



**Nicholson GeoSolutions, LLC**

3433 East Lake Drive  
Centennial, CO 80121

June 27, 2017

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

**Subject: Long Ridge J-15 Former Reserve Pit Investigation**

Dear Derek:

Nicholson GeoSolutions LLC was retained by Berry Petroleum Company (Berry) to conduct confirmation soil sampling of the former reserve pit excavation on the Long Ridge J-15 well pad in the Garden Gulch area, Garfield County, Colorado.

Three borings were drilled at the location in September, 2016 and the results reported previously. Impacted soils from the former reserve pit were excavated using a trackhoe and placed in a landfarm cell on site prior to sampling activities. Five discrete confirmation samples were collected from the walls and base of the excavation at the locations shown on Figure 1 on April 11<sup>th</sup>, 2017. In addition, one 12-point composite sample was collected from the spoils from the excavation.

A photoionization detector (PID) was used to screen the walls and base of the excavation and the samples were located where the highest PID readings were obtained. PID readings ranged from 0.0 to 2.1 ppm and were highest on the southwest, west, and north walls at sample locations J15-C-3, J15-C-4, and J15-C-5. All readings on the base of the excavation and the east wall were 0.0 ppm. The east wall was composed of bare bedrock, therefore a confirmation sample was not collected from that wall of the excavation.

All samples were analyzed for Total Volatile Petroleum Hydrocarbons (TVPH – gasoline range), Total Extractable Petroleum Hydrocarbons (TEPH – diesel and motor range), BTEX (benzene, toluene, ethylbenzene, and xylenes), sodium adsorption ratio (SAR), pH, conductivity, PAHs, and metals to evaluate compliance with the Table 910-1 standards.

Table 1 provides a summary of the analytical results for the soil samples collected. The laboratory analytical reports are contained in Appendix A. All confirmation sample results were below the COGCC Table 910-1 standards except for pH for two samples and arsenic for all

samples. For the spoils sample, TPH exceeded the standard at 581.48 mg/kg and benzo(a)pyrene exceeded the standard at 0.049 mg/kg. All other results for the spoils sample were below the standards except for arsenic.

Nicholson GeoSolutions LLC



David K. Nicholson, P.G.  
Principal Geologist

**Table 1 Long Ridge J-15 Confirmation Sample Results – April 11, 2017**

Parameter	COGCC Table 910-1 Standard	J15-C-1 (south base)	J15-C-2 (north base)	J15-C-3 (southwest wall)	J15-C-4 (west wall)	J15-C-5 (north wall)	LR J15-2 (spoils)
sp. conductance (mmhos/cm)	<4	0.502	0.266	0.378	0.431	0.413	0.39
pH (standard units)	6-9	9.00	8.70	8.87	<b>9.09</b>	<b>9.15</b>	8.73
SAR (ratio)	<12	2.57	1.65	1.77	1.57	1.63	4.03
TVPH – gasoline range	500 <sup>1</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<b>3.18</b>
TEPH – diesel range		8.62	53.3	<80	<80	<16	<b>578.3</b>
benzene	0.17	0.00145	0.00109	0.00121	0.00171	0.00154	0.00254
toluene	85	<0.005	<0.005	<0.005	<0.005	<0.005	0.00504
ethylbenzene	100	0.000515	0.000524	<0.0005	0.000712	0.000521	0.00323
xylenes	175	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	0.0172
benzo(a)pyrene	0.022	<0.006	<0.006	<0.006	0.013	0.0113	<b>0.049</b>
arsenic	0.39	<b>3.40</b>	<b>18.3</b>	<b>3.26</b>	<b>3.19</b>	<b>3.34</b>	<b>5.54</b>

<sup>1</sup>The standard is 500 for the combined total of TVPH and TEPH

Values in bold type exceed standards

All units in mg/kg except where indicated

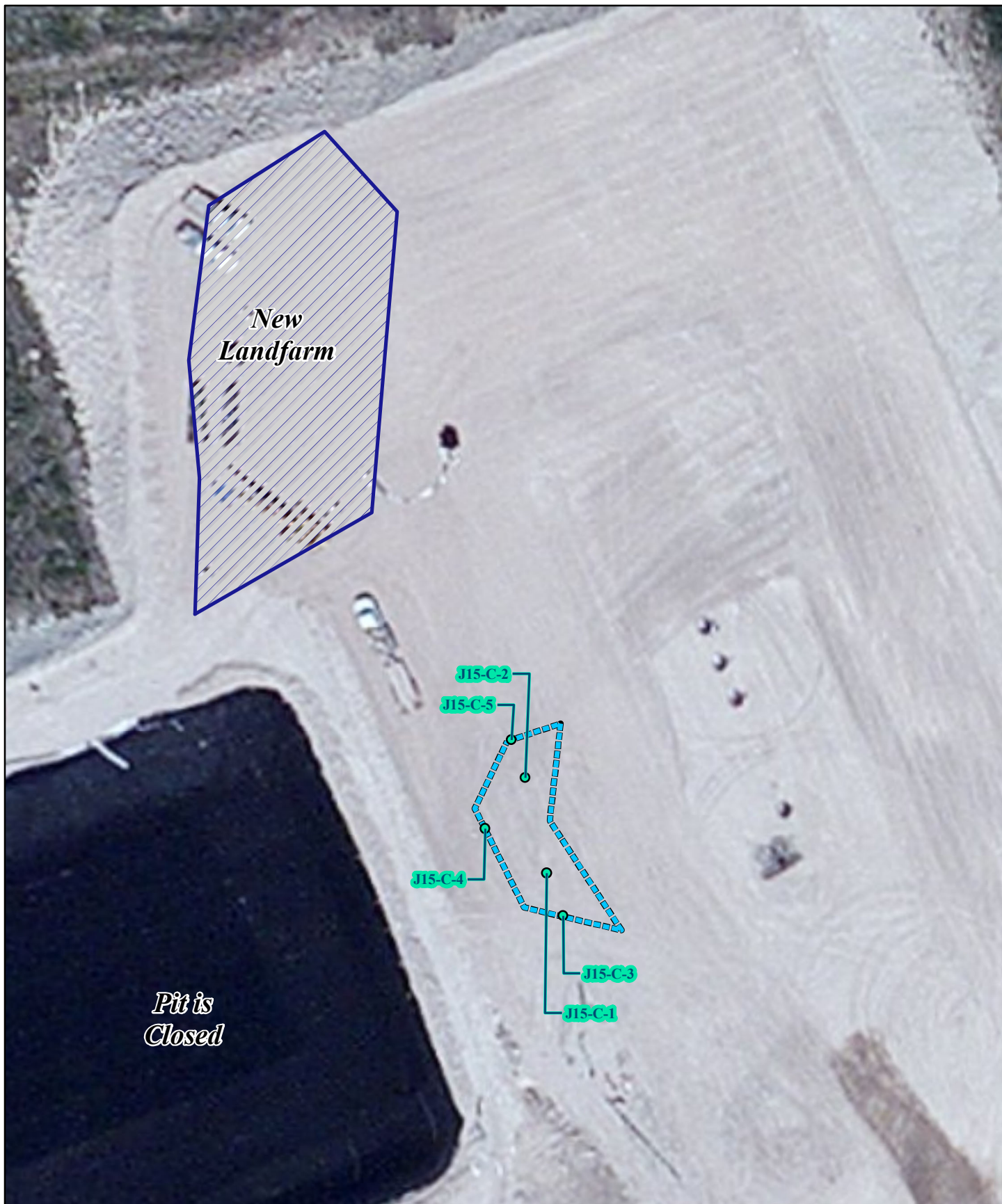


Figure 1

May 2017



### Legend



EXCAVATION 0.04 ACRES



NEW LANDFARM 0.24 ACRES

0 25 50 100 Feet 1" = 50'

***Berry Petroleum Company***

Long Ridge J-15  
Pit Investigation

## **APPENDIX A**

### **Laboratory Reports**

## Linn Energy - Denver, CO

Sample Delivery Group: L902087  
Samples Received: 04/12/2017  
Project Number:  
Description: Linn Energy 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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# SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## J15-C-1 L902087-01 Solid

Collected by  
DK Nicholson

Collected date/time  
04/11/17 09:30

Received date/time  
04/12/17 08:45

<sup>1</sup> Cp

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG970338	1	04/15/17 09:35	04/17/17 12:39	CCE
Wet Chemistry by Method 3060A/7196A	WG970382	1	04/14/17 11:19	04/15/17 17:56	MHM
Wet Chemistry by Method 9045D	WG969749	1	04/17/17 14:00	04/17/17 14:28	MHM
Wet Chemistry by Method 9050AMod	WG970233	1	04/14/17 01:38	04/14/17 01:38	MZ
Metals (ICP) by Method 6010B	WG969844	1	04/13/17 08:34	04/13/17 16:08	ST
Semi-Volatile Organic Compounds (GC) by Method 8015	WG970010	2	04/13/17 12:49	04/14/17 18:25	DMG
Volatile Organic Compounds (GC) by Method 8015/8021	WG970700	1	04/14/17 14:10	04/16/17 01:09	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG970010	2	04/13/17 12:49	04/14/17 18:25	DMG
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG969908	1	04/13/17 00:51	04/13/17 11:57	FMB

