Nicholson GeoSolutions LLC
3433 East Lake Drive
Centennial, CO 80121

May 4, 2017

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

Subject: Long Ridge M-15 Landfarm Screening Soil Sample Results

Dear Derek:

Nicholson GeoSolutions LLC collected a screening level soil sample from the landfarm on the M-15 well pad on Long Ridge, Garfield County, Colorado on April 19th, 2017. The sample was composited from 16 subsamples collected at depths of about 12-18 inches across the surface of the landfarm. The sample was analyzed for Total Volatile Petroleum Hydrocarbons (TVPH – gasoline range), Total Extractable Petroleum Hydrocarbons (TEPH – diesel and motor oil range), PAHs, BTEX, SAR, pH, conductivity, and metals to evaluate compliance with the COGCC Table 910-1 standards and whether additional treatment is necessary. The laboratory report is attached.

TPH was reported at 468.8 mg/kg (standard = 500 mg/kg), down from 623 mg/kg in November 2016. Benzo(a)pyrene was reported at 0.0311 mg/kg, above the standard of 0.022 mg/kg. All other results were below the standards except for arsenic at 7.34 mg/kg.

Further treatment of the landfarm should be conducted. The landfarm should be sampled again in the fall of 2017 to reassess the benzo(a)pyrene concentration and degradation rate.

Nicholson GeoSolutions LLC

DK Nicholson

David K. Nicholson, P.G.
Principal Geologist

ANALYTICAL REPORT

April 27, 2017

Linn Energy - Denver, CO

Sample Delivery Group:	L903862
Samples Received:	04/20/2017
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

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LR J15-1 L903862-01 Solid

Collected by: DK Nicholson
Collected date/time: 04/19/17 10:40
Received date/time: 04/20/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG972407	1	04/21/17 11:41	04/25/17 16:19	ST
Calculated Results	WG972559	1	04/22/17 08:58	04/25/17 16:53	MA
Wet Chemistry by Method 3060A/7196A	WG972776	1	04/25/17 09:10	04/25/17 16:53	MA
Wet Chemistry by Method 9045D	WG972465	1	04/20/17 15:48	04/21/17 09:40	MA
Wet Chemistry by Method 9050AMod	WG973401	1	04/25/17 17:30	04/25/17 17:30	KK
Mercury by Method 7471A	WG972389	1	04/20/17 14:58	04/22/17 08:58	TRB
Metals (ICP) by Method 6010B	WG972559	1	04/22/17 08:58	04/25/17 12:01	CCE
Volatile Organic Compounds (GC) by Method 8015/8021	WG973483	.93	04/24/17 12:53	04/25/17 16:10	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG972924	2	04/22/17 19:50	04/25/17 17:29	DMG
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG973164	1	04/24/17 14:51	04/25/17 14:24	CLG

LR J15-2 L903862-02 Solid

Collected by: DK Nicholson
Collected date/time: 04/19/17 11:30
Received date/time: 04/20/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG972407	1	04/21/17 11:41	04/25/17 16:22	ST
Calculated Results	WG972559	1	04/22/17 08:58	04/25/17 16:53	MA
Wet Chemistry by Method 3060A/7196A	WG972776	1	04/25/17 09:10	04/25/17 16:53	MA
Wet Chemistry by Method 9045D	WG972465	1	04/20/17 15:48	04/21/17 09:40	MA
Wet Chemistry by Method 9050AMod	WG973401	1	04/25/17 17:30	04/25/17 17:30	KK
Mercury by Method 7471A	WG972389	1	04/20/17 14:58	04/22/17 09:01	TRB
Metals (ICP) by Method 6010B	WG972559	1	04/22/17 08:58	04/25/17 12:27	CCE
Volatile Organic Compounds (GC) by Method 8015/8021	WG973483	1	04/24/17 12:53	04/25/17 16:32	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG972924	10	04/22/17 19:50	04/24/17 16:49	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG973164	1	04/24/17 14:51	04/25/17 18:37	CLG

