

Linn Energy - Parachute, CO

Sample Delivery Group: L897570
Samples Received: 03/22/2017
Project Number:
Description: 2017 Reclamation Pre-Treatment
Site: OLD MTN
Report To: Tom Hogelin
235 Callahan Avenue
Parachute, CO 81635

Entire Report Reviewed By:



Jason Romer
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.



B10 696 L897570-01 Solid

			Collected by	Collected date/time	Received date/time	
				03/21/17 00:00	03/22/17 09:00	¹ Cp
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	
Wet Chemistry by Method 350.1	WG963964	1	03/24/17 13:04	03/24/17 15:22	JER	
Wet Chemistry by Method 4500P E-2011	WG965018	1	03/29/17 12:01	03/29/17 14:09	MHM	² Tc
Wet Chemistry by Method 9056A	WG964500	10	03/28/17 12:11	03/28/17 16:47	KCF	³ Ss
Wet Chemistry by Method USDA LOI	WG964653	1	03/28/17 18:10	03/29/17 18:25	MMF	
Metals (ICP) by Method 6010B	WG963804	1	03/23/17 20:57	03/24/17 00:52	LTB	⁴ Cn

K15 696 L897570-02 Solid

			Collected by	Collected date/time	Received date/time	
				03/21/17 00:00	03/22/17 09:00	⁵ Sr
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	
Wet Chemistry by Method 350.1	WG963964	1	03/24/17 13:04	03/24/17 15:24	JER	⁶ Qc
Wet Chemistry by Method 4500P E-2011	WG965018	25	03/29/17 12:01	03/29/17 14:13	MHM	⁷ Gl
Wet Chemistry by Method 9056A	WG964500	1	03/28/17 12:11	03/28/17 17:08	KCF	
Wet Chemistry by Method USDA LOI	WG964653	1	03/28/17 18:10	03/29/17 18:24	MMF	⁸ Al
Metals (ICP) by Method 6010B	WG963804	1	03/23/17 20:57	03/24/17 01:06	LTB	⁹ Sc

L15 696 L897570-03 Solid

			Collected by	Collected date/time	Received date/time	
				03/21/17 00:00	03/22/17 09:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	
Wet Chemistry by Method 350.1	WG963964	1	03/24/17 13:04	03/24/17 15:25	ADH	
Wet Chemistry by Method 4500P E-2011	WG965018	25	03/29/17 12:01	03/29/17 14:14	MHM	
Wet Chemistry by Method 9056A	WG964500	5	03/28/17 12:11	03/28/17 17:29	KCF	
Wet Chemistry by Method USDA LOI	WG964653	1	03/28/17 18:10	03/29/17 18:25	MMF	
Metals (ICP) by Method 6010B	WG963804	1	03/23/17 20:57	03/24/17 01:08	LTB	



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.

Jason Romer
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	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	102		5.00	1	03/24/2017 15:22	WG963964

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 4500P E-2011

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Phosphate,Ortho	5.24	J6	0.250	1	03/29/2017 14:09	WG965018

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Nitrate as (N)	356		10.0	10	03/28/2017 16:47	WG964500

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	03/29/2017 18:25	WG964653

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Potassium	1740		100	1	03/24/2017 00:52	WG963804



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	03/24/2017 15:24	WG963964

1 Cp

2 Tc

Wet Chemistry by Method 4500P E-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Phosphate,Ortho	35.9		6.25	25	03/29/2017 14:13	WG965018

3 Ss

4 Cn

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Nitrate as (N)	22.6		1.00	1	03/28/2017 17:08	WG964500

5 Sr

6 Qc

Wet Chemistry by Method USDA LOI

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
TOC (Total Organic Carbon)	15300		10.0	1	03/29/2017 18:24	WG964653

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Potassium	1260		100	1	03/24/2017 01:06	WG963804

9 Sc



Wet Chemistry by Method 350.1

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	6.10	<u>J6</u>	5.00	1	03/24/2017 15:25	WG963964

¹ Cp² Tc

Wet Chemistry by Method 4500P E-2011

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Phosphate,Ortho	45.8		6.25	25	03/29/2017 14:14	WG965018

³ Ss⁴ Cn

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Nitrate as (N)	98.2		5.00	5	03/28/2017 17:29	WG964500

