



**Nicholson GeoSolutions, LLC**

3433 East Lake Drive  
Centennial, CO 80121

November 10, 2016

Mr. Derek Johnson  
Linn Energy, LLC  
235 Callahan Avenue  
Parachute, Colorado 81635

**Subject: F-01 Fresh Water Pit Soil Investigation**

Dear Derek:

Nicholson GeoSolutions LLC was retained by Linn Energy, LLC to conduct soil sampling of the fresh water pit located near the F-01 well pad in the Garden Gulch area, Garfield County, Colorado.

Four soil samples were initially collected from the locations shown on Figure 1 on September 28<sup>th</sup>, 2016 to evaluate compliance with the COGCC Table 910-1 standards. A photoionization detector (PID) was used to screen the bottom and sides of the pit to select sample locations. PID readings ranged from 0.0 to 0.3 ppm on the sidewalls, and from 0.0 to 2.7 ppm on the pit bottom. All 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), sodium adsorption ratio (SAR), pH, conductivity, PAHs, and metals.

Table 1 provides a summary of the analytical results for the soil samples collected. The laboratory analytical reports are contained in Appendix A. All results were below the standards for the four initial samples, except for TEPH for sample F01-FWP-1 (south bottom sample) at 692.6 mg/kg and arsenic. In response to the sample results, additional material was excavated from the south half of the floor of the pit and a fifth sample (F01-FWP-5) was collected in the same location as original sample F01-FWP-1. All results for this sample were below the COGCC standards except for arsenic. Arsenic ranged from 3.42 to 11.9 mg/kg for the five samples, within the range of natural background concentrations for the Garden Gulch area.



David K. Nicholson, P.G.  
Principal Geologist

**Table 1 F-01 Fresh Water Pit Sample Results**

Parameter		F01-FWP-1 (Sept 28, 2016)	F01-FWP-2 (Sept 28, 2016)	F01-FWP-3 (Sept 28, 2016)	F01-FWP-4 (Sept 28, 2016)	F01-FWP-5 (Nov 3, 2016)
sp. conductance (mmhos/cm)	<4	2.02	0.291	0.43	0.60	0.402
pH (standard units)	6-9	8.41	8.27	7.61	8.29	8.56
SAR (ratio)	<12	0.922	3.36	1.04	5.47	2.18
TVPH – gasoline range	500 <sup>1</sup>	<b>0.13</b>	<0.1	<0.1	<0.1	<0.1
TEPH – diesel/motor oil range	500 <sup>1</sup>	<b>692.6</b>	<8.0	<8.0	41.9	<8.0
benzene	0.17	0.00161	<0.0005	<0.0005	<0.0005	<0.0005
toluene	85	<0.005	<0.005	<0.005	<0.005	<0.005
ethylbenzene	100	0.00139	<0.0005	<0.0005	<0.0005	<0.0005
xylenes	175	0.00503	<0.0015	<0.0015	<0.0015	<0.0015
PAHs including benzo(a)pyrene	various	All ok	All ND	All ND	All ok	All ND
arsenic	0.39	<b>6.58</b>	<b>9.67</b>	<b>11.6</b>	<b>11.9</b>	<b>3.42</b>

<sup>1</sup>The standard is 500 for the combined total of TVPH and TEPH ND = not detected

Values in bold type exceed standards

All units in mg/kg except where indicated

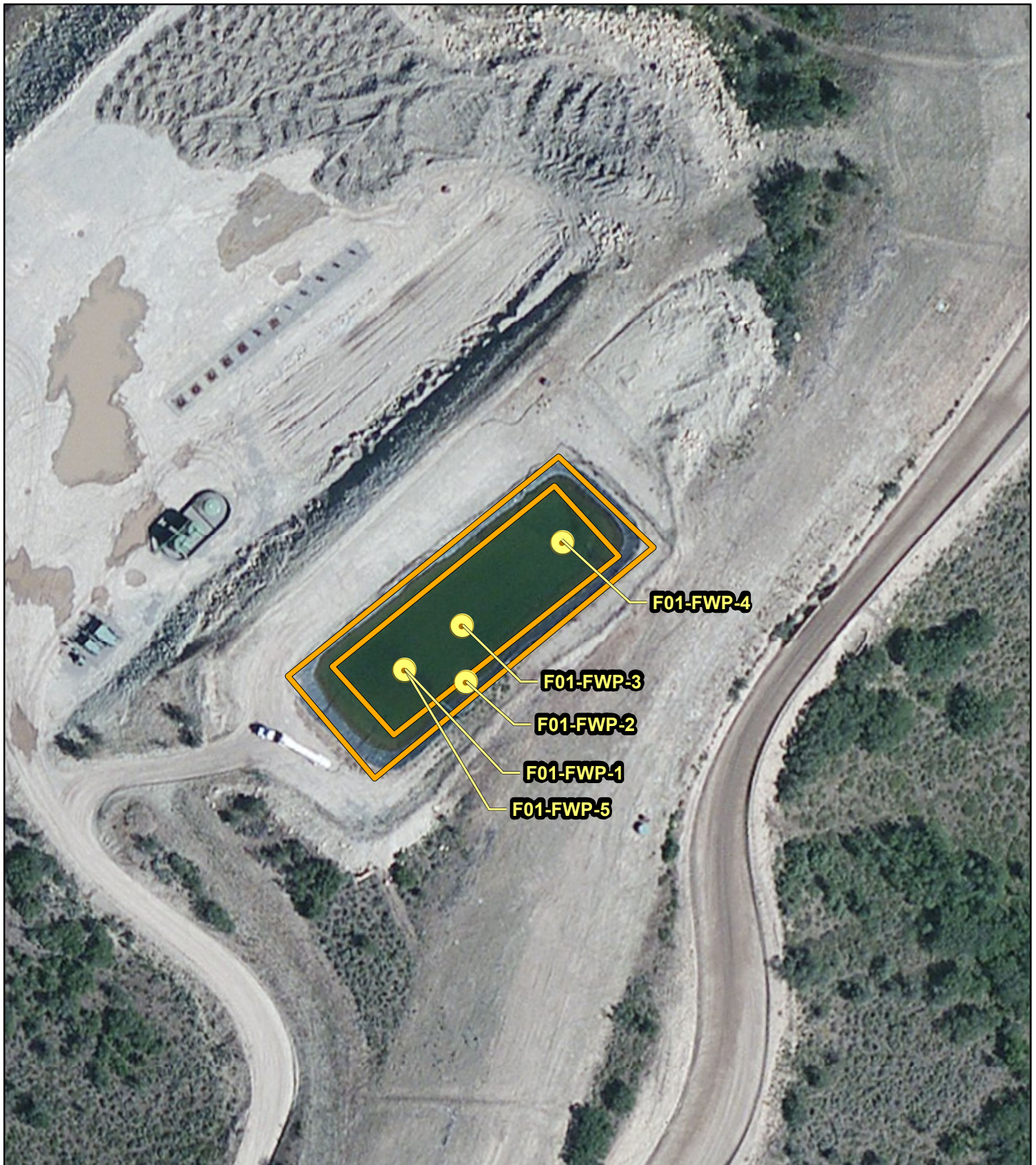


Figure 1

November  
2016

GeoSolutions  
NICHOLSON

### Legend

● Sample Location

□ Pit Boundary

0 50 100 200 Feet 1" = 100'

**Linn Energy, LLC**

F-01  
Freshwater  
Pit Investigation

## **APPENDIX A**

### **Laboratory Reports**



## Linn Energy - Denver, CO

Sample Delivery Group: L863374

Samples Received: 10/01/2016

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.



<b><sup>1</sup>Cp: Cover Page</b>	<b>1</b>
<b><sup>2</sup>Tc: Table of Contents</b>	<b>2</b>
<b><sup>3</sup>Ss: Sample Summary</b>	<b>3</b>
<b><sup>4</sup>Cn: Case Narrative</b>	<b>4</b>
<b><sup>5</sup>Sr: Sample Results</b>	<b>5</b>
F01-FWP-1 L863374-01	5
F01-FWP-2 L863374-02	7
F01-FWP-3 L863374-03	9
F01-FWP-4 L863374-04	11
<b><sup>6</sup>Qc: Quality Control Summary</b>	<b>13</b>
Wet Chemistry by Method 3060A/7196A	13
Wet Chemistry by Method 9045D	14
Wet Chemistry by Method 9050AMod	15
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Metals (ICP) by Method 6010B	17
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Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	23
<b><sup>7</sup>Gl: Glossary of Terms</b>	<b>25</b>
<b><sup>8</sup>Al: Accreditations &amp; Locations</b>	<b>26</b>
<b><sup>9</sup>Sc: Chain of Custody</b>	<b>27</b>



# SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## F01-FWP-1 L863374-01 Solid

			Collected by	Collected date/time	Received date/time
				09/28/16 13:00	10/01/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG914472	1	10/06/16 14:35	10/08/16 06:50	ST
Mercury by Method 7471A	WG913955	1	10/04/16 18:13	10/05/16 13:53	NJB
Metals (ICP) by Method 6010B	WG914040	1	10/06/16 09:15	10/07/16 12:23	LTB
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG914780	10	10/06/16 16:54	10/07/16 15:25	KMP
Semi-Volatile Organic Compounds (GC) by Method 8015	WG914332	20	10/07/16 08:03	10/08/16 00:35	DMG
Volatile Organic Compounds (GC) by Method 8015/8021	WG915244	1	10/07/16 03:04	10/08/16 20:07	ACG
Wet Chemistry by Method 3060A/7196A	WG913295	1	10/06/16 15:00	10/07/16 13:52	JJL
Wet Chemistry by Method 9045D	WG913294	1	10/06/16 10:16	10/06/16 14:21	JJL
Wet Chemistry by Method 9050AMod	WG914317	1	10/06/16 00:30	10/06/16 00:30	JLJ

