COPY

Los Alamos
NATIONAL LABORATORY
EST 1943

Environmental Protection & Compliance Division
Environmental Compliance Programs (EPC-CP)
PO Box 1663, K490
Los Alamos, New Mexico 87545
(505) 667-0666

National Nuclear Security Administration
Los Alamos Field Office, A316
3747 West Jemez Road
Los Alamos, New Mexico, 87544
(505) 665-7314 Fax (505) 667-5948

Date: SEP 2 7 2016
Symbol: EPC-DO-16-267
LA-UR: 16-27068
Locates Action No.: U1601352

RECEIVED
SEP 2016

Mr. John E. Kieling
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505

Dear Mr. Kieling:

Subject: **Supplemental Information to the Notice of Violation (NOV) from the New Mexico Environment Department Hazardous Waste Bureau (NMED-HWB) regarding the Los Alamos National Laboratory (LANL) 2015 Annual Hazardous Waste Inspection**

This letter provides additional information to supplement the response by the U.S. Department of Energy (DOE) and Los Alamos National Security, LLC (LANS), collectively the Permittees, to the June 1, 2016 Notice of Violation (NOV) from the New Mexico Environment Department – Hazardous Waste Bureau (NMED-HWB) regarding the 2015 Annual Hazardous Waste Inspection at, Los Alamos National Laboratory (LANL).

Enclosed is analytical data responding to Finding #3, "*Failure to determine applicable hazardous waste code. This violation is associated with waste profile 41215, for hazardous waste containers stored at Site ID 5141. The waste profile indicates chromium but no code was included. Analytical results were not available for review to verify the waste would not be characteristic for chromium. This is a violation of 20.4.1.900 NMAC, incorporating 40 CFR § 268.9.*" The analytical data demonstrates that chromium is present but is below the regulatory limits.

Please contact Mark P. Haagenstad (LANS, LLC) at (505) 665-2014 or Karen Armijo (NNSA) at (505) 665-7314 if you have questions.

Sincerely,

Anthony R. Grieggs
Group Leader
Environmental Compliance Programs
Los Alamos National Security, LLC

Sincerely,

Karen E. Armijo
Permitting and Compliance Program Manager
National Nuclear Security Administration
Los Alamos Field Office
U.S. Department of Energy

ARG:KEA:MPH:GEM/lm

Enclosure:
1. Analytical data

Cy: Frank Rodarte, NMED/HWB, Santa Fe, NM (E-File)
Karen E. Armijo, NA-LA, (E-File)
Eric L. Trujillo, NA-LA, (E-File)
Kimberly Davis Lebak, NA-LA, (E-File)
Juan L. Griego, NA-LA, (E-File)
Peter Maggiore, NA-LA, (E-File)
Jody M. Pugh, NA-LA, (E-File)
Lisa K. Cummings, NA-LA (E-File)
Kirsten M. Laskey, EM-LA, (E-File)
Craig S. Leasure, PADOPS, (E-File)
William R. Mairson, PADOPS, (E-File)
Michael T. Brandt, ADESH, (E-File)
Raeanna Sharp-Geiger, ADESH, (E-File)
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John M. Tymkowych, EPC-CP, (E-File)
Geri E. Martinez, EPC-CP, (E-File)
Susan L. McMichael, LC-ESH, (E-File)
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ENCLOSURE 1

Analytical Data

EPC-DO-16-267

LA-UR-16-27068

Locates Action No.: U1601352

Date: SEP 2 7 2016

Field Sample ID	Location ID	Date Sampled	Parameter Name	Report Result	Report Units	Lab Qualifier	Detected	Sample Matrix	Sample Purpose	Sample Type	Validation Qualifier	Validation Reason Codes	Chain Of Custody No.
WST48-16-124425	WST-RCRA	07/25/2016	Silver	1120	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Silver	12700	ug/L		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Aluminum	151	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Arsenic	0.806	mg/kg	J	Y	SO	REG	S	J	J_LAB	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Barium	0.575	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Beryllium	0.0247	mg/kg	J	Y	SO	REG	S	J	J_LAB	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Calcium	189	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Cadmium	12.1	mg/kg	J	Y	SO	REG	S	J	J_LAB	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Cobalt	67000	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Chromium	46.8	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Chromium	470	ug/L		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Copper	0.689	mg/kg	J	Y	SO	REG	S	J	J_LAB	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Iron	1210	mg/kg	U	N	SO	REG	S	U	U_LAB	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Mercury	0.0117	mg/kg	U	N	SO	REG	S	U	U_LAB	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Potassium	59.3	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Magnesium	29.1	mg/kg	U	N	SO	REG	S	U	U_LAB	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Manganese	10.9	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Sodium	1270	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Nickel	13.3	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Lead	97.1	mg/kg	U	N	SO	REG	S	U	U_LAB	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Antimony	556	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Selenium	0.994	mg/kg	U	N	SO	REG	S	U	U_LAB	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Thallium	0.398	mg/kg	U	N	SO	REG	S	U	U_LAB	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Vanadium	15.1	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776
WST48-16-124425	WST-RCRA	07/25/2016	Zinc	2.63	mg/kg		Y	SO	REG	S	NQ	NQ	2016-1776

DATA VALIDATION REPORT

Chain Of Custody No. 2016-1776

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
402359	SW-846:6010C	1				
402359	SW-846:6020	1				
402359	SW-846:7471A	1				

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
402359	SW-846:6010C	1584909	1584908	1					1	1				1				1			
402359	SW-846:6020	1584912	1584911	1					1	1				1				1			
402359	SW-846:7471A	1585179	1585170	1					1	1				1				1			