LR M15 L903862-03 Solid

Collected by: DK Nicholson
Collected date/time: 04/19/17 12:15
Received date/time: 04/20/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG972407	1	04/21/17 11:41	04/25/17 16:25	ST
Calculated Results	WG972559	1	04/22/17 08:58	04/25/17 16:53	MA
Wet Chemistry by Method 3060A/7196A	WG972776	1	04/25/17 09:10	04/25/17 16:53	MA
Wet Chemistry by Method 9045D	WG972465	1	04/20/17 15:48	04/21/17 09:40	MA
Wet Chemistry by Method 9050AMod	WG973401	1	04/25/17 17:30	04/25/17 17:30	KK
Mercury by Method 7471A	WG972389	1	04/20/17 14:58	04/22/17 09:03	TRB
Metals (ICP) by Method 6010B	WG972559	1	04/22/17 08:58	04/25/17 12:30	CCE
Volatile Organic Compounds (GC) by Method 8015/8021	WG973483	.93	04/24/17 12:53	04/25/17 16:53	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG972924	10	04/22/17 19:50	04/24/17 17:07	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG973164	1	04/24/17 14:51	04/25/17 18:59	CLG

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

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	5.63		1	04/25/2017 16:25	WG972407

Calculated Results

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Trivalent	23.0		1.00	1	04/25/2017 16:53	WG972559

Wet Chemistry by Method 3060A/7196A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Hexavalent	ND		2.00	1	04/25/2017 16:53	WG972776

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	7.67	T8	1	04/21/2017 09:40	WG972465

Sample Narrative:

9045D L903862-03 WG972465: 7.67 at 22.5c

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	1980		1	04/25/2017 17:30	WG973401

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	0.0297		0.0200	1	04/22/2017 09:03	WG972389

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	7.34		2.00	1	04/25/2017 12:30	WG972559
Barium	380		0.500	1	04/25/2017 12:30	WG972559
Boron	ND		10.0	1	04/25/2017 12:30	WG972559
Cadmium	ND		0.500	1	04/25/2017 12:30	WG972559
Chromium	23.0		1.00	1	04/25/2017 12:30	WG972559
Copper	23.2		2.00	1	04/25/2017 12:30	WG972559
Lead	14.6		0.500	1	04/25/2017 12:30	WG972559
Nickel	18.3		2.00	1	04/25/2017 12:30	WG972559
Selenium	ND		2.00	1	04/25/2017 12:30	WG972559
Silver	ND		1.00	1	04/25/2017 12:30	WG972559
Zinc	50.8		5.00	1	04/25/2017 12:30	WG972559

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00222		0.000465	.93	04/25/2017 16:53	WG973483
Toluene	ND		0.00465	.93	04/25/2017 16:53	WG973483
Ethylbenzene	0.00178		0.000465	.93	04/25/2017 16:53	WG973483
Total Xylene	0.00360	B	0.00140	.93	04/25/2017 16:53	WG973483

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	ND		0.0930	.93	04/25/2017 16:53	WG973483
(S) a,a,a-Trifluorotoluene(FID)	*93.5*		*77.0-120*		*04/25/2017 16:53*	WG973483
(S) a,a,a-Trifluorotoluene(PID)	*86.3*		*75.0-128*		*04/25/2017 16:53*	WG973483

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	382	V	40.0	10	04/24/2017 17:07	WG972924
C28-C40 Oil Range	86.8		40.0	10	04/24/2017 17:07	WG972924
(S) o-Terphenyl	*76.7*		*18.0-148*		*04/24/2017 17:07*	WG972924

