Nicholson GeoSolutions LLC
3433 East Lake Drive
Centennial, CO 80121

June 26, 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 a screening level soil sample from the landfarm on the OM K-15 well pad in the Old Mountain area, Garfield County, Colorado on May 7th, 2017. The sample was composited from 16 subsamples collected at depths of about 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.

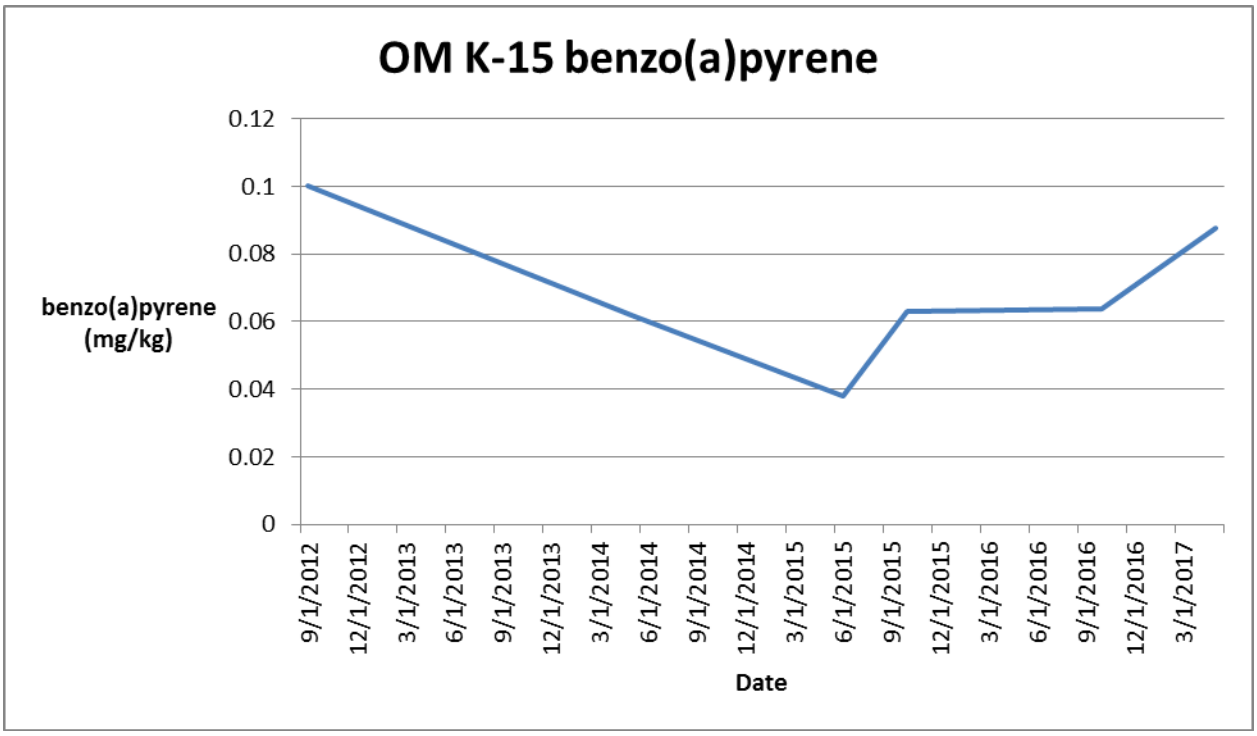
Benzo(a)pyrene was reported at 0.0875 mg/kg and dibenz(a,h)anthracene was reported at 0.0425 mg/kg (COGCC standard = 0.022 mg/kg). All other results were below the standards except for arsenic at 4.96 mg/kg.

The attached graph shows the concentrations of benzo(a)pyrene in the 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 0.038 mg/kg on June 1st, 2015, then rose to 0.0875 mg/kg for the most recent sample event, perhaps due to the more aggressive treatment program employed by Berry since the summer of 2015 that brought deeper material to the surface.