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

## F01-FWP-2 L863374-02 Solid

			Collected by	Collected date/time	Received date/time
				09/28/16 13:10	10/01/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG914472	1	10/06/16 14:35	10/08/16 06:53	ST
Mercury by Method 7471A	WG913955	1	10/04/16 18:13	10/05/16 13:56	NJB
Metals (ICP) by Method 6010B	WG914040	1	10/06/16 09:15	10/07/16 12:26	LTB
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG914780	1	10/06/16 16:54	10/07/16 14:19	KMP
Semi-Volatile Organic Compounds (GC) by Method 8015	WG914332	1	10/07/16 08:03	10/07/16 21:21	DMG
Volatile Organic Compounds (GC) by Method 8015/8021	WG915244	1	10/07/16 03:04	10/08/16 20:32	ACG
Wet Chemistry by Method 3060A/7196A	WG913295	1	10/06/16 15:00	10/07/16 13:53	JJL
Wet Chemistry by Method 9045D	WG913294	1	10/06/16 10:16	10/06/16 14:21	JJL
Wet Chemistry by Method 9050AMod	WG914317	1	10/06/16 00:30	10/06/16 00:30	JLJ

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

## F01-FWP-3 L863374-03 Solid

			Collected by	Collected date/time	Received date/time
				09/28/16 13:20	10/01/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG914472	1	10/06/16 14:35	10/08/16 06:56	ST
Mercury by Method 7471A	WG913955	1	10/04/16 18:13	10/05/16 13:06	NJB
Metals (ICP) by Method 6010B	WG914040	1	10/06/16 09:15	10/07/16 12:29	LTB
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG914780	1	10/06/16 16:54	10/07/16 14:41	KMP
Semi-Volatile Organic Compounds (GC) by Method 8015	WG915441	1	10/08/16 21:05	10/10/16 12:29	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG915244	1	10/07/16 03:04	10/08/16 20:56	ACG
Wet Chemistry by Method 3060A/7196A	WG913295	1	10/06/16 15:00	10/07/16 13:54	JJL
Wet Chemistry by Method 9045D	WG913294	1	10/06/16 10:16	10/06/16 14:21	JJL
Wet Chemistry by Method 9050AMod	WG914317	1	10/06/16 00:30	10/06/16 00:30	JLJ

## F01-FWP-4 L863374-04 Solid

			Collected by	Collected date/time	Received date/time
				09/28/16 13:30	10/01/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG914472	1	10/06/16 14:35	10/08/16 06:59	ST
Mercury by Method 7471A	WG913955	1	10/04/16 18:13	10/05/16 13:58	NJB
Metals (ICP) by Method 6010B	WG914040	1	10/06/16 09:15	10/07/16 12:32	LTB
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG914780	1	10/06/16 16:54	10/07/16 15:03	KMP
Semi-Volatile Organic Compounds (GC) by Method 8015	WG915441	1	10/08/16 21:05	10/10/16 12:45	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG915244	1	10/07/16 03:04	10/08/16 21:21	ACG
Wet Chemistry by Method 3060A/7196A	WG913295	1	10/06/16 15:00	10/07/16 13:55	JJL
Wet Chemistry by Method 9045D	WG913294	1	10/06/16 10:16	10/06/16 14:21	JJL
Wet Chemistry by Method 9050AMod	WG914317	1	10/06/16 00:30	10/06/16 00:30	JLJ



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

### Sample Handling and Receiving

The following samples were prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

ESC Sample ID	Project Sample ID	Method
<a href="#">L863374-01</a>	<a href="#">F01-FWP-1</a>	9045D
<a href="#">L863374-02</a>	<a href="#">F01-FWP-2</a>	9045D
<a href="#">L863374-03</a>	<a href="#">F01-FWP-3</a>	9045D
<a href="#">L863374-04</a>	<a href="#">F01-FWP-4</a>	9045D

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc





## Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	0.922		1	10/08/2016 06:50	WG914472

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium,Hexavalent	ND		2.00	1	10/07/2016 13:52	<a href="#">WG913295</a>

## Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.41		1	10/06/2016 14:21	<a href="#">WG913294</a>

## Sample Narrative:

9045D L863374-01 WG913294: 8.41 at 20.7c

## Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	2020		1	10/06/2016 00:30	<a href="#">WG914317</a>

## Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	10/05/2016 13:53	<a href="#">WG913955</a>

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	6.58		2.00	1	10/07/2016 12:23	<a href="#">WG914040</a>
Barium	468		0.500	1	10/07/2016 12:23	<a href="#">WG914040</a>
Boron	13.1	B	10.0	1	10/07/2016 12:23	<a href="#">WG914040</a>
Cadmium	0.885		0.500	1	10/07/2016 12:23	<a href="#">WG914040</a>
Chromium	34.7		1.00	1	10/07/2016 12:23	<a href="#">WG914040</a>
Copper	22.2		2.00	1	10/07/2016 12:23	<a href="#">WG914040</a>
Lead	35.8		0.500	1	10/07/2016 12:23	<a href="#">WG914040</a>
Nickel	17.4		2.00	1	10/07/2016 12:23	<a href="#">WG914040</a>
Selenium	ND		2.00	1	10/07/2016 12:23	<a href="#">WG914040</a>
Silver	ND		1.00	1	10/07/2016 12:23	<a href="#">WG914040</a>
Zinc	110		5.00	1	10/07/2016 12:23	<a href="#">WG914040</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00161		0.000500	1	10/08/2016 20:07	<a href="#">WG915244</a>
Toluene	ND		0.00500	1	10/08/2016 20:07	<a href="#">WG915244</a>
Ethylbenzene	0.00139		0.000500	1	10/08/2016 20:07	<a href="#">WG915244</a>
Total Xylene	0.00503		0.00150	1	10/08/2016 20:07	<a href="#">WG915244</a>
TPH (GC/FID) Low Fraction	0.130	B	0.100	1	10/08/2016 20:07	<a href="#">WG915244</a>
(S) a,a,a-Trifluorotoluene(FID)	87.6		59.0-128		10/08/2016 20:07	<a href="#">WG915244</a>
(S) a,a,a-Trifluorotoluene(PID)	91.3		54.0-144		10/08/2016 20:07	<a href="#">WG915244</a>



## 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	603		80.0	20	10/08/2016 00:35	<a href="#">WG914332</a>
C28-C40 Oil Range	89.6		80.0	20	10/08/2016 00:35	<a href="#">WG914332</a>
(S) o-Terphenyl	98.5	<a href="#">J7</a>	50.0-150		10/08/2016 00:35	<a href="#">WG914332</a>

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	0.312	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Acenaphthene	0.566	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Acenaphthylene	0.144	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Benzo(a)anthracene	ND	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Benzo(a)pyrene	0.0200	<a href="#">J3</a>	0.00600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Benzo(b)fluoranthene	ND	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Benzo(g,h,i)perylene	ND	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Benzo(k)fluoranthene	ND	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Chrysene	0.0744	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Dibenz(a,h)anthracene	0.0110	<a href="#">J3 J4</a>	0.00600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Fluoranthene	0.0853	<a href="#">J3</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Fluorene	0.310	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Indeno(1,2,3-cd)pyrene	ND	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Naphthalene	1.35	<a href="#">J3 J4</a>	0.200	10	10/07/2016 15:25	<a href="#">WG914780</a>
Phenanthrene	2.65	<a href="#">J3 J4</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
Pyrene	0.708	<a href="#">J3</a>	0.0600	10	10/07/2016 15:25	<a href="#">WG914780</a>
1-Methylnaphthalene	1.69	<a href="#">J3</a>	0.200	10	10/07/2016 15:25	<a href="#">WG914780</a>
2-Methylnaphthalene	3.14	<a href="#">J3 J4</a>	0.200	10	10/07/2016 15:25	<a href="#">WG914780</a>
2-Chloronaphthalene	ND	<a href="#">J3 J4</a>	0.200	10	10/07/2016 15:25	<a href="#">WG914780</a>
(S) p-Terphenyl-d14	79.0		32.2-131		10/07/2016 15:25	<a href="#">WG914780</a>
(S) Nitrobenzene-d5	76.5		22.1-146		10/07/2016 15:25	<a href="#">WG914780</a>
(S) 2-Fluorobiphenyl	87.7		40.6-122		10/07/2016 15:25	<a href="#">WG914780</a>

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



## Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	3.36		1	10/08/2016 06:53	WG914472

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	10/07/2016 13:53	<a href="#">WG913295</a>

## Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.27		1	10/06/2016 14:21	<a href="#">WG913294</a>

## Sample Narrative:

9045D L863374-02 WG913294: 8.27 at 20.4c

## Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	291		1	10/06/2016 00:30	<a href="#">WG914317</a>

## Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	10/05/2016 13:56	<a href="#">WG913955</a>

