



Nicholson GeoSolutions LLC

3433 East Lake Drive
Centennial, CO 80121

September 20, 2017

Mr. Derek Johnson
Berry Petroleum Company
235 Callahan Avenue
Parachute, Colorado 81635

Subject: OM K-15 Landfarm Screening Soil Sample Results

Dear Derek:

Nicholson GeoSolutions LLC collected screening level soil samples from the landfarms on the OM K-15 and OM L-15 well pad in the Old Mountain area, Garfield County, Colorado on September 9th, 2017. Material from the K-15 well pad was moved to the L-15 well pad during early 2017 to assist with the treatment of the K-15 material.

The samples were composited from 16 subsamples collected at depths of about 18 inches across the surface of the landfarms. The samples were analyzed for Total Volatile Petroleum Hydrocarbons (TVPH – gasoline range), Total Extractable Petroleum Hydrocarbons (TEPH – diesel and motor oil range), BTEX (benzene, toluene, ethylbenzene, and xylenes) and PAHs to evaluate compliance with the COGCC Table 910-1 standards and further treatment needs. Inorganic parameters (SAR, pH, conductivity, and metals) were not analyzed for these samples since these parameters have been previously well characterized. The laboratory report is attached.

For the material on the K-15 well pad, benzo(a)pyrene was reported at 0.0605 mg/kg and dibenz(a,h)anthracene was reported at 0.0342 mg/kg (COGCC standard = 0.022 mg/kg for both compounds). All other results were below the standards.

The attached graph shows the concentrations of benzo(a)pyrene in the original K-15 landfarm from September 2012 to the present. Benzo(a)pyrene concentrations in the OM K-15 landfarm fell from 0.10 mg/kg on September 26, 2012 to 0.0605 mg/kg for the most recent sample event.

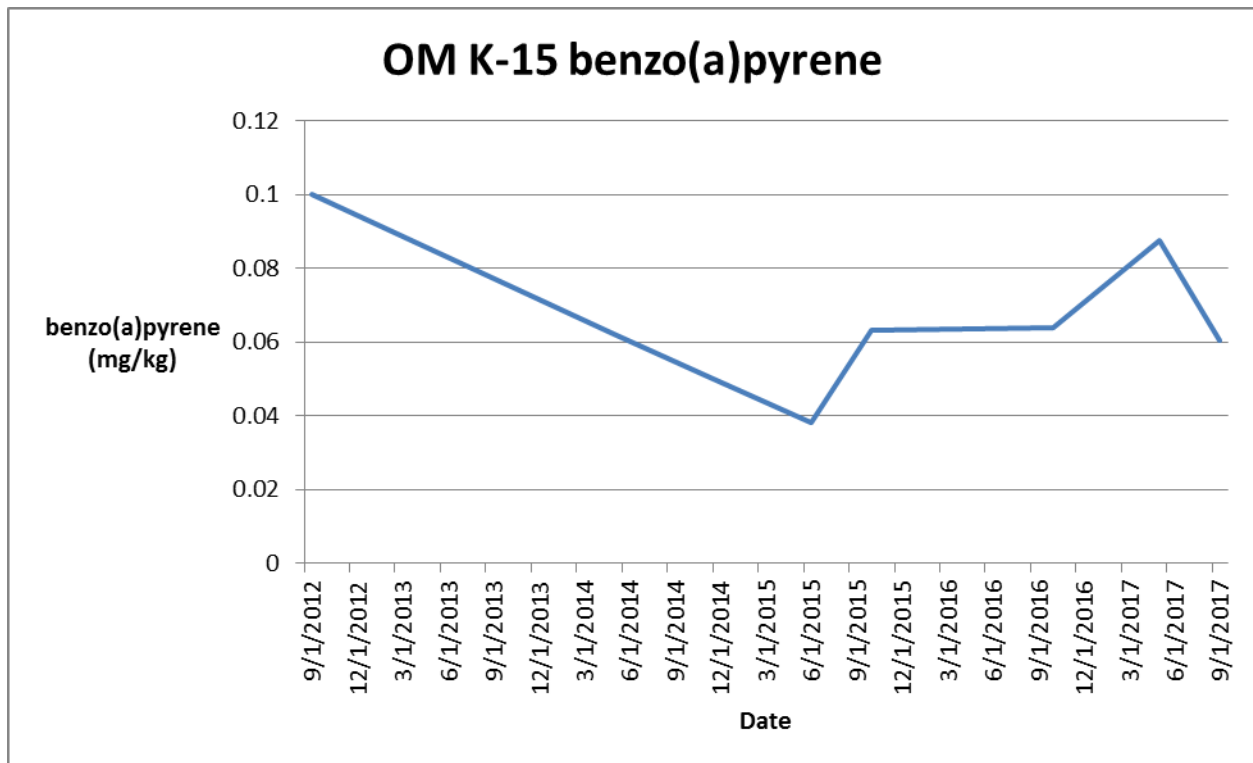
For the material placed on the OM L-15 well pad, benzo(a)pyrene was reported at 0.0764 mg/kg and dibenz(a,h)anthracene was reported at 0.052 mg/kg (COGCC standard = 0.022 mg/kg for both compounds). All other results were below the standards.

Further treatment of both landfarms should be conducted. The landfarms should be sampled again in the spring of 2018 to reassess the benzo(a)pyrene and dibenz(a,h)anthracene concentrations and degradation rates.

Nicholson GeoSolutions LLC



David K. Nicholson, P.G.
Principal Geologist



APPENDIX A
Laboratory Report

September 20, 2017

Berry Petroleum - Denver, CO

Sample Delivery Group: L935551

Samples Received: 09/12/2017

Project Number:

Description: Pit Reclamation

Report To:

Dave Nicholson

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.