Further treatment of this landfarm should be conducted. The landfarm should be sampled again in the fall of 2017 to reassess the benzo(a)pyrene and dibenz(a,h)anthracene concentrations.

Nicholson GeoSolutions LLC

David K. Nicholson, P.G.
Principal Geologist



APPENDIX A
Laboratory Report

ANALYTICAL REPORT

May 17, 2017

Berry Petroleum - Denver, CO

Sample Delivery Group:	L908089
Samples Received:	05/10/2017
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.

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L-15 L908089-01 Solid

Collected by: DK Nicholsen
Collected date/time: 05/07/17 11:00
Received date/time: 05/10/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG978536	1	05/16/17 09:53	05/17/17 00:35	CCE
Wet Chemistry by Method 3060A/7196A	WG978168	1	05/12/17 12:56	05/16/17 11:37	MHM
Wet Chemistry by Method 9045D	WG978223	1	05/10/17 15:25	05/10/17 16:20	MHM
Wet Chemistry by Method 9050AMod	WG978499	1	05/11/17 17:29	05/11/17 17:29	MAJ
Mercury by Method 7471A	WG978275	1	05/10/17 13:47	05/11/17 16:21	TRB
Metals (ICP) by Method 6010B	WG978509	1	05/12/17 08:57	05/12/17 15:07	ST
Volatile Organic Compounds (GC) by Method 8015/8021	WG979637	.99	05/15/17 07:30	05/15/17 13:53	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG978849	10	05/12/17 08:24	05/13/17 16:16	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG979225	1	05/13/17 08:41	05/16/17 09:05	CLG

K-15 L908089-02 Solid

Collected by: DK Nicholsen
Collected date/time: 05/07/17 11:20
Received date/time: 05/10/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG978536	1	05/16/17 09:53	05/17/17 00:38	CCE
Wet Chemistry by Method 3060A/7196A	WG978168	1	05/12/17 12:56	05/16/17 11:41	MHM
Wet Chemistry by Method 9045D	WG978223	1	05/10/17 15:25	05/10/17 16:20	MHM
Wet Chemistry by Method 9050AMod	WG978499	1	05/11/17 17:29	05/11/17 17:29	MAJ
Mercury by Method 7471A	WG978275	1	05/10/17 13:47	05/11/17 16:23	TRB
Metals (ICP) by Method 6010B	WG978509	1	05/12/17 08:57	05/12/17 16:15	ST
Volatile Organic Compounds (GC) by Method 8015/8021	WG979637	.99	05/15/17 07:30	05/16/17 08:19	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG978849	10	05/12/17 08:24	05/13/17 11:00	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG979225	1	05/13/17 08:41	05/16/17 14:56	CLG

B-10 SMALL L908089-03 Solid

Collected by: DK Nicholsen
Collected date/time: 05/07/17 12:15
Received date/time: 05/10/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG978536	1	05/16/17 09:53	05/17/17 00:41	CCE
Wet Chemistry by Method 3060A/7196A	WG978168	1	05/12/17 12:56	05/16/17 11:41	MHM
Wet Chemistry by Method 9045D	WG978223	1	05/10/17 15:25	05/10/17 16:20	MHM
Wet Chemistry by Method 9050AMod	WG978499	1	05/11/17 17:29	05/11/17 17:29	MAJ
Mercury by Method 7471A	WG978275	1	05/10/17 13:47	05/11/17 16:26	TRB
Metals (ICP) by Method 6010B	WG978509	1	05/12/17 08:57	05/12/17 16:18	ST
Volatile Organic Compounds (GC) by Method 8015/8021	WG979637	.98	05/15/17 07:30	05/17/17 04:46	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG978849	10	05/12/17 08:24	05/13/17 11:14	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG979225	1	05/13/17 08:41	05/16/17 15:18	CLG