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
SW-846:6010C	INORGANIC	LCS	1203592748	LCS	0	0	17	0
SW-846:6010C	INORGANIC	MB	1203592747	MB	17	0	0	0
SW-846:6010C	INORGANIC	WST48-16-124425	402359001	REG	17	0	0	0
SW-846:6010C	INORGANIC	WST53-16-124424	1203592749	DUP	17	0	0	0
SW-846:6010C	INORGANIC	WST53-16-124424	1203592750	MS	0	0	17	0
SW-846:6020	INORGANIC	LCS	1203592753	LCS	0	0	5	0
SW-846:6020	INORGANIC	MB	1203592752	MB	5	0	0	0
SW-846:6020	INORGANIC	WST48-16-124425	402359001	REG	5	0	0	0
SW-846:6020	INORGANIC	WST53-16-124424	1203592754	DUP	5	0	0	0
SW-846:6020	INORGANIC	WST53-16-124424	1203592755	MS	0	0	5	0
SW-846:7471A	INORGANIC	LCS	1203593302	LCS	0	0	1	0
SW-846:7471A	INORGANIC	MB	1203593301	MB	1	0	0	0
SW-846:7471A	INORGANIC	WST48-16-124425	1203593303	DUP	1	0	0	0
SW-846:7471A	INORGANIC	WST48-16-124425	1203593304	MS	0	0	1	0
SW-846:7471A	INORGANIC	WST48-16-124425	402359001	REG	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name	Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
MB	1203592747	METHOD BLANK	SW-846:6010C	SO	Zinc	536	J	ug/kg	969

No.

6. Any surrogate recoveries outside the control limits?

No.

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

Field Sample ID	MS Lab Sample ID	MSD Lab Sample ID	Analytical Method	Parameter Name	Analysis Lot ID	Analysis Date	Sample Matrix	MS Spike Recovery	MSD Spike Recovery	MS Upper Limit	MS Lower Limit	MS Relect Limit	RPD	RPD Limit
WST53-16-124424	1203592750		SW-846:6010C	Aluminum	1584908	07-28-2016	SO	17.6		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Antimony	1584908	07-28-2016	SO	6.06		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Barium	1584908	07-28-2016	SO	15.2		125	75			

DATA VALIDATION REPORT

Field Sample ID	MS Lab Sample ID	MSD Lab Sample ID	Analytical Method	Parameter Name	Analysis Lot ID	Analysis Date	Sample Matrix	MS Spike Recovery	MSD Spike Recovery	MS Upper Limit	MS Lower Limit	MS Reject Limit	RPD	RPD Limit
WST53-16-124424	1203592750		SW-846:6010C	Cadmium	1584908	07-28-2016	SO	21.7		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Calcium	1584908	07-28-2016	SO	8.21		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Chromium	1584908	07-28-2016	SO	-1.11		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Cobalt	1584908	07-28-2016	SO	15.9		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Copper	1584908	07-28-2016	SO	14.3		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Iron	1584908	07-28-2016	SO	-11.8		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Lead	1584908	07-28-2016	SO	20.1		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Magnesium	1584908	07-28-2016	SO	15.6		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Manganese	1584908	07-28-2016	SO	12.8		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Potassium	1584908	07-28-2016	SO	16.8		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Silver	1584908	07-28-2016	SO	18.7		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Sodium	1584908	07-28-2016	SO	-4.01		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Vanadium	1584908	07-28-2016	SO	15.4		125	75			
WST53-16-124424	1203592750		SW-846:6010C	Zinc	1584908	07-28-2016	SO	13.1		125	75			
WST53-16-124424	1203592755		SW-846:6020	Arsenic	1584911	07-27-2016	SO	53.3		125	75	10		
WST53-16-124424	1203592755		SW-846:6020	Beryllium	1584911	07-27-2016	SO	57.7		125	75	10		
WST53-16-124424	1203592755		SW-846:6020	Nickel	1584911	07-27-2016	SO	47.7		125	75	10		
WST53-16-124424	1203592755		SW-846:6020	Selenium	1584911	07-27-2016	SO	55.5		125	75	10		
WST53-16-124424	1203592755		SW-846:6020	Thallium	1584911	07-27-2016	SO	56.6		125	75	10		

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

No.

9. Any Field Duplicate RPDs outside the desired limits?

No.

DATA VALIDATION REPORT

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

None.

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 qualifiy the analyte as not detected and/or any other standard qualifire. The analyte is detected in the sample.
U_LAB	The analytical laboratory qualified the analyte as not detected.

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
WST48-16-124425	WST-RCRA	REG	SW-846:6010C	0	17
WST48-16-124425	WST-RCRA	REG	SW-846:6020	0	5
WST48-16-124425	WST-RCRA	REG	SW-846:7471A	0	1

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston SC 29417
2040 Savage Road Charleston SC 29407
P 843 556 8171
F 843 766 1178

gel.com

September 01, 2016

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

Re: LANL ER
Work Order: 404833
SDG: 2016-1776-1

Dear Mr. Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on July 26, 2016, and analyzed for Metals. 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,

Linda Pullano for
Valerie Davis
Project Manager

Chain of Custody: 2016-1776
Enclosures

ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL ER
Work Order #: 404833
SDG: 2016-1776-1

Table of Contents

Case Narrative

Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL ER
Workorder #: 404833
SDG # : 2016-1776-1

September 01, 2016

Laboratory Identification:

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

Summary

Sample receipt The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on July 26, 2016 for analysis. The sample was delivered with proper chain of custody documentation and signatures. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. Containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Shipping container temperature was within specification (0 - 6C). Shipping container temperature was checked, documented, and within specifications. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following sample:

Laboratory ID	Client ID
404833001	WST48-16-124425

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.

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.