Cp: Cover Page	1
Tc: Table of Contents	2
Ss: Sample Summary	3
Cn: Case Narrative	5
Sr: Sample Results	6
K-15 L935551-01	6
B-10 L935551-02	7
C-10 L935551-03	8
K-15-2 L935551-04	9
L-15 L935551-05	10
LR J-15 L935551-06	11
LR M-15 L935551-07	12
Qc: Quality Control Summary	13
Volatile Organic Compounds (GC) by Method 8015/8021	13
Semi-Volatile Organic Compounds (GC) by Method 8015	15
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	16
Gl: Glossary of Terms	18
Al: Accreditations & Locations	19
Sc: Sample Chain of Custody	20



SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



K-15 L935551-01 Solid

Collected by
DK Nicholson

Collected date/time
09/09/17 14:20

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 12:20	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 10:08	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 16:37	KM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

B-10 L935551-02 Solid

Collected by
DK Nicholson

Collected date/time
09/09/17 14:50

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 12:42	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 10:22	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 16:59	KM

C-10 L935551-03 Solid

Collected by
DK Nicholson

Collected date/time
09/09/17 15:00

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 13:05	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 10:36	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 17:21	KM

K-15-2 L935551-04 Solid

Collected by
DK Nicholson

Collected date/time
09/09/17 14:00

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 13:27	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 10:49	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 17:42	KM

L-15 L935551-05 Solid

Collected by
DK Nicholson

Collected date/time
09/10/17 15:40

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 13:49	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 11:03	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 18:47	KM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	5	09/14/17 21:44	09/19/17 10:59	KM

LR J-15 L935551-06 Solid

Collected by
DK Nicholson

Collected date/time
09/10/17 15:50

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 14:12	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 11:17	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 18:04	KM

ACCOUNT:

Berry Petroleum - Denver, CO

PROJECT:

SDG:

L935551

DATE/TIME:

09/20/17 08:49

PAGE:

3 of 21



LR M-15 L935551-07 Solid

Collected by
DK NicholsonCollected date/time
09/10/17 16:30Received date/time
09/12/17 08:45

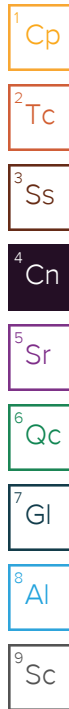
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 14:34	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 11:31	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 18:25	KM

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ 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 radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. 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





Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00151		0.000500	1	09/13/2017 12:20	WG1019615
Toluene	ND		0.00500	1	09/13/2017 12:20	WG1019615
Ethylbenzene	0.00131		0.000500	1	09/13/2017 12:20	WG1019615
Total Xylene	0.00203		0.00150	1	09/13/2017 12:20	WG1019615
TPH (GC/FID) Low Fraction	ND		0.100	1	09/13/2017 12:20	WG1019615
(S) a,a,a-Trifluorotoluene(FID)	89.8		77.0-120		09/13/2017 12:20	WG1019615
(S) a,a,a-Trifluorotoluene(PID)	96.8		75.0-128		09/13/2017 12:20	WG1019615

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	63.5		40.0	10	09/19/2017 10:08	WG1021639
C28-C40 Oil Range	48.7		40.0	10	09/19/2017 10:08	WG1021639
(S) o-Terphenyl	118		18.0-148		09/19/2017 10:08	WG1021639

6 Qc

7 Gl

8 Al

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	0.00640		0.00600	1	09/15/2017 16:37	WG1020499
Acenaphthene	ND		0.00600	1	09/15/2017 16:37	WG1020499
Acenaphthylene	ND		0.00600	1	09/15/2017 16:37	WG1020499
Benzo(a)anthracene	0.0386		0.00600	1	09/15/2017 16:37	WG1020499
Benzo(a)pyrene	0.0605		0.00600	1	09/15/2017 16:37	WG1020499
Benzo(b)fluoranthene	0.124		0.00600	1	09/15/2017 16:37	WG1020499
Benzo(g,h,i)perylene	0.105		0.00600	1	09/15/2017 16:37	WG1020499
Benzo(k)fluoranthene	0.0360		0.00600	1	09/15/2017 16:37	WG1020499
Chrysene	0.0563		0.00600	1	09/15/2017 16:37	WG1020499
Dibenz(a,h)anthracene	0.0342		0.00600	1	09/15/2017 16:37	WG1020499
Fluoranthene	0.0367		0.00600	1	09/15/2017 16:37	WG1020499
Fluorene	0.00640		0.00600	1	09/15/2017 16:37	WG1020499
Indeno(1,2,3-cd)pyrene	0.0792		0.00600	1	09/15/2017 16:37	WG1020499
Naphthalene	0.0478		0.0200	1	09/15/2017 16:37	WG1020499
Phenanthrene	0.0376		0.00600	1	09/15/2017 16:37	WG1020499
Pyrene	0.0354		0.00600	1	09/15/2017 16:37	WG1020499
1-Methylnaphthalene	0.0397		0.0200	1	09/15/2017 16:37	WG1020499
2-Methylnaphthalene	0.0757		0.0200	1	09/15/2017 16:37	WG1020499
2-Chloronaphthalene	ND		0.0200	1	09/15/2017 16:37	WG1020499
(S) p-Terphenyl-d14	59.3		23.0-120		09/15/2017 16:37	WG1020499
(S) Nitrobenzene-d5	62.3		14.0-149		09/15/2017 16:37	WG1020499
(S) 2-Fluorobiphenyl	59.6		34.0-125		09/15/2017 16:37	WG1020499

9 Sc



Method Blank (MB)