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	0.0169		0.00600	1	04/25/2017 18:59	WG973164
Acenaphthene	0.0214		0.00600	1	04/25/2017 18:59	WG973164
Acenaphthylene	ND		0.00600	1	04/25/2017 18:59	WG973164
Benzo(a)anthracene	0.0192		0.00600	1	04/25/2017 18:59	WG973164
Benzo(a)pyrene	0.0311		0.00600	1	04/25/2017 18:59	WG973164
Benzo(b)fluoranthene	0.0496		0.00600	1	04/25/2017 18:59	WG973164
Benzo(g,h,i)perylene	0.0466		0.00600	1	04/25/2017 18:59	WG973164
Benzo(k)fluoranthene	0.00960		0.00600	1	04/25/2017 18:59	WG973164
Chrysene	0.0371		0.00600	1	04/25/2017 18:59	WG973164
Dibenz(a,h)anthracene	0.0128		0.00600	1	04/25/2017 18:59	WG973164
Fluoranthene	0.0223		0.00600	1	04/25/2017 18:59	WG973164
Fluorene	0.0239		0.00600	1	04/25/2017 18:59	WG973164
Indeno(1,2,3-cd)pyrene	0.0356		0.00600	1	04/25/2017 18:59	WG973164
Naphthalene	0.213		0.0200	1	04/25/2017 18:59	WG973164
Phenanthrene	0.0895		0.00600	1	04/25/2017 18:59	WG973164
Pyrene	0.0592		0.00600	1	04/25/2017 18:59	WG973164
1-Methylnaphthalene	0.265		0.0200	1	04/25/2017 18:59	WG973164
2-Methylnaphthalene	0.578		0.0200	1	04/25/2017 18:59	WG973164
2-Chloronaphthalene	ND		0.0200	1	04/25/2017 18:59	WG973164
(S) p-Terphenyl-d14	*57.8*		*23.0-120*		*04/25/2017 18:59*	WG973164
(S) Nitrobenzene-d5	*88.5*		*14.0-149*		*04/25/2017 18:59*	WG973164
(S) 2-Fluorobiphenyl	*64.6*		*34.0-125*		*04/25/2017 18:59*	WG973164

Method Blank (MB)

(MB) R3213362-1 04/25/17 16:40

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chromium,Hexavalent	U		0.64	2.00

L903500-04 Original Sample (OS) • Duplicate (DUP)

(OS) L903500-04 04/25/17 16:41 • (DUP) R3213362-4 04/25/17 16:41

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	ND	0.000	1	0		20

L904141-01 Original Sample (OS) • Duplicate (DUP)

(OS) L904141-01 04/25/17 16:56 • (DUP) R3213362-5 04/25/17 16:56

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	U	0	1	0		20

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

(LCS) R3213362-2 04/25/17 16:40 • (LCSD) R3213362-3 04/25/17 16:40

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 %
Chromium,Hexavalent	56.9	53.6	53.6	94	94	80-120			0	20

L904141-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L904141-01 04/25/17 16:56 • (MS) R3213362-6 04/25/17 16:57 • (MSD) R3213362-7 04/25/17 16:57

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 %
Chromium,Hexavalent	25.5	U	24.2	24.2	95	95	1	75-125			0	20

L903028-01 Original Sample (OS) • Duplicate (DUP)

(OS) L903028-01 04/21/17 09:40 • (DUP) WG972465-3 04/21/17 09:40

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	10.7	10.7	1	0.280	T8	1

L903864-03 Original Sample (OS) • Duplicate (DUP)

(OS) L903864-03 04/21/17 09:40 • (DUP) WG972465-4 04/21/17 09:40

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.15	8.14	1	0.123	T8	1

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

(LCS) WG972465-1 04/21/17 09:40 • (LCSD) WG972465-2 04/21/17 09:40

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	7.50	7.49	7.47	99.9	99.6	98.7-101			0.267	1

Method Blank (MB)

(MB) WG973401-1 04/25/17 17:30

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	umhos/cm		umhos/cm	umhos/cm
Specific Conductance	1.27			

L903862-01 Original Sample (OS) • Duplicate (DUP)

(OS) L903862-01 04/25/17 17:30 • (DUP) WG973401-4 04/25/17 17:30

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	umhos/cm	umhos/cm		%		%
Specific Conductance	1690	1690	1	0.236		20

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

(LCS) WG973401-2 04/25/17 17:30 • (LCSD) WG973401-3 04/25/17 17:30

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	umhos/cm	umhos/cm	umhos/cm	%	%	%			%	%
Specific Conductance	169	164	158	97.0	93.5	90.0-110			3.73	20

Method Blank (MB)

(MB) R3212690-1 04/22/17 07:52

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	U		0.0028	0.0200

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

(LCS) R3212690-2 04/22/17 07:54 • (LCSD) R3212690-3 04/22/17 07:57

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 %
Mercury	0.300	0.254	0.251	85	84	80-120			1	20