Linda Pullano for
Valerie Davis
Project Manager

List of current GEL Certifications as of 01 September 2016

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA160006
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-16-11
Utah NELAP	SC000122016-20
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Chain of Custody and Supporting Documentation

402359

General Engineering
Charleston SC

Chain of Custody/Analysis Request

COC/Lab Request #: 2016-1776
Page 1 of 1

Client Contact:

Lab Agreement #:

Site Name: Los Alamos National Laboratory

Project Number: ADESH

Analysis Turnaround Time:
24 Hour - ☐ Other - ☒
7 Days - ☐
14 Days - ☐ 5 Day
21 Days - ☐
28 Days - ☐

Rad Screening Info:

Lab Reporting Limit Type: Sample Quantitation Limit

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Tal Metals
WST48-16-124425	Jul 25 2016	10:30	SO	1

Special Instructions:

Relinquished by:	Print Name: Antonio Montoya	Date/Time: 7/25/16 3:00	Received by: P. Vent	Print Name: Patricia Vent	Date/Time: 7.26.16 0850
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: LANL			SDG/AR/COC/Work Order: 2016-1776
Received By: P. Clement			Date Received: 7.26.16
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): 0 cpm
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?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)*	✓			Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 3.23
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): 201404337
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		✓		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples have headspace as required?		✓		Sample ID's and containers affected:
7	VOA vials contain acid preservation?		✓		(If unknown, select No)
8	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
9	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
10	Samples received within holding time?	✓			ID's and tests affected:
11	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
12	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
13	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
14	Are sample containers identifiable as GEL provided?			✓	
15	COC form is properly signed in relinquished/received sections?	✓			
16	Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 5908 1780 8149 5908 1780 8150 } 3,23

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials VSD Date 7/26/16 Page 1 of 1

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

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 25JUL16
ACTWGT: 43.0 LB MAN
CAD: 0014176/CAFE2916

BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407
(843) 556-8171
REF: 6A000ASRCH08BFBPA0

3c

53BC1/5CBA/329B

FedEx Express

J1G1316081301av

TRK# 0201 5908 1780 8149

TUE - 26 JUL 10:30A
PRIORITY OVERNIGHT

X7 CHSA

29407
SC-US CHS

Part # 156148V-434 RIT2 06/15

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

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 25JUL16
ACTWGT: 2.0 LB MAN
CAD: 0014176/CAFE2916

BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407
(843) 556-8171
REF: WE6L11551000

23

Fed
Exp

TRK# 0201 5908 1780 8150

TUE - 26 JUL 10:3
PRIORITY OVERNIG

X7 CHSA

294(
SC-US CH

Part # 156148V-434 RIT2 06/15

Data Review Qualifier Flag Definition Sheet

Data Review Qualifier Definitions

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

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

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

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2016-1776-1
Work Order #: 404833

Sample ID	Client ID
404833001	WST48-16-124425
1203617195	TCLP Blank (TB)
1203617952	Method Blank (MB)**ICP-MS**
1203617953	Laboratory Control Sample (LCS)
1203617956	404833001(WST48-16-124425L) Serial Dilution (SD)
1203617954	404833001(WST48-16-124425D) Sample Duplicate (DUP)
1203617194	404833001(WST48-16-124425S) Matrix Spike (MS)

Sample Analysis

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

Method/Analysis Information

Analytical Batch:	1594888
Prep Batch :	1594887
TCLP Prep Batch :	1594589
Standard Operating Procedures:	GL-MA-E-014 REV# 28, GL-MA-E-008 REV# 18 and GL-LB-E-006 REV# 20
Analytical Method:	SW846 3010A/6020A
Prep Method :	SW846 3010A
TCLP Prep Method :	SW846 1311

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

Calibration Information

Instrument Calibration

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

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

ICSA/ICSAB Statement
All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

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

Continuing Calibration Verification (CCV) Requirements
All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement
The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement
The following sample was selected as the quality control (QC) sample for this SDG: 404833001 (WST48-16-124425).

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

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

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

Technical Information

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

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
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 404833001 (WST48-16-124425) was diluted to ensure that the analyte concentration was within the linear calibration range of the instrument.

Analyte	404833
	001
Silver	10X

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

Miscellaneous Information

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation
A data exception report was not required for this SDG.

Additional Comments
Additional comments were not required for this SDG.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report
for

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

Client SDG: 2016-1776-1 GEL Work Order: 404833

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

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

Review/Validation

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

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

Signature: 

Name: Jamie Johnson

Date: 02 SEP 2016

Title: Group Leader

Sample Data Summary

METALS
–1–
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2016–1776–1 **CONTRACT:** LANL00114 **METHOD TYPE:** SW846

SAMPLE ID: 404833001 **BASIS:** As Received **DATE COLLECTED** 25–JUL–16

CLIENT ID: WST48–16–124425 **LEVEL:** Low **DATE RECEIVED** 26–JUL–16

MATRIX: SO **%SOLIDS:** 0

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7440–47–3	Chromium	470	ug/L		20	100	100	1	MS	PRB	08/31/16 16:28	160831–1	1594888
7440–22–4	Silver	12700	ug/L		20	100	100	10	MS	PRB	08/31/16 17:49	160831–1	1594888

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1594888	1594887	SW846 3010A	5	mL	50	mL	08/31/16	SXW1

***Analytical Methods:**

MS **SW846 3010A/6020A**

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 2016-1776-1
Contract: LANL00114
Matrix: TCLP

Sample ID	Analyte	Result	Units	Acceptance Window	Conc Qual	M*	MDL	RDL
1203617195								
	Chromium	20	ug/L	+/-100	U	MS	20	100
	Silver	2	ug/L	+/-10	U	MS	2	10
1203617952								
	Chromium	20	ug/L	+/-100	U	MS	20	100
	Silver	2	ug/L	+/-10	U	MS	2	10

***Analytical Methods:**

MS **SW846 3010A/6020A**

METALS
-5a-

Matrix Spike Summary

SDG NO. 2016-1776-1 **Client ID** WST48-16-124425S

Contract: LANL00114 **Level:** Low

Matrix: TCLP **% Solids:**

Sample ID: 404833001 **Spike ID:** 1203617194

Analyte	Units	Acceptance Limit	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M*
Chromium	ug/L	75-125	5650		470		5000	104		MS
Silver	ug/L		13200		12700		503	101	N/A	MS

***Analytical Methods:**

MS **SW846 3010A/6020A**

Metals
–6–
Duplicate Sample Summary

SDG No.: 2016–1776–1 **Lab Code:** GEL

Contract: LANL00114 **Client ID:** WST48–16–124425D

Matrix: TCLP **Level:** Low

Sample ID: 404833001 **Duplicate ID:** 1203617954 **Percent Solids for Dup:** N/A