(MB) R3249649-5 09/13/17 11:28

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	U		0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	98.6			77.0-120
(S) a,a,a-Trifluorotoluene(PID)	105			75.0-128

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) R3249649-1 09/13/17 09:15 • (LCSD) R3249649-2 09/13/17 09:59

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 %
Benzene	0.0500	0.0466	0.0484	93.2	96.7	71.0-121			3.67	20
Toluene	0.0500	0.0486	0.0498	97.1	99.6	72.0-120			2.48	20
Ethylbenzene	0.0500	0.0507	0.0520	101	104	76.0-121			2.50	20
Total Xylene	0.150	0.154	0.158	103	105	75.0-124			2.18	20
(S) a,a,a-Trifluorotoluene(FID)				98.7	99.0	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				104	104	75.0-128				

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

(LCS) R3249649-3 09/13/17 10:21 • (LCSD) R3249649-4 09/13/17 10:43

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 %
TPH (GC/FID) Low Fraction	5.50	6.23	6.31	113	115	70.0-136			1.31	20
(S) a,a,a-Trifluorotoluene(FID)				107	107	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				119	119	75.0-128				



L935558-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L935558-09 09/13/17 17:56 • (MS) R3249649-6 09/13/17 18:18 • (MSD) R3249649-7 09/13/17 18:40

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 %
Benzene	0.0500	0.00189	0.0139	0.0255	24.1	47.2	1	10.0-146		J3	58.7	29
Toluene	0.0500	ND	0.0125	0.0199	18.3	33.1	1	10.0-143		J3	45.5	30
Ethylbenzene	0.0500	0.00144	0.00970	0.0154	16.5	27.8	1	10.0-147		J3	45.1	31
Total Xylene	0.150	0.00219	0.0264	0.0411	16.1	25.9	1	10.0-149	J6	J3 J6	43.5	30
(S) a,a,a-Trifluorotoluene(FID)					91.4	93.9		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					97.0	99.0		75.0-128				

L935558-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L935558-09 09/13/17 17:56 • (MS) R3249649-8 09/13/17 19:02 • (MSD) R3249649-9 09/13/17 19:24

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 %
TPH (GC/FID) Low Fraction	5.50	ND	2.34	1.71	42.5	31.1	1	10.0-147		J3	31.1	30
(S) a,a,a-Trifluorotoluene(FID)					94.3	93.2		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					103	101		75.0-128				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3250308-1 09/19/17 09:26

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	86.8			18.0-148

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) R3250308-2 09/19/17 09:40 • (LCSD) R3250308-3 09/19/17 09:54

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 %
C10-C28 Diesel Range	60.0	57.6	55.0	96.0	91.7	50.0-150			4.64	20
(S) o-Terphenyl				94.2	85.9	18.0-148				

L935558-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L935558-02 09/19/17 11:59 • (MS) R3250308-4 09/19/17 12:13 • (MSD) R3250308-5 09/19/17 12:27

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 %
C10-C28 Diesel Range	6.00	92.4	185	164	154	120	10	50.0-150	J5		12.0	20
(S) o-Terphenyl					87.7	88.0		18.0-148				

Method Blank (MB)

(MB) R3249985-3 09/15/17 15:54

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Anthracene	U		0.000600	0.00600
Acenaphthene	U		0.000600	0.00600
Acenaphthylene	U		0.000600	0.00600
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(g,h,i)perylene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Fluoranthene	U		0.000600	0.00600
Fluorene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
Naphthalene	U		0.00200	0.0200
Phenanthrene	U		0.000600	0.00600
Pyrene	U		0.000600	0.00600
1-Methylnaphthalene	U		0.00200	0.0200
2-Methylnaphthalene	U		0.00200	0.0200
2-Chloronaphthalene	U		0.00200	0.0200
(S) Nitrobenzene-d5	70.2			14.0-149
(S) 2-Fluorobiphenyl	65.2			34.0-125
(S) p-Terphenyl-d14	60.7			23.0-120

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) R3249985-1 09/15/17 15:11 • (LCSD) R3249985-2 09/15/17 15:32

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 %
Anthracene	0.0800	0.0618	0.0608	77.2	76.0	50.0-125			1.57	20
Acenaphthene	0.0800	0.0599	0.0597	74.9	74.6	52.0-120			0.390	20
Acenaphthylene	0.0800	0.0661	0.0655	82.6	81.9	51.0-120			0.890	20
Benzo(a)anthracene	0.0800	0.0582	0.0561	72.8	70.1	46.0-121			3.70	20
Benzo(a)pyrene	0.0800	0.0531	0.0544	66.4	68.0	42.0-121			2.39	20
Benzo(b)fluoranthene	0.0800	0.0571	0.0517	71.4	64.7	42.0-123			9.96	20
Benzo(g,h,i)perylene	0.0800	0.0616	0.0613	77.0	76.6	43.0-128			0.580	20
Benzo(k)fluoranthene	0.0800	0.0567	0.0609	70.9	76.1	45.0-128			7.17	20
Chrysene	0.0800	0.0564	0.0567	70.5	70.9	48.0-127			0.580	20
Dibenz(a,h)anthracene	0.0800	0.0674	0.0669	84.2	83.7	43.0-132			0.630	20
Fluoranthene	0.0800	0.0619	0.0606	77.4	75.7	49.0-129			2.20	20

