

Linn Energy - Denver, CO

Sample Delivery Group: L902101
Samples Received: 04/12/2017
Project Number:
Description: 2017 reclamation pre-treatment
Site: GG
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.



O29 596 L902101-01 Solid

			Collected by	Collected date/time	Received date/time	
				04/10/17 12:30	04/12/17 09:00	¹ Cp
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	
Wet Chemistry by Method 350.1	WG970004	1	04/14/17 10:38	04/14/17 14:18	DR	
Wet Chemistry by Method 9056A	WG970252	1	04/14/17 13:54	04/14/17 16:44	MCG	² Tc
Wet Chemistry by Method 9056A	WG971970	5	04/20/17 09:45	04/20/17 19:54	KCF	³ Ss
Wet Chemistry by Method USDA LOI	WG969836	1	04/13/17 09:00	04/14/17 18:06	MMF	
Metals (ICP) by Method 6010B	WG970425	1	04/13/17 20:53	04/14/17 02:25	LTB	⁴ Cn

I02 697 L902101-02 Solid

			Collected by	Collected date/time	Received date/time	
				04/10/17 11:30	04/12/17 09:00	⁵ Sr
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	
Wet Chemistry by Method 350.1	WG970004	1	04/14/17 10:38	04/14/17 14:19	DR	⁶ Qc
Wet Chemistry by Method 9056A	WG970252	1	04/14/17 13:54	04/14/17 18:02	MCG	⁷ Gl
Wet Chemistry by Method 9056A	WG971249	1	04/18/17 14:00	04/18/17 21:00	MCG	
Wet Chemistry by Method USDA LOI	WG969836	1	04/13/17 09:00	04/14/17 18:03	MMF	⁸ Al
Metals (ICP) by Method 6010B	WG970425	1	04/13/17 20:53	04/14/17 02:28	LTB	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 Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 350.1

Analyte	Result mg/kg	<u>Qualifier</u>	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Ammonia Nitrogen	67.5		5.00	1	04/14/2017 14:18	WG970004

1
Cp2
Tc

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	<u>Qualifier</u>	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Nitrate as (N)	2.92		1.00	1	04/14/2017 16:44	WG970252
Phosphate, Ortho	107		5.00	5	04/20/2017 19:54	WG971970

3
Ss4
Cn5
Sr

Wet Chemistry by Method USDA LOI

Analyte	Result mg/kg	<u>Qualifier</u>	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
TOC (Total Organic Carbon)	25600		10.0	1	04/14/2017 18:06	WG969836

6
Qc7
Gl

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	<u>Qualifier</u>	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Potassium	1360		100	1	04/14/2017 02:25	WG970425

8
Al9
Sc



Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Ammonia Nitrogen	ND		5.00	1	04/14/2017 14:19	WG970004

¹ Cp² Tc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Nitrate as (N)	2.83		1.00	1	04/14/2017 18:02	WG970252
Phosphate, Ortho	18.6		1.00	1	04/18/2017 21:00	WG971249

³ Ss⁴ Cn⁵ Sr

Wet Chemistry by Method USDA LOI

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
TOC (Total Organic Carbon)	13300		10.0	1	04/14/2017 18:03	WG969836

⁶ Qc⁷ Gl

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Potassium	1230		100	1	04/14/2017 02:28	WG970425

⁸ Al⁹ Sc

Method Blank (MB)

(MB) R3210928-1 04/14/17 14:01

	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

L901370-03 Original Sample (OS) • Duplicate (DUP)

(OS) L901370-03 04/14/17 14:10 • (DUP) R3210928-6 04/14/17 14:11

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Ammonia Nitrogen	6.21	3.43	1	58	J P1	20

L902453-02 Original Sample (OS) • Duplicate (DUP)

(OS) L902453-02 04/14/17 14:22 • (DUP) R3210928-7 04/14/17 14:23

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Ammonia Nitrogen	17.5	18.2	1	4		20

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

(LCS) R3210928-2 04/14/17 14:02 • (LCSD) R3210928-3 04/14/17 14:03

	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	510	474	102	95	90-110			7	20