C-10 L908089-04 Solid

Collected by: DK Nicholsen
Collected date/time: 05/07/17 12:30
Received date/time: 05/10/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG978536	1	05/16/17 09:53	05/17/17 00:44	CCE
Wet Chemistry by Method 3060A/7196A	WG978168	1	05/12/17 12:56	05/16/17 11:41	MHM
Wet Chemistry by Method 9045D	WG978223	1	05/10/17 15:25	05/10/17 16:20	MHM
Wet Chemistry by Method 9050AMod	WG978499	1	05/11/17 17:29	05/11/17 17:29	MAJ
Mercury by Method 7471A	WG978275	1	05/10/17 13:47	05/11/17 16:28	TRB
Metals (ICP) by Method 6010B	WG978509	1	05/12/17 08:57	05/12/17 16:21	ST
Volatile Organic Compounds (GC) by Method 8015/8021	WG979637	1	05/15/17 07:30	05/17/17 04:24	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG978849	10	05/12/17 08:24	05/13/17 11:29	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG979225	5	05/13/17 08:41	05/16/17 15:40	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	3.38		1	05/17/2017 00:38	WG978536

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	05/16/2017 11:41	WG978168

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	7.85	T8	1	05/10/2017 16:20	WG978223

Sample Narrative:

9045D L908089-02 WG978223: 7.85 at 20.6c

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	457		1	05/11/2017 17:29	WG978499

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	0.0295		0.0200	1	05/11/2017 16:23	WG978275

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	4.96		2.00	1	05/12/2017 16:15	WG978509
Barium	436		0.500	1	05/12/2017 16:15	WG978509
Boron	ND		10.0	1	05/12/2017 16:15	WG978509
Cadmium	ND		0.500	1	05/12/2017 16:15	WG978509
Chromium	39.5		1.00	1	05/12/2017 16:15	WG978509
Copper	15.1		2.00	1	05/12/2017 16:15	WG978509
Lead	13.6		0.500	1	05/12/2017 16:15	WG978509
Nickel	21.6		2.00	1	05/12/2017 16:15	WG978509
Selenium	ND		2.00	1	05/12/2017 16:15	WG978509
Silver	ND		1.00	1	05/12/2017 16:15	WG978509
Zinc	46.4		5.00	1	05/12/2017 16:15	WG978509

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00168		0.000495	.99	05/16/2017 08:19	WG979637
Toluene	ND		0.00495	.99	05/16/2017 08:19	WG979637
Ethylbenzene	0.00131	B	0.000495	.99	05/16/2017 08:19	WG979637
Total Xylene	0.00164	B	0.00148	.99	05/16/2017 08:19	WG979637
TPH (GC/FID) Low Fraction	0.125		0.0990	.99	05/16/2017 08:19	WG979637
(S) a,a,a-Trifluorotoluene(FID)	*88.2*		*77.0-120*		*05/16/2017 08:19*	WG979637
(S) a,a,a-Trifluorotoluene(PID)	*98.4*		*75.0-128*		*05/16/2017 08:19*	WG979637

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	84.4		40.0	10	05/13/2017 11:00	WG978849
C28-C40 Oil Range	40.4		40.0	10	05/13/2017 11:00	WG978849
(S) o-Terphenyl	*140*		*18.0-148*		*05/13/2017 11:00*	WG978849