L903832-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L903832-05 04/22/17 07:59 • (MS) R3212690-4 04/22/17 08:02 • (MSD) R3212690-5 04/22/17 08:12

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 %
Mercury	0.300	ND	0.222	0.264	74	88	1	75-125	J6		17	20

Method Blank (MB)

(MB) R3213311-1 04/25/17 11:53

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.65	2.00
Barium	U		0.17	0.500
Boron	U		1.26	10.0
Cadmium	U		0.07	0.500
Chromium	U		0.14	1.00
Copper	U		0.53	2.00
Lead	U		0.19	0.500
Nickel	U		0.49	2.00
Selenium	U		0.74	2.00
Silver	U		0.28	1.00
Zinc	1.22	J	0.59	5.00

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

(LCS) R3213311-2 04/25/17 11:56 • (LCSD) R3213311-3 04/25/17 11:58

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 %
Arsenic	100	105	104	105	104	80-120			1	20
Barium	100	109	108	109	108	80-120			1	20
Boron	100	103	102	103	102	80-120			1	20
Cadmium	100	106	104	106	104	80-120			1	20
Chromium	100	103	102	103	102	80-120			1	20
Copper	100	109	108	109	108	80-120			1	20
Lead	100	106	104	106	104	80-120			2	20
Nickel	100	108	106	108	106	80-120			2	20
Selenium	100	107	106	107	106	80-120			1	20
Silver	20.0	20.2	20.0	101	100	80-120			1	20
Zinc	100	108	105	108	105	80-120			2	20

L903862-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L903862-01 04/25/17 12:01 • (MS) R3213311-6 04/25/17 12:08 • (MSD) R3213311-7 04/25/17 12:11

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 %
Arsenic	100	5.95	111	107	105	101	1	75-125			4	20
Barium	100	501	666	648	165	147	1	75-125	V	V	3	20
Boron	100	ND	108	105	98	95	1	75-125			2	20
Cadmium	100	ND	106	103	106	102	1	75-125			3	20
Chromium	100	26.5	124	122	97	96	1	75-125			2	20

L903862-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L903862-01 04/25/17 12:01 • (MS) R3213311-6 04/25/17 12:08 • (MSD) R3213311-7 04/25/17 12:11

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 %
Copper	100	20.2	131	128	111	108	1	75-125			2	20
Lead	100	13.3	120	117	107	104	1	75-125			3	20
Nickel	100	20.6	131	129	111	109	1	75-125			2	20
Selenium	100	ND	105	101	105	101	1	75-125			4	20
Silver	20.0	ND	20.6	19.9	103	99	1	75-125			3	20
Zinc	100	56.7	156	153	99	96	1	75-125			2	20

Method Blank (MB)

(MB) R3213991-5 04/25/17 12:00

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000298	J	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)	*101*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*92.6*			*75.0-128*

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

(LCS) R3213991-1 04/25/17 10:11 • (LCSD) R3213991-2 04/25/17 10:33

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	0.0539	0.0533	108	107	71.0-121			1.18	20
Toluene	0.0500	0.0535	0.0522	107	104	72.0-120			2.51	20
Ethylbenzene	0.0500	0.0546	0.0539	109	108	76.0-121			1.30	20
Total Xylene	0.150	0.171	0.167	114	111	75.0-124			2.36	20
(S) a,a,a-Trifluorotoluene(FID)				*100*	*101*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*98.4*	*100*	*75.0-128*				

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

(LCS) R3213991-3 04/25/17 10:55 • (LCSD) R3213991-4 04/25/17 11:16

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	6.27	5.39	114	97.9	70.0-136			15.2	20
(S) a,a,a-Trifluorotoluene(FID)				*102*	*100*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*109*	*107*	*75.0-128*				

L903864-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L903864-01 04/25/17 14:00 • (MS) R3213991-6 04/25/17 14:22 • (MSD) R3213991-7 04/25/17 14:44