⁵ Sr⁶ Qc

Wet Chemistry by Method USDA LOI

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	17500		10.0	1	03/29/2017 18:25	WG964653

⁷ Gl⁸ Al

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Potassium	1930		100	1	03/24/2017 01:08	WG963804

⁹ Sc



Method Blank (MB)

(MB) R3205802-1 03/24/17 15:15

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

L897570-01 Original Sample (OS) • Duplicate (DUP)

(OS) L897570-01 03/24/17 15:22 • (DUP) R3205802-4 03/24/17 15:23

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Ammonia Nitrogen	102	106	1	3		20

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

(LCS) R3205802-2 03/24/17 15:16 • (LCSD) R3205802-3 03/24/17 15:18

	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	%	%	%			%	%
Ammonia Nitrogen	500	530	496	106	99	90-110			7	20

L897570-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L897570-03 03/24/17 15:25 • (MS) R3205802-5 03/24/17 15:29

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/kg	mg/kg	mg/kg	%		%	
Ammonia Nitrogen	500	6.10	319	63	1	80-120	J6

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3206721-1 03/29/17 13:49				
	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Phosphate,Ortho	U		0.0825	0.250

L898404-01 Original Sample (OS) • Duplicate (DUP)

(OS) L898404-01 03/29/17 14:17 • (DUP) R3206721-2 03/29/17 14:18						
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Phosphate,Ortho	3.58	3.62	1	1		20

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

(LCS) R3206721-5 03/29/17 14:30 • (LCSD) R3206721-6 03/29/17 14:31										
	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	%	%	%			%	%
Phosphate,Ortho	5.00	5.12	5.08	102	102	85-115			1	20

L897570-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L897570-01 03/29/17 14:09 • (MS) R3206721-3 03/29/17 14:19 • (MSD) R3206721-4 03/29/17 14:19												
	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	5.24	7.43	7.64	44	48	1	80-120	J6	J6	3	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3206551-1 03/28/17 13:27

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

L898126-07 Original Sample (OS) • Duplicate (DUP)

(OS) L898126-07 03/28/17 21:22 • (DUP) R3206551-6 03/28/17 21:43

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Nitrate	0.336	0.349	1	4	J	15

L898126-11 Original Sample (OS) • Duplicate (DUP)

(OS) L898126-11 03/28/17 23:51 • (DUP) R3206551-7 03/29/17 00:12

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Nitrate	2.99	2.98	1	0		15

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

(LCS) R3206551-2 03/28/17 13:48 • (LCSD) R3206551-3 03/28/17 14:10

	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	19.0	19.0	95	95	80-120			0	15

L897875-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L897875-01 03/28/17 19:36 • (MS) R3206551-4 03/28/17 19:57 • (MSD) R3206551-5 03/28/17 20:19

	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	51.2	53.0	102	105	1	80-120			3	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3206835-1 03/29/17 18:24

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

L897570-03 Original Sample (OS) • Duplicate (DUP)

(OS) L897570-03 03/29/17 18:25 • (DUP) R3206835-4 03/29/17 18:25

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
TOC (Total Organic Carbon)	17500	19000	1	8.61		20

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

(LCS) R3206835-2 03/29/17 18:26 • (LCSD) R3206835-3 03/29/17 18:26

	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	8270	7730	148	138	50.0-150			6.74	20

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3205577-1 03/24/17 00:45

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Potassium	73.3	⬇	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) R3205577-2 03/24/17 00:47 • (LCSD) R3205577-3 03/24/17 00:50

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	1020	1010	102	101	80-120			1	20

L897570-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L897570-01 03/24/17 00:52 • (MS) R3205577-6 03/24/17 01:00 • (MSD) R3205577-7 03/24/17 01:03

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Potassium	1000	1740	2550	2550	82	82	1	75-125			0	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.
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.

