REG	EPA:900	0	2
CAPA-13-29670	R-19 S3	REG	EPA:901.1	0	5
CAPA-13-29670	R-19 S3	REG	EPA:905.0	0	1
CAPA-13-29670	R-19 S3	REG	HASL-300:AM-241	0	1
CAPA-13-29670	R-19 S3	REG	HASL-300:ISOPU	0	2
CAPA-13-29670	R-19 S3	REG	HASL-300:ISOU	0	3
CAPA-13-29681	R-19 S3	REG	EPA:245.2	0	1
CAPA-13-29681	R-19 S3	REG	SM:A2340B	0	1
CAPA-13-29681	R-19 S3	REG	SW-846:6010B	0	16
CAPA-13-29681	R-19 S3	REG	SW-846:6020	0	11



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
0.00219	pCi/L	0.00219	pCi/L	0.0382	0.00379	W	4/16/2013		1296310	VAL	Y
-0.408	pCi/L	-0.408	pCi/L	7.61	2.19	W	4/16/2013		1296138	VAL	Y
-1.4	pCi/L	-1.4	pCi/L	6.9	1.94	W	4/16/2013		1296138	VAL	Y
0.961	pCi/L	0.961	pCi/L	2.37	0.699	W	4/16/2013		1296612	VAL	Y
0.79	pCi/L	0.79	pCi/L	2.99	0.882	W	4/16/2013		1296612	VAL	Y
2.88	pCi/L	2.88	pCi/L	10.6	2.75	W	4/16/2013		1296138	VAL	Y
0.00271	pCi/L	0.00271	pCi/L	0.0421	0.00469	W	4/16/2013		1296308	VAL	Y
0.00812	pCi/L	0.00812	pCi/L	0.0411	0.00898	W	4/16/2013		1296308	VAL	Y
10	pCi/L	10	pCi/L	86.4	22.3	W	4/16/2013		1296138	VAL	Y
-2.4	pCi/L	-2.4	pCi/L	6.14	1.84	W	4/16/2013		1296138	VAL	Y
0.0634	pCi/L	0.0634	pCi/L	0.473	0.129	W	4/16/2013		1296601	VAL	Y
0.0167	pCi/L	0.0167	pCi/L	0.0508	0.0102	W	4/16/2013		1296306	VAL	Y



May 15, 2013

[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: 324095  
SDG: 2013-735

Dear Keith Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on April 18, 2013, and analyzed for Metals 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,

Hope Taylor for  
Valerie Davis  
Project Manager

Purchase Order: 63641-10  
Chain of Custody: 2013-735  
Enclosures



**ARS International (63641-10)**  
**LANL-WQH Water Samples**  
**Work Order #: 324095**  
**SDG: 2013-735**

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# Case Narrative

**Case Narrative for  
ARS International (63641-10)  
LANL-WQH Water Samples  
Workorder #: 324095  
SDG # : 2013-735**

**May 15, 2013**

**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 April 18, 2013 for analysis. Please see attached email for discrepancies. 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). Shipping container temperatures were checked, documented, and within specifications. There are no additional comments concerning sample receipt.

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

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
324095001	CAPA-13-29670
324095002	CAPA-13-29681

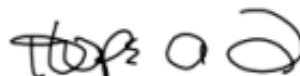
**Case Narrative**

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: Metals 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.



Hope Taylor for  
Valerie Davis  
Project Manager

**List of current GEL Certifications as of 15 May 2013**

<b>State</b>	<b>Certification</b>
Alaska	UST-110
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	P330-12-00283, P330-12-00284
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	LA130005
Maryland	270
Massachusetts	M-SC012
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
Plant Material Permit	PDEP-12-00260
South Carolina Chemistry	10120001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235-13-8
Utah NELAP	SC000122013-8
Vermont	VT87156
Virginia NELAP	460202
Washington	C780-12
Wisconsin	999887790

# **Chain of Custody and Supporting Documentation**





## SAMPLE RECEIPT &amp; REVIEW FORM

Client: <u>LANC</u>			SDG/AR/COC/Work Order: <u>2013-735</u>		
Received By: <u>JP</u>			Date Received: <u>4-18-13</u>		
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?				Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0cpm</u>	
Classified Radioactive II or III by RSO?				If yes, Were swipes taken of sample containers < action levels?	
COC/Samples marked containing PCBs?					
Package, COC, and/or Samples marked as beryllium or asbestos containing?				If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.	
Shipped as a DOT Hazardous?				Hazard Class Shipped: UN#:	
Samples identified as Foreign Soil?					

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken    Damaged container    Leaking container    Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: Ice bags <u>Blue ice</u> Dry ice    None    Other (describe) <u>see below</u> *all temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: <u>41502209</u> Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken    Damaged container    Leaking container    Other (describe)
5 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's, containers affected and observed pH: <u>Gross A/B for 29540 preserved</u> If Preservation added, Lot#: <u>AX0409-TS</u> upon receipt
6 VOA vials free of headspace (defined as < 6mm bubble)?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
7 Are Encore containers present?	<input checked="" type="checkbox"/>			(If yes, immediately deliver to Volatiles laboratory)
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected: <u>see below</u>
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>			
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
14 Carrier and tracking number.				Circle Applicable: <u>FedEx Air</u> FedEx Ground    UPS    Field Services    Courier    Other  <u>5462 9832 9409-4°</u> <u>" " 9410-2°</u>

Comments (Use Continuation Form if needed):  
Only received one vial of 29544, 29554, + 29555

**Subject:** Sample Receipt for 041813  
**From:** Hope Taylor <Hope.Taylor@gel.com>  
**Date:** 4/18/2013 3:34 PM  
**To:** "Keith R. Greene" <kgreene@lanl.gov>, LANL@amrad.com  
**CC:** "team.davis" <team.davis@gel.com>

The containers for Gross A/B were preserved prior to analysis.

RN 2013-731 lab received 1 container each for IDs CAPA-13-29544, 29554 and 29555, chain indicates two.