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	9.67		2.00	1	10/07/2016 12:26	<a href="#">WG914040</a>
Barium	308		0.500	1	10/07/2016 12:26	<a href="#">WG914040</a>
Boron	ND		10.0	1	10/07/2016 12:26	<a href="#">WG914040</a>
Cadmium	ND		0.500	1	10/07/2016 12:26	<a href="#">WG914040</a>
Chromium	24.2		1.00	1	10/07/2016 12:26	<a href="#">WG914040</a>
Copper	18.6		2.00	1	10/07/2016 12:26	<a href="#">WG914040</a>
Lead	16.4		0.500	1	10/07/2016 12:26	<a href="#">WG914040</a>
Nickel	20.9		2.00	1	10/07/2016 12:26	<a href="#">WG914040</a>
Selenium	ND		2.00	1	10/07/2016 12:26	<a href="#">WG914040</a>
Silver	ND		1.00	1	10/07/2016 12:26	<a href="#">WG914040</a>
Zinc	64.0		5.00	1	10/07/2016 12:26	<a href="#">WG914040</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	10/08/2016 20:32	<a href="#">WG915244</a>
Toluene	ND		0.00500	1	10/08/2016 20:32	<a href="#">WG915244</a>
Ethylbenzene	ND		0.000500	1	10/08/2016 20:32	<a href="#">WG915244</a>
Total Xylene	ND		0.00150	1	10/08/2016 20:32	<a href="#">WG915244</a>
TPH (GC/FID) Low Fraction	ND		0.100	1	10/08/2016 20:32	<a href="#">WG915244</a>
(S) a,a,a-Trifluorotoluene(FID)	99.1		59.0-128		10/08/2016 20:32	<a href="#">WG915244</a>
(S) a,a,a-Trifluorotoluene(PID)	103		54.0-144		10/08/2016 20:32	<a href="#">WG915244</a>



## 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	ND		4.00	1	10/07/2016 21:21	<a href="#">WG914332</a>
C28-C40 Oil Range	ND		4.00	1	10/07/2016 21:21	<a href="#">WG914332</a>
(S) o-Terphenyl	89.8		50.0-150		10/07/2016 21:21	<a href="#">WG914332</a>

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Acenaphthene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Acenaphthylene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Benzo(a)anthracene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Benzo(a)pyrene	ND	<a href="#">J3</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Benzo(b)fluoranthene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Benzo(g,h,i)perylene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Benzo(k)fluoranthene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Chrysene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Dibenz(a,h)anthracene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Fluoranthene	ND	<a href="#">J3</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Fluorene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Indeno(1,2,3-cd)pyrene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Naphthalene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.0200	1	10/07/2016 14:19	<a href="#">WG914780</a>
Phenanthrene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
Pyrene	ND	<a href="#">J3</a>	0.00600	1	10/07/2016 14:19	<a href="#">WG914780</a>
1-Methylnaphthalene	ND	<a href="#">J3</a>	0.0200	1	10/07/2016 14:19	<a href="#">WG914780</a>
2-Methylnaphthalene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.0200	1	10/07/2016 14:19	<a href="#">WG914780</a>
2-Chloronaphthalene	ND	<a href="#">J3</a> <a href="#">J4</a>	0.0200	1	10/07/2016 14:19	<a href="#">WG914780</a>
(S) p-Terphenyl-d14	81.5		32.2-131		10/07/2016 14:19	<a href="#">WG914780</a>
(S) Nitrobenzene-d5	79.2		22.1-146		10/07/2016 14:19	<a href="#">WG914780</a>
(S) 2-Fluorobiphenyl	97.4		40.6-122		10/07/2016 14:19	<a href="#">WG914780</a>

1  
Cp2  
Tc3  
Ss4  
Cn5  
Sr6  
Qc7  
Gl8  
Al9  
Sc



## Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	1.04		1	10/08/2016 06:56	WG914472

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium,Hexavalent	ND		2.00	1	10/07/2016 13:54	<a href="#">WG913295</a>

## Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.61		1	10/06/2016 14:21	<a href="#">WG913294</a>

## Sample Narrative:

9045D L863374-03 WG913294: 7.61 at 20.3c

## Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	430		1	10/06/2016 00:30	<a href="#">WG914317</a>

## Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	10/05/2016 13:06	<a href="#">WG913955</a>

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	11.6		2.00	1	10/07/2016 12:29	<a href="#">WG914040</a>
Barium	228		0.500	1	10/07/2016 12:29	<a href="#">WG914040</a>
Boron	ND		10.0	1	10/07/2016 12:29	<a href="#">WG914040</a>
Cadmium	ND		0.500	1	10/07/2016 12:29	<a href="#">WG914040</a>
Chromium	22.3		1.00	1	10/07/2016 12:29	<a href="#">WG914040</a>
Copper	17.6		2.00	1	10/07/2016 12:29	<a href="#">WG914040</a>
Lead	16.1		0.500	1	10/07/2016 12:29	<a href="#">WG914040</a>
Nickel	17.6		2.00	1	10/07/2016 12:29	<a href="#">WG914040</a>
Selenium	ND		2.00	1	10/07/2016 12:29	<a href="#">WG914040</a>
Silver	ND		1.00	1	10/07/2016 12:29	<a href="#">WG914040</a>
Zinc	55.4		5.00	1	10/07/2016 12:29	<a href="#">WG914040</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	10/08/2016 20:56	<a href="#">WG915244</a>
Toluene	ND		0.00500	1	10/08/2016 20:56	<a href="#">WG915244</a>
Ethylbenzene	ND		0.000500	1	10/08/2016 20:56	<a href="#">WG915244</a>
Total Xylene	ND		0.00150	1	10/08/2016 20:56	<a href="#">WG915244</a>
TPH (GC/FID) Low Fraction	ND		0.100	1	10/08/2016 20:56	<a href="#">WG915244</a>
(S) a,a,a-Trifluorotoluene(FID)	99.1		59.0-128		10/08/2016 20:56	<a href="#">WG915244</a>
(S) a,a,a-Trifluorotoluene(PID)	103		54.0-144		10/08/2016 20:56	<a href="#">WG915244</a>





## 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	ND	<u>J3</u>	4.00	1	10/10/2016 12:29	<a href="#">WG915441</a>
C28-C40 Oil Range	ND		4.00	1	10/10/2016 12:29	<a href="#">WG915441</a>
(S) o-terphenyl	61.4		50.0-150		10/10/2016 12:29	<a href="#">WG915441</a>

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Acenaphthene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Acenaphthylene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Benzo(a)anthracene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Benzo(a)pyrene	ND	<u>J3</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Benzo(b)fluoranthene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Benzo(g,h,i)perylene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Benzo(k)fluoranthene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Chrysene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Dibenz(a,h)anthracene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Fluoranthene	ND	<u>J3</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Fluorene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Indeno(1,2,3-cd)pyrene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Naphthalene	ND	<u>J3 J4</u>	0.0200	1	10/07/2016 14:41	<a href="#">WG914780</a>
Phenanthrene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
Pyrene	ND	<u>J3</u>	0.00600	1	10/07/2016 14:41	<a href="#">WG914780</a>
1-Methylnaphthalene	ND	<u>J3</u>	0.0200	1	10/07/2016 14:41	<a href="#">WG914780</a>
2-Methylnaphthalene	ND	<u>J3 J4</u>	0.0200	1	10/07/2016 14:41	<a href="#">WG914780</a>
2-Chloronaphthalene	ND	<u>J3 J4</u>	0.0200	1	10/07/2016 14:41	<a href="#">WG914780</a>
(S) p-Terphenyl-d14	64.9		32.2-131		10/07/2016 14:41	<a href="#">WG914780</a>
(S) Nitrobenzene-d5	69.4		22.1-146		10/07/2016 14:41	<a href="#">WG914780</a>
(S) 2-Fluorobiphenyl	82.7		40.6-122		10/07/2016 14:41	<a href="#">WG914780</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	5.47		1	10/08/2016 06:59	WG914472

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium,Hexavalent	ND		2.00	1	10/07/2016 13:55	<a href="#">WG913295</a>

## Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.29		1	10/06/2016 14:21	<a href="#">WG913294</a>

## Sample Narrative:

9045D L863374-04 WG913294: 8.29 at 20.4c

## Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	600		1	10/06/2016 00:30	<a href="#">WG914317</a>

## Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	10/05/2016 13:58	<a href="#">WG913955</a>

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	11.9		2.00	1	10/07/2016 12:32	<a href="#">WG914040</a>
Barium	288		0.500	1	10/07/2016 12:32	<a href="#">WG914040</a>
Boron	ND		10.0	1	10/07/2016 12:32	<a href="#">WG914040</a>
Cadmium	ND		0.500	1	10/07/2016 12:32	<a href="#">WG914040</a>
Chromium	23.7		1.00	1	10/07/2016 12:32	<a href="#">WG914040</a>
Copper	18.2		2.00	1	10/07/2016 12:32	<a href="#">WG914040</a>
Lead	16.4		0.500	1	10/07/2016 12:32	<a href="#">WG914040</a>
Nickel	17.9		2.00	1	10/07/2016 12:32	<a href="#">WG914040</a>
Selenium	ND		2.00	1	10/07/2016 12:32	<a href="#">WG914040</a>
Silver	ND		1.00	1	10/07/2016 12:32	<a href="#">WG914040</a>
Zinc	55.2		5.00	1	10/07/2016 12:32	<a href="#">WG914040</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	10/08/2016 21:21	<a href="#">WG915244</a>
Toluene	ND		0.00500	1	10/08/2016 21:21	<a href="#">WG915244</a>
Ethylbenzene	ND		0.000500	1	10/08/2016 21:21	<a href="#">WG915244</a>
Total Xylene	ND		0.00150	1	10/08/2016 21:21	<a href="#">WG915244</a>
TPH (GC/FID) Low Fraction	ND		0.100	1	10/08/2016 21:21	<a href="#">WG915244</a>
(S) a,a,a-Trifluorotoluene(FID)	99.1		59.0-128		10/08/2016 21:21	<a href="#">WG915244</a>
(S) a,a,a-Trifluorotoluene(PID)	103		54.0-144		10/08/2016 21:21	<a href="#">WG915244</a>