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	0.00895		0.00600	1	05/16/2017 14:56	WG979225
Acenaphthene	ND		0.00600	1	05/16/2017 14:56	WG979225
Acenaphthylene	ND		0.00600	1	05/16/2017 14:56	WG979225
Benzo(a)anthracene	0.0611		0.00600	1	05/16/2017 14:56	WG979225
Benzo(a)pyrene	0.0875		0.00600	1	05/16/2017 14:56	WG979225
Benzo(b)fluoranthene	0.194		0.00600	1	05/16/2017 14:56	WG979225
Benzo(g,h,i)perylene	0.152		0.00600	1	05/16/2017 14:56	WG979225
Benzo(k)fluoranthene	0.0446		0.00600	1	05/16/2017 14:56	WG979225
Chrysene	0.0916		0.00600	1	05/16/2017 14:56	WG979225
Dibenz(a,h)anthracene	0.0425		0.00600	1	05/16/2017 14:56	WG979225
Fluoranthene	0.0580		0.00600	1	05/16/2017 14:56	WG979225
Fluorene	0.00880		0.00600	1	05/16/2017 14:56	WG979225
Indeno(1,2,3-cd)pyrene	0.107		0.00600	1	05/16/2017 14:56	WG979225
Naphthalene	0.0637		0.0200	1	05/16/2017 14:56	WG979225
Phenanthrene	0.0510		0.00600	1	05/16/2017 14:56	WG979225
Pyrene	0.0508		0.00600	1	05/16/2017 14:56	WG979225
1-Methylnaphthalene	0.0393		0.0200	1	05/16/2017 14:56	WG979225
2-Methylnaphthalene	0.0962		0.0200	1	05/16/2017 14:56	WG979225
2-Chloronaphthalene	ND		0.0200	1	05/16/2017 14:56	WG979225
(S) p-Terphenyl-d14	*89.1*		*23.0-120*		*05/16/2017 14:56*	WG979225
(S) Nitrobenzene-d5	*88.9*		*14.0-149*		*05/16/2017 14:56*	WG979225
(S) 2-Fluorobiphenyl	*86.3*		*34.0-125*		*05/16/2017 14:56*	WG979225

Method Blank (MB)

(MB) R3218337-1 05/16/17 11:30

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

L908089-01 Original Sample (OS) • Duplicate (DUP)

(OS) L908089-01 05/16/17 11:37 • (DUP) R3218337-4 05/16/17 11:38

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

L908344-07 Original Sample (OS) • Duplicate (DUP)

(OS) L908344-07 05/16/17 11:44 • (DUP) R3218337-9 05/16/17 11:44

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	ND	0.800	1	0		20

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

(LCS) R3218337-2 05/16/17 11:34 • (LCSD) R3218337-3 05/16/17 11:34

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	58.2	58.0	102	102	80-120			0	20

L908089-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908089-01 05/16/17 11:37 • (MS) R3218337-5 05/16/17 11:40 • (MSD) R3218337-6 05/16/17 11:40

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 %
Chromium,Hexavalent	20.0	ND	16.0	16.0	80	80	1	75-125			0	20

L907642-02 Original Sample (OS) • Duplicate (DUP)

(OS) L907642-02 05/10/17 16:20 • (DUP) WG978223-3 05/10/17 16:20

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.40	7.38	1	0.271	T8	1

L908228-08 Original Sample (OS) • Duplicate (DUP)

(OS) L908228-08 05/10/17 16:20 • (DUP) WG978223-4 05/10/17 16:20

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.55	8.52	1	0.351	T8	1

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

(LCS) WG978223-1 05/10/17 16:20 • (LCSD) WG978223-2 05/10/17 16:20

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	7.58	7.58	101	101	98.7-101			0.000	1

Method Blank (MB)

(MB) WG978499-5 05/11/17 17:29

Analyte	MB Result umhos/cm	MB Qualifier	MB MDL umhos/cm	MB RDL umhos/cm
Specific Conductance	1.51			

L908089-01 Original Sample (OS) • Duplicate (DUP)

(OS) L908089-01 05/11/17 17:29 • (DUP) WG978499-1 05/11/17 17:29

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	1320	1320	1	0.152		20

L908344-07 Original Sample (OS) • Duplicate (DUP)

(OS) L908344-07 05/11/17 17:29 • (DUP) WG978499-4 05/11/17 17:29

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	224	234	1	4.49		20

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

(LCS) WG978499-2 05/11/17 17:29 • (LCSD) WG978499-3 05/11/17 17:29

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCSD Result umhos/cm	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Specific Conductance	1070	1070	1070	100	100	90.0-110			0.000	20