Thanks

--  
Hope Taylor  
Project Manager Assistant  
GEL Laboratories, LLC  
2040 Savage Road  
Charleston, SC 29407

---

Direct: 843.769.7376 ext. 4778  
Main: 843.556.8171  
Fax: 843.766.1178  
E-mail: [hop01200@gel.com](mailto:hop01200@gel.com)  
Web: [www.gel.com](http://www.gel.com)

ORIGIN ID: SAFA (505) 665-9966

KEITH GREENE  
LOS ALAMOS NATL LAB  
TA00 BLDG 1237 DPU 03

SHIP DATE: 17APR13  
ACTWGT: 18.0 LB MAN  
CAD: 0014176/CAFE2511

LOS ALAMOS NM 87545  
UNITED STATES US

BILL SENDER

VALERIE DAVIS  
GENERAL ENGINEERING LAB  
2040 SAVAGE RD

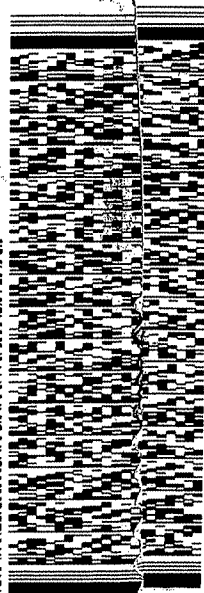
CHARLESTON SC 29407

(843) 556-8171

REF: MR1A015AGWFO

58DCL1/64BE/10BC

FedEx  
Express



THU - 18 APR 10:30A  
PRIORITY OVERNIGHT

2 of 2

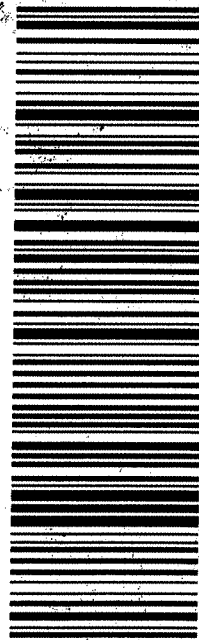
MPS# 5462 9832 9410

Mstr# 5462 9832 9409

0201

XX CHSA

29407  
SC-US CHS



Part # 166148-434 RIT2 08/10

RT 249  
FZ

ORIGIN ID: SAFA (505) 665-9966

KEITH GREENE  
LOS ALAMOS NATL LAB  
TA00 BLDG 1237 DPU 03

LOS ALAMOS NM 87545  
UNITED STATES US

VALERIE DAVIS  
GENERAL ENGINEERING LAB  
2040 SAVAGE RD

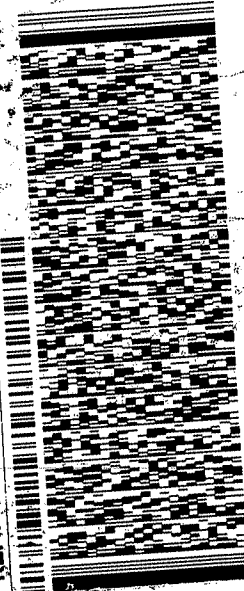
CHARLESTON SC 29407

(843) 556-8171

REF: MR1A015AGWFO

58DCL1/64BE/10BC

FedEx  
Express



THU - 18 APR 10:30A  
PRIORITY OVERNIGHT

1 of 2

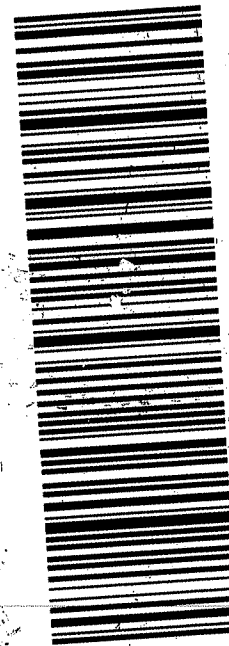
TRK# 5462 9832 9409

0201

## MASTER ##

XX CHSA

29407  
SC-US CHS



Part # 166148-434 RIT2 08/10

# **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.

# Metals Analysis

# Case Narrative



**Metals Fractional Narrative  
ARS International (ARSL)  
SDG 2013-735**

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
324095002	CAPA-13-29681
1202863772	Method Blank (MB) <b>ICP</b>
1202863773	Laboratory Control Sample (LCS)
1202863776	324376001(WST36-13-30956L) Serial Dilution (SD)
1202863774	324376001(WST36-13-30956D) Sample Duplicate (DUP)
1202863775	324376001(WST36-13-30956S) Matrix Spike (MS)
1202863777	Method Blank (MB) <b>ICP-MS</b>
1202863778	Laboratory Control Sample (LCS)
1202863781	324205002(CAPA-13-29680L) Serial Dilution (SD)
1202863779	324205002(CAPA-13-29680D) Sample Duplicate (DUP)
1202863780	324205002(CAPA-13-29680S) Matrix Spike (MS)
1202868624	Method Blank (MB) <b>CVAA</b>
1202868625	Laboratory Control Sample (LCS)
1202868628	324095002(CAPA-13-29681L) Serial Dilution (SD)
1202868626	324095002(CAPA-13-29681D) Sample Duplicate (DUP)
1202868627	324095002(CAPA-13-29681S) Matrix Spike (MS)

**Method/Analysis Information**

<b>Analytical Batch:</b>	1296991, 1296993, 1298962 and 1301128
<b>Prep Batch :</b>	1296990, 1296992 and 1298950
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 22, GL-MA-E-006 REV# 9, GL-MA-E-014 REV# 25, GL-MA-E-010 REV# 25 and GL-GC-E-107 REV# 8
<b>Analytical Method:</b>	SW846 3005/6010B, SW846 3005/6020 DOE-AL, EPA 245.1/245.2 and SM 2340 B
<b>Prep Method :</b>	SW846 3005A and EPA 245.1/245.2 Prep

## **Preparation/Analytical Method Verification**

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

### **System Configuration**

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

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with 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 for all applicable analytes with the exception of potassium. CCB04 (analyzed at 10:04 on 05/08/13) and CCB05 (analyzed at 10:29 on 05/08/13) recovered high for potassium; however, the bracketed QC samples contained potassium at levels 10x greater than PQL/RDL.