Collected date/time: 09/28/16 13:30

L863374

## Semi-Volatile Organic Compounds (GC) by Method 8015

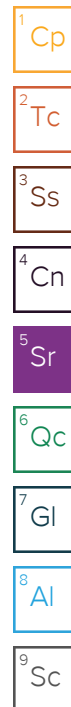
Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	29.4	<u>J3</u>	4.00	1	10/10/2016 12:45	<a href="#">WG915441</a>
C28-C40 Oil Range	12.5		4.00	1	10/10/2016 12:45	<a href="#">WG915441</a>
(S) o-Terphenyl	47.4	<u>J2</u>	50.0-150		10/10/2016 12:45	<a href="#">WG915441</a>

## Sample Narrative:

8015 L863374-04 WG915441: Duplicate analysis was performed.

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Acenaphthene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Acenaphthylene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Benzo(a)anthracene	0.0111	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Benzo(a)pyrene	ND	<u>J3</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Benzo(b)fluoranthene	0.0134	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Benzo(g,h,i)perylene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Benzo(k)fluoranthene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Chrysene	0.0156	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Dibenz(a,h)anthracene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Fluoranthene	0.0249	<u>J3</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Fluorene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Indeno(1,2,3-cd)pyrene	ND	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Naphthalene	ND	<u>J3 J4</u>	0.0200	1	10/07/2016 15:03	<a href="#">WG914780</a>
Phenanthrene	0.0280	<u>J3 J4</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
Pyrene	0.0225	<u>J3</u>	0.00600	1	10/07/2016 15:03	<a href="#">WG914780</a>
1-Methylnaphthalene	ND	<u>J3</u>	0.0200	1	10/07/2016 15:03	<a href="#">WG914780</a>
2-Methylnaphthalene	0.0246	<u>J3 J4</u>	0.0200	1	10/07/2016 15:03	<a href="#">WG914780</a>
2-Chloronaphthalene	ND	<u>J3 J4</u>	0.0200	1	10/07/2016 15:03	<a href="#">WG914780</a>
(S) p-Terphenyl-d14	67.2		32.2-131		10/07/2016 15:03	<a href="#">WG914780</a>
(S) Nitrobenzene-d5	69.1		22.1-146		10/07/2016 15:03	<a href="#">WG914780</a>
(S) 2-Fluorobiphenyl	86.3		40.6-122		10/07/2016 15:03	<a href="#">WG914780</a>



Method Blank (MB)

(MB) R3168980-1 10/07/16 13:42

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Chromium,Hexavalent	U		0.640	2.00

L862984-19 Original Sample (OS) • Duplicate (DUP)

(OS) L862984-19 10/07/16 13:46 • (DUP) R3168980-4 10/07/16 13:47

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

L863374-04 Original Sample (OS) • Duplicate (DUP)

(OS) L863374-04 10/07/16 13:55 • (DUP) R3168980-8 10/07/16 13:55

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

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

(LCS) R3168980-2 10/07/16 13:42 • (LCSD) R3168980-3 10/07/16 13:43

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Chromium,Hexavalent	56.9	46.8	46.6	82.0	82.0	80.0-120			0.000	20

L862984-19 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L862984-19 10/07/16 13:46 • (MS) R3168980-5 10/07/16 13:48 • (MSD) R3168980-6 10/07/16 13:48

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chromium,Hexavalent	20.0	ND	20.1	20.2	96.0	96.0	1	75.0-125			1.00	20

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



L862638-01 Original Sample (OS) • Duplicate (DUP)

(OS) L862638-01 10/06/16 14:21 • (DUP) WG913294-3 10/06/16 14:21						
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	8.13	8.14	1	0.123		1

L863374-04 Original Sample (OS) • Duplicate (DUP)

(OS) L863374-04 10/06/16 14:21 • (DUP) WG913294-4 10/06/16 14:21						
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	8.29	8.30	1	0.121		1

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

(LCS) WG913294-1 10/06/16 14:21 • (LCSD) WG913294-2 10/06/16 14:21									
	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD
Analyte	su	su	su	%	%	%			%
pH	6.11	6.06	6.06	99.2	99.2	98.4-102			0.000

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc





Method Blank (MB)

(MB) WG914317-1 10/06/16 00:30

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	umhos/cm		umhos/cm	umhos/cm
Specific Conductance	0.920			

L863353-04 Original Sample (OS) • Duplicate (DUP)

(OS) L863353-04 10/06/16 00:30 • (DUP) WG914317-4 10/06/16 00:30

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	umhos/cm	umhos/cm		%		%
Specific Conductance	785	783	1	0.255		20

L863374-04 Original Sample (OS) • Duplicate (DUP)

(OS) L863374-04 10/06/16 00:30 • (DUP) WG914317-5 10/06/16 00:30

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	umhos/cm	umhos/cm		%		%
Specific Conductance	600	593	1	1.17		20

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

(LCS) WG914317-2 10/06/16 00:30 • (LCSD) WG914317-3 10/06/16 00:30

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	umhos/cm	umhos/cm	umhos/cm	%	%	%			%	%
Specific Conductance	542	555	554	102	102	90.0-110			0.180	20

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



Method Blank (MB)

(MB) R3168383-1 10/05/16 12:58

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

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

(LCS) R3168383-2 10/05/16 13:01 • (LCSD) R3168383-3 10/05/16 13:03

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.300	0.296	0.270	99	90	80-120			9	20

L863374-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L863374-03 10/05/16 13:06 • (MS) R3168383-4 10/05/16 13:08 • (MSD) R3168383-5 10/05/16 13:11

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.300	ND	0.252	0.266	81	86	1	75-125			5	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3168951-1 10/07/16 11:10

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	1.42	J	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	1.51	J	0.59	5.00

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) R3168951-2 10/07/16 11:12 • (LCSD) R3168951-3 10/07/16 11:15

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	100	92.8	100	93	80-120			8	20
Barium	100	102	94.5	102	95	80-120			8	20
Boron	100	103	95.6	103	96	80-120			7	20
Cadmium	100	99.7	92.4	100	92	80-120			8	20
Chromium	100	98.5	91.0	99	91	80-120			8	20
Copper	100	100	92.9	100	93	80-120			8	20
Lead	100	98.9	91.9	99	92	80-120			7	20
Nickel	100	101	93.4	101	93	80-120			7	20
Selenium	100	98.4	90.9	98	91	80-120			8	20
Silver	100	99.3	92.1	99	92	80-120			7	20
Zinc	100	101	93.7	101	94	80-120			7	20

L863123-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L863123-01 10/07/16 11:18 • (MS) R3168951-6 10/07/16 11:25 • (MSD) R3168951-7 10/07/16 11:28

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 %
Arsenic	111	U	109	113	96	100	1	75-125			3	20
Barium	111	U	112	116	99	103	1	75-125			4	20
Boron	111	U	110	113	99	102	1	75-125			3	20
Cadmium	111	U	108	111	97	100	1	75-125			3	20



L863123-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L863123-01 10/07/16 11:18 • (MS) R3168951-6 10/07/16 11:25 • (MSD) R3168951-7 10/07/16 11:28

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	111	6.50	113	117	96	100	1	75-125			4	20
Copper	111	U	117	120	101	104	1	75-125			3	20
Lead	111	1.99	110	114	97	101	1	75-125			4	20
Nickel	111	U	110	114	99	103	1	75-125			4	20
Selenium	111	U	104	108	94	98	1	75-125			4	20
Silver	111	U	108	111	97	100	1	75-125			3	20
Zinc	111	U	113	117	97	101	1	75-125			4	20

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

Method Blank (MB)

(MB) R3169585-5 10/07/16 15:27

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000406	J	0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	0.0369	J	0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID) 101				59.0-128
(S) a,a,a-Trifluorotoluene(PID) 105				54.0-144

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

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

(LCS) R3169585-1 10/07/16 13:27 • (LCSD) R3169585-2 10/07/16 13:51

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	0.0427	0.0448	85.5	89.7	70.0-130			4.76	20
Toluene	0.0500	0.0430	0.0440	86.0	88.1	70.0-130			2.36	20
Ethylbenzene	0.0500	0.0454	0.0467	90.8	93.5	70.0-130			2.90	20
Total Xylene	0.150	0.140	0.143	93.6	95.6	70.0-130			2.18	20
(S) a,a,a-Trifluorotoluene(FID)				101	100	59.0-128				
(S) a,a,a-Trifluorotoluene(PID)				105	104	54.0-144				

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

(LCS) R3169585-3 10/07/16 14:15 • (LCSD) R3169585-4 10/07/16 14:39

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	4.91	5.24	89.2	95.2	63.5-137			6.55	20
(S) a,a,a-Trifluorotoluene(FID)				104	102	59.0-128				
(S) a,a,a-Trifluorotoluene(PID)				121	118	54.0-144				

L863710-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L863710-01 10/07/16 21:39 • (MS) R3169585-6 10/07/16 19:38 • (MSD) R3169585-7 10/07/16 20:02

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 %
Benzene	0.0631	ND	0.441	0.453	37.5	38.5	18.5	49.7-127	J6	J6	2.62	23.5
Toluene	0.0631	ND	0.533	0.531	44.6	44.4	18.5	49.8-132	J6	J6	0.350	23.5
Ethylbenzene	0.0631	ND	0.682	0.692	57.9	58.8	18.5	40.8-141			1.50	23.8
Total Xylene	0.189	ND	2.16	2.17	61.1	61.4	18.5	41.2-140			0.450	23.7





L863710-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L863710-01 10/07/16 21:39 • (MS) R3169585-6 10/07/16 19:38 • (MSD) R3169585-7 10/07/16 20:02

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 %
(S) a,a,a-Trifluorotoluene(FID)					101	101		59.0-128				
(S) a,a,a-Trifluorotoluene(PID)					105	105		54.0-144				

L863710-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L863710-01 10/07/16 21:39 • (MS) R3169585-8 10/07/16 20:26 • (MSD) R3169585-9 10/07/16 20:50