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

## J15-C-2 L902087-02 Solid

Collected by  
DK Nicholson

Collected date/time  
04/11/17 09:50

Received date/time  
04/12/17 08:45

<sup>7</sup> Gl

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG970338	1	04/15/17 09:35	04/17/17 12:42	CCE
Wet Chemistry by Method 3060A/7196A	WG970382	1	04/14/17 11:19	04/15/17 17:56	MHM
Wet Chemistry by Method 9045D	WG969749	1	04/17/17 14:00	04/17/17 14:28	MHM
Wet Chemistry by Method 9050AMod	WG970233	1	04/14/17 01:38	04/14/17 01:38	MZ
Metals (ICP) by Method 6010B	WG969844	1	04/13/17 08:34	04/13/17 16:10	ST
Semi-Volatile Organic Compounds (GC) by Method 8015	WG970010	2	04/13/17 12:49	04/14/17 05:17	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG970700	1	04/14/17 14:10	04/16/17 01:31	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG970010	2	04/13/17 12:49	04/14/17 05:17	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG969908	1	04/13/17 00:51	04/13/17 10:33	FMB

<sup>8</sup> Al

<sup>9</sup> Sc

## J15-C-3 L902087-03 Solid

Collected by  
DK Nicholson

Collected date/time  
04/11/17 10:00

Received date/time  
04/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG970338	1	04/15/17 09:35	04/17/17 12:44	CCE
Wet Chemistry by Method 3060A/7196A	WG970382	1	04/14/17 11:19	04/15/17 17:57	MHM
Wet Chemistry by Method 9045D	WG969749	1	04/17/17 14:00	04/17/17 14:28	MHM
Wet Chemistry by Method 9050AMod	WG970233	1	04/14/17 01:38	04/14/17 01:38	MZ
Metals (ICP) by Method 6010B	WG969844	1	04/13/17 08:34	04/13/17 16:13	ST
Semi-Volatile Organic Compounds (GC) by Method 8015	WG970010	10	04/13/17 12:49	04/14/17 05:44	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG970700	1	04/14/17 14:10	04/16/17 01:53	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG970010	10	04/13/17 12:49	04/14/17 05:44	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG969908	1	04/13/17 00:51	04/13/17 12:40	FMB

## J15-C-4 L902087-04 Solid

Collected by  
DK Nicholson

Collected date/time  
04/11/17 10:20

Received date/time  
04/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG970338	1	04/15/17 09:35	04/17/17 12:47	CCE
Wet Chemistry by Method 3060A/7196A	WG970382	1	04/14/17 11:19	04/15/17 17:57	MHM
Wet Chemistry by Method 9045D	WG969749	1	04/17/17 14:00	04/17/17 14:28	MHM
Wet Chemistry by Method 9050AMod	WG970233	1	04/14/17 01:38	04/14/17 01:38	MZ
Metals (ICP) by Method 6010B	WG969844	1	04/13/17 08:34	04/13/17 16:16	ST
Semi-Volatile Organic Compounds (GC) by Method 8015	WG970010	10	04/13/17 12:49	04/14/17 05:56	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG970700	1	04/14/17 14:10	04/16/17 02:16	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG970010	10	04/13/17 12:49	04/14/17 05:56	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG969908	1	04/13/17 00:51	04/13/17 13:01	FMB

ACCOUNT:

Linn Energy - Denver, CO

PROJECT:

SDG:

L902087

DATE/TIME:

04/18/17 10:43

PAGE:

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## SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



J15-C-5 L902087-05 Solid

Collected by  
DK NicholsonCollected date/time  
04/11/17 10:40Received date/time  
04/12/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG970338	1	04/15/17 09:35	04/17/17 12:50	CCE
Wet Chemistry by Method 3060A/7196A	WG970382	1	04/14/17 11:19	04/15/17 17:57	MHM
Wet Chemistry by Method 9045D	WG969749	1	04/17/17 14:00	04/17/17 14:28	MHM
Wet Chemistry by Method 9050AMod	WG970233	1	04/14/17 01:38	04/14/17 01:38	MZ
Metals (ICP) by Method 6010B	WG969844	1	04/13/17 08:34	04/13/17 16:18	ST
Semi-Volatile Organic Compounds (GC) by Method 8015	WG970010	2	04/13/17 12:49	04/14/17 05:31	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG970700	1	04/14/17 14:10	04/16/17 02:38	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG970010	2	04/13/17 12:49	04/14/17 05:31	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG969908	1	04/13/17 00:51	04/13/17 12:18	FMB

<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 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

<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	2.57		1	04/17/2017 12:39	WG970338

## Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	04/15/2017 17:56	<a href="#">WG970382</a>

## Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	9.00	<a href="#">T8</a>	1	04/17/2017 14:28	<a href="#">WG969749</a>

## Sample Narrative:

9045D L902087-01 WG969749: 9.00 at 20.4c

## Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	502		1	04/14/2017 01:38	<a href="#">WG970233</a>

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	3.40		2.00	1	04/13/2017 16:08	<a href="#">WG969844</a>
Barium	4050		0.500	1	04/13/2017 16:08	<a href="#">WG969844</a>
Boron	ND		10.0	1	04/13/2017 16:08	<a href="#">WG969844</a>
Cadmium	ND		0.500	1	04/13/2017 16:08	<a href="#">WG969844</a>
Chromium	29.0		1.00	1	04/13/2017 16:08	<a href="#">WG969844</a>
Copper	22.1		2.00	1	04/13/2017 16:08	<a href="#">WG969844</a>
Lead	24.5		0.500	1	04/13/2017 16:08	<a href="#">WG969844</a>
Nickel	18.1		2.00	1	04/13/2017 16:08	<a href="#">WG969844</a>
Selenium	ND		2.00	1	04/13/2017 16:08	<a href="#">WG969844</a>
Silver	ND		1.00	1	04/13/2017 16:08	<a href="#">WG969844</a>
Zinc	70.6		5.00	1	04/13/2017 16:08	<a href="#">WG969844</a>

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00145		0.000500	1	04/16/2017 01:09	<a href="#">WG970700</a>
Toluene	ND		0.00500	1	04/16/2017 01:09	<a href="#">WG970700</a>
Ethylbenzene	0.000515	<a href="#">B</a>	0.000500	1	04/16/2017 01:09	<a href="#">WG970700</a>
Total Xylene	ND		0.00150	1	04/16/2017 01:09	<a href="#">WG970700</a>
TPH (GC/FID) Low Fraction	ND		0.100	1	04/16/2017 01:09	<a href="#">WG970700</a>
(S) a,a,a-Trifluorotoluene(FID)	91.3		77.0-120		04/16/2017 01:09	<a href="#">WG970700</a>
(S) a,a,a-Trifluorotoluene(PID)	98.7		75.0-128		04/16/2017 01:09	<a href="#">WG970700</a>

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	8.62		8.00	2	04/14/2017 18:25	<a href="#">WG970010</a>
C28-C40 Oil Range	ND		8.00	2	04/14/2017 18:25	<a href="#">WG970010</a>
(S) o-Terphenyl	38.7		18.0-148		04/14/2017 18:25	<a href="#">WG970010</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 04/11/17 09:30

L902087

## 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	04/13/2017 11:57	<a href="#">WG969908</a>
Acenaphthene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Acenaphthylene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Benzo(a)anthracene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Benzo(a)pyrene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Benzo(b)fluoranthene	0.00969		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Benzo(g,h,i)perylene	0.00894		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Benzo(k)fluoranthene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Chrysene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Dibenz(a,h)anthracene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Fluoranthene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Fluorene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Naphthalene	0.0316		0.0200	1	04/13/2017 11:57	<a href="#">WG969908</a>
Phenanthrene	0.0139		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
Pyrene	ND		0.00600	1	04/13/2017 11:57	<a href="#">WG969908</a>
1-Methylnaphthalene	0.0344		0.0200	1	04/13/2017 11:57	<a href="#">WG969908</a>
2-Methylnaphthalene	0.0818		0.0200	1	04/13/2017 11:57	<a href="#">WG969908</a>
2-Chloronaphthalene	ND		0.0200	1	04/13/2017 11:57	<a href="#">WG969908</a>
(S) p-Terphenyl-d14	69.9		23.0-120		04/13/2017 11:57	<a href="#">WG969908</a>
(S) Nitrobenzene-d5	75.6		14.0-149		04/13/2017 11:57	<a href="#">WG969908</a>
(S) 2-Fluorobiphenyl	80.6		34.0-125		04/13/2017 11:57	<a href="#">WG969908</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	1.65		1	04/17/2017 12:42	WG970338

## Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	04/15/2017 17:56	<a href="#">WG970382</a>

## Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.70	<a href="#">T8</a>	1	04/17/2017 14:28	<a href="#">WG969749</a>

## Sample Narrative:

9045D L902087-02 WG969749: 8.70 at 20.3c

## Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	266		1	04/14/2017 01:38	<a href="#">WG970233</a>

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	18.3		2.00	1	04/13/2017 16:10	<a href="#">WG969844</a>
Barium	1700		0.500	1	04/13/2017 16:10	<a href="#">WG969844</a>
Boron	ND		10.0	1	04/13/2017 16:10	<a href="#">WG969844</a>
Cadmium	ND		0.500	1	04/13/2017 16:10	<a href="#">WG969844</a>
Chromium	25.1		1.00	1	04/13/2017 16:10	<a href="#">WG969844</a>
Copper	23.9		2.00	1	04/13/2017 16:10	<a href="#">WG969844</a>
Lead	27.5		0.500	1	04/13/2017 16:10	<a href="#">WG969844</a>
Nickel	16.2		2.00	1	04/13/2017 16:10	<a href="#">WG969844</a>
Selenium	ND		2.00	1	04/13/2017 16:10	<a href="#">WG969844</a>
Silver	ND		1.00	1	04/13/2017 16:10	<a href="#">WG969844</a>
Zinc	52.4		5.00	1	04/13/2017 16:10	<a href="#">WG969844</a>

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00109		0.000500	1	04/16/2017 01:31	<a href="#">WG970700</a>
Toluene	ND		0.00500	1	04/16/2017 01:31	<a href="#">WG970700</a>
Ethylbenzene	0.000524	<a href="#">B</a>	0.000500	1	04/16/2017 01:31	<a href="#">WG970700</a>
Total Xylene	ND		0.00150	1	04/16/2017 01:31	<a href="#">WG970700</a>
TPH (GC/FID) Low Fraction	ND		0.100	1	04/16/2017 01:31	<a href="#">WG970700</a>
(S) a,a,a-Trifluorotoluene(FID)	89.3		77.0-120		04/16/2017 01:31	<a href="#">WG970700</a>
(S) a,a,a-Trifluorotoluene(PID)	98.7		75.0-128		04/16/2017 01:31	<a href="#">WG970700</a>

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	42.1		8.00	2	04/14/2017 05:17	<a href="#">WG970010</a>
C28-C40 Oil Range	11.2		8.00	2	04/14/2017 05:17	<a href="#">WG970010</a>
(S) o-Terphenyl	71.2		18.0-148		04/14/2017 05:17	<a href="#">WG970010</a>



Collected date/time: 04/11/17 09:50

L902087

## 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	04/13/2017 10:33	<a href="#">WG969908</a>
Acenaphthene	ND		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Acenaphthylene	ND		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Benzo(a)anthracene	ND		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Benzo(a)pyrene	ND		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Benzo(b)fluoranthene	0.0105		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Benzo(g,h,i)perylene	0.0101		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Benzo(k)fluoranthene	ND		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Chrysene	ND		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Dibenz(a,h)anthracene	ND		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Fluoranthene	0.00686		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Fluorene	ND		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Indeno(1,2,3-cd)pyrene	0.00652		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Naphthalene	ND		0.0200	1	04/13/2017 10:33	<a href="#">WG969908</a>
Phenanthrene	0.00957		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
Pyrene	0.00794		0.00600	1	04/13/2017 10:33	<a href="#">WG969908</a>
1-Methylnaphthalene	0.0233		0.0200	1	04/13/2017 10:33	<a href="#">WG969908</a>
2-Methylnaphthalene	0.0437		0.0200	1	04/13/2017 10:33	<a href="#">WG969908</a>
2-Chloronaphthalene	ND		0.0200	1	04/13/2017 10:33	<a href="#">WG969908</a>
(S) p-Terphenyl-d14	70.0		23.0-120		04/13/2017 10:33	<a href="#">WG969908</a>
(S) Nitrobenzene-d5	84.2		14.0-149		04/13/2017 10:33	<a href="#">WG969908</a>
(S) 2-Fluorobiphenyl	79.0		34.0-125		04/13/2017 10:33	<a href="#">WG969908</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	1.77		1	04/17/2017 12:44	WG970338

## Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	04/15/2017 17:57	<a href="#">WG970382</a>

## Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.87	<a href="#">T8</a>	1	04/17/2017 14:28	<a href="#">WG969749</a>

## Sample Narrative:

9045D L902087-03 WG969749: 8.87 at 20.8c

## Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	378		1	04/14/2017 01:38	<a href="#">WG970233</a>

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	3.26		2.00	1	04/13/2017 16:13	<a href="#">WG969844</a>
Barium	2370		0.500	1	04/13/2017 16:13	<a href="#">WG969844</a>
Boron	ND		10.0	1	04/13/2017 16:13	<a href="#">WG969844</a>
Cadmium	ND		0.500	1	04/13/2017 16:13	<a href="#">WG969844</a>
Chromium	26.6		1.00	1	04/13/2017 16:13	<a href="#">WG969844</a>
Copper	22.1		2.00	1	04/13/2017 16:13	<a href="#">WG969844</a>
Lead	23.2		0.500	1	04/13/2017 16:13	<a href="#">WG969844</a>
Nickel	18.1		2.00	1	04/13/2017 16:13	<a href="#">WG969844</a>
Selenium	ND		2.00	1	04/13/2017 16:13	<a href="#">WG969844</a>
Silver	ND		1.00	1	04/13/2017 16:13	<a href="#">WG969844</a>
Zinc	71.1		5.00	1	04/13/2017 16:13	<a href="#">WG969844</a>

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00121		0.000500	1	04/16/2017 01:53	<a href="#">WG970700</a>
Toluene	ND		0.00500	1	04/16/2017 01:53	<a href="#">WG970700</a>
Ethylbenzene	ND		0.000500	1	04/16/2017 01:53	<a href="#">WG970700</a>
Total Xylene	ND		0.00150	1	04/16/2017 01:53	<a href="#">WG970700</a>
TPH (GC/FID) Low Fraction	ND		0.100	1	04/16/2017 01:53	<a href="#">WG970700</a>
(S) a,a,a-Trifluorotoluene(FID)	89.4		77.0-120		04/16/2017 01:53	<a href="#">WG970700</a>
(S) a,a,a-Trifluorotoluene(PID)	98.8		75.0-128		04/16/2017 01:53	<a href="#">WG970700</a>

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		40.0	10	04/14/2017 05:44	<a href="#">WG970010</a>
C28-C40 Oil Range	ND		40.0	10	04/14/2017 05:44	<a href="#">WG970010</a>
(S) o-Terphenyl	60.0		18.0-148		04/14/2017 05:44	<a href="#">WG970010</a>





Collected date/time: 04/11/17 10:00

L902087

## 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	04/13/2017 12:40	<a href="#">WG969908</a>
Acenaphthene	ND		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Acenaphthylene	ND		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Benzo(a)anthracene	ND		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Benzo(a)pyrene	ND		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Benzo(b)fluoranthene	0.0121		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Benzo(g,h,i)perylene	0.0115		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Benzo(k)fluoranthene	ND		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Chrysene	ND		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Dibenz(a,h)anthracene	ND		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Fluoranthene	0.00810		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Fluorene	ND		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Naphthalene	0.0353		0.0200	1	04/13/2017 12:40	<a href="#">WG969908</a>
Phenanthrene	0.0179		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
Pyrene	0.00995		0.00600	1	04/13/2017 12:40	<a href="#">WG969908</a>
1-Methylnaphthalene	0.0415		0.0200	1	04/13/2017 12:40	<a href="#">WG969908</a>
2-Methylnaphthalene	0.104		0.0200	1	04/13/2017 12:40	<a href="#">WG969908</a>
2-Chloronaphthalene	ND		0.0200	1	04/13/2017 12:40	<a href="#">WG969908</a>
(S) p-Terphenyl-d14	68.1		23.0-120		04/13/2017 12:40	<a href="#">WG969908</a>
(S) Nitrobenzene-d5	76.5		14.0-149		04/13/2017 12:40	<a href="#">WG969908</a>
(S) 2-Fluorobiphenyl	79.8		34.0-125		04/13/2017 12:40	<a href="#">WG969908</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	1.57		1	04/17/2017 12:47	WG970338

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	04/15/2017 17:57	<a href="#">WG970382</a>

## Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	9.09	<a href="#">T8</a>	1	04/17/2017 14:28	<a href="#">WG969749</a>

## Sample Narrative:

9045D L902087-04 WG969749: 9.09 at 20.6c

## Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	431		1	04/14/2017 01:38	<a href="#">WG970233</a>

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	3.19		2.00	1	04/13/2017 16:16	<a href="#">WG969844</a>
Barium	2780		0.500	1	04/13/2017 16:16	<a href="#">WG969844</a>
Boron	ND		10.0	1	04/13/2017 16:16	<a href="#">WG969844</a>
Cadmium	ND		0.500	1	04/13/2017 16:16	<a href="#">WG969844</a>
Chromium	26.4		1.00	1	04/13/2017 16:16	<a href="#">WG969844</a>
Copper	20.4		2.00	1	04/13/2017 16:16	<a href="#">WG969844</a>
Lead	20.8		0.500	1	04/13/2017 16:16	<a href="#">WG969844</a>
Nickel	18.4		2.00	1	04/13/2017 16:16	<a href="#">WG969844</a>
Selenium	ND		2.00	1	04/13/2017 16:16	<a href="#">WG969844</a>
Silver	ND		1.00	1	04/13/2017 16:16	<a href="#">WG969844</a>
Zinc	66.5		5.00	1	04/13/2017 16:16	<a href="#">WG969844</a>

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00171		0.000500	1	04/16/2017 02:16	<a href="#">WG970700</a>
Toluene	ND		0.00500	1	04/16/2017 02:16	<a href="#">WG970700</a>
Ethylbenzene	0.000712	<a href="#">B</a>	0.000500	1	04/16/2017 02:16	<a href="#">WG970700</a>
Total Xylene	ND		0.00150	1	04/16/2017 02:16	<a href="#">WG970700</a>
TPH (GC/FID) Low Fraction	ND		0.100	1	04/16/2017 02:16	<a href="#">WG970700</a>
(S) a,a,a-Trifluorotoluene(FID)	88.9		77.0-120		04/16/2017 02:16	<a href="#">WG970700</a>
(S) a,a,a-Trifluorotoluene(PID)	98.2		75.0-128		04/16/2017 02:16	<a href="#">WG970700</a>

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		40.0	10	04/14/2017 05:56	<a href="#">WG970010</a>
C28-C40 Oil Range	ND		40.0	10	04/14/2017 05:56	<a href="#">WG970010</a>
(S) o-Terphenyl	57.8		18.0-148		04/14/2017 05:56	<a href="#">WG970010</a>



Collected date/time: 04/11/17 10:20

L902087

## 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	04/13/2017 13:01	<a href="#">WG969908</a>
Acenaphthene	ND		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Acenaphthylene	ND		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Benzo(a)anthracene	0.00866		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Benzo(a)pyrene	0.0130		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Benzo(b)fluoranthene	0.0267		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Benzo(g,h,i)perylene	0.0224		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Benzo(k)fluoranthene	0.00834		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Chrysene	0.0111		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Dibenz(a,h)anthracene	ND		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Fluoranthene	0.0145		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Fluorene	0.00735		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Indeno(1,2,3-cd)pyrene	0.0154		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Naphthalene	0.0624		0.0200	1	04/13/2017 13:01	<a href="#">WG969908</a>
Phenanthrene	0.0304		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
Pyrene	0.0119		0.00600	1	04/13/2017 13:01	<a href="#">WG969908</a>
1-Methylnaphthalene	0.0846		0.0200	1	04/13/2017 13:01	<a href="#">WG969908</a>
2-Methylnaphthalene	0.188		0.0200	1	04/13/2017 13:01	<a href="#">WG969908</a>
2-Chloronaphthalene	ND		0.0200	1	04/13/2017 13:01	<a href="#">WG969908</a>
(S) p-Terphenyl-d14	67.0		23.0-120		04/13/2017 13:01	<a href="#">WG969908</a>
(S) Nitrobenzene-d5	73.8		14.0-149		04/13/2017 13:01	<a href="#">WG969908</a>
(S) 2-Fluorobiphenyl	78.5		34.0-125		04/13/2017 13:01	<a href="#">WG969908</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	1.63		1	04/17/2017 12:50	WG970338

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	04/15/2017 17:57	<a href="#">WG970382</a>

## Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	9.15	<a href="#">T8</a>	1	04/17/2017 14:28	<a href="#">WG969749</a>

## Sample Narrative:

9045D L902087-05 WG969749: 9.15 at 20.3c

## Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	413		1	04/14/2017 01:38	<a href="#">WG970233</a>

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	3.34		2.00	1	04/13/2017 16:18	<a href="#">WG969844</a>
Barium	3100		0.500	1	04/13/2017 16:18	<a href="#">WG969844</a>
Boron	ND		10.0	1	04/13/2017 16:18	<a href="#">WG969844</a>
Cadmium	ND		0.500	1	04/13/2017 16:18	<a href="#">WG969844</a>
Chromium	29.6		1.00	1	04/13/2017 16:18	<a href="#">WG969844</a>
Copper	22.2		2.00	1	04/13/2017 16:18	<a href="#">WG969844</a>
Lead	23.9		0.500	1	04/13/2017 16:18	<a href="#">WG969844</a>
Nickel	21.8		2.00	1	04/13/2017 16:18	<a href="#">WG969844</a>
Selenium	ND		2.00	1	04/13/2017 16:18	<a href="#">WG969844</a>
Silver	ND		1.00	1	04/13/2017 16:18	<a href="#">WG969844</a>
Zinc	75.7		5.00	1	04/13/2017 16:18	<a href="#">WG969844</a>

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00154		0.000500	1	04/16/2017 02:38	<a href="#">WG970700</a>
Toluene	ND		0.00500	1	04/16/2017 02:38	<a href="#">WG970700</a>
Ethylbenzene	0.000521	<a href="#">B</a>	0.000500	1	04/16/2017 02:38	<a href="#">WG970700</a>
Total Xylene	ND		0.00150	1	04/16/2017 02:38	<a href="#">WG970700</a>
TPH (GC/FID) Low Fraction	ND		0.100	1	04/16/2017 02:38	<a href="#">WG970700</a>
(S) a,a,a-Trifluorotoluene(FID)	89.3		77.0-120		04/16/2017 02:38	<a href="#">WG970700</a>
(S) a,a,a-Trifluorotoluene(PID)	98.3		75.0-128		04/16/2017 02:38	<a href="#">WG970700</a>

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		8.00	2	04/14/2017 05:31	<a href="#">WG970010</a>
C28-C40 Oil Range	ND		8.00	2	04/14/2017 05:31	<a href="#">WG970010</a>
(S) o-Terphenyl	79.8		18.0-148		04/14/2017 05:31	<a href="#">WG970010</a>



Collected date/time: 04/11/17 10:40

L902087

## 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	04/13/2017 12:18	<a href="#">WG969908</a>
Acenaphthene	ND		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Acenaphthylene	ND		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Benzo(a)anthracene	0.00759		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Benzo(a)pyrene	0.0113		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Benzo(b)fluoranthene	0.0206		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Benzo(g,h,i)perylene	0.0167		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Benzo(k)fluoranthene	ND		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Chrysene	0.00943		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Dibenz(a,h)anthracene	ND		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Fluoranthene	0.0146		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Fluorene	ND		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Indeno(1,2,3-cd)pyrene	0.0114		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Naphthalene	0.0288		0.0200	1	04/13/2017 12:18	<a href="#">WG969908</a>
Phenanthrene	0.0155		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
Pyrene	0.00988		0.00600	1	04/13/2017 12:18	<a href="#">WG969908</a>
1-Methylnaphthalene	0.0306		0.0200	1	04/13/2017 12:18	<a href="#">WG969908</a>
2-Methylnaphthalene	0.0790		0.0200	1	04/13/2017 12:18	<a href="#">WG969908</a>
2-Chloronaphthalene	ND		0.0200	1	04/13/2017 12:18	<a href="#">WG969908</a>
(S) p-Terphenyl-d14	69.1		23.0-120		04/13/2017 12:18	<a href="#">WG969908</a>
(S) Nitrobenzene-d5	75.1		14.0-149		04/13/2017 12:18	<a href="#">WG969908</a>
(S) 2-Fluorobiphenyl	81.5		34.0-125		04/13/2017 12:18	<a href="#">WG969908</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3211069-1 04/15/17 17:55

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

L902149-06 Original Sample (OS) • Duplicate (DUP)

(OS) L902149-06 04/15/17 18:02 • (DUP) R3211069-9 04/15/17 18:02

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

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

(LCS) R3211069-2 04/15/17 17:55 • (LCSD) R3211069-3 04/15/17 17:55

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	58.8	58.4	103	103	80-120			1	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc





L902348-04 Original Sample (OS) • Duplicate (DUP)

(OS) L902348-04 04/17/17 14:28 • (DUP) WG969749-4 04/17/17 14:28

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	12.1	12.0	1	0.663	T8	1

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

(LCS) WG969749-1 04/17/17 14:28 • (LCSD) WG969749-2 04/17/17 14:28

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	7.47	7.46	99.6	99.5	98.7-101			0.134	1

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) WG970233-1 04/14/17 01:38

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	umhos/cm		umhos/cm	umhos/cm
Specific Conductance	1.23			

L902087-01 Original Sample (OS) • Duplicate (DUP)

(OS) L902087-01 04/14/17 01:38 • (DUP) WG970233-4 04/14/17 01:38

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	umhos/cm	umhos/cm		%		%
Specific Conductance	502	508	1	1.19		20

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

(LCS) WG970233-2 04/14/17 01:38 • (LCSD) WG970233-3 04/14/17 01:38

	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	169	168	168	99.4	99.4	90.0-110			0.000	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3210700-1 04/13/17 15:29

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	1.08	J	0.59	5.00

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

(LCS) R3210700-2 04/13/17 15:31 • (LCSD) R3210700-3 04/13/17 15:34

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 %
Arsenic	100	105	103	105	103	80-120			2	20
Barium	100	107	107	107	107	80-120			1	20
Boron	100	102	103	102	103	80-120			1	20
Cadmium	100	105	104	105	104	80-120			1	20
Chromium	100	108	107	108	107	80-120			1	20
Copper	100	112	112	112	112	80-120			0	20
Lead	100	102	101	102	101	80-120			1	20
Nickel	100	102	101	102	101	80-120			1	20
Selenium	100	103	102	103	102	80-120			1	20
Silver	20.0	19.7	19.5	98	98	80-120			1	20
Zinc	100	105	103	105	103	80-120			1	20

L902098-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L902098-01 04/13/17 15:37 • (MS) R3210700-6 04/13/17 15:45 • (MSD) R3210700-7 04/13/17 15:47

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	ND	105	105	104	104	1	75-125			0	20
Barium	100	32.2	138	133	106	101	1	75-125			4	20
Boron	100	ND	101	105	101	105	1	75-125			4	20
Cadmium	100	ND	104	105	104	105	1	75-125			1	20
Chromium	100	3.27	110	109	107	106	1	75-125			1	20



L902098-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L902098-01 04/13/17 15:37 • (MS) R3210700-6 04/13/17 15:45 • (MSD) R3210700-7 04/13/17 15:47

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	3.03	116	116	113	113	1	75-125			0	20
Lead	100	1.72	105	105	103	103	1	75-125			0	20
Nickel	100	2.28	106	106	104	104	1	75-125			0	20
Selenium	100	ND	101	102	101	102	1	75-125			1	20
Silver	20.0	ND	19.5	19.4	97	97	1	75-125			0	20
Zinc	100	12.0	112	113	100	101	1	75-125			0	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3211211-5 04/15/17 21:14

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000535	<span>U</span>	0.000150	0.00500
Ethylbenzene	0.000271	<span>U</span>	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) 95.1			77.0-120	
(S) a,a,a-Trifluorotoluene(PID) 104			75.0-128	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

(LCS) R3211211-1 04/15/17 19:14 • (LCSD) R3211211-2 04/15/17 19:36

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	0.0475	0.0476	95.0	95.2	71.0-121			0.270	20
Toluene	0.0500	0.0476	0.0468	95.2	93.7	72.0-120			1.64	20
Ethylbenzene	0.0500	0.0477	0.0474	95.3	94.9	76.0-121			0.440	20
Total Xylene	0.150	0.146	0.145	97.5	96.3	75.0-124			1.17	20
(S) a,a,a-Trifluorotoluene(FID)				95.3	94.5	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				103	103	75.0-128				

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

(LCS) R3211211-3 04/15/17 19:58 • (LCSD) R3211211-4 04/15/17 20:21

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	4.32	4.37	78.6	79.4	70.0-136			1.00	20
(S) a,a,a-Trifluorotoluene(FID)				103	101	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				111	110	75.0-128				

L902120-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L902120-06 04/16/17 00:24 • (MS) R3211211-6 04/15/17 22:33 • (MSD) R3211211-7 04/15/17 22:55

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	0.644	0.658	50.6	51.7	25	10.0-146			2.11	29
Toluene	0.0500	ND	0.707	0.726	55.2	56.7	25	10.0-143			2.68	30
Ethylbenzene	0.0500	0.0428	0.868	0.917	66.0	70.0	25	10.0-147			5.55	31
Total Xylene	0.150	0.362	2.85	2.97	66.3	69.5	25	10.0-149	<span>J6</span>	<span>J6</span>	4.12	30
(S) a,a,a-Trifluorotoluene(FID)					95.0	95.0		77.0-120				



L902120-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L902120-06 04/16/17 00:24 • (MS) R3211211-6 04/15/17 22:33 • (MSD) R3211211-7 04/15/17 22:55												
	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)					103	104		75.0-128				

L902120-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L902120-06 04/16/17 00:24 • (MS) R3211211-8 04/15/17 23:17 • (MSD) R3211211-9 04/15/17 23:40												
	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	16.7	65.0	67.4	35.1	36.9	25	10.0-147			3.69	30
(S) a,a,a-Trifluorotoluene(FID)					94.7	94.3		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					106	105		75.0-128				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc





Method Blank (MB)

(MB) R3210801-1 04/14/17 02:12

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	97.3			18.0-148

1  
Cp

2  
Tc

3  
Ss

4  
Cn

5  
Sr

6  
Qc

7  
Gl

8  
Al

9  
Sc

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

(LCS) R3210801-2 04/14/17 02:26 • (LCSD) R3210801-3 04/14/17 02:38

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	53.9	54.3	89.8	90.6	50.0-150			0.820	20
(S) o-Terphenyl				120	117	18.0-148				

L901821-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L901821-02 04/14/17 03:46 • (MS) R3210801-4 04/14/17 04:00 • (MSD) R3210801-5 04/14/17 04:13

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	ND	46.9	48.5	78.1	80.9	1	50.0-150			3.54	20
(S) o-Terphenyl					102	100		18.0-148				



Method Blank (MB)

(MB) R3210851-3 04/13/17 07:02

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	74.6			23.0-120
(S) Nitrobenzene-d5	75.7			14.0-149
(S) 2-Fluorobiphenyl	79.4			34.0-125

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

(LCS) R3210851-1 04/13/17 06:19 • (LCSD) R3210851-2 04/13/17 06:41

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	0.0719	0.0711	89.9	88.9	50.0-125			1.09	20
Acenaphthene	0.0800	0.0674	0.0659	84.3	82.4	52.0-120			2.25	20
Acenaphthylene	0.0800	0.0673	0.0661	84.1	82.7	51.0-120			1.71	20
Benzo(a)anthracene	0.0800	0.0636	0.0633	79.5	79.1	46.0-121			0.500	20
Benzo(a)pyrene	0.0800	0.0658	0.0658	82.2	82.3	42.0-121			0.0700	20
Benzo(b)fluoranthene	0.0800	0.0593	0.0584	74.2	73.1	42.0-123			1.52	20
Benzo(g,h,i)perylene	0.0800	0.0665	0.0652	83.2	81.4	43.0-128			2.10	20
Benzo(k)fluoranthene	0.0800	0.0702	0.0708	87.8	88.5	45.0-128			0.800	20
Chrysene	0.0800	0.0715	0.0727	89.4	90.9	48.0-127			1.59	20
Dibenz(a,h)anthracene	0.0800	0.0682	0.0662	85.2	82.7	43.0-132			2.99	20
Fluoranthene	0.0800	0.0796	0.0780	99.6	97.5	49.0-129			2.11	20

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

(LCS) R3210851-1 04/13/17 06:19 • (LCSD) R3210851-2 04/13/17 06:41

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	0.0690	0.0670	86.3	83.8	50.0-120			2.99	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0692	0.0682	86.5	85.2	44.0-131			1.48	20
Naphthalene	0.0800	0.0644	0.0643	80.5	80.4	50.0-120			0.0800	20
Phenanthrene	0.0800	0.0641	0.0642	80.2	80.3	48.0-120			0.100	20
Pyrene	0.0800	0.0611	0.0607	76.3	75.9	48.0-135			0.640	20
1-Methylnaphthalene	0.0800	0.0720	0.0721	90.0	90.1	52.0-122			0.150	20
2-Methylnaphthalene	0.0800	0.0689	0.0691	86.1	86.4	52.0-120			0.330	20
2-Chloronaphthalene	0.0800	0.0681	0.0665	85.2	83.1	50.0-120			2.47	20
(S) p-Terphenyl-d14				67.9	60.7	23.0-120				
(S) Nitrobenzene-d5				73.3	67.7	14.0-149				
(S) 2-Fluorobiphenyl				76.7	68.8	34.0-125				