Method Blank (MB)

(MB) R3217417-1 05/11/17 15:19

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) R3217417-2 05/11/17 15:22 • (LCSD) R3217417-3 05/11/17 15:24

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	0.334	0.333	111	111	80-120			0	20

L908023-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908023-01 05/11/17 15:27 • (MS) R3217417-4 05/11/17 15:30 • (MSD) R3217417-5 05/11/17 15:32

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 %
Mercury	0.352	0.142	0.49	0.58	99	124	1	75-125			17	20

Method Blank (MB)

(MB) R3217867-8 05/12/17 14:58

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	2.64	J	0.59	5.00

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

(LCS) R3217867-9 05/12/17 15:02 • (LCSD) R3217867-10 05/12/17 15:04

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	103	103	103	103	80-120			1	20
Barium	100	108	107	108	107	80-120			1	20
Boron	100	104	103	104	103	80-120			1	20
Cadmium	100	104	103	104	103	80-120			1	20
Chromium	100	104	105	104	105	80-120			0	20
Copper	100	105	106	105	106	80-120			1	20
Lead	100	104	104	104	104	80-120			1	20
Nickel	100	105	104	105	104	80-120			1	20
Selenium	100	104	103	104	103	80-120			1	20
Silver	20.0	19.7	19.8	99	99	80-120			1	20
Zinc	100	107	106	107	106	80-120			0	20

L908089-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908089-01 05/12/17 15:07 • (MS) R3217867-13 05/12/17 15:15 • (MSD) R3217867-14 05/12/17 15:18

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	5.54	105	104	100	99	1	75-125			1	20
Barium	100	173	289	295	116	122	1	75-125			2	20
Boron	100	ND	97.3	96.1	95	93	1	75-125			1	20
Cadmium	100	ND	101	99.5	101	99	1	75-125			2	20
Chromium	100	17.9	120	114	102	96	1	75-125			5	20

L908089-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908089-01 05/12/17 15:07 • (MS) R3217867-13 05/12/17 15:15 • (MSD) R3217867-14 05/12/17 15:18

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	12.7	121	118	108	105	1	75-125			2	20
Lead	100	7.95	115	112	107	104	1	75-125			3	20
Nickel	100	18.1	126	122	108	104	1	75-125			3	20
Selenium	100	ND	99.9	98.8	100	99	1	75-125			1	20
Silver	20.0	ND	19.7	19.4	99	97	1	75-125			2	20
Zinc	100	41.5	139	135	97	94	1	75-125			3	20

Method Blank (MB)

(MB) R3218441-5 05/15/17 11:53

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000381	J	0.000150	0.00500
Ethylbenzene	0.000224	J	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)	*93.2*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*102*			*75.0-128*

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

(LCS) R3218441-1 05/15/17 10:01 • (LCSD) R3218441-2 05/15/17 10:24

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	0.0480	0.0490	96.1	98.0	71.0-121			2.03	20
Toluene	0.0500	0.0478	0.0480	95.7	96.0	72.0-120			0.370	20
Ethylbenzene	0.0500	0.0474	0.0481	94.8	96.2	76.0-121			1.53	20
Total Xylene	0.150	0.139	0.140	92.9	93.3	75.0-124			0.430	20
(S) a,a,a-Trifluorotoluene(FID)				*92.9*	*92.8*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*100*	*101*	*75.0-128*				

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

(LCS) R3218441-3 05/15/17 10:46 • (LCSD) R3218441-4 05/15/17 11:08

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.07	5.15	92.1	93.6	70.0-136			1.63	20
(S) a,a,a-Trifluorotoluene(FID)				*104*	*105*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*112*	*111*	*75.0-128*				