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

(LCS) R3249985-1 09/15/17 15:11 • (LCSD) R3249985-2 09/15/17 15:32

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 %
Fluorene	0.0800	0.0633	0.0627	79.1	78.4	50.0-120			0.900	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0637	0.0633	79.6	79.2	44.0-131			0.610	20
Naphthalene	0.0800	0.0599	0.0596	74.9	74.5	50.0-120			0.600	20
Phenanthrene	0.0800	0.0581	0.0577	72.6	72.1	48.0-120			0.670	20
Pyrene	0.0800	0.0588	0.0584	73.5	73.0	48.0-135			0.690	20
1-Methylnaphthalene	0.0800	0.0615	0.0606	76.9	75.8	52.0-122			1.46	20
2-Methylnaphthalene	0.0800	0.0584	0.0574	73.0	71.7	52.0-120			1.75	20
2-Chloronaphthalene	0.0800	0.0624	0.0618	78.0	77.3	50.0-120			0.940	20
(S) Nitrobenzene-d5				80.7	78.5	14.0-149				
(S) 2-Fluorobiphenyl				75.0	72.1	34.0-125				
(S) p-Terphenyl-d14				68.7	66.6	23.0-120				

L935936-17 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L935936-17 09/15/17 19:09 • (MS) R3249985-4 09/15/17 19:30 • (MSD) R3249985-5 09/15/17 19:52

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 %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Anthracene	0.0981	0.0111	0.0753	0.0657	65.4	55.6	1	20.0-136			13.6	24
Acenaphthene	0.0981	0.00430	0.0613	0.0599	58.1	56.6	1	29.0-124			2.43	20
Acenaphthylene	0.0981	U	0.0701	0.0681	71.5	69.4	1	35.0-120			2.88	20
Benzo(a)anthracene	0.0981	0.0397	0.103	0.0803	64.5	41.4	1	13.0-132			24.7	27
Benzo(a)pyrene	0.0981	0.0355	0.0905	0.0721	56.0	37.3	1	14.0-138			22.6	27
Benzo(b)fluoranthene	0.0981	0.0361	0.0819	0.0696	46.7	34.2	1	10.0-129			16.2	31
Benzo(g,h,i)perylene	0.0981	0.0205	0.0647	0.0529	45.0	33.0	1	10.0-133			20.0	30
Benzo(k)fluoranthene	0.0981	0.0171	0.0594	0.0541	43.1	37.7	1	15.0-131			9.29	27
Chrysene	0.0981	0.0349	0.0931	0.0717	59.4	37.5	1	15.0-137		J3	26.0	25
Dibenz(a,h)anthracene	0.0981	0.00605	0.0568	0.0479	51.8	42.7	1	15.0-132			17.0	27
Fluoranthene	0.0981	0.0927	0.182	0.130	90.6	38.0	1	13.0-139		J3	33.1	28
Fluorene	0.0981	0.00355	0.0636	0.0614	61.2	58.9	1	27.0-122			3.56	22
Indeno(1,2,3-cd)pyrene	0.0981	0.0174	0.0670	0.0544	50.5	37.6	1	11.0-133			20.8	29
Naphthalene	0.0981	0.0105	0.0684	0.0715	59.0	62.1	1	18.0-136			4.46	21
Phenanthrene	0.0981	0.0469	0.112	0.0908	66.0	44.8	1	15.0-133			20.5	25
Pyrene	0.0981	0.100	0.183	0.132	83.8	32.4	1	11.0-146		J3	32.0	29
1-Methylnaphthalene	0.0981	U	0.0661	0.0667	67.4	68.0	1	24.0-137			0.800	22
2-Methylnaphthalene	0.0981	0.00323	0.0631	0.0627	61.1	60.6	1	23.0-136			0.750	22
2-Chloronaphthalene	0.0981	U	0.0622	0.0607	63.4	61.9	1	36.0-120			2.39	20
(S) Nitrobenzene-d5					69.1	83.9		14.0-149				
(S) 2-Fluorobiphenyl					71.3	70.8		34.0-125				
(S) p-Terphenyl-d14					73.3	72.6		23.0-120				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
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.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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

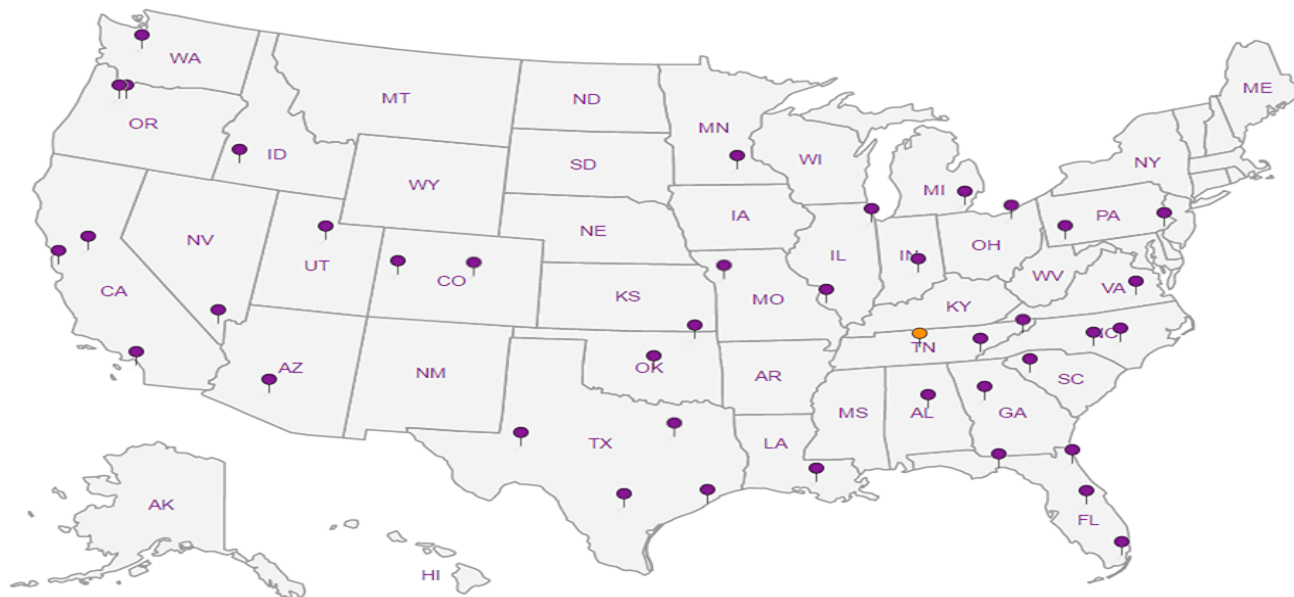
Third Party & Federal Accreditations

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:
Nicholson GeoSolutions, LLC
3433 E. Lake Dr.
Centennial, CO 80121