L901370-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L901370-01 04/14/17 14:06 • (MS) R3210928-4 04/14/17 14:07 • (MSD) R3210928-5 04/14/17 14:08

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	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	649	U	614	621	95	96	1	80-120			1	20



Method Blank (MB)

(MB) R3211055-3 04/14/17 14:26

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Nitrate	U		0.0116	1.00

L901798-01 Original Sample (OS) • Duplicate (DUP)

(OS) L901798-01 04/14/17 16:14 • (DUP) R3211055-5 04/14/17 16:29

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Nitrate	9310	7380	5	23	J3	15

L902495-03 Original Sample (OS) • Duplicate (DUP)

(OS) L902495-03 04/14/17 23:25 • (DUP) R3211055-7 04/14/17 23:41

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Nitrate	ND	0.269	1	0		15

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

(LCS) R3211055-9 04/15/17 12:37 • (LCSD) R3211055-8 04/15/17 11:46

	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	19.4	19.6	97	98	80-120			1	15

L902101-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L902101-01 04/14/17 16:44 • (MS) R3211055-6 04/14/17 17:00 • (MSD) R3211055-10 04/14/17 17:46

	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	2.92	53.0	55.1	100	104	1	80-120			4	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3211693-1 04/18/17 18:53

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Phosphate,Ortho	U		0.0769	1.00
Phosphate,Ortho	U		0.0825	0.250

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

L903003-02 Original Sample (OS) • Duplicate (DUP)

(OS) L903003-02 04/19/17 12:57 • (DUP) R3211693-6 04/19/17 13:18

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Phosphate,Ortho	0.488	0.491	1	1	J	15

L902546-01 Original Sample (OS) • Duplicate (DUP)

(OS) L902546-01 04/19/17 14:22 • (DUP) R3211693-8 04/19/17 14:43

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Phosphate,Ortho	220	198	1	11		15

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

(LCS) R3211693-2 04/18/17 19:14 • (LCSD) R3211693-3 04/18/17 19:36

	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	%	%	%			%	%
Phosphate,Ortho	20.0	16.4	16.4	82	82	80-120			0	15

L902586-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L902586-06 04/19/17 15:04 • (MS) R3211693-9 04/19/17 15:26 • (MSD) R3211693-10 04/19/17 15:47

	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	%	%		%			%	%
Phosphate,Ortho	50.0	ND	3.66	4.58	6	8	1	80-120	J6	J3 J6	22	15



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

(LCS) R3212455-2 04/20/17 17:47 • (LCSD) R3212455-3 04/20/17 18:08

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Phosphate,Ortho	20.0	19.1	19.9	96	99	80-120			4	15

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



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

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

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3210746-1 04/14/17 02:02

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Potassium	U		10.2	100

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

(LCS) R3210746-2 04/14/17 02:05 • (LCSD) R3210746-3 04/14/17 02:08

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Potassium	1000	967	1040	97	104	80-120			7	20

L902259-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L902259-04 04/14/17 02:11 • (MS) R3210746-6 04/14/17 02:19 • (MSD) R3210746-7 04/14/17 02:22

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Potassium	1220	2430	3070	3060	53	51	1	75-125	J6	J6	1	20



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
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
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.