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Chromium	ug/L	+/–100	470		487		3.58		MS
Silver	ug/L	+/–20%	12700		12500		1.24		MS

***Analytical Methods:**
MS SW846 3010A/6020A

METALS
-7-
Laboratory Control Sample Summary

SDG NO. 2016-1776-1

Contract: LANL00114

Aqueous LCS Source: O2Si **Solid LCS Source:**

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Acceptance Limit	M*
1203617953								
	Chromium	ug/L	500	520		104	80-120	MS
	Silver	ug/L	500	496		99.1	80-120	MS

***Analytical Methods:**

MS **SW846 3010A/6020A**

METALS
-9-
Serial Dilution Sample Summary

SDG NO. 2016-1776-1 **Client ID** WST48-16-124425L

Contract: LANL00114

Matrix: TCLP **Level:** Low

Sample ID: 404833001 **Serial Dilution ID:** 1203617956

Analyte	Initial Value ug/L	C	Serial Value ug/L	C	% Difference	Qual	Acceptance Limit	M*
Chromium	47		50.1		6.635			MS
Silver	127		125		1.105		10	MS

***Analytical Methods:**

MS **SW846 3010A/6020A**

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston SC 29417
2040 Savage Road Charleston SC 29407
P 843.556.8171
F 843.766.1178

gel.com

July 28, 2016

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

Re: LANL ER
Work Order: 402359
SDG: 2016-1776

Dear Mr. Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on July 26, 2016, and analyzed for Metals. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Margo Herron for
Valerie Davis
Project Manager

Chain of Custody: 2016-1776
Enclosures

ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL ER
Work Order #: 402359
SDG: 2016-1776

Table of Contents

Case Narrative

Case Narrative for
ARS International, LLC (ARS-LANS-MTOA6-25093-GEL)
LANL ER
Workorder #: 402359
SDG # : 2016-1776

July 28, 2016

Laboratory Identification:

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

Summary

Sample receipt The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on July 26, 2016 for analysis. The sample was delivered with proper chain of custody documentation and signatures. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. Containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Shipping container temperature was within specification (0 - 6C). Shipping container temperature was checked, documented, and within specifications. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following sample:

Laboratory ID	Client ID
402359001	WST48-16-124425

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.

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

Margo Herron for
Valerie Davis
Project Manager

List of current GEL Certifications as of 28 July 2016

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA160006
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-16-11
Utah NELAP	SC000122016-20
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Chain of Custody and Supporting Documentation

402359

General Engineering
Charleston SC

Chain of Custody/Analysis Request

COC/Lab Request #: 2016-1776
Page 1 of 1

Client Contact:

Lab Agreement #:

Project Number: ADESH

Analysis Turnaround Time:
24 Hour - ☐ Other - ☒
7 Days - ☐
14 Days - ☐ 5 Day
21 Days - ☐
28 Days - ☐

Site Name: Los Alamos National Laboratory

Rad Screening Info:

Lab Reporting Limit Type: Sample Quantitation Limit

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Tal Metals																				
WST48-16-124425	Jul 25 2016	10:30	SO	1																				

Special Instructions:

Relinquished by:	Print Name: Melissa Montoya	Date/Time: 7/26/16 1130	Received by: P. Ment	Print Name: Patricia Dent	Date/Time: 7.26.16 0850
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:

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

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 25JUL16
ACTWGT: 43.0 LB MAN
CAD: 0014176/CAFE2916

BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407
(843) 556-8171
REF: 6A000ASRCH08BFBPA0

3c

FedEx Express

TRK# 0201 5908 1780 8149

TUE - 26 JUL 10:30A
PRIORITY OVERNIGHT

X7 CHSA

29407
SC-US CHS

Part # 156148V-434 RIT2 06/15

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

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 25JUL16
ACTWGT: 2.0 LB MAN
CAD: 0014176/CAFE2916

BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407
(843) 556-8171
REF: WE6L11551000

23

Fed Exp

TRK# 0201 5908 1780 8150

TUE - 26 JUL 10:3
PRIORITY OVERNIG

X7 CHSA

294(
SC-US CH

Part # 156148V-434 RIT2 06/15

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: LANL	SDG/AR/COC/Work Order: 2016-1776
Received By: P. Nieto	Date Received: 7.26.16

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): 0 cpm
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?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	✓			Preservation Method: Ice bags Blue Ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 3.23
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): 201404337
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		✓		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples have headspace as required?		✓		Sample ID's and containers affected:
7	VOA vials contain acid preservation?		✓		(If unknown, select No)
8	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
9	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
10	Samples received within holding time?	✓			ID's and tests affected:
11	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
12	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
13	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
14	Are sample containers identifiable as GEL provided?			✓	
15	COC form is properly signed in relinquished/received sections?	✓			
16	Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 5908 1780 8149 5908 1780 8150 } 3,23

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials VSD Date 7/26/16 Page 1 of 1

Data Review Qualifier Flag Definition Sheet

Data Review Qualifier Definitions

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

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

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

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
ARS International, LLC (ARSL)
SDG #: 2016-1776
Work Order #: 402359

Sample ID	Client ID
402359001	WST48-16-124425
1203592747	Method Blank (MB)**ICP**
1203592748	Laboratory Control Sample (LCS)
1203592751	402358002(WST53-16-124424L) Serial Dilution (SD)
1203592749	402358002(WST53-16-124424D) Sample Duplicate (DUP)
1203592750	402358002(WST53-16-124424S) Matrix Spike (MS)
1203594016	402358002(WST53-16-124424PS) Post Spike (PS)
1203592752	Method Blank (MB)**ICP-MS**
1203592753	Laboratory Control Sample (LCS)
1203592756	402358002(WST53-16-124424L) Serial Dilution (SD)
1203592754	402358002(WST53-16-124424D) Sample Duplicate (DUP)
1203592755	402358002(WST53-16-124424S) Matrix Spike (MS)
1203593974	402358002(WST53-16-124424PS) Post Spike (PS)
1203593301	Method Blank (MB)**CVAA**
1203593302	Laboratory Control Sample (LCS)
1203593305	402359001(WST48-16-124425L) Serial Dilution (SD)
1203593303	402359001(WST48-16-124425D) Sample Duplicate (DUP)
1203593304	402359001(WST48-16-124425S) Matrix Spike (MS)

Sample Analysis

The samples in this SDG were analyzed on a "dry weight" basis.