Report to:
Dave Nicholson

Project Description:
Pit Reclamation

Phone: **303-601-2023**
Fax:

Collected by (print):
[Signature]

Collected by (signature):
[Signature]

Immediately Packed on Ice ☒

Billing Information:
Tom Hogelin
Berry Petroleum Company
235 Callahan Ave
Parachute, CO 81635

Email To:
dknicholson@q.com

City/State Collected:

Lab Project #
BERPETDCO030615S

P.O. #

Date Results Needed

Email? ☒ No ☒ Yes
FAX? ☒ No ☒ Yes

No. of Cntrs

Analysis / Container / Preservative

SAB Metals - Cu6 (1) 4oz Clear - No Pres


BTEX/TVPH (1) 4oz Clear - No Pres


TEPH(8015)Diesel & Oil Range (1) 4oz Clear-No Pres

SPCON - pH (1) 4oz Clear - No Pres

PATHS by 8270 SIM

Chain of Custody Page 1 of 1


L.A.B. S.C.I.E.N.C.E.S.
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859



L# **L935551**
F104
Acctnum: **BERPETDCO**
Template:
Prelogin:
TSR:
Cooler:
Shipped Via:
Rem./Contaminant
Sample # (lab only)

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	SAB Metals - Cu6 (1) 4oz Clear - No Pres	BTEX/TVPH (1) 4oz Clear - No Pres	TEPH(8015)Diesel & Oil Range (1) 4oz Clear-No Pres	SPCON - pH (1) 4oz Clear - No Pres	Other	Other	Other	Other	Other	Other	Other	Other	Other
K-15-2		SS		9/11	1400	3	X	X	X	X									
K-15		SS			1420	3	X	X	X	X									-01
B-10		SS			1450	3	X	X	X	X									02
G-10		SS			1500	3	X	X	X	X									03
K-15-2		SS		9/9	1400	3	X	X	X	X									04
L-15		SS		9/10	1540	3	X	X	X	X									05
LR J-15		SS			1550	3	X	X	X	X									06
LR M-15		SS			1630	3	X	X	X	X									07
		SS				4													
		SS				4													

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

Remarks: **As, Ba, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn, Gr6**

Relinquished by: (Signature) **[Signature]** Date: **9/10/17** Time: **1700**

Relinquished by: (Signature) Date: Time:

Relinquished by: (Signature) Date: Time:

Received by: (Signature) **[Signature]** Date: **9/12/17** Time: **0845**

Received by: (Signature) Date: Time:

Received by: (Signature) Date: Time:

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

Temp: **3.6** °C Bottles Received: **21-402**

Date: **9-12-17** Time: **0845**

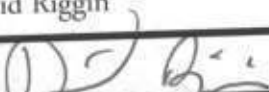
Condition: (lab use only) **OK**

COC Seal Intact: **Y** **N** **NA**

pH Checked: NCF:

ESC LAB SCIENCES

Cooler Receipt Form

Client:	BERPET DCO	SDG#	1935551
Cooler Received/Opened On:	9/12/17	Temperature:	3.6°C
Received by: David Riffin			
Signature: 			

	NP	Yes	No
Receipt Check List			
COC Seal Present / Intact?	/		
COC Signed / Accurate?		/	
Bottles arrive intact?		/	
Correct bottles used?		/	
Sufficient volume sent?			
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			

September 20, 2017

Berry Petroleum - Denver, CO

Sample Delivery Group: L935551

Samples Received: 09/12/2017

Project Number:

Description: Pit Reclamation

Report To:

Dave Nicholson

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.



Cp: Cover Page	1
Tc: Table of Contents	2
Ss: Sample Summary	3
Cn: Case Narrative	5
Sr: Sample Results	6
K-15 L935551-01	6
B-10 L935551-02	7
C-10 L935551-03	8
K-15-2 L935551-04	9
L-15 L935551-05	10
LR J-15 L935551-06	11
LR M-15 L935551-07	12
Qc: Quality Control Summary	13
Volatile Organic Compounds (GC) by Method 8015/8021	13
Semi-Volatile Organic Compounds (GC) by Method 8015	15
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	16
Gl: Glossary of Terms	18
Al: Accreditations & Locations	19
Sc: Sample Chain of Custody	20



SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



K-15 L935551-01 Solid

Collected by
DK Nicholson

Collected date/time
09/09/17 14:20

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 12:20	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 10:08	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 16:37	KM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

B-10 L935551-02 Solid

Collected by
DK Nicholson

Collected date/time
09/09/17 14:50

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 12:42	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 10:22	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 16:59	KM

C-10 L935551-03 Solid

Collected by
DK Nicholson

Collected date/time
09/09/17 15:00

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 13:05	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 10:36	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 17:21	KM

K-15-2 L935551-04 Solid

Collected by
DK Nicholson

Collected date/time
09/09/17 14:00

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 13:27	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 10:49	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 17:42	KM