#### **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: 324376001 (WST36-13-30956)-ICP, 324205002 (CAPA-13-29680)-ICP-MS and 324095002 (CAPA-13-29681)-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. The MS met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes.

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

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required 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 instrument. Sample 324095002 required a dilution for tin in order to minimize suppression due to matrix interferences.

#### **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 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 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: 05/13/13

# **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: 2013-735 GEL Work Order: 324095

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

- \* A quality control analyte recovery is outside of specified acceptance criteria
- J Value is estimated
- N Metals--The Matrix spike sample recovery is not within specified control limits
- U Analyte was analyzed for, but not detected above the MDL, MDA, 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 limit as defined in the 'U' qualifier above.

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



05/13/13

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

**SDG No:** 2013-735**CONTRACT:** ESHL00210**METHOD TYPE:** EPA**SAMPLE ID:** 324095002**BASIS:** As Received**DATE COLLECTED** 16-APR-13**CLIENT ID:** CAPA-13-29681**LEVEL:** Low**DATE RECEIVED** 18-APR-13**MATRIX:** W**%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7439-97-6	Mercury	0.20	ug/L	U	0.067	0.2	0.2	1	AV	NOR1	05/03/13 10:30	050313W1-5	1298962



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

SDG No: 2013-735

CONTRACT: ESHL00210

METHOD TYPE: SW846

SAMPLE ID: 324095002

BASIS: As Received

DATE COLLECTED 16-APR-13

CLIENT ID: CAPA-13-29681

LEVEL: Low

DATE RECEIVED 18-APR-13

MATRIX: W

%SOLIDS: 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429-90-5	Aluminum	200	ug/L	U	68	200	200	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7440-36-0	Antimony	3	ug/L	U	1	3	3	1	MS	BAJ	05/07/13 21:03	130507-3	1296993
7440-38-2	Arsenic	5	ug/L	U	1.7	5	5	1	MS	BAJ	05/08/13 14:50	130508-4	1296993
7440-39-3	Barium	18.3	ug/L		1	5	5	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7440-41-7	Beryllium	5	ug/L	U	1	5	5	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7440-42-8	Boron	15.1	ug/L	J	15	50	50	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7440-43-9	Cadmium	1	ug/L	U	0.11	1	1	1	MS	BAJ	05/07/13 21:03	130507-3	1296993
7440-70-2	Calcium	12300	ug/L		50	200	200	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7440-47-3	Chromium	10	ug/L	U	2	10	10	1	MS	BAJ	05/08/13 14:50	130508-4	1296993
7440-48-4	Cobalt	5	ug/L	U	1	5	5	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7440-50-8	Copper	10	ug/L	U	3	10	10	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7439-89-6	Iron	100	ug/L	U	30	100	100	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7439-92-1	Lead	2	ug/L	U	0.5	2	2	1	MS	BAJ	05/07/13 21:03	130507-3	1296993
7439-95-4	Magnesium	3110	ug/L		110	300	300	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7439-96-5	Manganese	10	ug/L	U	2	10	10	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7439-98-7	Molybdenum	0.986	ug/L		0.165	0.5	0.5	1	MS	BAJ	05/08/13 14:50	130508-4	1296993
7440-02-0	Nickel	0.512	ug/L	J	0.5	2	2	1	MS	BAJ	05/08/13 14:50	130508-4	1296993
7440-09-7	Potassium	1220	ug/L		50	150	150	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7782-49-2	Selenium	5	ug/L	U	1.5	5	5	1	MS	BAJ	05/08/13 14:50	130508-4	1296993
7440-22-4	Silver	1	ug/L	U	0.2	1	1	1	MS	BAJ	05/07/13 21:03	130507-3	1296993
7440-23-5	Sodium	10100	ug/L		100	300	300	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7440-24-6	Strontium	51	ug/L		1	5	5	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7440-28-0	Thallium	2	ug/L	U	0.45	2	2	1	MS	BAJ	05/07/13 21:03	130507-3	1296993
7440-31-5	Tin	50	ug/L	U	12.5	50	50	5	P	HSC	05/08/13 08:48	050813B-2	1296991
7440-61-1	Uranium	0.304	ug/L		0.067	0.2	0.2	1	MS	BAJ	05/08/13 14:50	130508-4	1296993
7440-62-2	Vanadium	3.93	ug/L	J	1	5	5	1	P	HSC	05/07/13 15:16	050713A-1	1296991
7440-66-6	Zinc	3.37	ug/L	J	3.3	10	10	1	P	HSC	05/07/13 15:16	050713A-1	1296991

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

**SDG No:** 2013-735**CONTRACT:** ESHL00210**METHOD TYPE:****SAMPLE ID:** 324095002      **BASIS:** As Received      **DATE COLLECTED** 16-APR-13**CLIENT ID:** CAPA-13-29681      **LEVEL:** Low      **DATE RECEIVED** 18-APR-13**MATRIX:** W      **%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
	Hardness as CaCO3	43.5	mg/L		0.453	1.24	1.24	1		JJ2	05/10/13 14:31		1301128

**Prep Information:**

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1296991	1296990	SW846 3005A	50	mL	50	mL	05/07/13	AXG2
1296993	1296992	SW846 3005A	50	mL	50	mL	05/07/13	AXG2
1298962	1298950	EPA 245.1/245.2 Prep	20	mL	20	mL	05/02/13	AXS5

**\*Analytical Methods:**

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

# **Quality Control Summary**

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

**SDG NO.** 2013-735  
**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>
1202863772	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
	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
1202863777	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	0.165	ug/L	+/-0.5	U	MS	0.165	0.5
	Nickel	0.5	ug/L	+/-2	U	MS	0.5	2
	Selenium	1.5	ug/L	+/-5	U	MS	1.5	5
	Silver	0.2	ug/L	+/-1	U	MS	0.2	1
	Thallium	0.45	ug/L	+/-2	U	MS	0.45	2
	Uranium	0.067	ug/L	+/-0.2	U	MS	0.067	0.2
1202868624	Mercury	0.067	ug/L	+/-0.2	U	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. 2013-735