Method/Analysis Information

Analytical Batch:	1584909, 1584912 and 1585179
Prep Batch :	1584908, 1584911 and 1585170
Standard Operating Procedures:	GL-MA-E-013 REV# 26, GL-MA-E-009 REV# 26, GL-MA-E-014 REV# 28 and GL-MA-E-010 REV# 31
Analytical Method:	SW846 3050B/6010C, SW846 3050B/6020A and SW-846:7471A
Prep Method :	SW846 3050B and SW846 7471A 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 Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma

atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard.

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

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

Calibration Information

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

CRDL/PQL Requirements
The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 402359001 (WST48-16-124425)-ICP.

ICSA/ICSAB Statement
All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

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

Continuing Calibration Verification (CCV) Requirements
All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement
The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement
The following samples were selected as the quality control (QC) samples for this SDG: 402358002 (WST53-16-124424)-ICP and ICP-MS and 402359001 (WST48-16-124425)-CVAA.

Matrix Spike (MS/MSD) Recovery Statement
The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits for some of the analyte. This verifies the absence of a matrix interference in the post-digested sample. For other analyte the post spike failed verifying the presence of a matrix interference in the post-digested sample. The failing spike recovery may be attributed to possible matrix interference and/or sample non-homogeneity.

Sample	Analyte	Value
1203592750 (WST53-16-124424MS)	Several	See applicable report

The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

Sample	Analyte	Value
1203592755 (WST53-16-124424MS)	Arsenic	53.3* (75%-125%)
	Beryllium	57.7* (75%-125%)
	Nickel	47.7* (75%-125%)
	Selenium	55.5* (75%-125%)
	Thallium	56.6* (75%-125%)

Duplicate Relative Percent Difference (RPD) Statement

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203592749 (WST53-16-124424DUP)	Calcium	35.1* (0%-20%)
	Chromium	63.1* (0%-20%)
	Cobalt	670* (+/-492 ug/kg)
	Copper	29.9* (0%-20%)
	Iron	24.4* (0%-20%)
	Lead	1160* (+/-984 ug/kg)
	Manganese	29.5* (0%-20%)
1203592754 (WST53-16-124424DUP)	Nickel	460* (+/-382 ug/kg)

Post Spike (PS) Recovery Statement

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

Sample	Analyte	Value
1203594016 (WST53-16-124424PS)	Barium	19* (80%-120%)
	Lead	70.9* (80%-120%)

Serial Dilution % Difference Statement

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

Sample	Analyte	Value
1203592751 (WST53-16-124424SDILT)	Chromium	10.3 *(0%-10%)
	Sodium	19.9 *(0%-10%)

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

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 required dilution for iron in order to minimize suppression due to matrix interferences. Sample was diluted for cobalt in order to bring raw values within the linear range of the instrument, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for cadmium and lead. Sample was diluted for silver to ensure that the analyte concentration was within the linear calibration range of the instrument. 402359001 (WST48-16-124425)-ICP. The ICPMS solid samples in this SDG were diluted the standard two times. ICP-MS.

Analyte	402359 001
Arsenic	2X
Beryllium	2X
Cadmium	100X
Cobalt	100X
Iron	50X
Lead	100X
Nickel	2X
Selenium	2X
Silver	50X
Thallium	2X

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

Miscellaneous Information

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation
A Data exception report (DER) was generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) 1542483 was generated for samples 1203592749 (WST53-16-124424DUP), 1203592750 (WST53-16-124424MS), 1203592751 (WST53-16-124424SDILT) and 1203594016 (WST53-16-124424PS) in this SDG/batch. A data exception report (DER) 1541994 was generated for samples 1203592754 (WST53-16-124424DUP) and 1203592755 (WST53-16-124424MS) in this SDG/batch.

Additional Comments
Additional comments were not required for this SDG.

Certification Statement

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

GEL LABORATORIES LLC

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Qualifier Definition Report
for

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

Client SDG: 2016-1776 GEL Work Order: 402359

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: Nik-Cole A. Elmore **Name: Nik-Cole Elmore**

Date: 29 JUL 2016 **Title: Data Validator**

Sample Data Summary

METALS
–1–
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 2016–1776 **CONTRACT:** LANL00114 **METHOD TYPE:** SW846