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 %
TPH (GC/FID) Low Fraction	6.94	ND	72.8	71.1	55.1	53.8	18.5	28.5-138			2.31	23.6
(S) a,a,a-Trifluorotoluene(FID)					97.9	97.9		59.0-128				
(S) a,a,a-Trifluorotoluene(PID)					110	110		54.0-144				

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

Method Blank (MB)

(MB) R3169113-1 10/07/16 16:27

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	78.0			50.0-150

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

(LCS) R3169113-2 10/07/16 16:44 • (LCSD) R3169113-3 10/07/16 17:02

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	34.7	35.7	57.8	59.4	50.0-150			2.79	20
(S) o-Terphenyl				85.2	85.3	50.0-150				

L863353-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L863353-05 10/08/16 12:59 • (MS) R3169120-1 10/08/16 13:15 • (MSD) R3169120-2 10/08/16 13:31

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	60.0	116	174	160	96.1	72.0	1	50.0-150			8.66	20
(S) o-Terphenyl					59.5	64.8		50.0-150				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3169430-1 10/10/16 10:32

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	120			50.0-150

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) R3169430-2 10/10/16 10:49 • (LCSD) R3169430-3 10/10/16 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 %
C10-C28 Diesel Range	60.0	38.6	50.3	64.3	83.9	50.0-150		J3	26.5	20
(S) o-Terphenyl				122	122	50.0-150				

L864048-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L864048-05 10/11/16 00:25 • (MS) R3169430-4 10/11/16 00:41 • (MSD) R3169430-5 10/11/16 00:57

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	60.0	150	158	184	13.4	57.3	1	50.0-150	J6		15.4	20
(S) o-Terphenyl					86.0	82.2		50.0-150				

Method Blank (MB)

(MB) R3168962-2 10/07/16 08:10

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	100			32.2-131
(S) Nitrobenzene-d5	102			22.1-146
(S) 2-Fluorobiphenyl	119			40.6-122

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

(LCS) R3168962-3 10/07/16 08:53 • (LCSD) R3168962-1 10/07/16 07:48

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	0.0371	0.0756	46.4	94.5	50.3-130	J4	J3	68.2	20
Acenaphthene	0.0800	0.0362	0.0741	45.2	92.6	52.4-120	J4	J3	68.8	20
Acenaphthylene	0.0800	0.0362	0.0717	45.3	89.6	49.6-120	J4	J3	65.7	20
Benzo(a)anthracene	0.0800	0.0354	0.0752	44.2	94.0	46.7-125	J4	J3	72.1	20
Benzo(a)pyrene	0.0800	0.0377	0.0809	47.1	101	42.3-119		J3	72.9	20
Benzo(b)fluoranthene	0.0800	0.0344	0.0723	43.0	90.4	43.6-124	J4	J3	71.1	20
Benzo(g,h,i)perylene	0.0800	0.0359	0.0773	44.9	96.6	45.1-132	J4	J3	73.0	20
Benzo(k)fluoranthene	0.0800	0.0360	0.0769	45.0	96.1	46.1-131	J4	J3	72.4	20
Chrysene	0.0800	0.0352	0.0746	44.0	93.3	49.5-131	J4	J3	71.8	20
Dibenz(a,h)anthracene	0.0800	0.0357	0.0773	44.7	96.7	44.8-133	J4	J3	73.6	20
Fluoranthene	0.0800	0.0395	0.0801	49.4	100	49.3-128		J3	67.8	20



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

(LCS) R3168962-3 10/07/16 08:53 • (LCSD) R3168962-1 10/07/16 07:48

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	0.0366	0.0750	45.8	93.8	50.6-121	J4	J3	68.8	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0360	0.0773	45.0	96.7	46.1-135	J4	J3	72.9	20
Naphthalene	0.0800	0.0359	0.0711	44.9	88.8	49.6-115	J4	J3	65.7	20
Phenanthrene	0.0800	0.0367	0.0751	45.9	93.9	48.8-121	J4	J3	68.7	20
Pyrene	0.0800	0.0389	0.0820	48.6	102	44.7-130		J3	71.3	20
1-Methylnaphthalene	0.0800	0.0406	0.0799	50.8	99.9	50.6-122		J3	65.2	20
2-Methylnaphthalene	0.0800	0.0397	0.0794	49.7	99.3	50.4-120	J4	J3	66.6	20
2-Chloronaphthalene	0.0800	0.0367	0.0741	45.9	92.6	53.9-121	J4	J3	67.5	20
(S) p-Terphenyl-d14				76.1	86.7	32.2-131				
(S) Nitrobenzene-d5				78.7	89.1	22.1-146				
(S) 2-Fluorobiphenyl				93.7	103	40.6-122				

L864145-18 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L864145-18 10/07/16 09:58 • (MS) R3168962-4 10/07/16 10:20 • (MSD) R3168962-5 10/07/16 10:42

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 %
Anthracene	0.0830	ND	0.0758	0.0743	91.3	89.5	1	26.5-141			2.01	21.2
Acenaphthene	0.0830	ND	0.0737	0.0712	88.8	85.8	1	31.9-130			3.47	20
Acenaphthylene	0.0830	ND	0.0744	0.0724	89.6	87.3	1	33.7-129			2.66	20
Benzo(a)anthracene	0.0830	ND	0.0766	0.0749	92.3	90.2	1	18.3-136			2.33	24.6
Benzo(a)pyrene	0.0830	ND	0.0828	0.0802	99.7	96.6	1	16.9-135			3.16	25.2
Benzo(b)fluoranthene	0.0830	ND	0.0761	0.0732	91.7	88.2	1	10.0-134			3.88	30.9
Benzo(g,h,i)perylene	0.0830	ND	0.0707	0.0685	85.2	82.5	1	14.1-140			3.17	25.5
Benzo(k)fluoranthene	0.0830	ND	0.0724	0.0721	87.3	86.8	1	18.2-138			0.530	25.6
Chrysene	0.0830	ND	0.0748	0.0727	90.1	87.6	1	17.1-145			2.85	24.2
Dibenz(a,h)anthracene	0.0830	ND	0.0732	0.0713	88.2	85.9	1	18.5-138			2.70	24.3
Fluoranthene	0.0830	ND	0.0787	0.0767	94.8	92.5	1	15.4-144			2.54	27.1
Fluorene	0.0830	ND	0.0751	0.0732	90.5	88.2	1	23.5-136			2.56	20
Indeno(1,2,3-cd)pyrene	0.0830	ND	0.0724	0.0702	87.3	84.6	1	14.5-142			3.05	25.8
Naphthalene	0.0830	ND	0.0666	0.0650	80.2	78.3	1	29.2-128			2.43	20
Phenanthrene	0.0830	ND	0.0742	0.0721	89.5	86.9	1	20.1-134			2.94	23.6
Pyrene	0.0830	ND	0.0846	0.0822	102	99.0	1	11.0-148			2.93	26.1
1-Methylnaphthalene	0.0830	ND	0.0768	0.0776	92.6	93.4	1	28.4-137			0.930	20
2-Methylnaphthalene	0.0830	ND	0.0761	0.0780	91.7	94.0	1	26.6-137			2.42	20
2-Chloronaphthalene	0.0830	ND	0.0722	0.0700	87.0	84.3	1	38.6-126			3.12	20
(S) p-Terphenyl-d14					84.7	76.6		32.2-131				
(S) Nitrobenzene-d5					79.2	71.5		22.1-146				
(S) 2-Fluorobiphenyl					95.3	85.8		40.6-122				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc





## Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(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.
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.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> 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 <sup>1</sup>	DW21704
Florida	E87487	North Carolina <sup>2</sup>	41
Georgia	NELAP	North Dakota	R-140
Georgia <sup>1</sup>	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 <sup>1</sup>	90010	South Dakota	n/a
Kentucky <sup>2</sup>	16	Tennessee <sup>14</sup>	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas <sup>5</sup>	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		

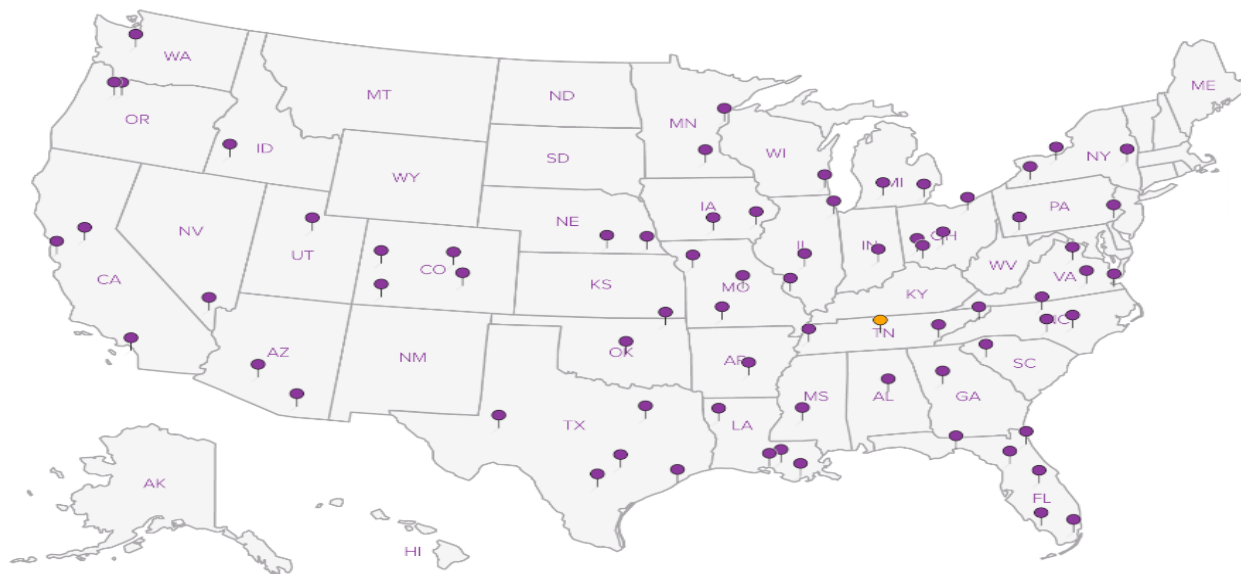
## Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>n/a</sup> 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