Client ID: WST36-13-30956S

Contract: ESHL00210

Level: Low

Matrix: WATER

% Solids:

Sample ID: 324376001

Spike ID: 1202863775

<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	5030		481	J	5000	90.9		P
Barium	ug/L	75-125	493		33.2		500	91.9		P
Beryllium	ug/L	75-125	528		5	U	500	106		P
Boron	ug/L		35400		32200		500	626	N/A	P
Calcium	ug/L	75-125	11600		6210		5000	107		P
Cobalt	ug/L	75-125	480		5	U	500	96		P
Copper	ug/L	75-125	708		203		500	101		P
Iron	ug/L	75-125	6480		1260		5000	104		P
Magnesium	ug/L	75-125	6930		1860		5000	102		P
Manganese	ug/L	75-125	530		44.9	J	500	97		P
Potassium	ug/L		2810000		2660000		5000	2870	N/A	P
Sodium	ug/L		575000		519000		5000	1110	N/A	P
Strontium	ug/L	75-125	467		13.8	J	500	90.7		P
Tin	ug/L	75-125	844		322		500	104		P
Vanadium	ug/L	75-125	515		16.8	J	500	99.7		P
Zinc	ug/L	75-125	2250		1650		500	120		P

## \*Analytical Methods:

P SW846 3005/6010B

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2013-735

Client ID: CAPA-13-29680S

Contract: ESHL00210

Level: Low

Matrix: WATER

% Solids:

Sample ID: 324205002

Spike ID: 1202863780

<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	53.4		1	U	50	106		MS
Arsenic	ug/L	75-125	48		1.7	U	50	94.5		MS
Cadmium	ug/L	75-125	50.1		0.11	U	50	100		MS
Chromium	ug/L	75-125	48.5		2	U	50	93.4		MS
Lead	ug/L	75-125	50.3		0.5	U	50	101		MS
Molybdenum	ug/L	75-125	50.8		1.27		50	99.1		MS
Nickel	ug/L	75-125	45.9		0.5	U	50	90.9		MS
Selenium	ug/L	75-125	51		1.5	U	50	101		MS
Silver	ug/L	75-125	51.9		0.2	U	50	104		MS
Thallium	ug/L	75-125	47.9		0.45	U	50	95.9		MS
Uranium	ug/L	75-125	48.8		0.306		50	96.9		MS

## \*Analytical Methods:

MS SW846 3005/6020 DOE-AL

## METALS

-5a-

## Matrix Spike Summary

SDG NO. 2013-735

Client ID: CAPA-13-29681S

Contract: ESHL00210

Level: Low

Matrix: WATER

% Solids:

Sample ID: 324095002

Spike ID: 1202868627

<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	2.05		0.067	U	2	102		AV

## \*Analytical Methods:

AV EPA 245.1/245.2

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

SDG No.: 2013-735

Lab Code: GEL

Contract: ESHL00210

Client ID: WST36-13-30956D

Matrix: LIQUID

Level: Low

Sample ID: 324376001

Duplicate ID: 1202863774

Percent Solids for Dup: N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/L	+/-1000	481 J		525 J		8.73		P
Barium	ug/L	+/-25	33.2		34.3		3.5		P
Beryllium	ug/L		5 U		5 U				P
Boron	ug/L	+/-20%	32200		35300		9.08		P
Calcium	ug/L	+/-20%	6210		6740		8.3		P
Cobalt	ug/L		5 U		5 U				P
Copper	ug/L	+/-50	203		228		11.4		P
Iron	ug/L	+/-500	1260		1440		13.5		P
Magnesium	ug/L	+/-1500	1860		1910		2.95		P
Manganese	ug/L	+/-50	44.9 J		49.2 J		9.04		P
Potassium	ug/L	+/-20%	2660000		2850000		6.6		P
Sodium	ug/L	+/-20%	519000		570000		9.33		P
Strontium	ug/L	+/-25	13.8 J		16.3 J		16.5		P
Tin	ug/L	+/-20%	322		359		10.8		P
Vanadium	ug/L	+/-25	16.8 J		16.7 J		.41		P
Zinc	ug/L	+/-20%	1650		1810		8.76		P

\*Analytical Methods:

P SW846 3005/6010B



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

SDG No.: 2013-735

Lab Code: GEL

Contract: ESHL00210

Client ID: CAPA-13-29680D

Matrix: LIQUID

Level: Low

Sample ID: 324205002

Duplicate ID: 1202863779

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		2 U		2 U				MS
Lead	ug/L		0.5 U		0.5 U				MS
Molybdenum	ug/L	+/- .5	1.27		1.24		2.23		MS
Nickel	ug/L		0.5 U		0.5 U				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	0.306		0.298		2.65		MS

## \*Analytical Methods:

MS SW846 3005/6020 DOE-AL

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

**SDG No.:** 2013–735**Lab Code:** GEL**Contract:** ESHL00210**Client ID:** CAPA–13–29681D**Matrix:** LIQUID**Level:** Low**Sample ID:** 324095002**Duplicate ID:** 1202868626**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

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## Laboratory Control Sample Summary

SDG NO. 2013-735

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>
1202863773								
	Aluminum	ug/L	5000	5050		101	80-120	P
	Barium	ug/L	500	484		96.9	80-120	P
	Beryllium	ug/L	500	481		96.3	80-120	P
	Boron	ug/L	500	478		95.6	80-120	P
	Calcium	ug/L	5000	5000		100	80-120	P
	Cobalt	ug/L	500	483		96.7	80-120	P
	Copper	ug/L	500	486		97.1	80-120	P
	Iron	ug/L	5000	5050		101	80-120	P
	Magnesium	ug/L	5000	5080		102	80-120	P
	Manganese	ug/L	500	493		98.6	80-120	P
	Potassium	ug/L	5000	4930		98.6	80-120	P
	Sodium	ug/L	5000	4970		99.3	80-120	P
	Strontium	ug/L	500	497		99.4	80-120	P
	Tin	ug/L	500	494		98.8	80-120	P
	Vanadium	ug/L	500	497		99.3	80-120	P
	Zinc	ug/L	500	485		97	80-120	P