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	0.232	1.53	1.71	104	118	25	10.0-146			10.9	29
Toluene	0.0500	3.11	3.74	3.94	50.3	66.8	25	10.0-143			5.36	30
Ethylbenzene	0.0500	0.609	1.61	1.78	79.9	93.6	25	10.0-147			10.1	31
Total Xylene	0.150	12.6	13.9	14.5	33.9	49.6	25	10.0-149	J6	J6	4.16	30
(S) a,a,a-Trifluorotoluene(FID)					*88.1*	*90.7*		*77.0-120*				

L903864-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L903864-01 04/25/17 14:00 • (MS) R3213991-6 04/25/17 14:22 • (MSD) R3213991-7 04/25/17 14:44

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 %
(S) a,a,a-Trifluorotoluene(PID)					*100*	*103*		*75.0-128*				

L903864-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L903864-01 04/25/17 14:00 • (MS) R3213991-8 04/25/17 15:05 • (MSD) R3213991-9 04/25/17 15:27

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 %
TPH (GC/FID) Low Fraction	5.50	314	278	373	0.000	43.0	25	10.0-147	E J6	E	29.0	30
(S) a,a,a-Trifluorotoluene(FID)					*90.0*	*99.8*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*103*	*111*		*75.0-128*				

Method Blank (MB)

(MB) R3213152-1 04/24/17 15:25

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	*102*			*18.0-148*

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

(LCS) R3213152-2 04/24/17 15:42 • (LCSD) R3213152-3 04/24/17 15:58

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
C10-C28 Diesel Range	60.0	58.8	53.4	98.1	89.1	50.0-150			9.60	20
(S) o-Terphenyl				*99.0*	*95.4*	*18.0-148*				

L903862-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L903862-03 04/24/17 17:07 • (MS) R3213152-4 04/24/17 17:24 • (MSD) R3213152-5 04/24/17 17:41

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
C10-C28 Diesel Range	6.00	382	489	412	179	50.5	10	50.0-150	V		17.1	20
(S) o-Terphenyl					*84.7*	*93.5*		*18.0-148*				

Method Blank (MB)

(MB) R3213388-3 04/25/17 12:17

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) p-Terphenyl-d14	*61.0*			*23.0-120*
(S) Nitrobenzene-d5	*65.7*			*14.0-149*
(S) 2-Fluorobiphenyl	*65.1*			*34.0-125*

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

(LCS) R3213388-1 04/25/17 11:35 • (LCSD) R3213388-2 04/25/17 11:56

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	0.0554	0.0579	69.2	72.4	50.0-125			4.50	20
Acenaphthene	0.0800	0.0576	0.0597	72.1	74.6	52.0-120			3.51	20
Acenaphthylene	0.0800	0.0576	0.0599	72.0	74.9	51.0-120			3.96	20
Benzo(a)anthracene	0.0800	0.0544	0.0558	68.1	69.7	46.0-121			2.41	20
Benzo(a)pyrene	0.0800	0.0510	0.0547	63.7	68.3	42.0-121			6.98	20
Benzo(b)fluoranthene	0.0800	0.0537	0.0559	67.2	69.9	42.0-123			3.98	20
Benzo(g,h,i)perylene	0.0800	0.0581	0.0604	72.6	75.6	43.0-128			3.99	20
Benzo(k)fluoranthene	0.0800	0.0548	0.0572	68.5	71.5	45.0-128			4.31	20
Chrysene	0.0800	0.0567	0.0588	70.8	73.5	48.0-127			3.63	20
Dibenz(a,h)anthracene	0.0800	0.0582	0.0606	72.8	75.7	43.0-132			3.97	20
Fluoranthene	0.0800	0.0616	0.0646	77.0	80.8	49.0-129			4.88	20