L908089-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908089-03 05/17/17 04:46 • (MS) R3218586-1 05/17/17 05:08 • (MSD) R3218586-2 05/17/17 05:30

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	0.00135	0.0202	0.0205	40.3	40.9	1	10.0-146			1.49	29
Toluene	0.0500	ND	0.0165	0.0166	33.0	33.2	1	10.0-143			0.630	30
Ethylbenzene	0.0500	0.000542	0.0123	0.0125	24.6	25.0	1	10.0-147			1.70	31
Total Xylene	0.150	0.00161	0.0311	0.0320	20.7	21.4	1	10.0-149	J6	J6	3.07	30
(S) a,a,a-Trifluorotoluene(FID)					*92.6*	*93.4*		*77.0-120*				

L908089-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908089-03 05/17/17 04:46 • (MS) R3218586-1 05/17/17 05:08 • (MSD) R3218586-2 05/17/17 05:30

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)					*97.4*	*98.5*		*75.0-128*				

L908089-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908089-03 05/17/17 04:46 • (MS) R3218586-3 05/17/17 05:52 • (MSD) R3218586-4 05/17/17 06:15

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	0.109	0.965	1.04	17.6	18.8	1	10.0-147			6.99	30
(S) a,a,a-Trifluorotoluene(FID)					*94.5*	*94.1*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*99.2*	*99.0*		*75.0-128*				

Method Blank (MB)

(MB) R3217776-1 05/12/17 23:58

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	*90.0*			*18.0-148*

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

(LCS) R3217776-2 05/13/17 00:11 • (LCSD) R3217776-3 05/13/17 00:25

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	49.8	56.5	83.0	94.2	50.0-150			12.6	20
(S) o-Terphenyl				*92.6*	*102*	*18.0-148*				

L908089-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908089-01 05/13/17 16:16 • (MS) R3217806-1 05/13/17 16:30 • (MSD) R3217806-2 05/13/17 16:44

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	49.8	86.3	62.1	60.8	20.5	10	50.0-150		J3 J6	32.6	20
(S) o-Terphenyl					*80.7*	*84.8*		*18.0-148*				

Method Blank (MB)

(MB) R3218374-3 05/16/17 06:32

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	0.00253	J	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	*101*			*14.0-149*
(S) 2-Fluorobiphenyl	*94.0*			*34.0-125*
(S) p-Terphenyl-d14	*98.7*			*23.0-120*

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

(LCS) R3218374-1 05/16/17 05:48 • (LCSD) R3218374-2 05/16/17 06:10

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	0.0799	0.0824	99.8	103	50.0-125			3.18	20
Acenaphthene	0.0800	0.0770	0.0800	96.3	99.9	52.0-120			3.74	20
Acenaphthylene	0.0800	0.0769	0.0790	96.1	98.8	51.0-120			2.70	20
Benzo(a)anthracene	0.0800	0.0759	0.0786	94.9	98.3	46.0-121			3.52	20
Benzo(a)pyrene	0.0800	0.0746	0.0758	93.2	94.8	42.0-121			1.65	20
Benzo(b)fluoranthene	0.0800	0.0807	0.0822	101	103	42.0-123			1.84	20
Benzo(g,h,i)perylene	0.0800	0.0845	0.0866	106	108	43.0-128			2.53	20
Benzo(k)fluoranthene	0.0800	0.0799	0.0805	99.9	101	45.0-128			0.720	20
Chrysene	0.0800	0.0775	0.0785	96.9	98.2	48.0-127			1.36	20
Dibenz(a,h)anthracene	0.0800	0.0810	0.0808	101	101	43.0-132			0.160	20
Fluoranthene	0.0800	0.0771	0.0789	96.4	98.7	49.0-129			2.36	20

