

Linn Energy - Denver, CO

Sample Delivery Group: L901058
Samples Received: 04/07/2017
Project Number:
Description: 2017 Reclamation Pre-Treatment
Site: OLD MTN
Report To: Tom Hogelin
1999 Broadway, Suite 3700
Denver, CO 80202

Entire Report Reviewed By:



Mark W. Beasley
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



M15 595 L901058-01 Solid

Collected by

Collected date/time

Received date/time

04/05/17 15:00

04/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 350.1	WG968584	1	04/08/17 18:07	04/12/17 00:00	ASK
Wet Chemistry by Method 9056A	WG970185	1	04/12/17 08:07	04/13/17 17:30	JD
Wet Chemistry by Method 9056A	WG970185	5	04/12/17 08:07	04/13/17 16:26	JD
Wet Chemistry by Method USDA LOI	WG969836	1	04/13/17 09:00	04/14/17 17:58	MMF
Metals (ICP) by Method 6010B	WG969241	1	04/11/17 08:52	04/12/17 03:55	CCE

¹ Cp

² Tc

³ Ss

⁴ Cn

J15 595 FWP L901058-02 Solid

Collected by

Collected date/time

Received date/time

04/05/17 15:00

04/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 350.1	WG968584	1	04/08/17 18:07	04/12/17 00:02	ASK
Wet Chemistry by Method 9056A	WG970185	5	04/12/17 08:07	04/13/17 17:08	JD
Wet Chemistry by Method USDA LOI	WG969836	1	04/13/17 09:00	04/14/17 17:56	MMF
Metals (ICP) by Method 6010B	WG969241	1	04/11/17 08:52	04/12/17 03:57	CCE

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Mark W. Beasley
Technical Service Representative

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Wet Chemistry by Method 350.1

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	8.30	P1	5.00	1	04/12/2017 00:00	WG968584

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Nitrate as (N)	142		5.00	5	04/13/2017 16:26	WG970185
Phosphate,Ortho	37.4		1.00	1	04/13/2017 17:30	WG970185

6 Qc

7 Gl

Wet Chemistry by Method USDA LOI

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	17700		10.0	1	04/14/2017 17:58	WG969836

8 Al

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Potassium	1660		100	1	04/12/2017 03:55	WG969241



Wet Chemistry by Method 350.1

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND	J6	5.00	1	04/12/2017 00:02	WG968584

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Nitrate as (N)	206		5.00	5	04/13/2017 17:08	WG970185
Phosphate,Ortho	70.3		5.00	5	04/13/2017 17:08	WG970185

6 Qc

7 Gl

Wet Chemistry by Method USDA LOI

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	14700		10.0	1	04/14/2017 17:56	WG969836

8 Al

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Potassium	2170		100	1	04/12/2017 03:57	WG969241



Method Blank (MB)

(MB) R3210044-1 04/11/17 23:55

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Ammonia Nitrogen	U		1.57	5.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L901058-01 Original Sample (OS) • Duplicate (DUP)

(OS) L901058-01 04/12/17 00:00 • (DUP) R3210044-4 04/12/17 00:01

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Ammonia Nitrogen	8.30	5.25	1	45	P1	20

L901487-11 Original Sample (OS) • Duplicate (DUP)

(OS) L901487-11 04/12/17 00:24 • (DUP) R3210044-7 04/12/17 00:25

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Ammonia Nitrogen	U	0	1	0		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3210044-2 04/11/17 23:56 • (LCSD) R3210044-3 04/11/17 23:57

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Ammonia Nitrogen	500	540	485	108	97	90-110			11	20

L901058-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L901058-02 04/12/17 00:02 • (MS) R3210044-5 04/12/17 00:03 • (MSD) R3210044-6 04/12/17 00:04

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Ammonia Nitrogen	500	ND	279	308	56	62	1	80-120	J6	J6	10	20



L901487-14 Original Sample (OS) • Matrix Spike (MS)

(OS) L901487-14 04/12/17 00:28 • (MS) R3210044-8 04/12/17 00:30

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MS Rec.	Dilution	Rec. Limits	<u>MS Qualifier</u>
Analyte	mg/kg	mg/kg	mg/kg	%		%	
Ammonia Nitrogen	553	U	303	55	1	80-120	<u>J6</u>