L-15 L935551-05 Solid

Collected by
DK Nicholson

Collected date/time
09/10/17 15:40

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 13:49	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 11:03	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 18:47	KM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	5	09/14/17 21:44	09/19/17 10:59	KM

LR J-15 L935551-06 Solid

Collected by
DK Nicholson

Collected date/time
09/10/17 15:50

Received date/time
09/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 14:12	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 11:17	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 18:04	KM

ACCOUNT:

Berry Petroleum - Denver, CO

PROJECT:

SDG:

L935551

DATE/TIME:

09/20/17 08:49

PAGE:

3 of 21



LR M-15 L935551-07 Solid

Collected by
DK NicholsonCollected date/time
09/10/17 16:30Received date/time
09/12/17 08:45

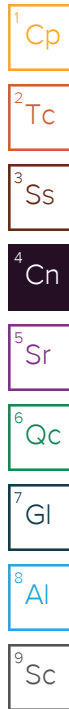
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1019615	1	09/12/17 14:38	09/13/17 14:34	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1021639	10	09/18/17 19:47	09/19/17 11:31	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1020499	1	09/14/17 21:44	09/15/17 18:25	KM

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ 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 radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. 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





Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00176		0.000500	1	09/13/2017 13:27	WG1019615
Toluene	ND		0.00500	1	09/13/2017 13:27	WG1019615
Ethylbenzene	0.00173		0.000500	1	09/13/2017 13:27	WG1019615
Total Xylene	0.00237		0.00150	1	09/13/2017 13:27	WG1019615
TPH (GC/FID) Low Fraction	ND		0.100	1	09/13/2017 13:27	WG1019615
(S) a,a,a-Trifluorotoluene(FID)	90.7		77.0-120		09/13/2017 13:27	WG1019615
(S) a,a,a-Trifluorotoluene(PID)	97.1		75.0-128		09/13/2017 13:27	WG1019615

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	125		40.0	10	09/19/2017 10:49	WG1021639
C28-C40 Oil Range	90.1		40.0	10	09/19/2017 10:49	WG1021639
(S) o-Terphenyl	90.6		18.0-148		09/19/2017 10:49	WG1021639

6 Qc

7 Gl

8 Al

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	0.0116		0.00600	1	09/15/2017 17:42	WG1020499
Acenaphthene	0.00679		0.00600	1	09/15/2017 17:42	WG1020499
Acenaphthylene	ND		0.00600	1	09/15/2017 17:42	WG1020499
Benzo(a)anthracene	0.0800		0.00600	1	09/15/2017 17:42	WG1020499
Benzo(a)pyrene	0.0764		0.00600	1	09/15/2017 17:42	WG1020499
Benzo(b)fluoranthene	0.195		0.00600	1	09/15/2017 17:42	WG1020499
Benzo(g,h,i)perylene	0.117		0.00600	1	09/15/2017 17:42	WG1020499
Benzo(k)fluoranthene	0.0389		0.00600	1	09/15/2017 17:42	WG1020499
Chrysene	0.110		0.00600	1	09/15/2017 17:42	WG1020499
Dibenz(a,h)anthracene	0.0520		0.00600	1	09/15/2017 17:42	WG1020499
Fluoranthene	0.0869		0.00600	1	09/15/2017 17:42	WG1020499
Fluorene	0.00873		0.00600	1	09/15/2017 17:42	WG1020499
Indeno(1,2,3-cd)pyrene	0.100		0.00600	1	09/15/2017 17:42	WG1020499
Naphthalene	0.112		0.0200	1	09/15/2017 17:42	WG1020499
Phenanthrene	0.0758		0.00600	1	09/15/2017 17:42	WG1020499
Pyrene	0.0635		0.00600	1	09/15/2017 17:42	WG1020499
1-Methylnaphthalene	0.0877		0.0200	1	09/15/2017 17:42	WG1020499
2-Methylnaphthalene	0.199		0.0200	1	09/15/2017 17:42	WG1020499
2-Chloronaphthalene	ND		0.0200	1	09/15/2017 17:42	WG1020499
(S) p-Terphenyl-d14	61.9		23.0-120		09/15/2017 17:42	WG1020499
(S) Nitrobenzene-d5	71.1		14.0-149		09/15/2017 17:42	WG1020499
(S) 2-Fluorobiphenyl	62.9		34.0-125		09/15/2017 17:42	WG1020499

9 Sc



Method Blank (MB)

(MB) R3249649-5 09/13/17 11:28

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	U		0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	98.6			77.0-120
(S) a,a,a-Trifluorotoluene(PID)	105			75.0-128

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) R3249649-1 09/13/17 09:15 • (LCSD) R3249649-2 09/13/17 09:59

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 %
Benzene	0.0500	0.0466	0.0484	93.2	96.7	71.0-121			3.67	20
Toluene	0.0500	0.0486	0.0498	97.1	99.6	72.0-120			2.48	20
Ethylbenzene	0.0500	0.0507	0.0520	101	104	76.0-121			2.50	20
Total Xylene	0.150	0.154	0.158	103	105	75.0-124			2.18	20
(S) a,a,a-Trifluorotoluene(FID)				98.7	99.0	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				104	104	75.0-128				

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

(LCS) R3249649-3 09/13/17 10:21 • (LCSD) R3249649-4 09/13/17 10:43

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 %
TPH (GC/FID) Low Fraction	5.50	6.23	6.31	113	115	70.0-136			1.31	20
(S) a,a,a-Trifluorotoluene(FID)				107	107	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				119	119	75.0-128				



[L935551-01,02,03,04,05,06,07](#)

L935558-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L935558-09 09/13/17 17:56 • (MS) R3249649-6 09/13/17 18:18 • (MSD) R3249649-7 09/13/17 18:40