SAMPLE ID: 402359001 **BASIS:** Dry Weight **DATE COLLECTED** 25–JUL–16

CLIENT ID: WST48–16–124425 **LEVEL:** Low **DATE RECEIVED** 26–JUL–16

MATRIX: SO **%SOLIDS:** 99.985

CAS No.	Analyte	Result	Units	Qual	MDL	PQL	CRDL	DF	M*	Analyst	Run Date	Analytical Run	Analytical Batch
7429–90–5	Aluminum	151000	ug/kg		6600	19400	19400	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7440–36–0	Antimony	556000	ug/kg		320	971	971	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7440–38–2	Arsenic	806	ug/kg	J	199	994	994	2	MS	BAJ	07/27/16 21:27	160727–2	1584912
7440–39–3	Barium	575	ug/kg		97.1	486	486	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7440–41–7	Beryllium	24.7	ug/kg	J	19.9	99.4	99.4	2	MS	BAJ	07/27/16 21:27	160727–2	1584912
7440–43–9	Cadmium	12100	ug/kg	J	9710	48600	48600	100	P	HSC	07/28/16 08:22	072816A–1	1584909
7440–70–2	Calcium	189000	ug/kg		7770	24300	24300	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7440–47–3	Chromium	46800	ug/kg		146	486	486	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7440–48–4	Cobalt	67000000	ug/kg		14600	48600	48600	100	P	HSC	07/28/16 08:22	072816A–1	1584909
7440–50–8	Copper	689	ug/kg	J	291	971	971	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7439–89–6	Iron	1210000	ug/kg	U	388000	1210000	1210000	50	P	HSC	07/28/16 07:54	072816A–1	1584909
7439–92–1	Lead	97100	ug/kg	U	32000	97100	97100	100	P	HSC	07/28/16 08:22	072816A–1	1584909
7439–95–4	Magnesium	29100	ug/kg	U	8250	29100	29100	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7439–96–5	Manganese	10900	ug/kg		194	971	971	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7439–97–6	Mercury	11.7	ug/kg	U	3.9	11.7	11.7	1	AV	MTM1	07/28/16 10:15	072816S1–3	1585179
7440–02–0	Nickel	13300	ug/kg		99.4	398	398	2	MS	BAJ	07/27/16 21:27	160727–2	1584912
7440–09–7	Potassium	59300	ug/kg		6210	24300	24300	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7782–49–2	Selenium	994	ug/kg	U	328	994	994	2	MS	BAJ	07/27/16 21:27	160727–2	1584912
7440–22–4	Silver	1120000	ug/kg		4860	24300	24300	50	P	HSC	07/28/16 07:54	072816A–1	1584909
7440–23–5	Sodium	1270000	ug/kg		6800	24300	24300	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7440–28–0	Thallium	398	ug/kg	U	59.7	398	398	2	MS	BAJ	07/27/16 21:27	160727–2	1584912
7440–62–2	Vanadium	15100	ug/kg		97.1	486	486	1	P	HSC	07/28/16 07:48	072816A–1	1584909
7440–66–6	Zinc	2630	ug/kg		388	971	971	1	P	HSC	07/28/16 07:48	072816A–1	1584909

Prep Information:

Analytical Batch	Prep Batch	Prep Method	Initial wt./vol.	Units	Final wt./vol.	Units	Date	Analyst
1584909	1584908	SW846 3050B	0.515	g	50	mL	07/27/16	SXW1
1584912	1584911	SW846 3050B	0.503	g	50	mL	07/27/16	SXW1
1585179	1585170	SW846 7471A Prep	0.515	g	30	mL	07/27/16	AXS5

***Analytical Methods:**

P	**SW846 3050B/6010C**
MS	**SW846 3050B/6020A**
AV	**SW846 7471A**

Quality Control Summary

METALS
–3b–
PREPARATION BLANK SUMMARY

SDG NO. 2016–1776
Contract: LANL00114
Matrix: SO

Sample ID	Analyte	Result	Units	Acceptance Window	Conc Qual	M*	MDL	RDL
1203592747								
	Aluminum	6590	ug/kg	+/–19400	U	P	6590	19400
	Antimony	320	ug/kg	+/–969	U	P	320	969
	Barium	96.9	ug/kg	+/–484	U	P	96.9	484
	Cadmium	96.9	ug/kg	+/–484	U	P	96.9	484
	Calcium	7750	ug/kg	+/–24200	U	P	7750	24200
	Chromium	145	ug/kg	+/–484	U	P	145	484
	Cobalt	145	ug/kg	+/–484	U	P	145	484
	Copper	291	ug/kg	+/–969	U	P	291	969
	Iron	7750	ug/kg	+/–24200	U	P	7750	24200
	Lead	320	ug/kg	+/–969	U	P	320	969
	Magnesium	8240	ug/kg	+/–29100	U	P	8240	29100
	Manganese	194	ug/kg	+/–969	U	P	194	969
	Potassium	6200	ug/kg	+/–24200	U	P	6200	24200
	Silver	96.9	ug/kg	+/–484	U	P	96.9	484
	Sodium	6780	ug/kg	+/–24200	U	P	6780	24200
	Vanadium	96.9	ug/kg	+/–484	U	P	96.9	484
	Zinc	536	ug/kg	+/–969	J	P	388	969
1203592752								
	Arsenic	189	ug/kg	+/–947	U	MS	189	947
	Beryllium	18.9	ug/kg	+/–94.7	U	MS	18.9	94.7
	Nickel	94.7	ug/kg	+/–379	U	MS	94.7	379
	Selenium	313	ug/kg	+/–947	U	MS	313	947
	Thallium	56.8	ug/kg	+/–379	U	MS	56.8	379
1203593301								
	Mercury	3.76	ug/kg	+/–11.2	U	AV	3.76	11.2

***Analytical Methods:**

P	**SW846 3050B/6010C**
MS	**SW846 3050B/6020A**
AV	**SW846 7471A**

METALS
-5a-

Matrix Spike Summary

SDG NO. 2016-1776 **Client ID** WST53-16-124424S

Contract: LANL00114 **Level:** Low

Matrix: SOIL **% Solids:** 99.48

Sample ID: 402358002 **Spike ID:** 1203592750

Analyte	Units	Acceptance Limit	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M*
Aluminum	ug/kg	75-125	127000		45500		461000	17.6	N	P
Antimony	ug/kg	75-125	3180		386	J	46100	6.06	N	P
Barium	ug/kg	75-125	8600		1570		46100	15.2	N	P
Cadmium	ug/kg	75-125	10300		242	J	46100	21.7	N	P
Calcium	ug/kg	75-125	224000		186000		461000	8.21	N	P
Chromium	ug/kg	75-125	10600		11100		46100	-1.11	N	P
Cobalt	ug/kg	75-125	9040		1690		46100	15.9	N	P
Copper	ug/kg	75-125	15400		8820		46100	14.3	N	P
Iron	ug/kg	75-125	399000		453000		461000	-11.8	N	P
Lead	ug/kg	75-125	12800		3570		46100	20.1	N	P
Magnesium	ug/kg	75-125	98300		26300	J	461000	15.6	N	P
Manganese	ug/kg	75-125	17100		11200		46100	12.8	N	P
Potassium	ug/kg	75-125	115000		37600		461000	16.8	N	P
Silver	ug/kg	75-125	8890		255	J	46100	18.7	N	P
Sodium	ug/kg	75-125	498000		517000		461000	-4.01	N	P
Vanadium	ug/kg	75-125	7320		216	J	46100	15.4	N	P
Zinc	ug/kg	75-125	18800		12800		46100	13.1	N	P