Pit Reclamation

Description:

City/State

Collected:

Phone: 303-601-2023

Client Project #

Lab Project #

Fax:

BERPETDCO030615S

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

DK Nicholson

**Rush?** (Lab MUST Be Notified)

☐ Same Day .....200%  
☐ Next Day .....100%  
☐ Two Day .....50%  
☐ Three Day .....25%

Date Results Needed

Email? ☐ No ☒ YesFAX? ☒ No ☐ YesNo.  
of  
Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs
F01-FWP-1		SS		9/28	1300	5
F01-FWP-2		SS			1310	5
F01-FWP-3		SS			1320	5
F01-FWP-4		SS			1330	5
		SS				5
		SS				5
		SS				5
		SS				5
		SS				5
		SS				5
		SS				5

SAR, Metals, Cr6 (1) 4oz Clear - No Pres

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

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

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

PAHSIM 8270 (1) 4oz Soil Jar

Analysis / Container / Preservative

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# 6863374

C159

Acctnum:BERPETDCO

Template:

Prelogin:

TSR:

Cooler:

Shipped Via:

Rem./Contaminant Sample # (lab only)

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

pH \_\_\_\_\_ Temp \_\_\_\_\_

6827 1104 4425

Remarks: As, Ba, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn, Cr6

Flow \_\_\_\_\_ Other \_\_\_\_\_

Hold #

Relinquished by: (Signature)

DK Nicholson

Date:

9/30/16

Time:

1200

Received by: (Signature)

FedEx

Samples returned via: ☐ UPS☐ FedEx ☐ Courier ☐

Condition: (lab use only)

Gmo

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Temp: 3.2 °C Bottles Received: 20 = 4oz

COC Seal Intact: ☒ Y ☐ N ☐ NA

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

Date: 10-1-16

Time: 90

pH Checked:

NCF:



## Cooler Receipt Form

Client: <b>BERPETCO</b>	SDG# <b>L663374</b>			
Cooler Received/Opened On: <b>10/1/2016</b>	Temperature Upon Receipt: <b>3.2 °C</b>			
Received By: <b>Richard Hughes</b>				
Signature: <i>[Signature]</i>				
Receipt Check List		Yes	No	N/A
Were custody seals on outside of cooler and intact?				/
Were custody papers properly filled out?		/		
Did all bottles arrive in good condition?		/		
Were correct bottles used for the analyses requested?		/		
Was sufficient amount of sample sent in each bottle?				/
Were all applicable sample containers correctly preserved and checked for preservation? (Any not in accepted range noted on COC)				/
If applicable, was an observable VOA headspace present?				/
Non Conformance Generated. (If yes see attached NCF)				



## Linn Energy - Denver, CO

Sample Delivery Group: L870803

Samples Received: 11/05/2016

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.



<b><sup>1</sup>Cp: Cover Page</b>	<b>1</b>
<b><sup>2</sup>Tc: Table of Contents</b>	<b>2</b>
<b><sup>3</sup>Ss: Sample Summary</b>	<b>3</b>
<b><sup>4</sup>Cn: Case Narrative</b>	<b>4</b>
<b><sup>5</sup>Sr: Sample Results</b>	<b>5</b>
F01-FWP-5    L870803-01	5
<b><sup>6</sup>Qc: Quality Control Summary</b>	<b>7</b>
Wet Chemistry by Method 3060A/7196A	7
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<b><sup>7</sup>Gl: Glossary of Terms</b>	<b>18</b>
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<b><sup>9</sup>Sc: Chain of Custody</b>	<b>20</b>



## SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



F01-FWP-5 L870803-01 Solid

Collected by  
DK NicholsonCollected date/time  
11/03/16 11:20Received date/time  
11/05/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG924211	1	11/07/16 14:37	11/08/16 19:54	ST
Mercury by Method 7471A	WG924296	1	11/07/16 11:25	11/08/16 10:05	NJB
Metals (ICP) by Method 6010B	WG924013	1	11/06/16 17:28	11/07/16 23:47	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG924190	1	11/06/16 22:42	11/08/16 02:16	KMP
Semi-Volatile Organic Compounds (GC) by Method 8015	WG924180	1	11/07/16 02:37	11/07/16 20:03	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG924564	1	11/08/16 09:00	11/08/16 15:13	ACG
Wet Chemistry by Method 3060A/7196A	WG924316	1	11/08/16 15:12	11/09/16 14:47	MHM
Wet Chemistry by Method 9045D	WG923656	1	11/09/16 11:55	11/09/16 12:06	JJL
Wet Chemistry by Method 9050AMod	WG924105	1	11/07/16 16:57	11/07/16 16:57	MZ

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc



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

### Sample Handling and Receiving

The following samples were prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

<u>ESC Sample ID</u>	<u>Project Sample ID</u>	<u>Method</u>
<a href="#">L870803-01</a>	<a href="#">F01-FWP-5</a>	9045D

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc





## Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	2.18		1	11/08/2016 19:54	WG924211

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	11/09/2016 14:47	<a href="#">WG924316</a>

## Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.56		1	11/09/2016 12:06	<a href="#">WG923656</a>

## Sample Narrative:

9045D L870803-01 WG923656: 8.56 at 19.6c

## Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	402		1	11/07/2016 16:57	<a href="#">WG924105</a>

## Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	11/08/2016 10:05	<a href="#">WG924296</a>

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	3.42		2.00	1	11/07/2016 23:47	<a href="#">WG924013</a>
Barium	201		0.500	1	11/07/2016 23:47	<a href="#">WG924013</a>
Boron	ND		10.0	1	11/07/2016 23:47	<a href="#">WG924013</a>
Cadmium	ND		0.500	1	11/07/2016 23:47	<a href="#">WG924013</a>
Chromium	63.6		1.00	1	11/07/2016 23:47	<a href="#">WG924013</a>
Copper	13.4		2.00	1	11/07/2016 23:47	<a href="#">WG924013</a>
Lead	12.2		0.500	1	11/07/2016 23:47	<a href="#">WG924013</a>
Nickel	29.4		2.00	1	11/07/2016 23:47	<a href="#">WG924013</a>
Selenium	ND		2.00	1	11/07/2016 23:47	<a href="#">WG924013</a>
Silver	ND		1.00	1	11/07/2016 23:47	<a href="#">WG924013</a>
Zinc	44.5		5.00	1	11/07/2016 23:47	<a href="#">WG924013</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	11/08/2016 15:13	<a href="#">WG924564</a>
Toluene	ND		0.00500	1	11/08/2016 15:13	<a href="#">WG924564</a>
Ethylbenzene	ND		0.000500	1	11/08/2016 15:13	<a href="#">WG924564</a>
Total Xylene	ND		0.00150	1	11/08/2016 15:13	<a href="#">WG924564</a>
TPH (GC/FID) Low Fraction	ND		0.100	1	11/08/2016 15:13	<a href="#">WG924564</a>
(S) a,a,a-Trifluorotoluene(FID)	97.9		59.0-128		11/08/2016 15:13	<a href="#">WG924564</a>
(S) a,a,a-Trifluorotoluene(PID)	88.9		54.0-144		11/08/2016 15:13	<a href="#">WG924564</a>



Collected date/time: 11/03/16 11:20

L870803

## 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	ND		4.00	1	11/07/2016 20:03	<a href="#">WG924180</a>
C28-C40 Oil Range	ND		4.00	1	11/07/2016 20:03	<a href="#">WG924180</a>
(S) o-Terphenyl	111		50.0-150		11/07/2016 20:03	<a href="#">WG924180</a>

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Acenaphthene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Acenaphthylene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Benzo(a)anthracene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Benzo(a)pyrene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Benzo(b)fluoranthene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Benzo(g,h,i)perylene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Benzo(k)fluoranthene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Chrysene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Dibenz(a,h)anthracene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Fluoranthene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Fluorene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Naphthalene	ND		0.0200	1	11/08/2016 02:16	<a href="#">WG924190</a>
Phenanthrene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
Pyrene	ND		0.00600	1	11/08/2016 02:16	<a href="#">WG924190</a>
1-Methylnaphthalene	ND		0.0200	1	11/08/2016 02:16	<a href="#">WG924190</a>
2-Methylnaphthalene	ND		0.0200	1	11/08/2016 02:16	<a href="#">WG924190</a>
2-Chloronaphthalene	ND		0.0200	1	11/08/2016 02:16	<a href="#">WG924190</a>
(S) p-Terphenyl-d14	95.6		32.2-131		11/08/2016 02:16	<a href="#">WG924190</a>
(S) Nitrobenzene-d5	76.8		22.1-146		11/08/2016 02:16	<a href="#">WG924190</a>
(S) 2-Fluorobiphenyl	88.1		40.6-122		11/08/2016 02:16	<a href="#">WG924190</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3176860-1 11/09/16 14:39

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Chromium,Hexavalent	U		0.640	2.00

L870750-01 Original Sample (OS) • Duplicate (DUP)

(OS) L870750-01 11/09/16 14:43 • (DUP) R3176860-4 11/09/16 14:43

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

L870833-01 Original Sample (OS) • Duplicate (DUP)