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 %
Benzene	0.0500	0.00189	0.0139	0.0255	24.1	47.2	1	10.0-146		J3	58.7	29
Toluene	0.0500	ND	0.0125	0.0199	18.3	33.1	1	10.0-143		J3	45.5	30
Ethylbenzene	0.0500	0.00144	0.00970	0.0154	16.5	27.8	1	10.0-147		J3	45.1	31
Total Xylene	0.150	0.00219	0.0264	0.0411	16.1	25.9	1	10.0-149	J6	J3 J6	43.5	30
(S) a,a,a-Trifluorotoluene(FID)					91.4	93.9		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					97.0	99.0		75.0-128				

L935558-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L935558-09 09/13/17 17:56 • (MS) R3249649-8 09/13/17 19:02 • (MSD) R3249649-9 09/13/17 19:24

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 %
TPH (GC/FID) Low Fraction	5.50	ND	2.34	1.71	42.5	31.1	1	10.0-147		J3	31.1	30
(S) a,a,a-Trifluorotoluene(FID)					94.3	93.2		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					103	101		75.0-128				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3250308-1 09/19/17 09:26

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	86.8			18.0-148

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) R3250308-2 09/19/17 09:40 • (LCSD) R3250308-3 09/19/17 09:54

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 %
C10-C28 Diesel Range	60.0	57.6	55.0	96.0	91.7	50.0-150			4.64	20
(S) o-Terphenyl				94.2	85.9	18.0-148				

L935558-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L935558-02 09/19/17 11:59 • (MS) R3250308-4 09/19/17 12:13 • (MSD) R3250308-5 09/19/17 12:27

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 %
C10-C28 Diesel Range	6.00	92.4	185	164	154	120	10	50.0-150	J5		12.0	20
(S) o-Terphenyl					87.7	88.0		18.0-148				

Method Blank (MB)

(MB) R3249985-3 09/15/17 15:54

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Anthracene	U		0.000600	0.00600
Acenaphthene	U		0.000600	0.00600
Acenaphthylene	U		0.000600	0.00600
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(g,h,i)perylene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Fluoranthene	U		0.000600	0.00600
Fluorene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
Naphthalene	U		0.00200	0.0200
Phenanthrene	U		0.000600	0.00600
Pyrene	U		0.000600	0.00600
1-Methylnaphthalene	U		0.00200	0.0200
2-Methylnaphthalene	U		0.00200	0.0200
2-Chloronaphthalene	U		0.00200	0.0200
(S) Nitrobenzene-d5	70.2			14.0-149
(S) 2-Fluorobiphenyl	65.2			34.0-125
(S) p-Terphenyl-d14	60.7			23.0-120

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

(LCS) R3249985-1 09/15/17 15:11 • (LCSD) R3249985-2 09/15/17 15:32

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 %
Anthracene	0.0800	0.0618	0.0608	77.2	76.0	50.0-125			1.57	20
Acenaphthene	0.0800	0.0599	0.0597	74.9	74.6	52.0-120			0.390	20
Acenaphthylene	0.0800	0.0661	0.0655	82.6	81.9	51.0-120			0.890	20
Benzo(a)anthracene	0.0800	0.0582	0.0561	72.8	70.1	46.0-121			3.70	20
Benzo(a)pyrene	0.0800	0.0531	0.0544	66.4	68.0	42.0-121			2.39	20
Benzo(b)fluoranthene	0.0800	0.0571	0.0517	71.4	64.7	42.0-123			9.96	20
Benzo(g,h,i)perylene	0.0800	0.0616	0.0613	77.0	76.6	43.0-128			0.580	20
Benzo(k)fluoranthene	0.0800	0.0567	0.0609	70.9	76.1	45.0-128			7.17	20
Chrysene	0.0800	0.0564	0.0567	70.5	70.9	48.0-127			0.580	20
Dibenz(a,h)anthracene	0.0800	0.0674	0.0669	84.2	83.7	43.0-132			0.630	20
Fluoranthene	0.0800	0.0619	0.0606	77.4	75.7	49.0-129			2.20	20

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

(LCS) R3249985-1 09/15/17 15:11 • (LCSD) R3249985-2 09/15/17 15:32

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 %
Fluorene	0.0800	0.0633	0.0627	79.1	78.4	50.0-120			0.900	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0637	0.0633	79.6	79.2	44.0-131			0.610	20
Naphthalene	0.0800	0.0599	0.0596	74.9	74.5	50.0-120			0.600	20
Phenanthrene	0.0800	0.0581	0.0577	72.6	72.1	48.0-120			0.670	20
Pyrene	0.0800	0.0588	0.0584	73.5	73.0	48.0-135			0.690	20
1-Methylnaphthalene	0.0800	0.0615	0.0606	76.9	75.8	52.0-122			1.46	20
2-Methylnaphthalene	0.0800	0.0584	0.0574	73.0	71.7	52.0-120			1.75	20
2-Chloronaphthalene	0.0800	0.0624	0.0618	78.0	77.3	50.0-120			0.940	20
(S) Nitrobenzene-d5				80.7	78.5	14.0-149				
(S) 2-Fluorobiphenyl				75.0	72.1	34.0-125				
(S) p-Terphenyl-d14				68.7	66.6	23.0-120				

L935936-17 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L935936-17 09/15/17 19:09 • (MS) R3249985-4 09/15/17 19:30 • (MSD) R3249985-5 09/15/17 19:52