***Analytical Methods:**

P **SW846 3050B/6010C**

METALS
-5a-

Matrix Spike Summary

SDG NO.	2016-1776	**Client ID**	WST53-16-124424S
Contract:	LANL00114	**Level:**	Low
Matrix:	SOIL	**% Solids:**	99.48
Sample ID:	402358002	**Spike ID:**	1203592755

Analyte	Units	Acceptance Limit	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M*
Arsenic	ug/kg	75-125	2970		479	J	4670	53.3	N	MS
Beryllium	ug/kg	75-125	2730		36.7	J	4670	57.7	N	MS
Nickel	ug/kg	75-125	3910		1680		4670	47.7	N	MS
Selenium	ug/kg	75-125	2700		314	U	4670	55.5	N	MS
Thallium	ug/kg	75-125	2700		57.1	U	4670	56.6	N	MS

***Analytical Methods:**

MS **SW846 3050B/6020A**

METALS
-5a-

Matrix Spike Summary

SDG NO.	2016-1776	**Client ID**	WST48-16-124425S
Contract:	LANL00114	**Level:**	Low
Matrix:	SOIL	**% Solids:**	99.985
Sample ID:	402359001	**Spike ID:**	1203593304

Analyte	Units	Acceptance Limit	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M*
Mercury	ug/kg	80-120	121		3.9	U	119	102		AV

***Analytical Methods:**

AV **SW846 7471A**

METALS
-5a-

Spike Summary

SDG NO. 2016-1776 **Client ID** WST53-16-124424PS

Contract: LANL00114 **Level:** Low

Matrix: SOIL **% Solids:** 99.48

Sample ID: 402358002 **Spike ID:** 1203593974

Analyte	Units	Acceptance Limit	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M*
Arsenic	ug/L	80-120	25.4		2.52	J	25	91.4		MS
Beryllium	ug/L	80-120	22.9		0.193	J	25	90.9		MS
Nickel	ug/L	80-120	33.1		8.81		25	97.2		MS
Selenium	ug/L	80-120	24.9		314	U	25	97.4		MS
Thallium	ug/L	80-120	24.9		57.1	U	25	98.3		MS

***Analytical Methods:**

MS **SW846 3050B/6020A**

METALS
–5a–

Spike Summary

SDG NO. 2016–1776 **Client ID** WST53–16–124424PS

Contract: LANL00114 **Level:** Low

Matrix: SOIL **% Solids:** 99.48

Sample ID: 402358002 **Spike ID:** 1203594016

Analyte	Units	Acceptance Limit	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M*
Aluminum	ug/L	80–120	5320		465		5000	97.1		P
Antimony	ug/L	80–120	480		3.94	J	500	95.3		P
Barium	ug/L	80–120	111		16		500	19	N	P
Cadmium	ug/L	80–120	492		2.47	J	500	97.9		P
Calcium	ug/L	80–120	6810		1900		5000	98.4		P
Chromium	ug/L	80–120	597		113		500	96.8		P
Cobalt	ug/L	80–120	503		17.3		500	97.1		P
Copper	ug/L	80–120	593		90		500	101		P
Iron	ug/L	80–120	9360		4620		5000	94.7		P
Lead	ug/L	80–120	391		36.4		500	70.9	N	P
Magnesium	ug/L	80–120	5230		268	J	5000	99.3		P
Manganese	ug/L	80–120	592		114		500	95.7		P
Potassium	ug/L	80–120	5270		383		5000	97.8		P
Silver	ug/L	80–120	418		2.6	J	500	83		P
Sodium	ug/L	80–120	9850		5270		5000	91.5		P
Vanadium	ug/L	80–120	493		2.2	J	500	98.1		P
Zinc	ug/L	80–120	615		130		500	97		P

***Analytical Methods:**

P **SW846 3050B/6010C**

Metals
–6–
Duplicate Sample Summary

SDG No.: 2016–1776 **Lab Code:** GEL

Contract: LANL00114 **Client ID:** WST53–16–124424D

Matrix: SOIL **Level:** Low

Sample ID: 402358002 **Duplicate ID:** 1203592749 **Percent Solids for Dup:** 99.48

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Aluminum	ug/kg	+/–19700	45500		59300		26.4		P
Antimony	ug/kg	+/–984	386	J	496	J	25		P
Barium	ug/kg	+/–492	1570		1820		14.5		P
Cadmium	ug/kg	+/–492	242	J	288	J	17.3		P
Calcium	ug/kg	+/–20%	186000		265000		35.1	*	P
Chromium	ug/kg	+/–20%	11100		5760		63.1	*	P
Cobalt	ug/kg	+/–492	1690		2360		33	*	P
Copper	ug/kg	+/–20%	8820		11900		29.9	*	P
Iron	ug/kg	+/–20%	453000		579000		24.4	*	P
Lead	ug/kg	+/–984	3570		4730		28.1	*	P
Magnesium	ug/kg	+/–29500	26300	J	33600		24.4		P
Manganese	ug/kg	+/–20%	11200		15000		29.5	*	P
Potassium	ug/kg	+/–24600	37600		39900		5.93		P
Silver	ug/kg	+/–492	255	J	162	J	44.3		P
Sodium	ug/kg	+/–20%	517000		511000		1.18		P
Vanadium	ug/kg	+/–492	216	J	239	J	10.3		P
Zinc	ug/kg	+/–20%	12800		10800		16.2		P