(OS) L870833-01 11/09/16 14:54 • (DUP) R3176860-5 11/09/16 14:54

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chromium,Hexavalent	5.36	5.36	1	0.000		20

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

(LCS) R3176860-2 11/09/16 14:39 • (LCSD) R3176860-3 11/09/16 14:39

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Chromium,Hexavalent	56.9	58.6	59.4	103	104	80.0-120			1.00	20

L870833-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L870833-01 11/09/16 14:54 • (MS) R3176860-6 11/09/16 14:56 • (MSD) R3176860-7 11/09/16 14:56

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chromium,Hexavalent	20.0	5.36	26.7	26.7	107	107	1	75.0-125			0.000	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



L870255-01 Original Sample (OS) • Duplicate (DUP)

(OS) L870255-01 11/09/16 12:06 • (DUP) WG923656-3 11/09/16 12:06

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.81	6.79	1	0.294		1

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

L870803-01 Original Sample (OS) • Duplicate (DUP)

(OS) L870803-01 11/09/16 12:06 • (DUP) WG923656-4 11/09/16 12:06

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.56	8.53	1	0.351		1

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

(LCS) WG923656-1 11/09/16 12:06 • (LCSD) WG923656-2 11/09/16 12:06

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.11	6.10	6.12	99.8	100	98.4-102			0.327	1

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



Method Blank (MB)

(MB) WG924105-1 11/07/16 16:57

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	umhos/cm		umhos/cm	umhos/cm
Specific Conductance	0.910			

L870803-01 Original Sample (OS) • Duplicate (DUP)

(OS) L870803-01 11/07/16 16:57 • (DUP) WG924105-4 11/07/16 16:57

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	umhos/cm	umhos/cm		%		%
Specific Conductance	402	405	1	0.743		20

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

(LCS) WG924105-2 11/07/16 16:57 • (LCSD) WG924105-3 11/07/16 16:57

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	542	555	554	102	102	90.0-110			0.180	20

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



Method Blank (MB)

(MB) R3176446-1 11/08/16 08:59

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

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

(LCS) R3176446-2 11/08/16 09:02 • (LCSD) R3176446-3 11/08/16 09:05

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.300	0.250	0.260	83	87	80-120			4	20

L870750-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L870750-01 11/08/16 09:07 • (MS) R3176446-4 11/08/16 09:10 • (MSD) R3176446-5 11/08/16 09:12

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.300	ND	0.269	0.283	87	91	1	75-125			5	20

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

Method Blank (MB)

(MB) R3176349-1 11/07/16 22:30

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	1.91	J	0.59	5.00

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

(LCS) R3176349-2 11/07/16 22:33 • (LCSD) R3176349-3 11/07/16 22:35

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	96.7	98.9	97	99	80-120			2	20
Barium	100	101	103	101	103	80-120			2	20
Boron	100	105	109	105	109	80-120			3	20
Cadmium	100	100	102	100	102	80-120			2	20
Chromium	100	99.5	102	100	102	80-120			2	20
Copper	100	102	105	102	105	80-120			3	20
Lead	100	100	103	100	103	80-120			2	20
Nickel	100	102	104	102	104	80-120			2	20
Selenium	100	101	103	101	103	80-120			2	20
Silver	100	97.0	98.2	97	98	80-120			1	20
Zinc	100	103	105	103	105	80-120			2	20

L870693-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L870693-01 11/07/16 22:38 • (MS) R3176349-6 11/07/16 22:46 • (MSD) R3176349-7 11/07/16 22:49

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	6.64	95.6	95.8	89	89	1	75-125			0	20
Barium	100	41.3	116	135	75	94	1	75-125			16	20
Boron	100	ND	91.2	94.7	91	95	1	75-125			4	20
Cadmium	100	ND	92.6	93.9	92	94	1	75-125			1	20
Chromium	100	21.6	115	111	93	89	1	75-125			4	20



L870803-01

L870693-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L870693-01 11/07/16 22:38 • (MS) R3176349-6 11/07/16 22:46 • (MSD) R3176349-7 11/07/16 22:49

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	12.3	110	108	98	95	1	75-125			2	20
Lead	100	9.68	108	105	99	96	1	75-125			3	20
Nickel	100	12.6	117	107	104	95	1	75-125			8	20
Selenium	100	ND	93.3	94.8	92	94	1	75-125			2	20
Silver	100	ND	89.8	92.4	90	92	1	75-125			3	20
Zinc	100	67.5	154	152	86	85	1	75-125			1	20

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc



Method Blank (MB)

(MB) R3176601-5 11/08/16 12:32

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000262	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) 99.4			59.0-128	
(S) a,a,a-Trifluorotoluene(PID) 92.8			54.0-144	

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

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

(LCS) R3176601-1 11/08/16 10:41 • (LCSD) R3176601-2 11/08/16 11:03

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	0.0521	0.0534	104	107	70.0-130			2.40	20
Toluene	0.0500	0.0517	0.0526	103	105	70.0-130			1.58	20
Ethylbenzene	0.0500	0.0530	0.0545	106	109	70.0-130			2.80	20
Total Xylene	0.150	0.164	0.167	110	111	70.0-130			1.65	20
(S) a,a,a-Trifluorotoluene(FID)				98.1	98.8	59.0-128				
(S) a,a,a-Trifluorotoluene(PID)				100	101	54.0-144				

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

(LCS) R3176601-3 11/08/16 11:25 • (LCSD) R3176601-4 11/08/16 11:47

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	5.32	4.95	96.8	90.0	63.5-137			7.29	20
(S) a,a,a-Trifluorotoluene(FID)				99.4	100	59.0-128				
(S) a,a,a-Trifluorotoluene(PID)				108	109	54.0-144				

L870803-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L870803-01 11/08/16 15:13 • (MS) R3176601-6 11/08/16 18:32 • (MSD) R3176601-7 11/08/16 18:54

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	ND	0.0356	0.0375	70.6	74.3	1	49.7-127			5.08	23.5
Toluene	0.0500	ND	0.0334	0.0352	65.9	69.4	1	49.8-132			5.15	23.5
Ethylbenzene	0.0500	ND	0.0311	0.0334	62.2	66.8	1	40.8-141			7.05	23.8
Total Xylene	0.150	ND	0.0946	0.102	63.1	67.7	1	41.2-140			7.12	23.7
(S) a,a,a-Trifluorotoluene(FID)					97.6	97.7		59.0-128				



L870803-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L870803-01 11/08/16 15:13 • (MS) R3176601-6 11/08/16 18:32 • (MSD) R3176601-7 11/08/16 18:54												
	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
(S) a,a,a-Trifluorotoluene(PID)					94.9	95.6		54.0-144				

L870803-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L870803-01 11/08/16 15:13 • (MS) R3176601-8 11/08/16 19:16 • (MSD) R3176601-9 11/08/16 19:38												
	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
TPH (GC/FID) Low Fraction	5.50	ND	3.39	3.02	61.6	54.9	1	28.5-138			11.6	23.6
(S) a,a,a-Trifluorotoluene(FID)					96.6	96.6		59.0-128				
(S) a,a,a-Trifluorotoluene(PID)					103	103		54.0-144				

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc



Method Blank (MB)

(MB) R3176440-1 11/07/16 18:41

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	122			50.0-150

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

(LCS) R3176440-2 11/07/16 18:55 • (LCSD) R3176440-3 11/07/16 19:09

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	50.3	52.6	83.8	87.7	50.0-150			4.48	20
(S) o-Terphenyl				124	127	50.0-150				

L869696-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L869696-03 11/07/16 22:15 • (MS) R3176440-4 11/07/16 21:22 • (MSD) R3176440-5 11/07/16 21:36

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	954	2730	2380	2960	2370	10	50.0-150	V	V	13.8	20
(S) o-Terphenyl					161	156		50.0-150	J1	J1		



Method Blank (MB)

(MB) R3176204-3 11/07/16 05:27

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	88.9			32.2-131
(S) Nitrobenzene-d5	77.3			22.1-146
(S) 2-Fluorobiphenyl	84.0			40.6-122

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

(LCS) R3176204-1 11/07/16 04:43 • (LCSD) R3176204-2 11/07/16 05:05

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	0.0717	0.0740	89.6	92.5	50.3-130			3.18	20
Acenaphthene	0.0800	0.0686	0.0689	85.7	86.2	52.4-120			0.520	20
Acenaphthylene	0.0800	0.0697	0.0701	87.2	87.6	49.6-120			0.440	20
Benzo(a)anthracene	0.0800	0.0684	0.0685	85.5	85.6	46.7-125			0.200	20
Benzo(a)pyrene	0.0800	0.0681	0.0695	85.1	86.9	42.3-119			2.06	20
Benzo(b)fluoranthene	0.0800	0.0699	0.0737	87.4	92.1	43.6-124			5.27	20
Benzo(g,h,i)perylene	0.0800	0.0687	0.0710	85.9	88.7	45.1-132			3.27	20
Benzo(k)fluoranthene	0.0800	0.0701	0.0689	87.6	86.2	46.1-131			1.65	20
Chrysene	0.0800	0.0689	0.0694	86.1	86.7	49.5-131			0.680	20
Dibenz(a,h)anthracene	0.0800	0.0707	0.0725	88.4	90.6	44.8-133			2.45	20
Fluoranthene	0.0800	0.0705	0.0706	88.2	88.3	49.3-128			0.0800	20

