

Linn Energy - Denver, CO

Sample Delivery Group: L896615
Samples Received: 03/17/2017
Project Number:
Description: 2017 reclamation pre-treatment

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.



¹ Cp: Cover Page	1	¹ Cp
² Tc: Table of Contents	2	
³ Ss: Sample Summary	3	² Tc
⁴ Cn: Case Narrative	4	
⁵ Sr: Sample Results	5	³ Ss
C10 696 L896615-01	5	
⁶ Qc: Quality Control Summary	6	⁴ Cn
Wet Chemistry by Method 350.1	6	⁵ Sr
Wet Chemistry by Method 4500P E-2011	8	
Wet Chemistry by Method 9056A	9	⁶ Qc
Wet Chemistry by Method USDA LOI	10	
Metals (ICP) by Method 6010B	11	⁷ Gl
⁷ Gl: Glossary of Terms	12	⁸ Al
⁸ Al: Accreditations & Locations	13	
⁹ Sc: Chain of Custody	14	⁹ Sc



C10 696 L896615-01 Solid

Collected by

Collected date/time
03/16/17 00:00Received date/time
03/17/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	¹ Cp
Wet Chemistry by Method 350.1	WG961961	1	03/18/17 11:18	03/20/17 16:06	JER	² Tc
Wet Chemistry by Method 4500P E-2011	WG961681	1	03/23/17 09:12	03/23/17 15:18	MHM	³ Ss
Wet Chemistry by Method 9056A	WG962232	1	03/19/17 19:31	03/20/17 05:47	KCF	⁴ Cn
Wet Chemistry by Method USDA LOI	WG962560	1	03/22/17 00:01	03/23/17 05:32	JM	⁵ Sr
Metals (ICP) by Method 6010B	WG962447	1	03/20/17 20:22	03/21/17 00:34	LTB	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 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	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Ammonia Nitrogen	ND		5.00	1	03/20/2017 16:06	WG961961

1
Cp2
Tc

Wet Chemistry by Method 4500P E-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Phosphate,Ortho	0.706		0.250	1	03/23/2017 15:18	WG961681

3
Ss4
Cn

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Nitrate as (N)	36.5		1.00	1	03/20/2017 05:47	WG962232

5
Sr6
Qc

Wet Chemistry by Method USDA LOI

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
TOC (Total Organic Carbon)	19600		10.0	1	03/23/2017 05:32	WG962560

7
Gl8
Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Potassium	1410		100	1	03/21/2017 00:34	WG962447

9
Sc

Method Blank (MB)

(MB) R3204546-2 03/20/17 15:34

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

L896101-01 Original Sample (OS) • Duplicate (DUP)

(OS) L896101-01 03/20/17 15:39 • (DUP) R3204546-5 03/20/17 15:40

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Ammonia Nitrogen	1770	1790	1	1		20

L896341-01 Original Sample (OS) • Duplicate (DUP)

(OS) L896341-01 03/20/17 16:14 • (DUP) R3204546-9 03/20/17 16:15

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Ammonia Nitrogen	3920	3880	5	1		20

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

(LCS) R3204546-3 03/20/17 15:36 • (LCSD) R3204546-4 03/20/17 15:37

	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	505	505	101	101	90-110			0	20

L896321-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L896321-01 03/20/17 15:42 • (MS) R3204546-6 03/20/17 15:43 • (MSD) R3204546-7 03/20/17 15:44

	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	629	U	404	399	64	64	1	80-120	J6	J6	1	20

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



[L896615-01](#)

L896582-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L896582-01 03/20/17 16:03 • (MS) R3204546-8 03/20/17 16:04

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MS Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>
Ammonia Nitrogen	500	ND	457	91	1	80-120	

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3205460-1 03/23/17 15:01

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

L896310-01 Original Sample (OS) • Duplicate (DUP)

(OS) L896310-01 03/23/17 15:02 • (DUP) R3205460-4 03/23/17 15:03

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Phosphate,Ortho	0.920	0.930	1	1		20

L896717-03 Original Sample (OS) • Duplicate (DUP)

(OS) L896717-03 03/23/17 15:23 • (DUP) R3205460-7 03/23/17 15:24

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Phosphate,Ortho	1.60	1.60	1	0		20

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

(LCS) R3205460-2 03/23/17 15:01 • (LCSD) R3205460-3 03/23/17 15:02

	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	5.00	4.96	4.92	99	98	85-115			1	20

L896310-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L896310-01 03/23/17 15:02 • (MS) R3205460-5 03/23/17 15:03 • (MSD) R3205460-6 03/23/17 15:04

	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	%	%		%			%	%
Phosphate,Ortho	5.00	0.920	4.64	4.14	74	64	1	80-120	J6	J6	11	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3204345-1 03/19/17 20:36

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Nitrate	0.362	<div></div>	0.0116	1.00

L896328-22 Original Sample (OS) • Duplicate (DUP)