L901374-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L901374-01 04/13/17 07:23 • (MS) R3210851-4 04/13/17 07:44 • (MSD) R3210851-5 04/13/17 08:05

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	0.0949	U	0.0821	0.0826	86.6	87.1	1	20.0-136			0.640	24
Acenaphthene	0.0949	U	0.0761	0.0769	80.2	81.1	1	29.0-124			1.05	20
Acenaphthylene	0.0949	U	0.0752	0.0768	79.3	80.9	1	35.0-120			2.08	20
Benzo(a)anthracene	0.0949	0.00133	0.0763	0.0753	79.0	77.9	1	13.0-132			1.37	27
Benzo(a)pyrene	0.0949	0.00111	0.0758	0.0762	78.7	79.1	1	14.0-138			0.540	27
Benzo(b)fluoranthene	0.0949	0.00175	0.0722	0.0717	74.2	73.7	1	10.0-129			0.610	31
Benzo(g,h,i)perylene	0.0949	0.000844	0.0778	0.0780	81.2	81.3	1	10.0-133			0.200	30
Benzo(k)fluoranthene	0.0949	0.000825	0.0726	0.0800	75.7	83.5	1	15.0-131			9.66	27
Chrysene	0.0949	0.00133	0.0777	0.0772	80.5	79.9	1	15.0-137			0.730	25
Dibenz(a,h)anthracene	0.0949	U	0.0773	0.0778	81.4	82.0	1	15.0-132			0.670	27
Fluoranthene	0.0949	0.00186	0.0994	0.0963	103	99.6	1	13.0-139			3.14	28
Fluorene	0.0949	U	0.0770	0.0776	81.2	81.8	1	27.0-122			0.740	22
Indeno(1,2,3-cd)pyrene	0.0949	U	0.0818	0.0823	86.2	86.7	1	11.0-133			0.570	29
Naphthalene	0.0949	U	0.0744	0.0751	78.5	79.2	1	18.0-136			0.880	21
Phenanthrene	0.0949	U	0.0753	0.0728	79.4	76.7	1	15.0-133			3.38	25
Pyrene	0.0949	0.00118	0.0744	0.0736	77.2	76.3	1	11.0-146			1.13	29
1-Methylnaphthalene	0.0949	U	0.0839	0.0840	88.5	88.5	1	24.0-137			0.0300	22
2-Methylnaphthalene	0.0949	U	0.0804	0.0808	84.7	85.2	1	23.0-136			0.510	22
2-Chloronaphthalene	0.0949	U	0.0766	0.0775	80.7	81.7	1	36.0-120			1.20	20
(S) p-Terphenyl-d14					68.8	69.1		23.0-120				
(S) Nitrobenzene-d5					75.1	77.4		14.0-149				
(S) 2-Fluorobiphenyl					78.3	78.3		34.0-125				



## Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
T8	Sample(s) received past/too close to holding time expiration.

<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

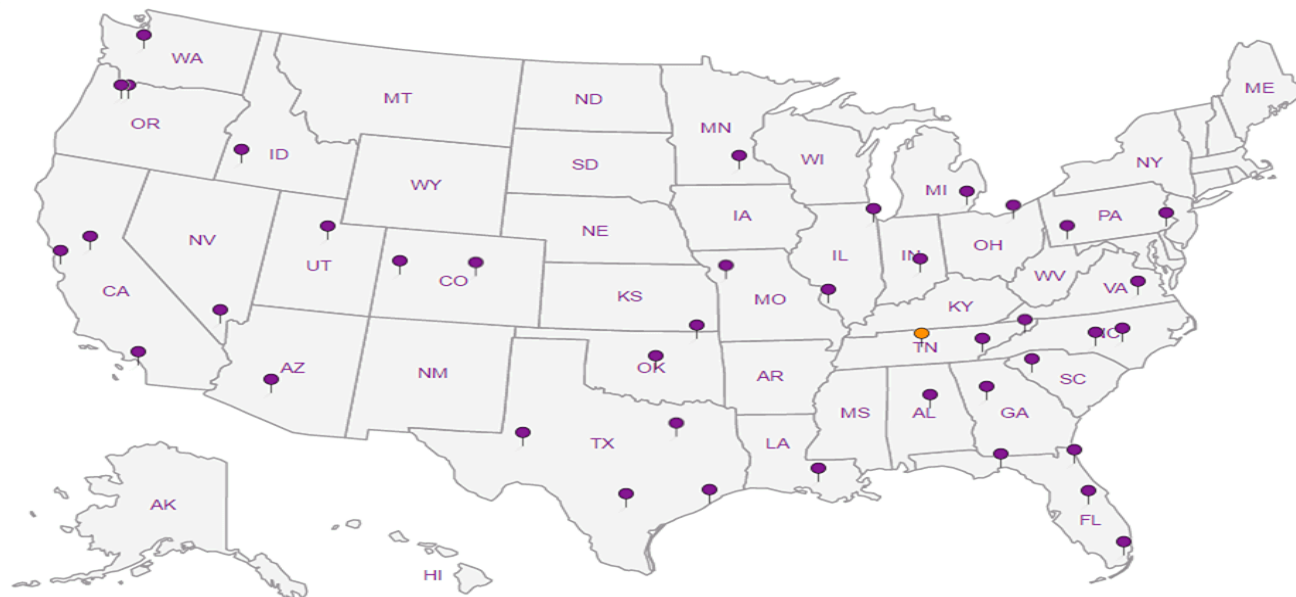
<sup>9</sup> Sc



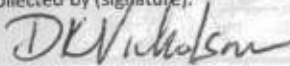
<sup>1</sup>Cp ${}^2\text{Tc}$  ${}^3S_s$  ${}^4\text{Cn}$  ${}^5\text{Sr}$ <sup>6</sup>Qc ${}^7\text{Gf}$  ${}^8\text{Al}$  ${}^9\text{Sc}$ 

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 <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		

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

## Our Locations




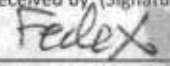
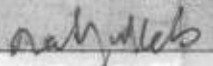
Company Name/Address: <b>Nicholson GeoSolutions. LLC.</b> 3433 E. Lake Dr. Centennial, CO 80121				Billing Information: Tom Hogelin Linn Energy LLC 235 Callahan Ave Parachute, CO				Analysis / Container / Preservative										Chain of Custody Page <u>1</u> of <u>1</u>  L.A.B S.C.I.E.N.C.E.S YOUR LAB OF CHOICE 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-8859 Fax: 615-758-5859 					
Report to: <b>Dave Nicholson</b>				Email To: <b>dknicholson@q.com</b>																			
Project Description: <b>Linn Energy Reclamation</b>				City/State Collected:																			
Phone: <b>303-601-2023</b> Fax:		Client Project #		Lab Project #																			
Collected by (print):		Site/Facility ID #		P.O. #																			
Collected by (signature): 				Rush? (Lab MUST Be Notified) Same Day ..... 200% Next Day ..... 100% <input checked="" type="checkbox"/> Two Day ..... 50% <input checked="" type="checkbox"/> Three Day ..... 25%				Date Results Needed Email? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes FAX? <input type="checkbox"/> No <input type="checkbox"/> Yes				No. of Cntrs											
Immediately Packed on Ice N <input type="checkbox"/> Y <input checked="" type="checkbox"/>																							
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time																		
J15-C-1		GW SS		4/11	0930	5	12	X	X	X	X	X	X	X	X	X	X	X	X	X		01	
J15-C-2		GW			0950	12	12	X	X	X	X	X	X	X	X	X	X	X	X	X		02	
J15-C-3		GW			1000	12	12	X	X	X	X	X	X	X	X	X	X	X	X	X		03	
J15-C-4		GW			1020	12	12	X	X	X	X	X	X	X	X	X	X	X	X	X		04	
J15-C-5		GW			1040	12	12	X	X	X	X	X	X	X	X	X	X	X	X	X		05	
		GW				12	12	X	X	X	X	X	X	X	X	X	X	X	X	X			
		GW				12	12	X	X	X	X	X	X	X	X	X	X	X	X	X			
		GW				12	12	X	X	X	X	X	X	X	X	X	X	X	X	X			
		GW				12	12	X	X	X	X	X	X	X	X	X	X	X	X	X			
		GW				12	12	X	X	X	X	X	X	X	X	X	X	X	X	X			
		GW				12	12	X	X	X	X	X	X	X	X	X	X	X	X	X			
		GW				12	12	X	X	X	X	X	X	X	X	X	X	X	X	X			