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

(LCS) R3176204-1 11/07/16 04:43 • (LCSD) R3176204-2 11/07/16 05:05

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	0.0683	0.0684	85.3	85.5	50.6-121			0.240	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0718	0.0727	89.7	90.9	46.1-135			1.30	20
Naphthalene	0.0800	0.0650	0.0661	81.3	82.6	49.6-115			1.68	20
Phenanthrene	0.0800	0.0699	0.0704	87.3	88.0	48.8-121			0.790	20
Pyrene	0.0800	0.0748	0.0759	93.5	94.8	44.7-130			1.39	20
1-Methylnaphthalene	0.0800	0.0689	0.0704	86.2	88.1	50.6-122			2.17	20
2-Methylnaphthalene	0.0800	0.0667	0.0677	83.4	84.6	50.4-120			1.38	20
2-Chloronaphthalene	0.0800	0.0683	0.0687	85.3	85.9	53.9-121			0.700	20
(S) p-Terphenyl-d14				97.2	93.8	32.2-131				
(S) Nitrobenzene-d5				92.4	85.9	22.1-146				
(S) 2-Fluorobiphenyl				94.0	91.7	40.6-122				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

L870448-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L870448-13 11/08/16 04:05 • (MS) R3176421-2 11/08/16 04:27 • (MSD) R3176421-3 11/08/16 04:48

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	0.0175	ND	0.0681	0.0709	77.8	80.9	5	26.5-141			3.98	21.2
Acenaphthene	0.0175	ND	0.0676	0.0700	77.2	79.9	5	31.9-130			3.45	20
Acenaphthylene	0.0175	ND	0.0672	0.0692	76.8	79.1	5	33.7-129			2.97	20
Benzo(a)anthracene	0.0175	ND	0.0702	0.0795	74.3	84.9	5	18.3-136			12.4	24.6
Benzo(a)pyrene	0.0175	ND	0.0698	0.0796	72.0	83.3	5	16.9-135			13.2	25.2
Benzo(b)fluoranthene	0.0175	ND	0.0680	0.0886	67.1	90.6	5	10.0-134			26.3	30.9
Benzo(g,h,i)perylene	0.0175	ND	0.0830	0.0985	79.6	97.3	5	14.1-140			17.1	25.5
Benzo(k)fluoranthene	0.0175	ND	0.0672	0.0654	72.1	70.1	5	18.2-138			2.69	25.6
Chrysene	0.0175	ND	0.0705	0.0800	74.5	85.3	5	17.1-145			12.6	24.2
Dibenz(a,h)anthracene	0.0175	ND	0.0726	0.0791	82.9	90.3	5	18.5-138			8.58	24.3
Fluoranthene	0.0175	ND	0.0810	0.0971	82.9	101	5	15.4-144			18.1	27.1
Fluorene	0.0175	ND	0.0635	0.0649	72.5	74.1	5	23.5-136			2.23	20
Indeno(1,2,3-cd)pyrene	0.0175	ND	0.0774	0.0852	80.7	89.6	5	14.5-142			9.62	25.8
Naphthalene	0.0175	ND	0.0731	0.0757	83.5	86.5	5	29.2-128			3.53	20
Phenanthrene	0.0175	ND	0.0693	0.0744	79.2	84.9	5	20.1-134			7.00	23.6
Pyrene	0.0175	ND	0.0816	0.0959	82.2	98.5	5	11.0-148			16.1	26.1
1-Methylnaphthalene	0.0175	ND	0.0729	0.0752	83.2	85.9	5	28.4-137			3.10	20
2-Methylnaphthalene	0.0175	ND	0.0677	0.0691	77.3	78.9	5	26.6-137			2.11	20
2-Chloronaphthalene	0.0175	ND	0.0685	0.0693	78.2	79.1	5	38.6-126			1.14	20
(S) p-Terphenyl-d14					81.1	83.0		32.2-131				
(S) Nitrobenzene-d5					70.3	69.7		22.1-146				
(S) 2-Fluorobiphenyl					84.2	84.2		40.6-122				



## 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

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.
V	The sample concentration is too high to evaluate accurate spike recoveries.

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



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

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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 <sup>1</sup>	DW21704
Florida	E87487	North Carolina <sup>2</sup>	41
Georgia	NELAP	North Dakota	R-140
Georgia <sup>1</sup>	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 <sup>1</sup>	90010	South Dakota	n/a
Kentucky <sup>2</sup>	16	Tennessee <sup>14</sup>	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	6157585858
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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		

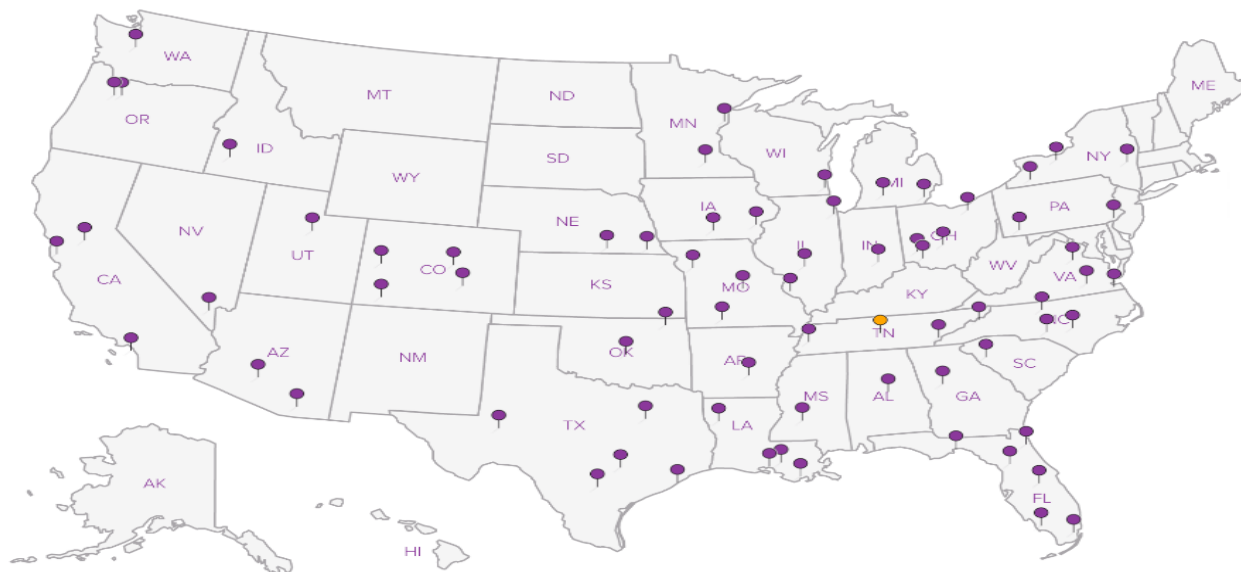
## Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>n/a</sup> 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:

**Berry Petroleum Company**1999 Broadway Suite 3700  
Denver, CO 80202

Billing Information:

Tom Hogelin, Parachute Office  
~~Accounts Payable~~ Lim Energy  
~~1999 Broadway Suite 3700~~  
~~Denver, CO 80202~~ 235 Callahan  
Parachute, CO 81635

Report to:

Dave Nicholson

Email To:

dknicholson@q.com

Project

Pit Reclamation

Description:

City/State

Collected:

Phone: 303-601-2023

Client Project #

Lab Project #

Fax:

BERPETCO306155

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)

Date Results Needed

Same Day ..... 200%

Next Day ..... 100%

☒ Two Day ..... 50%

Three Day ..... 25%

Email? ☐ No ☐ YesFAX? ☐ No ☐ YesNo.  
of  
Cntrs

Sample ID

Comp/Grab

Matrix \*

Depth

Date

Time

Cntrs

F01-FWP-5

SS

11/3

1120

5

X

X

X

X

X

X

SAR, Metals, Cr6 (1) 4oz jar

BTEX/TVPH (8021) (1) 4oz jar

PAHS by (8270) SIM (1) 4oz jar

SPCON, pH (1) 4oz jar

TEPH (Diesel &amp; motor oil) (1) 4oz Jar

Analysis / Container / Preservative

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# 870803

D205

Tab

Acctnum: BERPETDCO

Template:

Prelogin:

TSR:

Cooler:

Shipped Via:

Rem./Contaminant

Sample # (lab only)

01

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

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

Relinquished by: (Signature)

Date:

11/4/16

Time:

930

Received by: (Signature)

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

pH \_\_\_\_\_ Temp \_\_\_\_\_

Flow \_\_\_\_\_ Other \_\_\_\_\_

Samples returned via: ☐ UPS☐ FedEx ☐ Courier ☐ \_\_\_\_\_

Temp: °C Bottles Received:

3.1

5402

Date:

Time:

11-5-10

9:00

Hold #

Condition: (lab use only)

COC Seal Intact: ☐ Y ☐ N ☐ NA

pH Checked:

NCF:

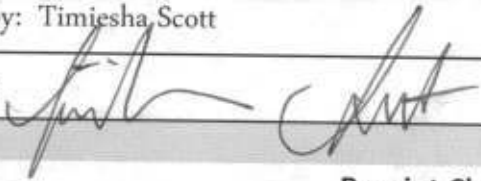




L · A · B   S · C · I · E · N · C · E · S

YOUR LAB OF CHOICE

## Cooler Receipt Form

Client:	BERRETOLO	SDG#	870303
Cooler Received/Opened On: 11/5/16	Temperature Upon Receipt:		3.1 °C
Received by: Timiesha Scott			
Signature: 			
<b>Receipt Check List</b>			
	Yes	No	N/A
Were custody seals on outside of cooler and intact?			/
Were custody papers properly filled out?	/		
Did all bottles arrive in good condition?	/		
Were correct bottles used for the analyses requested?	/		
Was sufficient amount of sample sent in each bottle?	/		
Were all applicable sample containers correctly preserved and checked for preservation? (Any not in accepted range noted on COC)			/
If applicable, was an observable VOA headspace present?			/
Non Conformance Generated. (If yes see attached NCF)			