## \*Analytical Methods:

P SW846 3005/6010B

## METALS

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## Laboratory Control Sample Summary

SDG NO. 2013-735

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>
1202863778								
	Antimony	ug/L	50	52		104	80-120	MS
	Arsenic	ug/L	50	48.1		96.3	80-120	MS
	Cadmium	ug/L	50	50.6		101	80-120	MS
	Chromium	ug/L	50	49.5		99.1	80-120	MS
	Lead	ug/L	50	49.8		99.6	80-120	MS
	Molybdenum	ug/L	50	50.3		101	80-120	MS
	Nickel	ug/L	50	49.3		98.6	80-120	MS
	Selenium	ug/L	50	50.2		100	80-120	MS
	Silver	ug/L	50	51.7		103	80-120	MS
	Thallium	ug/L	50	47.9		95.8	80-120	MS
	Uranium	ug/L	50	51.5		103	80-120	MS

## \*Analytical Methods:

MS SW846 3005/6020 DOE-AL

## METALS

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## Laboratory Control Sample Summary

SDG NO. 2013-735

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>
1202868625	Mercury	ug/L	2	2.09		105	85-115	AV

## \*Analytical Methods:

AV EPA 245.1/245.2

## METALS

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## Serial Dilution Sample Summary

SDG NO. 2013-735

Client ID: WST36-13-30956L

Contract: ESHL00210

Matrix: LIQUID

Level: Low

Sample ID: 324376001

Serial Dilution ID: 1202863776

<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	96.3	J	340	U	100			P
Barium	6.63		5.79	J	12.7			P
Beryllium	1	U	5	U				P
Boron	6450		6270		2.72		10	P
Calcium	1240		1210		2.57			P
Cobalt	1	U	5	U				P
Copper	40.6		46.2	J	13.6			P
Iron	252		245	J	2.66			P
Magnesium	372		550	U	100			P
Manganese	8.98	J	10	U	100			P
Potassium	53300		55900		4.89		10	P
Sodium	104000		106000		1.76		10	P
Strontium	2.77	J	5	U	100			P
Tin	64.5		57.6		10.7			P
Vanadium	3.35	J	5	U	100			P
Zinc	331		329		.452		10	P

## \*Analytical Methods:

P SW846 3005/6010B

## METALS

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## Serial Dilution Sample Summary

SDG NO. 2013-735

Client ID: CAPA-13-29680L

Contract: ESHL00210

Matrix: LIQUID

Level: Low

Sample ID: 324205002

Serial Dilution ID: 1202863781

<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	2	U	10	U				MS
Lead	.5	U	2.5	U				MS
Molybdenum	1.27		1.54	J	21			MS
Nickel	.5	U	2.5	U				MS
Selenium	1.5	U	7.5	U				MS
Silver	.2	U	1	U				MS
Thallium	.45	U	2.25	U				MS
Uranium	.306		.53	J	73.2			MS

## \*Analytical Methods:

MS SW846 3005/6020 DOE-AL

## METALS

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## Serial Dilution Sample Summary

**SDG NO.** 2013-735 **Client ID:** CAPA-13-29681L**Contract:** ESHL00210**Matrix:** LIQUID **Level:** Low**Sample ID:** 324095002 **Serial Dilution ID:** 1202868628

<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



# **Radiological Analysis**

**Radiochemistry Case Narrative  
ARS International (ARSL)  
SDG 2013-735  
Work Order 324095**

**Method/Analysis Information**

**Product:** Alphaspec U, Liquid  
**Analytical Method:** DOE EML HASL-300, U-02-RC Modified  
**Analytical Batch Number:** 1296306

<b>Sample ID</b>	<b>Client ID</b>
324095001	CAPA-13-29670
1202862063	Method Blank (MB)
1202862064	324205001(CAPA-13-29669) Sample Duplicate (DUP)
1202862065	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# 23.

**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 1202862063 (MB) and 1202862065 (LCS) were changed to 1.0 per client request.

**Designated QC**

The following sample was used for QC: 324205001 (CAPA-13-29669). The QC was from ARSL work order 324205.

**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:	1296308

<b>Sample ID</b>	<b>Client ID</b>
324095001	CAPA-13-29670
1202862066	Method Blank (MB)
1202862067	324205001(CAPA-13-29669) Sample Duplicate (DUP)
1202862068	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# 23.

#### **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 1202862066 (MB) and 1202862068 (LCS) were changed to 1.0 per client request.

##### **Designated QC**

The following sample was used for QC: 324205001 (CAPA-13-29669). The QC was from ARSL work order 324205.

##### **QC Information**

All of the QC samples met the required acceptance limits.

##### **CSU**

The Pu-239/240 blank result 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**

Sample 1202862068 (LCS) was) recounted twice due to a peak shift. The third count is reported.

#### **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 Pu-239/240 blank result is greater than the decision level but less than the MDC.

### **Qualifier Information**

Manual qualifiers were not required.

### **Method/Analysis Information**

**Product:** Alphaspec Am241 Liquid  
**Analytical Method:** DOE EML HASL-300, Am-05-RC Modified  
**Analytical Batch Number:** 1296310

<b>Sample ID</b>	<b>Client ID</b>
324095001	CAPA-13-29670
1202862069	Method Blank (MB)
1202862070	324205001(CAPA-13-29669) Sample Duplicate (DUP)
1202862071	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# 23.

### **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 1202862069 (MB) and 1202862071 (LCS) were changed to 1.0 per client request.

#### **Designated QC**

The following sample was used for QC: 324205001 (CAPA-13-29669). The QC was from ARSL work order 324205.

#### **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 1202862070 (CAPA-13-29669) was recounted due to a suspected false positive. The recount is reported.

**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:      1296138

<b>Sample ID</b>	<b>Client ID</b>
324095001	CAPA-13-29670
1202861665	Method Blank (MB)
1202861666	324205001(CAPA-13-29669) Sample Duplicate (DUP)
1202861667	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

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met. The initial Calibrations were performed in July 2012, August 2012, January 2013 and February 2013.