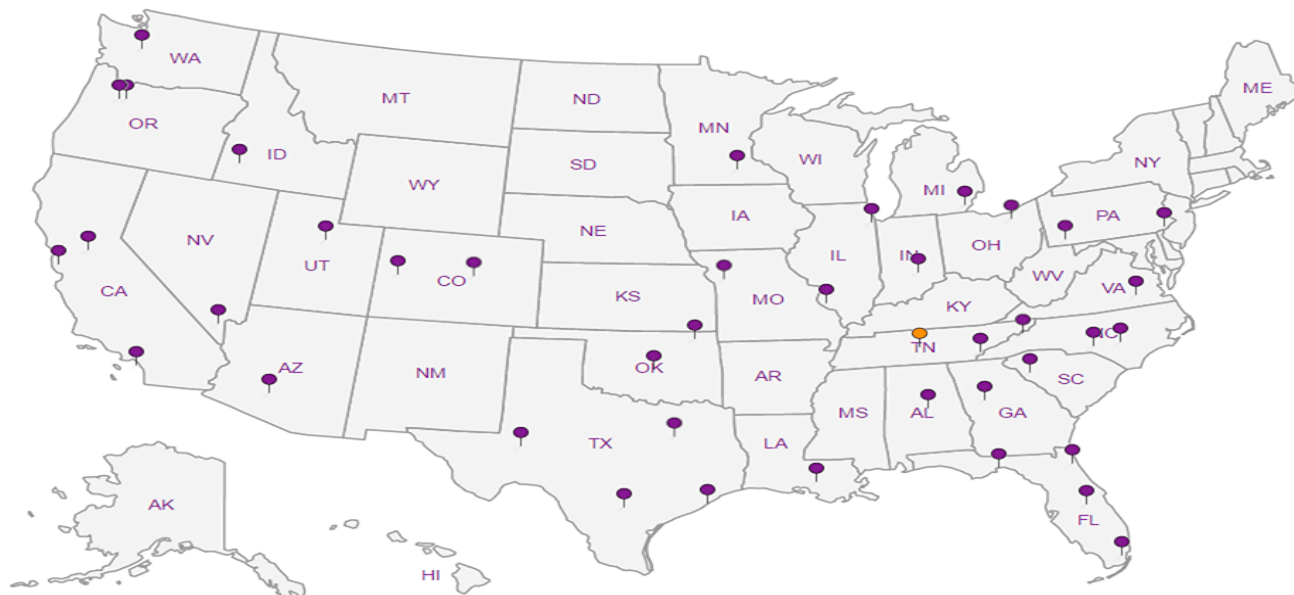
¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

- 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



Company Name/Address:

Linn Operating, Inc.235 Callahan Ave.
Parachute, CO
81635

Billing Information:

Linn Operating, Inc.235 Callahan Ave.
Parachute, CO
81635

Report to:

Tom Hogelin

Email To:

thogelin@linenergy.com

Project

Description: **2017 reclamation pre-treatment**

City/State

Collected:

Phone: **970-948-2785**

Client Project #

Lab Project #

Fax:

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)

Same Day200%

Next Day100%

Two Day50%

Three Day25%

Date Results Needed
standardEmail? ☐ No ☒ YesFAX? ☒ No ☐ YesNo.
of
Cntrs

Sample ID

Comp/Grab

Matrix *

Depth

Date

Time

No.
of
Cntrs

TOC

Potassium

Nitrate by IC

Ammonia Nitrogen

Ortho Phosphate

O29 596

Comp

SS

4/10/17

12:30pm

2

X

X

X

X

X

102 697

Comp

SS

4/10/17

11:30 am

2

X

X

X

X

X

Analysis / Container / Preservative

Chain of Custody Page 1 of 1



YOUR LAB OF CHOICE

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859L# **901101****G229**Acctnum: **BERPETCO**

Template:

Prelogin:

TSR:

Cooler:

Shipped Via:

Rem./Contaminant

Sample # (lab only)

01

02

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other _____

Remarks:

Relinquished by: (Signature)

Tom Bill

Date:

4/11/17

Time:

1330

Received by: (Signature)

[Signature]

pH _____

Temp _____

Flow _____

Other _____

Samples returned via: ☐ UPS☐ FedEx ☐ Courier ☐ _____

Temp: _____ °C Bottles Received:

2.1°C

4

Hold #

Condition: (lab use only)

L toll

COC Seal Intact: ☒ Y ☐ N ☐ NA

pH Checked:

NCF:

Relinquished by: (Signature)

Date:

4/11/17

Time:

1700

Received for lab by: (Signature)

[Signature]

Date:

4-12-17

Time:

0900

ESC LAB SCIENCES Cooler Receipt Form

Client: <u>Bett Berletco</u>	SDG#	<u>907101</u>
Cooler Received/Opened On: <u>4/ 12 /17</u>	Temperature: <u>2.1</u>	
Received By: Jon Deboard		
Signature: <u><i>Jon Deboard</i></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?			