(OS) L896328-22 03/20/17 01:11 • (DUP) R3204345-6 03/20/17 01:33

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Nitrate	0.297	0.294	1	1	<div></div>	15

L896615-01 Original Sample (OS) • Duplicate (DUP)

(OS) L896615-01 03/20/17 05:47 • (DUP) R3204345-7 03/20/17 06:08

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Nitrate	36.5	40.6	1	11		15

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

(LCS) R3204345-2 03/19/17 20:57 • (LCSD) R3204345-3 03/19/17 21:18

	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	18.3	19.2	92	96	80-120			5	15

L896328-18 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L896328-18 03/19/17 23:04 • (MS) R3204345-4 03/19/17 23:25 • (MSD) R3204345-5 03/19/17 23:47

	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	%	%		%			%	%
Nitrate	50.0	1.32	52.9	50.0	103	97	1	80-120			6	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3205218-1 03/23/17 05:29

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

L896085-01 Original Sample (OS) • Duplicate (DUP)

(OS) L896085-01 03/23/17 05:33 • (DUP) R3205218-4 03/23/17 05:33

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
TOC (Total Organic Carbon)	154000	168000	1	8.53		20

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

(LCS) R3205218-2 03/23/17 05:30 • (LCSD) R3205218-3 03/23/17 05:32

	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	6000	6080	107	109	50.0-150			1.23	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3204604-1 03/21/17 00:02

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

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

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

(LCS) R3204604-2 03/21/17 00:05 • (LCSD) R3204604-3 03/21/17 00:07

	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	%	%	%			%	%
Potassium	1000	937	976	94	98	80-120			4	20

L896531-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L896531-02 03/21/17 00:10 • (MS) R3204604-6 03/21/17 00:18 • (MSD) R3204604-7 03/21/17 00:21

	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	%	%		%			%	%
Potassium	1000	1370	1850	1820	48	45	1	75-125	J6	J6	2	20

⁷Gl

⁸Al

⁹Sc



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.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

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
Connecticut	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		

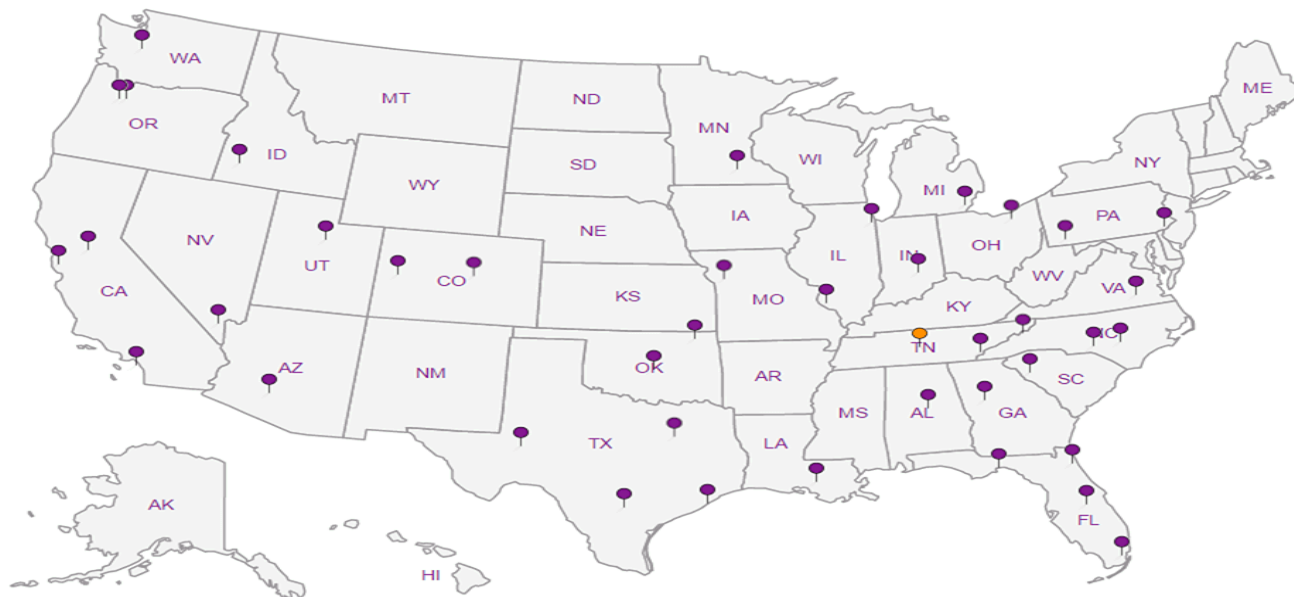
Third Party & Federal Accreditations

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	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



[illegible]

ESC LAB SCIENCES Cooler Receipt Form

Client: <u>BERPETCO</u>	SDG#	<u>89665</u>	
Cooler Received/Opened On: <u>3/17 /17</u>	Temperature:	<u>3.1</u>	
Received By: Marina Malone			
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?			