**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: 324205001 (CAPA-13-29669). The QC was from ARSL work order 324205.

**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**

Qualifier	Reason	Analyte	Sample	Client Sample
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UI	Data rejected due to no valid peak.	Cesium-137	1202861666	CAPA-13-29669(324205001DUP)
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### **Method/Analysis Information**

**Product:** GFPC, Sr90, liquid  
**Analytical Method:** EPA 905.0 Modified  
**Analytical Batch Number:** 1296601

<b>Sample ID</b>	<b>Client ID</b>
324095001	CAPA-13-29670
1202862827	Method Blank (MB)
1202862828	324205001(CAPA-13-29669) Sample Duplicate (DUP)
1202862829	324205001(CAPA-13-29669) Matrix Spike (MS)
1202862830	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 March 2013.

#### **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 1202862827 (MB) and 1202862830 (LCS) were changed to 1.0 per client request.

#### **Designated QC**

The following sample was used for QC: 324205001 (CAPA-13-29669). The QC was from ARSL work order 324205.



**QC Information**

All of the QC samples met the required acceptance limits.

**CSU**

The blank 1202862827 (MB) result 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**

Sample 1202862828 (CAPA-13-29669) 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, 1202862829 (CAPA-13-29669), aliquot was reduced to conserve sample volume.

**Blank Decision Level**

The blank 1202862827 (MB) result is greater than the decision level but less than the MDC.

**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:	1296612

<b>Sample ID</b>	<b>Client ID</b>
324095001	CAPA-13-29670
1202862848	Method Blank (MB)
1202862849	324095001(CAPA-13-29670) Sample Duplicate (DUP)
1202862850	324095001(CAPA-13-29670) Matrix Spike (MS)
1202862851	324095001(CAPA-13-29670) Matrix Spike Duplicate (MSD)
1202862852	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# 16.

#### **Calibration Information:**

##### **Calibration Information**

All initial and continuing calibration requirements have been met. The initial Calibration was performed in December 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 1202862848 (MB) and 1202862852 (LCS) were changed to 1.0 per client request.

##### **Designated QC**

The following sample was used for QC: 324095001 (CAPA-13-29670). The QC was from ARSL work order 324095.

##### **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, 1202862850 (CAPA-13-29670) and 1202862851 (CAPA-13-29670), 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: 2013-735 GEL Work Order: 324095

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

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

#### **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: 13 MAY 2013**

**Title: Analyst I**

# Sample Data Summary

# 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  
Contact: Keith Greene  
Project: LANL-WQH Water Samples

Report Date: May 13, 2013

Client Sample ID: CAPA-13-29670  
Sample ID: 324095001  
Matrix: W  
Collect Date: 16-APR-13  
Receive Date: 18-APR-13  
Collector: Client

Project: ESHL00210  
Client ID: ARSL001

Parameter	Qualifier	Result	Uncertainty	MDC	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	0.00219	+/-0.00379	0.0382	+/-0.00379	0.050	pCi/L		JXD2	04/23/13	0855	1296310	1
<i>Alphaspec Pu, Liquid "As Received"</i>													
Plutonium-238	U	0.00271	+/-0.00469	0.0421	+/-0.00469	0.050	pCi/L		JXD2	04/23/13	0855	1296308	2
Plutonium-239/240	U	0.00812	+/-0.00898	0.0411	+/-0.00899	0.050	pCi/L						
<i>Alphaspec U, Liquid "As Received"</i>													
Uranium-234		0.223	+/-0.0286	0.0827	+/-0.0323	1.00	pCi/L		JXD2	04/23/13	0855	1296306	3
Uranium-235/236	U	0.0167	+/-0.0102	0.0508	+/-0.0103	1.00	pCi/L						
Uranium-238		0.115	+/-0.0213	0.0464	+/-0.0227	0.500	pCi/L						
<b>Rad Gamma Spec Analysis</b>													
<i>Gammasespec "As Received"</i>													
Cesium-137	U	-0.408	+/-2.19	7.61	+/-2.19	8.00	pCi/L		MXR1	05/02/13	0937	1296138	4
Cobalt-60	U	-1.4	+/-1.94	6.90	+/-1.97	8.00	pCi/L						
Neptunium-237	U	2.88	+/-2.75	10.6	+/-2.84	10.0	pCi/L						
Potassium-40	U	10.0	+/-22.3	86.4	+/-22.5	10.0	pCi/L						
Sodium-22	U	-2.4	+/-1.84	6.14	+/-1.92	10.0	pCi/L						
<b>Rad Gas Flow Proportional Counting</b>													
<i>GFPC, Sr90, liquid "As Received"</i>													
Strontium-90	U	0.0634	+/-0.129	0.473	+/-0.129	0.500	pCi/L		BXF1	05/06/13	0846	1296601	5
<i>WSP-GrossA/B "As Received"</i>													
Beta	U	0.790	+/-0.882	2.99	+/-0.885	3.00	pCi/L		DYT1	05/07/13	1434	1296612	6
Alpha	U	0.961	+/-0.699	2.37	+/-0.703	3.00	pCi/L		DYT1	05/08/13	1133	1296612	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"	1296310	82.4	(50%-105%)
Plutonium-242 Tracer		Alphaspec Pu, Liquid "As Received"	1296308	74.9	(50%-105%)
Uranium-232 Tracer		Alphaspec U, Liquid "As Received"	1296306	65.3	(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: May 13, 2013

Contact: Keith Greene

Project: LANL-WQH Water Samples

Client Sample ID: CAPA-13-29670

Sample ID: 324095001

Project: ESHL00210

Client ID: ARSL001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery		Test					Batch ID	Recovery%	Acceptable Limits				
Strontium Carrier		GFPC, Sr90, liquid "As Received"					1296601	86.5	(50%-105%)				

### Notes:

TPU and Uncertainty are calculated at the 68% confidence level (1-sigma).