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		

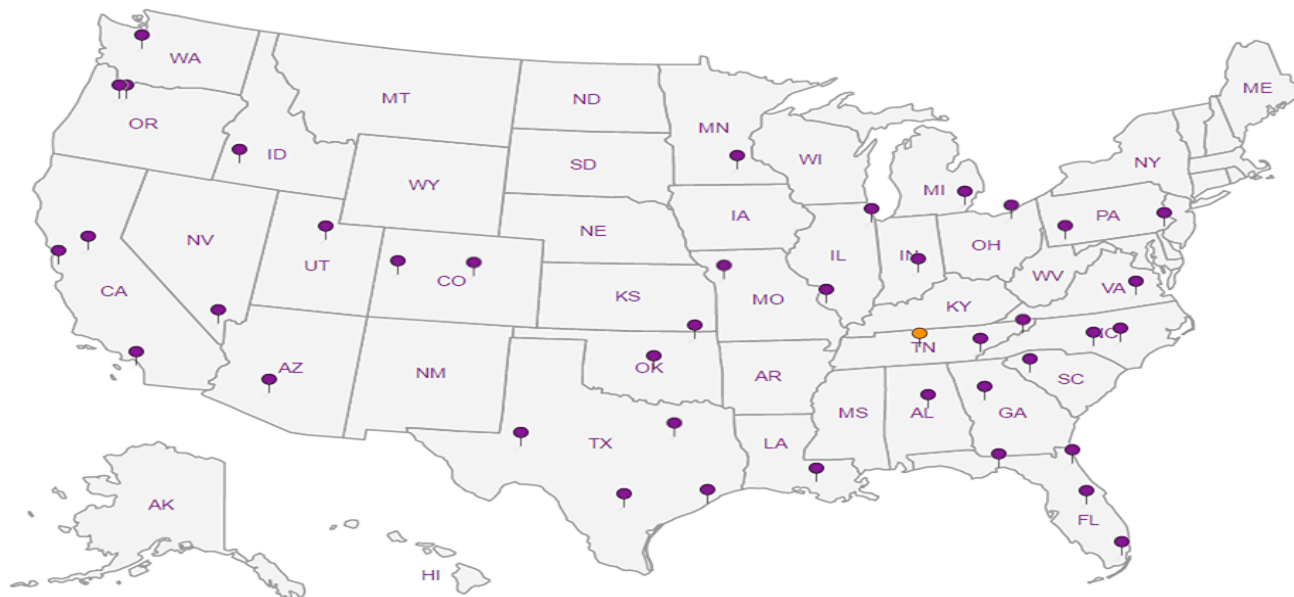
Third Party & Federal Accreditations

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.**



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:

2017 reclamation pre-treatment

Description:

City/State

Collected:

Phone: **970-948-2785**

Client Project #

Lab Project #

Fax:

Collected by (print):

Site/Facility ID #

P.O. #

Old Mtn

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
CntrsImmediately
Packed on Ice N ☐ Y ☒

Sample ID

Comp/Grab

Matrix *

Depth

Date

Time

TOC

Potassium

Nitrate by IC

Ammonia Nitrogen

Ortho Phosphate

B10 696

Comp

SS

3/21/17

2

X

X

X

X

X

K15 696

Comp

SS

3/21/17

2

X

X

X

X

X

L15 696

Comp

SS

3/21/17

2

X

X

X

X

X

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other _____Remarks: **TRK # 7136 2663 9528**

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

pH _____ Temp _____

Flow _____ Other _____

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

Temp: _____ °C Bottles Received:

21.1 202

Date: _____ Time: _____

3-22-17 jmo

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

Hold #

Condition: (lab use only)

COC Seal Intact: ☐ Y ☐ N ☒ NA

pH Checked: NCF:

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 # **1897570****B135**Acctnum: **BERPETCO**

Template:

Prelogin:

TSR:

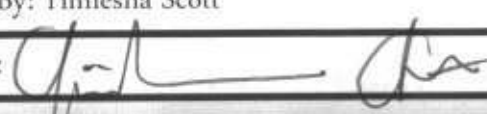
Cooler:

Shipped Via:

Rem./Contaminant Sample # (lab only)

-9
02
03

ESC LAB SCIENCES Cooler Receipt Form

Client: <u>BEALPETO</u>	SDG#	<u>18975P</u>	
Cooler Received/Opened On: <u>3/ 22 /17</u>	Temperature:	<u>2.1</u>	
Received By: Timiesha Scott			
Signature: 			
Receipt Check List	<u>(NP)</u>	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?			