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3210878-1 04/13/17 08:52

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Nitrate	0.538	⌵	0.0116	1.00
Phosphate,Ortho	U		0.0769	1.00

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

L901058-01 Original Sample (OS) • Duplicate (DUP)

(OS) L901058-01 04/13/17 16:26 • (DUP) R3210878-5 04/13/17 18:12

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Nitrate	142	147	5	3		15

L901058-01 Original Sample (OS) • Duplicate (DUP)

(OS) L901058-01 04/13/17 17:30 • (DUP) R3210878-4 04/13/17 17:51

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Phosphate,Ortho	37.4	32.4	1	14		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3210878-2 04/13/17 09:56 • (LCSD) R3210878-3 04/13/17 10:17

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Nitrate	20.0	20.3	20.5	102	103	80-120			1	15
Phosphate,Ortho	20.0	17.4	17.3	87	87	80-120			0	15

L901161-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L901161-01 04/14/17 13:50 • (MS) R3210971-4 04/14/17 14:11 • (MSD) R3210971-5 04/14/17 14:32

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Nitrate	50.0	ND	53.9	54.6	106	107	1	80-120			1	15

Method Blank (MB)

(MB) R3211010-1 04/14/17 17:56

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
TOC (Total Organic Carbon)	U		3.33	10.0

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

L902101-02 Original Sample (OS) • Duplicate (DUP)

(OS) L902101-02 04/14/17 18:03 • (DUP) R3211010-4 04/14/17 18:14

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
TOC (Total Organic Carbon)	13300	15900	1	17.9		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3211010-2 04/14/17 17:56 • (LCSD) R3211010-3 04/14/17 17:56

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TOC (Total Organic Carbon)	5590	8060	8000	144	143	50.0-150			0.698	20

Method Blank (MB)

(MB) R3210060-1 04/12/17 03:33				
	MB Result	<u>MB Qualifier</u>	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Potassium	U		10.2	100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3210060-2 04/12/17 03:35 • (LCSD) R3210060-3 04/12/17 03:38										
	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Potassium	1000	966	978	97	98	80-120			1	20

L901193-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L901193-04 04/12/17 03:41 • (MS) R3210060-6 04/12/17 03:49 • (MSD) R3210060-7 04/12/17 03:52												
	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Potassium	1000	578	1450	1350	87	77	1	75-125			7	20

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Rec.	Recovery.

Qualifier	Description
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J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

A2LA – ISO 17025	1461.01	AIHA-LAP, LLC	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA-Crypto	IN00003		

Our Locations

A map of the United States showing the locations of 25 study sites. The sites are marked with pins: 24 purple pins and 1 orange pin. The orange pin is located in Tennessee (TN). The purple pins are located in Washington (WA), Oregon (OR), Idaho (ID), Nevada (NV), California (CA), Utah (UT), Arizona (AZ), New Mexico (NM), Texas (TX), Wyoming (WY), Colorado (CO), Montana (MT), North Dakota (ND), South Dakota (SD), Nebraska (NE), Kansas (KS), Oklahoma (OK), Minnesota (MN), Iowa (IA), Missouri (MO), Arkansas (AR), Louisiana (LA), Mississippi (MS), Alabama (AL), Georgia (GA), Florida (FL), North Carolina (NC), South Carolina (SC), Virginia (VA), West Virginia (WV), Kentucky (KY), Illinois (IL), Indiana (IN), Michigan (MI), Ohio (OH), Pennsylvania (PA), New York (NY), and Maine (ME). The states are labeled with their abbreviations.

ESC LAB SCIENCES

Cooler Receipt Form

Client: <u>BERPETCO</u>		SDG# <u>L901058</u>		
Cooler Received/Opened On: <u>4/ 7 /17</u>		Temperature: <u>0.3</u>		
Received By: <u>Marina Malone</u>				
Signature: <u>Marina Malone</u>				
Receipt Check List		NP	Yes	No
COC Seal Present / Intact?		✓		
COC Signed / Accurate?			✓	
Bottles arrive intact?			✓	
Correct bottles used?			✓	
Sufficient volume sent?			✓	
If Applicable				
VOA Zero headspace?				
Preservation Correct / Checked?				