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 %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Anthracene	0.0981	0.0111	0.0753	0.0657	65.4	55.6	1	20.0-136			13.6	24
Acenaphthene	0.0981	0.00430	0.0613	0.0599	58.1	56.6	1	29.0-124			2.43	20
Acenaphthylene	0.0981	U	0.0701	0.0681	71.5	69.4	1	35.0-120			2.88	20
Benzo(a)anthracene	0.0981	0.0397	0.103	0.0803	64.5	41.4	1	13.0-132			24.7	27
Benzo(a)pyrene	0.0981	0.0355	0.0905	0.0721	56.0	37.3	1	14.0-138			22.6	27
Benzo(b)fluoranthene	0.0981	0.0361	0.0819	0.0696	46.7	34.2	1	10.0-129			16.2	31
Benzo(g,h,i)perylene	0.0981	0.0205	0.0647	0.0529	45.0	33.0	1	10.0-133			20.0	30
Benzo(k)fluoranthene	0.0981	0.0171	0.0594	0.0541	43.1	37.7	1	15.0-131			9.29	27
Chrysene	0.0981	0.0349	0.0931	0.0717	59.4	37.5	1	15.0-137		J3	26.0	25
Dibenz(a,h)anthracene	0.0981	0.00605	0.0568	0.0479	51.8	42.7	1	15.0-132			17.0	27
Fluoranthene	0.0981	0.0927	0.182	0.130	90.6	38.0	1	13.0-139		J3	33.1	28
Fluorene	0.0981	0.00355	0.0636	0.0614	61.2	58.9	1	27.0-122			3.56	22
Indeno(1,2,3-cd)pyrene	0.0981	0.0174	0.0670	0.0544	50.5	37.6	1	11.0-133			20.8	29
Naphthalene	0.0981	0.0105	0.0684	0.0715	59.0	62.1	1	18.0-136			4.46	21
Phenanthrene	0.0981	0.0469	0.112	0.0908	66.0	44.8	1	15.0-133			20.5	25
Pyrene	0.0981	0.100	0.183	0.132	83.8	32.4	1	11.0-146		J3	32.0	29
1-Methylnaphthalene	0.0981	U	0.0661	0.0667	67.4	68.0	1	24.0-137			0.800	22
2-Methylnaphthalene	0.0981	0.00323	0.0631	0.0627	61.1	60.6	1	23.0-136			0.750	22
2-Chloronaphthalene	0.0981	U	0.0622	0.0607	63.4	61.9	1	36.0-120			2.39	20
(S) Nitrobenzene-d5					69.1	83.9		14.0-149				
(S) 2-Fluorobiphenyl					71.3	70.8		34.0-125				
(S) p-Terphenyl-d14					73.3	72.6		23.0-120				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
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.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 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		

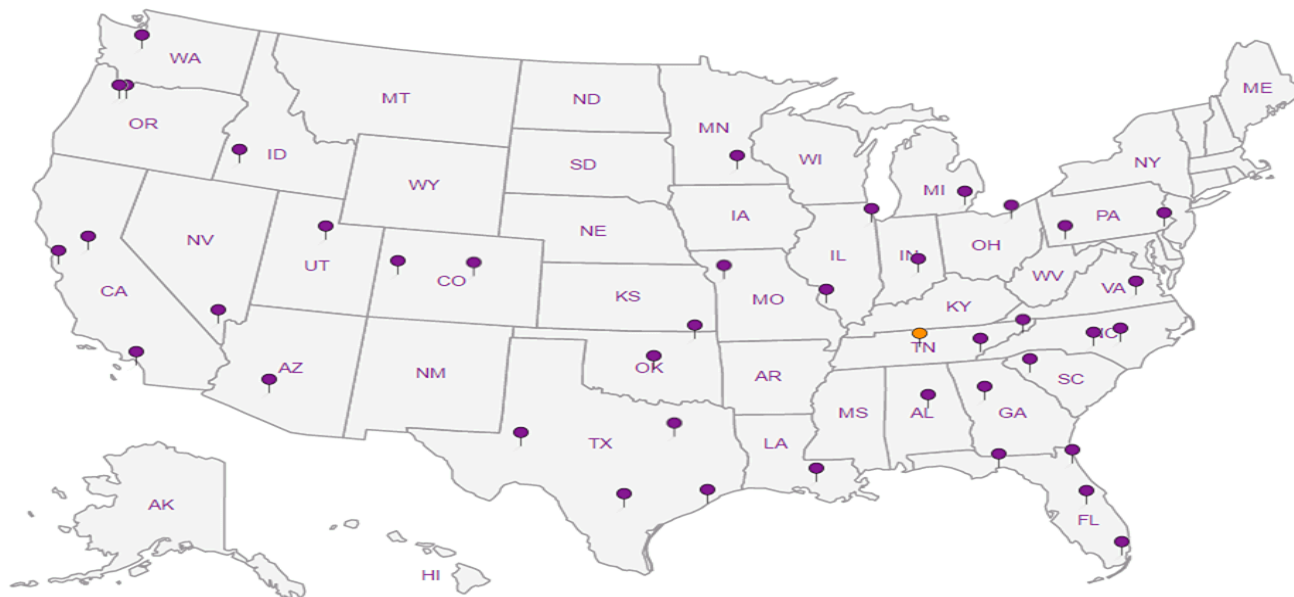
Third Party & Federal Accreditations

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		

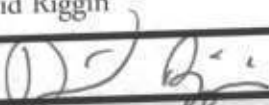
¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

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.**



ESC LAB SCIENCES Cooler Receipt Form

Client:	BERPET DCO	SDG#	1935551
Cooler Received/Opened On:	9/12/17	Temperature:	3.6°C
Received by: David Riggins			
Signature: 			

	NP	Yes	No
Receipt Check List			
COC Seal Present / Intact?	/		
COC Signed / Accurate?		/	
Bottles arrive intact?		/	
Correct bottles used?		/	
Sufficient volume sent?			
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			