# Quality Control Data



# GEL LABORATORIES LLC

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## QC Summary

Report Date: May 13, 2013

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: 324095**

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Alpha Spec</b>											
Batch	1296306										
QC1202862064	324205001	DUP									
Uranium-234		0.332		0.238	pCi/L	0.745		(0-1)	JXD2	04/23/1308:55	
		Uncert:		+/-0.0277							
		TPU:		+/-0.0347							
Uranium-235/236		U	0.0107	U	0.00848	pCi/L	0.0745	(0-1)			
		Uncert:		+/-0.00759							
		TPU:		+/-0.00762							
Uranium-238			0.128		0.0846	pCi/L	0.603	(0-1)			
		Uncert:		+/-0.018							
		TPU:		+/-0.0198							
**Uranium-232 Tracer	2.70	2.10		2.14	pCi/L		79.5	(50%-105%)			
		Uncert:		+/-0.077							
		TPU:		+/-0.187							
QC1202862065	LCS										
Uranium-234				2.71	pCi/L				JXD2	04/23/1308:55	
		Uncert:		+/-0.0687							
		TPU:		+/-0.185							
Uranium-235/236				0.165	pCi/L						
		Uncert:		+/-0.0193							
		TPU:		+/-0.0219							
Uranium-238	2.70			2.73	pCi/L		101	(80%-120%)			
		Uncert:		+/-0.0689							
		TPU:		+/-0.186							
**Uranium-232 Tracer	2.16			1.79	pCi/L		82.9	(50%-105%)			
		Uncert:		+/-0.0619							
		TPU:		+/-0.150							
QC1202862063	MB										
Uranium-234			U	0.00444	pCi/L				JXD2	04/23/1308:55	
		Uncert:		+/-0.00679							
		TPU:		+/-0.00679							
Uranium-235/236			U	0.00366	pCi/L						
		Uncert:		+/-0.00366							
		TPU:		+/-0.00367							
Uranium-238			U	0.00296	pCi/L						
		Uncert:		+/-0.00468							
		TPU:		+/-0.00469							
**Uranium-232 Tracer	2.16			1.90	pCi/L		87.9	(50%-105%)			
		Uncert:		+/-0.0576							
		TPU:		+/-0.146							
Batch	1296308										
QC1202862067	324205001	DUP									
Plutonium-238		U	0.00759	U	-0.00257	pCi/L	0.341	(0-1)	JXD2	04/23/1308:55	
		Uncert:		+/-0.0104							

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## QC Summary

Workorder: 324095

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Alpha Spec</b>											
Batch	1296308										
Plutonium-239/240	TPU:	+/-0.0104		+/-0.00445							
	U	0.00759	U	0.0231	pCi/L	0.458		(0-1)			
	Uncert:	+/-0.00759		+/-0.00925							
	TPU:	+/-0.0076		+/-0.0093							
	2.44	1.75		1.62	pCi/L		66.3	(50%-105%)			
**Plutonium-242 Tracer											
QC1202862068 LCS Plutonium-238	TPU:	+/-0.0793		+/-0.0797							
	TPU:	+/-0.131		+/-0.132							
			U	0.00493	pCi/L			(80%-120%)	JXD2	04/29/1316:23	
	Uncert:			+/-0.00493							
	TPU:			+/-0.00493							
Plutonium-239/240	1.97			1.90	pCi/L		96.4	(80%-120%)			
	Uncert:			+/-0.0562							
	TPU:			+/-0.0952							
	1.95			1.59	pCi/L		81.6	(50%-105%)			
	Uncert:			+/-0.0571							
**Plutonium-242 Tracer											
QC1202862066 MB Plutonium-238	TPU:			+/-0.0974							
			U	-1.35E-09	pCi/L				JXD2	04/23/1308:55	
	Uncert:			+/-0.00642							
	TPU:			+/-0.00642							
			U	0.0162	pCi/L						
Plutonium-239/240	Uncert:			+/-0.00703							
	TPU:			+/-0.00706							
	1.95			1.56	pCi/L		80.1	(50%-105%)			
	Uncert:			+/-0.0634							
	TPU:			+/-0.105							
Batch 1296310											
QC1202862070 324205001 DUP Americium-241											
Americium-241	U	-0.00267	U	0.00256	pCi/L	0.224		(0-1)	JXD2	04/26/1316:00	
	Uncert:	+/-0.00596		+/-0.00573							
	TPU:	+/-0.00596		+/-0.00573							
	2.62	2.24		2.38	pCi/L		90.8	(50%-105%)			
	Uncert:	+/-0.0832		+/-0.0816							
**Americium-243 Tracer											
QC1202862071 LCS Americium-241	TPU:	+/-0.139		+/-0.137							
	1.41			1.45	pCi/L		103	(80%-120%)	JXD2	04/23/1308:55	
	Uncert:			+/-0.0513							
	TPU:			+/-0.0774							
	2.09			1.94	pCi/L		92.7	(50%-105%)			
**Americium-243 Tracer											
QC1202862069 MB Americium-241	Uncert:			+/-0.0594							
	TPU:			+/-0.103							
			U	-0.00324	pCi/L				JXD2	04/23/1308:55	
	Uncert:			+/-0.00607							
	TPU:			+/-0.00607							
Americium-241	2.09			1.84	pCi/L		87.8	(50%-105%)			
	Uncert:			+/-0.058							
	TPU:			+/-0.101							