***Analytical Methods:**
P SW846 3050B/6010C

Metals
-6-
Duplicate Sample Summary

SDG No.: 2016-1776 **Lab Code:** GEL

Contract: LANL00114 **Client ID:** WST53-16-124424D

Matrix: SOIL **Level:** Low

Sample ID: 402358002 **Duplicate ID:** 1203592754 **Percent Solids for Dup:** 99.48

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Arsenic	ug/kg	+/-955	479	J	242	J	65.7		MS
Beryllium	ug/kg	+/-95.5	36.7	J	32.3	J	12.9		MS
Nickel	ug/kg	+/-382	1680		1220		31.6	*	MS
Selenium	ug/kg		314	U	315	U			MS
Thallium	ug/kg		57.1	U	57.3	U			MS

***Analytical Methods:**
MS SW846 3050B/6020A

Metals
-6-
Duplicate Sample Summary

SDG No.: 2016-1776 **Lab Code:** GEL

Contract: LANL00114 **Client ID:** WST48-16-124425D

Matrix: SOIL **Level:** Low

Sample ID: 402359001 **Duplicate ID:** 1203593303 **Percent Solids for Dup:** 99.985

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M*
Mercury	ug/kg		3.9	U	3.66	U			AV

***Analytical Methods:**
AV SW846 7471A

METALS
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Laboratory Control Sample Summary

SDG NO. 2016–1776

Contract: LANL00114

Aqueous LCS Source: **Solid LCS Source:** ERA

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Acceptance Limit	M*
1203592748								
	Antimony	ug/kg	74000	135000		182	20–254	P
	Barium	ug/kg	345000	339000		98.3	74–126	P
	Cadmium	ug/kg	63900	66800		105	73–127	P
	Calcium	ug/kg	5330000	5570000		105	74–126	P
	Chromium	ug/kg	127000	131000		104	71–130	P
	Aluminum	ug/kg	7340000	5670000		77.2	39–161	P
	Cobalt	ug/kg	113000	115000		102	74–125	P
	Copper	ug/kg	102000	110000		108	75–125	P
	Iron	ug/kg	14600000	17500000		120	36–164	P
	Lead	ug/kg	176000	178000		101	73–127	P
	Magnesium	ug/kg	2430000	2340000		96.1	64–140	P
	Manganese	ug/kg	508000	497000		97.7	76–124	P
	Potassium	ug/kg	2190000	1970000		89.8	61–139	P
	Silver	ug/kg	48900	52500		107	66–134	P
	Sodium	ug/kg	366000	368000		100	65–134	P
	Vanadium	ug/kg	88700	98400		111	65–135	P
	Zinc	ug/kg	219000	222000		101	70–130	P

***Analytical Methods:**

P **SW846 3050B/6010C**

METALS
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Laboratory Control Sample Summary

SDG NO. 2016–1776

Contract: LANL00114

Aqueous LCS Source: **Solid LCS Source:** ERA

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Acceptance Limit	M*
1203592753								
	Arsenic	ug/kg	98500	96300		97.7	69–145	MS
	Beryllium	ug/kg	66000	63400		96.1	74–126	MS
	Nickel	ug/kg	149000	146000		98.2	73–127	MS
	Selenium	ug/kg	154000	149000		96.8	68–132	MS
	Thallium	ug/kg	175000	166000		94.8	69–131	MS

***Analytical Methods:**

MS **SW846 3050B/6020A**

METALS
–7–
Laboratory Control Sample Summary

SDG NO. 2016–1776

Contract: LANL00114

Aqueous LCS Source: **Solid LCS Source:** ERA

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Acceptance Limit	M*
1203593302								
	Mercury	ug/kg	7100	6150		86.7	51–149	AV

***Analytical Methods:**

AV **SW846 7471A**

METALS
-9-
Serial Dilution Sample Summary

SDG NO. 2016-1776 **Client ID** WST53-16-124424L

Contract: LANL00114

Matrix: SOLID **Level:** Low

Sample ID: 402358002 **Serial Dilution ID:** 1203592751

Analyte	Initial Value ug/L	C	Serial Value ug/L	C	% Difference	Qual	Acceptance Limit	M*
Aluminum	465		631	J	35.868			P
Antimony	3.94	J	16.5	U	6.198			P
Barium	16		16.4	J	2.074			P
Cadmium	2.47	J	5	U	13.287			P
Calcium	1900		2080		9.614			P
Chromium	113		125		10.253	E	10	P
Cobalt	17.3		19.5	J	12.869			P
Copper	90		96.1		6.796			P
Iron	4620		4960		7.289		10	P
Lead	36.4		31.3	J	13.866			P
Magnesium	268	J	425	U	23.945			P
Manganese	114		121		6.55		10	P
Potassium	383		601	J	56.79			P
Silver	2.6	J	5	U	48.818			P
Sodium	5270		6320		19.857	E	10	P
Vanadium	2.2	J	5	U	.59			P
Zinc	130		147		12.742			P

***Analytical Methods:**

P **SW846 3050B/6010C**

METALS
-9-
Serial Dilution Sample Summary

SDG NO. 2016-1776 **Client ID** WST53-16-124424L

Contract: LANL00114

Matrix: SOLID **Level:** Low

Sample ID: 402358002 **Serial Dilution ID:** 1203592756

Analyte	Initial Value ug/L	C	Serial Value ug/L	C	% Difference	Qual	Acceptance Limit	M*
Arsenic	2.52	J	5	U	43.34			MS
Beryllium	.193	J	.5	U	45.078			MS
Nickel	8.81		8.44	J	4.289			MS
Selenium	1.65	U	8.25	U				MS
Thallium	.3	U	1.5	U				MS

***Analytical Methods:**

MS **SW846 3050B/6020A**

METALS
–9–
Serial Dilution Sample Summary

SDG NO. 2016–1776 **Client ID** WST48–16–124425L

Contract: LANL00114

Matrix: SOLID **Level:** Low

Sample ID: 402359001 **Serial Dilution ID:** 1203593305

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

***Analytical Methods:**

AV **SW846 7471A**

Miscellaneous