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

Remarks: Metals As, Ba, B, Cd, Cr, Cu, Pb, Ni, Se, Ag, Zn + Cr<sup>VI</sup>

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

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

Relinquished by: (Signature) 		Date: <u>4/11/17</u> Time: <u>1500</u>		Received by: (Signature) 		Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/> _____		Condition: (lab use only) <u>OK Toll</u>	
Relinquished by: (Signature)		Date:		Time:		Received by: (Signature)		Temp: "C <u>1.2</u> Bottles Received: <u>25 = 402</u>	
Relinquished by: (Signature)		Date:		Time:		Received for lab by: (Signature) 		Date: <u>4-2-17</u> Time: <u>845</u>	
								COC Seal Intact: <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> NA	
								pH Checked: NCF:	



## ESC LAB SCIENCES Cooler Receipt Form

Client:	<i>Berle + Co</i>	SDG#	<i>902087</i>	
Cooler Received/Opened On:	4/ 12 /17	Temperature:	1.2	
Received By: Nadiar Yakob				
Signature: <i>Nadiar Yakob</i>				
<b>Receipt Check List</b>	<b>NP</b>	<b>Yes</b>	<b>No</b>	
COC Seal Present / Intact?	/			
COC Signed / Accurate?		/		
Bottles arrive intact?		/		
Correct bottles used?		/		
Sufficient volume sent?		/		
If Applicable				
VOA Zero headspace?				
Preservation Correct / Checked?				

## Linn Energy - Denver, CO

Sample Delivery Group: L903862

Samples Received: 04/20/2017

Project Number:

Description: Pit Reclamation

Report To:

Dave Nicholson

1999 Broadway, Suite 3700

Denver, CO 80202

Entire Report Reviewed By:



Mark W. Beasley

Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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# SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## LR J15-1 L903862-01 Solid

Collected by  
DK Nicholson

Collected date/time  
04/19/17 10:40

Received date/time  
04/20/17 08:45

<sup>1</sup>Cp

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

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

## LR J15-2 L903862-02 Solid

Collected by  
DK Nicholson

Collected date/time  
04/19/17 11:30

Received date/time  
04/20/17 08:45

<sup>7</sup>Gl

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

<sup>8</sup>Al

<sup>9</sup>Sc

## LR M15 L903862-03 Solid

Collected by  
DK Nicholson

Collected date/time  
04/19/17 12:15

Received date/time  
04/20/17 08:45

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



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Mark W. Beasley  
Technical Service Representative

<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	4.03		1	04/25/2017 16:22	WG972407

<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 mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium, Trivalent	27.2		1.00	1	04/25/2017 16:53	<a href="#">WG972559</a>

## Wet Chemistry by Method 3060A/7196A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	04/25/2017 16:53	<a href="#">WG972776</a>

## Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.73	<a href="#">T8</a>	1	04/21/2017 09:40	<a href="#">WG972465</a>

## Sample Narrative:

9045D L903862-02 WG972465: 8.73 at 22.7c

## Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	390		1	04/25/2017 17:30	<a href="#">WG973401</a>

## Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	04/22/2017 09:01	<a href="#">WG972389</a>

## Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	5.54		2.00	1	04/25/2017 12:27	<a href="#">WG972559</a>
Barium	2040		0.500	1	04/25/2017 12:27	<a href="#">WG972559</a>
Boron	ND		10.0	1	04/25/2017 12:27	<a href="#">WG972559</a>
Cadmium	0.611		0.500	1	04/25/2017 12:27	<a href="#">WG972559</a>
Chromium	27.2		1.00	1	04/25/2017 12:27	<a href="#">WG972559</a>
Copper	28.7		2.00	1	04/25/2017 12:27	<a href="#">WG972559</a>
Lead	17.3		0.500	1	04/25/2017 12:27	<a href="#">WG972559</a>
Nickel	19.6		2.00	1	04/25/2017 12:27	<a href="#">WG972559</a>
Selenium	ND		2.00	1	04/25/2017 12:27	<a href="#">WG972559</a>
Silver	ND		1.00	1	04/25/2017 12:27	<a href="#">WG972559</a>
Zinc	65.4		5.00	1	04/25/2017 12:27	<a href="#">WG972559</a>

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00254		0.000500	1	04/25/2017 16:32	<a href="#">WG973483</a>
Toluene	0.00504		0.00500	1	04/25/2017 16:32	<a href="#">WG973483</a>
Ethylbenzene	0.00323		0.000500	1	04/25/2017 16:32	<a href="#">WG973483</a>
Total Xylene	0.0172		0.00150	1	04/25/2017 16:32	<a href="#">WG973483</a>



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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	3.18		0.100	1	04/25/2017 16:32	<a href="#">WG973483</a>
(S) a,a,a-Trifluorotoluene(FID)	77.1		77.0-120		04/25/2017 16:32	<a href="#">WG973483</a>
(S) a,a,a-Trifluorotoluene(PID)	72.3	<u>J2</u>	75.0-128		04/25/2017 16:32	<a href="#">WG973483</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	524		40.0	10	04/24/2017 16:49	<a href="#">WG972924</a>
C28-C40 Oil Range	54.3		40.0	10	04/24/2017 16:49	<a href="#">WG972924</a>
(S) o-Terphenyl	58.0		18.0-148		04/24/2017 16:49	<a href="#">WG972924</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	0.0274		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Acenaphthene	0.0253		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Acenaphthylene	ND		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Benzo(a)anthracene	0.0412		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Benzo(a)pyrene	0.0490		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Benzo(b)fluoranthene	0.0950		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Benzo(g,h,i)perylene	0.0636		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Benzo(k)fluoranthene	0.0172		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Chrysene	0.0550		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Dibenz(a,h)anthracene	0.0206		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Fluoranthene	0.0612		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Fluorene	0.0225		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Indeno(1,2,3-cd)pyrene	0.0460		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Naphthalene	0.0798		0.0200	1	04/25/2017 18:37	<a href="#">WG973164</a>
Phenanthrene	0.0661		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
Pyrene	0.0817		0.00600	1	04/25/2017 18:37	<a href="#">WG973164</a>
1-Methylnaphthalene	0.135		0.0200	1	04/25/2017 18:37	<a href="#">WG973164</a>
2-Methylnaphthalene	0.230		0.0200	1	04/25/2017 18:37	<a href="#">WG973164</a>
2-Chloronaphthalene	ND		0.0200	1	04/25/2017 18:37	<a href="#">WG973164</a>
(S) p-Terphenyl-d14	58.1		23.0-120		04/25/2017 18:37	<a href="#">WG973164</a>
(S) Nitrobenzene-d5	115		14.0-149		04/25/2017 18:37	<a href="#">WG973164</a>
(S) 2-Fluorobiphenyl	66.4		34.0-125		04/25/2017 18:37	<a href="#">WG973164</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R3213362-1 04/25/17 16:40				
	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Chromium,Hexavalent	U		0.64	2.00

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

(OS) L903500-04 04/25/17 16:41 • (DUP) R3213362-4 04/25/17 16:41						
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chromium,Hexavalent	ND	0.000	1	0		20

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

(OS) L904141-01 04/25/17 16:56 • (DUP) R3213362-5 04/25/17 16:56						
	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chromium,Hexavalent	U	0	1	0		20

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

(LCS) R3213362-2 04/25/17 16:40 • (LCSD) R3213362-3 04/25/17 16:40										
	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Chromium,Hexavalent	56.9	53.6	53.6	94	94	80-120			0	20

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

(OS) L904141-01 04/25/17 16:56 • (MS) R3213362-6 04/25/17 16:57 • (MSD) R3213362-7 04/25/17 16:57												
	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chromium,Hexavalent	25.5	U	24.2	24.2	95	95	1	75-125			0	20

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc





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

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

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

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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

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

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

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

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

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



Method Blank (MB)

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

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

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

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

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

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

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

Analyte	Spike Amount 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	169	164	158	97.0	93.5	90.0-110			3.73	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

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

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

	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	0.254	0.251	85	84	80-120			1	20

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

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

	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	0.222	0.264	74	88	1	75-125	J6		17	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

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

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

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

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

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	105	104	105	104	80-120			1	20
Barium	100	109	108	109	108	80-120			1	20
Boron	100	103	102	103	102	80-120			1	20
Cadmium	100	106	104	106	104	80-120			1	20
Chromium	100	103	102	103	102	80-120			1	20
Copper	100	109	108	109	108	80-120			1	20
Lead	100	106	104	106	104	80-120			2	20
Nickel	100	108	106	108	106	80-120			2	20
Selenium	100	107	106	107	106	80-120			1	20
Silver	20.0	20.2	20.0	101	100	80-120			1	20
Zinc	100	108	105	108	105	80-120			2	20