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## QC Summary

Workorder: 324095

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Gamma Spec</b>											
Batch	1296138										
QC1202861666	324205001	DUP									
Cesium-137		UI	8.74	UI	5.79	pCi/L	0.354	(0-1)	MXR1	05/02/13	12:21
		Uncert:	+/-2.36		+/-1.75						
		TPU:	+/-2.40		+/-1.77						
Cobalt-60		U	-0.869	U	-2.77	pCi/L	0.301	(0-1)			
		Uncert:	+/-1.67		+/-1.34						
		TPU:	+/-1.68		+/-1.49						
Neptunium-237		U	-2.51	U	-2.83	pCi/L	0.0276	(0-1)			
		Uncert:	+/-2.77		+/-2.85						
		TPU:	+/-2.83		+/-2.93						
Potassium-40		U	27.3	U	-32.5	pCi/L	0.876	(0-1)			
		Uncert:	+/-17.0		+/-14.1						
		TPU:	+/-18.1		+/-16.0						
Sodium-22		U	2.94	U	-0.389	pCi/L	0.558	(0-1)			
		Uncert:	+/-1.43		+/-1.39						
		TPU:	+/-1.59		+/-1.39						
QC1202861667	LCS										
Americium-241		2780			2860	pCi/L		103	(80%-120%)	MXR1	05/02/13
		Uncert:			+/-183						
		TPU:			+/-257						
Cesium-137		6030			6090	pCi/L		101	(80%-120%)		
		Uncert:			+/-57.4						
		TPU:			+/-267						
Cobalt-60		5330			5300	pCi/L		99.3	(80%-120%)		
		Uncert:			+/-60.3						
		TPU:			+/-228						
Neptunium-237				U	44.7	pCi/L					
		Uncert:			+/-31.6						
		TPU:			+/-33.3						
Potassium-40				U	-13.5	pCi/L					
		Uncert:			+/-45.4						
		TPU:			+/-45.5						
Sodium-22				U	10.7	pCi/L					
		Uncert:			+/-7.22						
		TPU:			+/-7.64						
QC1202861665	MB										
Cesium-137				U	0.124	pCi/L			MXR1	05/02/13	10:08
		Uncert:			+/-1.55						
		TPU:			+/-1.55						
Cobalt-60				U	2.12	pCi/L					
		Uncert:			+/-1.46						
		TPU:			+/-1.54						
Neptunium-237				U	-1.31	pCi/L					
		Uncert:			+/-2.51						
		TPU:			+/-2.53						
Potassium-40				U	-12.3	pCi/L					
		Uncert:			+/-19.1						
		TPU:			+/-19.3						
Sodium-22				U	-0.971	pCi/L					

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## QC Summary

Workorder: 324095

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
<b>Rad Gamma Spec</b>											
Batch	1296138										
		Uncert:		+/-1.27							
		TPU:		+/-1.29							
<b>Rad Gas Flow</b>											
Batch	1296601										
QC1202862828	324205001	DUP									
Strontium-90		U	-0.204	U	-0.275	pCi/L	0.132	(0-1)	BXF1	05/07/13	11:56
		Uncert:	+/-0.134		+/-0.136						
		TPU:	+/-0.134		+/-0.136						
**Strontium Carrier		8.55	6.90		7.50	mg	87.7	(50%-105%)			
QC1202862830	LCS										
Strontium-90		24.3			25.6	pCi/L	105	(80%-120%)	BXF1	05/06/13	08:46
		Uncert:			+/-0.532						
		TPU:			+/-2.10						
**Strontium Carrier		8.55			7.60	mg	88.9	(50%-105%)			
QC1202862827	MB										
Strontium-90				U	0.157	pCi/L			BXF1	05/06/13	08:46
		Uncert:			+/-0.0664						
		TPU:			+/-0.0675						
**Strontium Carrier		8.55			7.50	mg	87.7	(50%-105%)			
QC1202862829	324205001	MS									
Strontium-90		243	U	-0.204	261	pCi/L	107	(75%-125%)	BXF1	05/06/13	08:46
		Uncert:		+/-0.134	+/-5.36						
		TPU:		+/-0.134	+/-21.5						
**Strontium Carrier		8.55			7.70	mg	90.1	(50%-105%)			
Batch	1296612										
QC1202862849	324095001	DUP									
Alpha		U	0.961	U	-0.277	pCi/L	0.533	(0-1)	DYT1	05/08/13	11:33
		Uncert:	+/-0.699		+/-0.457						
		TPU:	+/-0.703		+/-0.458						
Beta		U	0.790	U	1.91	pCi/L	0.313	(0-1)		05/07/13	14:38
		Uncert:	+/-0.882		+/-0.891						
		TPU:	+/-0.885		+/-0.908						
QC1202862852	LCS										
Alpha		12.3			12.6	pCi/L	102	(80%-120%)	DYT1	05/08/13	11:33
		Uncert:			+/-0.636						
		TPU:			+/-1.24						
Beta		48.6			53.3	pCi/L	110	(80%-120%)		05/07/13	13:33
		Uncert:			+/-0.943						
		TPU:			+/-4.54						
QC1202862848	MB										
Alpha				U	0.0364	pCi/L			DYT1	05/08/13	11:33
		Uncert:			+/-0.0807						
		TPU:			+/-0.0808						
Beta				U	-0.00605	pCi/L				05/07/13	14:37
		Uncert:			+/-0.113						
		TPU:			+/-0.113						
QC1202862850	324095001	MS									
Alpha		494	U	0.961	552	pCi/L	112	(75%-125%)	DYT1	05/08/13	11:33

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 324095

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	1296612										
Beta	1940	U	Uncert:	+/-0.699	+/-26.2	pCi/L	110	(75%-125%)		05/07/13	14:38
			TPU:	+/-0.703	+/-54.5						
			0.790	2150							
			Uncert:	+/-0.882	+/-38.0						
			TPU:	+/-0.885	+/-182						
QC1202862851 324095001 MSD											
Alpha	494	U	0.961	462	pCi/L	0.450	93.5	(0-1)	DYT1	05/08/13	11:33
Beta	1940	U	Uncert:	+/-0.699	+/-24.7	pCi/L	0.109	106	(0-1)	05/07/13	13:33
			TPU:	+/-0.703	+/-46.2						
			0.790	2070							
			Uncert:	+/-0.882	+/-37.5						
			TPU:	+/-0.885	+/-176						

### Notes:

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
E	%difference of sample and SD is >10%. Sample concentration must meet flagging criteria
FA	Failed analysis.
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	REMP Result > MDC/CL and < RDL
N	Metals--The Matrix spike sample recovery is not within specified control limits
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	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	Other specific qualifiers were required to properly define the results. Consult case narrative.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

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## QC Summary

Workorder: 324095

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Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
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.