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

(LCS) R3218374-1 05/16/17 05:48 • (LCSD) R3218374-2 05/16/17 06:10

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	0.0771	0.0797	96.3	99.6	50.0-120			3.33	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0847	0.0855	106	107	44.0-131			0.930	20
Naphthalene	0.0800	0.0762	0.0780	95.2	97.5	50.0-120			2.40	20
Phenanthrene	0.0800	0.0786	0.0807	98.3	101	48.0-120			2.62	20
Pyrene	0.0800	0.0806	0.0840	101	105	48.0-135			4.07	20
1-Methylnaphthalene	0.0800	0.0760	0.0783	95.0	97.9	52.0-122			3.06	20
2-Methylnaphthalene	0.0800	0.0736	0.0758	92.0	94.8	52.0-120			2.94	20
2-Chloronaphthalene	0.0800	0.0745	0.0772	93.1	96.6	50.0-120			3.62	20
(S) Nitrobenzene-d5				*101*	*101*	*14.0-149*				
(S) 2-Fluorobiphenyl				*96.6*	*96.6*	*34.0-125*				
(S) p-Terphenyl-d14				*96.9*	*97.8*	*23.0-120*				

L908125-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908125-02 05/16/17 09:49 • (MS) R3218374-4 05/16/17 10:11 • (MSD) R3218374-5 05/16/17 10:33

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	0.0800	0.295	0.302	0.295	9.64	0.990	1	20.0-136	J6	J6	2.31	24
Acenaphthene	0.0800	0.126	0.116	0.105	0.000	0.000	1	29.0-124	J6	J6	9.69	20
Acenaphthylene	0.0800	0.0225	0.0694	0.0624	58.5	49.8	1	35.0-120			10.6	20
Benzo(a)anthracene	0.0800	0.0583	0.0774	0.0818	23.8	29.4	1	13.0-132	V3	V3	5.63	27
Benzo(a)pyrene	0.0800	0.000899	0.0770	0.0776	95.1	95.9	1	14.0-138			0.750	27
Benzo(b)fluoranthene	0.0800	0.00198	0.0687	0.0676	83.4	82.1	1	10.0-129			1.60	31
Benzo(g,h,i)perylene	0.0800	0.00138	0.158	0.151	196	187	1	10.0-133	J5	J5	4.81	30
Benzo(k)fluoranthene	0.0800	U	0.0624	0.0650	78.0	81.3	1	15.0-131			4.16	27
Chrysene	0.0800	0.0556	0.112	0.118	70.4	77.4	1	15.0-137	V3	V3	4.93	25
Dibenz(a,h)anthracene	0.0800	U	0.159	0.154	199	192	1	15.0-132	J5	J5	3.19	27
Fluoranthene	0.0800	0.00786	0.0485	0.0530	50.8	56.4	1	13.0-139			8.94	28
Fluorene	0.0800	0.174	0.0655	0.0733	0.000	0.000	1	27.0-122	J6	J6	11.2	22
Indeno(1,2,3-cd)pyrene	0.0800	0.000610	0.153	0.147	191	183	1	11.0-133	J5	J5	4.01	29
Naphthalene	0.0800	0.0393	0.113	0.103	91.9	80.0	1	18.0-136			8.82	21
Phenanthrene	0.0800	0.131	0.199	0.203	84.4	89.8	1	15.0-133			2.16	25
Pyrene	0.0800	0.126	0.0992	0.110	0.000	0.000	1	11.0-146	J6 V3	J6 V3	10.5	29
1-Methylnaphthalene	0.0800	0.0359	0.163	0.149	159	142	1	24.0-137	J5	J5	8.74	22
2-Methylnaphthalene	0.0800	0.00755	0.128	0.119	151	140	1	23.0-136	J5	J5	7.16	22
2-Chloronaphthalene	0.0800	0.125	0.0318	0.0273	0.000	0.000	1	36.0-120	J6	J6	15.2	20
(S) Nitrobenzene-d5					*419*	*393*		*14.0-149*	J1	J1		
(S) 2-Fluorobiphenyl					*52.5*	*45.4*		*34.0-125*				
(S) p-Terphenyl-d14					*137*	*138*		*23.0-120*	J1	J1		

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.
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.
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.
V3	The internal standard exhibited poor recovery due to sample matrix interference. The analytical results will be biased high. BDL results will be unaffected.