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

(LCS) R3213388-1 04/25/17 11:35 • (LCSD) R3213388-2 04/25/17 11:56

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 %
Fluorene	0.0800	0.0613	0.0638	76.6	79.7	50.0-120			4.04	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0607	0.0626	75.9	78.2	44.0-131			3.00	20
Naphthalene	0.0800	0.0563	0.0578	70.4	72.3	50.0-120			2.56	20
Phenanthrene	0.0800	0.0542	0.0571	67.7	71.3	48.0-120			5.25	20
Pyrene	0.0800	0.0513	0.0529	64.2	66.2	48.0-135			3.13	20
1-Methylnaphthalene	0.0800	0.0621	0.0635	77.6	79.4	52.0-122			2.31	20
2-Methylnaphthalene	0.0800	0.0597	0.0612	74.7	76.5	52.0-120			2.45	20
2-Chloronaphthalene	0.0800	0.0569	0.0590	71.2	73.8	50.0-120			3.64	20
(S) p-Terphenyl-d14				*63.8*	*63.6*	*23.0-120*				
(S) Nitrobenzene-d5				*80.1*	*85.3*	*14.0-149*				
(S) 2-Fluorobiphenyl				*71.3*	*75.0*	*34.0-125*				

L904336-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L904336-01 04/25/17 20:02 • (MS) R3213388-4 04/25/17 20:23 • (MSD) R3213388-5 04/25/17 20:44

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 %
Anthracene	0.00800	ND	0.0638	0.0678	68.4	73.4	10	20.0-136			6.10	24
Acenaphthene	0.00800	ND	0.134	0.112	117	89.9	10	29.0-124			17.5	20
Acenaphthylene	0.00800	ND	0.0740	0.0700	83.2	78.2	10	35.0-120			5.55	20
Benzo(a)anthracene	0.00800	ND	0.0842	0.208	75.7	231	10	13.0-132		J3 J5	84.9	27
Benzo(a)pyrene	0.00800	ND	0.0853	0.226	74.5	251	10	14.0-138		J3 J5	90.5	27
Benzo(b)fluoranthene	0.00800	ND	0.111	0.290	79.8	303	10	10.0-129		J3 J5	89.2	31
Benzo(g,h,i)perylene	0.00800	ND	0.103	0.193	81.0	194	10	10.0-133		J3 J5	61.0	30
Benzo(k)fluoranthene	0.00800	ND	0.0692	0.128	70.0	143	10	15.0-131		J3 J5	59.4	27
Chrysene	0.00800	ND	0.103	0.250	74.6	258	10	15.0-137		J3 J5	83.0	25
Dibenz(a,h)anthracene	0.00800	ND	0.0699	0.0946	74.3	105	10	15.0-132		J3	30.0	27
Fluoranthene	0.00800	ND	0.128	0.371	87.6	392	10	13.0-139		J3 J5	97.6	28
Fluorene	0.00800	ND	0.121	0.105	110	89.7	10	27.0-122			14.5	22
Indeno(1,2,3-cd)pyrene	0.00800	ND	0.0934	0.181	84.7	194	10	11.0-133		J3 J5	63.7	29
Naphthalene	0.00800	ND	0.350	0.274	242	148	10	18.0-136	J5	J3 J5	24.1	21
Phenanthrene	0.00800	ND	0.0825	0.0837	78.2	79.7	10	15.0-133			1.37	25
Pyrene	0.00800	ND	0.105	0.352	69.3	378	10	11.0-146		J3 J5	108	29
1-Methylnaphthalene	0.00800	ND	0.380	0.258	321	168	10	24.0-137	J5	J3 J5	38.3	22
2-Methylnaphthalene	0.00800	ND	0.147	0.134	138	122	10	23.0-136	J5		9.26	22
2-Chloronaphthalene	0.00800	ND	0.0681	0.0673	85.1	84.2	10	36.0-120			1.09	20
(S) p-Terphenyl-d14					*66.5*	*62.2*		*23.0-120*				
(S) Nitrobenzene-d5					*492*	*363*		*14.0-149*	J1	J1		
(S) 2-Fluorobiphenyl					*73.0*	*78.1*		*34.0-125*				

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.
(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.
Rec.	Recovery.

Qualifier	Description
B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
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.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.