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

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

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	100	5.95	111	107	105	101	1	75-125			4	20
Barium	100	501	666	648	165	147	1	75-125	V	V	3	20
Boron	100	ND	108	105	98	95	1	75-125			2	20
Cadmium	100	ND	106	103	106	102	1	75-125			3	20
Chromium	100	26.5	124	122	97	96	1	75-125			2	20



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

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

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Copper	100	20.2	131	128	111	108	1	75-125			2	20
Lead	100	13.3	120	117	107	104	1	75-125			3	20
Nickel	100	20.6	131	129	111	109	1	75-125			2	20
Selenium	100	ND	105	101	105	101	1	75-125			4	20
Silver	20.0	ND	20.6	19.9	103	99	1	75-125			3	20
Zinc	100	56.7	156	153	99	96	1	75-125			2	20

<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) R3213991-5 04/25/17 12:00

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000298	J	0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID) 101				77.0-120
(S) a,a,a-Trifluorotoluene(PID) 92.6				75.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

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

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0539	0.0533	108	107	71.0-121			1.18	20
Toluene	0.0500	0.0535	0.0522	107	104	72.0-120			2.51	20
Ethylbenzene	0.0500	0.0546	0.0539	109	108	76.0-121			1.30	20
Total Xylene	0.150	0.171	0.167	114	111	75.0-124			2.36	20
(S) a,a,a-Trifluorotoluene(FID)				100	101	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				98.4	100	75.0-128				

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

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

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6.27	5.39	114	97.9	70.0-136			15.2	20
(S) a,a,a-Trifluorotoluene(FID)				102	100	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				109	107	75.0-128				

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

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

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.232	1.53	1.71	104	118	25	10.0-146			10.9	29
Toluene	0.0500	3.11	3.74	3.94	50.3	66.8	25	10.0-143			5.36	30
Ethylbenzene	0.0500	0.609	1.61	1.78	79.9	93.6	25	10.0-147			10.1	31
Total Xylene	0.150	12.6	13.9	14.5	33.9	49.6	25	10.0-149	J6	J6	4.16	30
(S) a,a,a-Trifluorotoluene(FID)					88.1	90.7		77.0-120				



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

(OS) L903864-01 04/25/17 14:00 • (MS) R3213991-6 04/25/17 14:22 • (MSD) R3213991-7 04/25/17 14:44												
Analyte	Spike Amount	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	%	%		%			%	%
(S) a,a,a-Trifluorotoluene(PID)					100	103		75.0-128				

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

(OS) L903864-01 04/25/17 14:00 • (MS) R3213991-8 04/25/17 15:05 • (MSD) R3213991-9 04/25/17 15:27												
Analyte	Spike Amount	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	%	%		%			%	%
TPH (GC/FID) Low Fraction	5.50	314	278	373	0.000	43.0	25	10.0-147	E J6	E	29.0	30
(S) a,a,a-Trifluorotoluene(FID)					90.0	99.8		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					103	111		75.0-128				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

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

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	102			18.0-148

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

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

Analyte	Spike Amount 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	58.8	53.4	98.1	89.1	50.0-150			9.60	20
(S) o-Terphenyl				99.0	95.4	18.0-148				

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

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

Analyte	Spike Amount 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	382	489	412	179	50.5	10	50.0-150	V		17.1	20
(S) o-Terphenyl					84.7	93.5		18.0-148				



Method Blank (MB)

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

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Anthracene	U		0.000600	0.00600
Acenaphthene	U		0.000600	0.00600
Acenaphthylene	U		0.000600	0.00600
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(g,h,i)perylene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Fluoranthene	U		0.000600	0.00600
Fluorene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
Naphthalene	U		0.00200	0.0200
Phenanthrene	U		0.000600	0.00600
Pyrene	U		0.000600	0.00600
1-Methylnaphthalene	U		0.00200	0.0200
2-Methylnaphthalene	U		0.00200	0.0200
2-Chloronaphthalene	U		0.00200	0.0200
(S) p-Terphenyl-d14	61.0			23.0-120
(S) Nitrobenzene-d5	65.7			14.0-149
(S) 2-Fluorobiphenyl	65.1			34.0-125

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

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

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



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

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

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

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

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

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

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



## Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

## Qualifier      Description

B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.

<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		

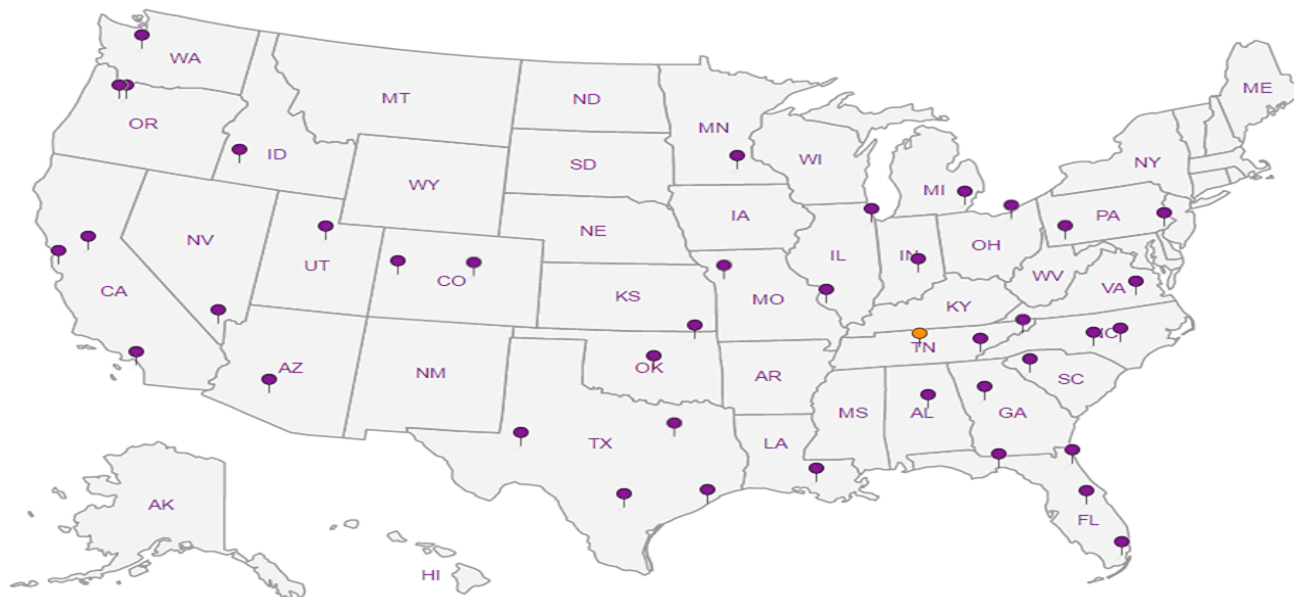
## Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	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

Description: **Pit Reclamation**

City/State

Collected:

Lab Project #

BERPETDCO030615S

Phone: 303-601-2023

Client Project #

Fax:

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

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

LR JIS-1

SS

4/19

1040

5

LR JIS-2

SS

↓

1130

5

LR MIS

SS

↓

1215

5

SS

5

SS

5

SS

5

SS

5

SS

5

SS

5

SS

5

SS

5

Analysis / Container / Preservative

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

Chain of Custody Page 1 of 1


**ESC**  
 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# 2903862

1070

Tabl

Acctnum:BERPETDCO

Template:

Prelogin:

TSR:

Cooler:

Shipped Via:

Rem./Contaminant

Sample # (lab only)

-01

02

03

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

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

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

Hold #

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

Relinquished by: (Signature)

Date:

4/19/17

Time:

1630

Received by: (Signature)

Fedex

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

Temp: \_\_\_\_\_ °C Bottles Received:

2.1 M 15-4ozchr

Date: \_\_\_\_\_ Time: \_\_\_\_\_

4/20/17 0845

Condition: (lab use only)

OK

COC Seal Intact: ☐ Y ☐ N ☒ NA

pH Checked:

NCF:

Relinquished by: (Signature)


Date:

Time:

Received for lab by: (Signature)

7215 4519 2848

## ESC LAB SCIENCES Cooler Receipt Form

Client: <b>BERPETDCO</b>	SDG#	<b>L903862</b>	
Cooler Received/Opened On: <b>4/20/17</b>	Temperature:	<b>2.1</b>	
Received By: Myra "Katie" Ingram			
Signature: 			
<b>Receipt Check List</b>	<b>NP</b>	<b>Yes</b>	<b>No</b>
COC Seal Present / Intact?	<input checked="" type="checkbox"/>		
COC Signed / Accurate?		<input checked="" type="checkbox"/>	
Bottles arrive intact?		<input checked="" type="checkbox"/>	
Correct bottles used?		<input checked="" type="checkbox"/>	
Sufficient volume sent?		<input checked="" type="checkbox"/>	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			