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
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Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
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Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

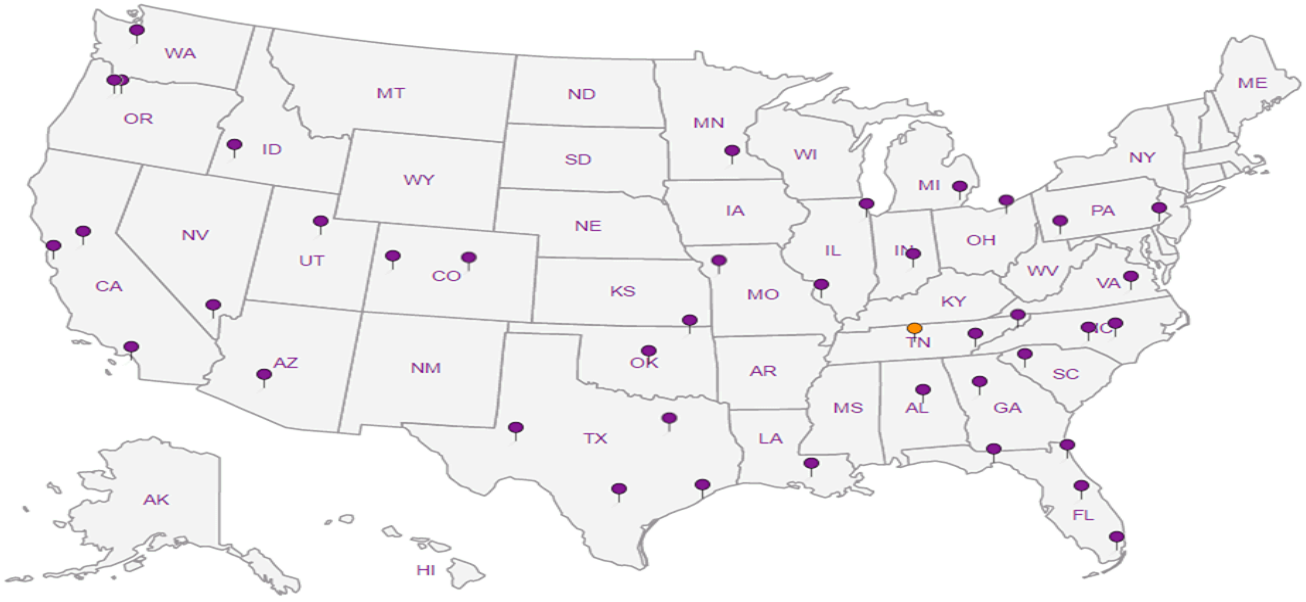
Third Party & Federal Accreditations

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 X

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)
L-15		SS		5/7	1100	5	X	X	X	X	X		01
K-15		SS			1120	5	X	X	X	X	X		02
B-10 Small		SS			1215	5	X	X	X	X	X		03
C-10		SS			1230	5	X	X	X	X	X		04
		SS				5	X	X	X	X	X		05

* 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 _____

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
DK Nicholson	5/8/17	1200	Fedex
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____
Temp: 4.2° °C Bottles Received: 20
Date: 5-10-17 Time: 0845

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

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
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L# 908689
D222
Acctnum: BERPETDCO
Template:
Prelogin:
TSR:
Cooler:
Shipped Via:

ESC LAB SCIENCES
Cooler Receipt Form

Client: BERPETDCO	SDG#	98089	
Cooler Received/Opened On: 5/ 10 /17	Temperature: 4.2		
Received By: Jon Deboard			
Signature: Jon Deboard			

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