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
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 [1 4]	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		

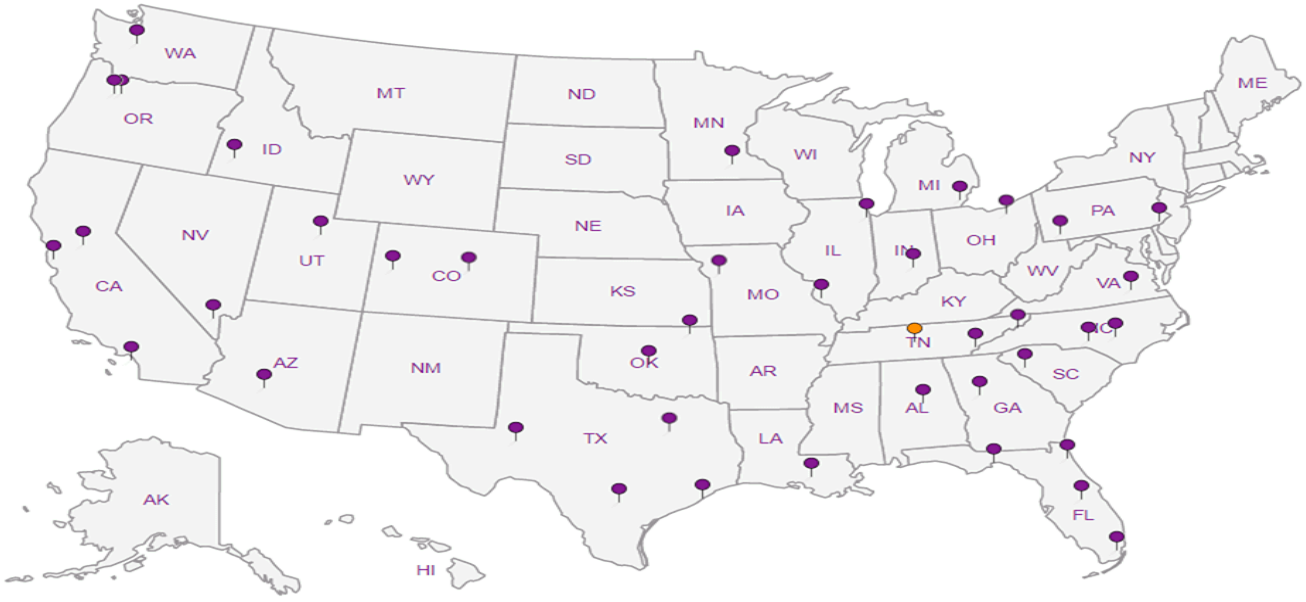
Third Party & Federal Accreditations

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

Billing Information:
Tom Hogelin
Linn Energy LLC
235 Callahan Ave
Parachute, CO 81635

Report to: Dave Nicholson

Email To: dknicholson@q.com

Project Description: Pit Reclamation

City/State Collected:

Phone: 303-601-2023
Fax:

Client Project #

Lab Project # BERPETDCO030615S

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature): DK Nicholson
Immediately Packed on Ice N ___ (Y) ___

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X Yes
FAX? X No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	SAR, Metals, Cr6 (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	PAHSIM 8270 (1) 4oz Soil Jar	Rem./Contaminant	Sample # (lab only)
LR JIS-1		SS		4/19	1040	5	X	X	X	X	X		-01
LR JIS-2		SS		↓	1130	5	X	X	X	X	X		02
LR M15		SS		↓	1215	5	X	X	X	X	X		03
		SS				5							
		SS				5							
		SS				5							
		SS				5							
		SS				5							
		SS				5							
		SS				5							

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L903862
Table 1070
Acctnum: BERPETDCO
Template:
Prelogin:
TSR:
Cooler:
Shipped Via:

* 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, Cr6

pH ___ Temp ___
Flow ___ Other ___

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
DK Nicholson	4/19/17	1630	FedEx
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
			7215 4519 2868
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☑ FedEx ☐ Courier ☐ ___
Temp: 2.1 °C Bottles Received: 15-4oz clr
Date: 4/20/17 Time: 0845

Condition: (lab use only) OK
COC Seal Intact: ___Y ___N ___NA
pH Checked: NCF:

ESC LAB SCIENCES
Cooler Receipt Form

Client: BERPETDCO		SDG#	L903862
Cooler Received/Opened On: 4/20/17	Temperature:	2.1	
Received By: Myra "Katie" Ingram			
Signature:			

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