



Nicholson GeoSolutions, LLC

3433 East Lake Drive
Centennial, CO 80121

May 3, 2017

Mr. Brent White
Berry Petroleum Company
235 Callahan Avenue
Parachute, Colorado 81635

Subject: L4 Soil Investigation

Dear Brent:

Nicholson GeoSolutions LLC was retained by Berry Petroleum Company (Berry) to conduct soil sampling at the site of a produced water and condensate leak on the L4 well pad in the Garden Gulch area, Garfield County, Colorado. Approximately 5 barrels of condensate and produced water were reported to be lost from a dump line leading from the process units to the storage tanks on site. Upon discovery of the leak, an excavation contractor was immediately mobilized to the site to begin excavation of impacted soils.

Nicholson GeoSolutions initially inspected the site on March 9th, 2017. Impacted soil and rock had been excavated and stored in a bermed area on the well pad prior to the inspection. During the inspection the perimeter of the excavation was mapped using a hand-held GPS unit and seven discrete soil samples were collected from the top shallow area and the base and sidewalls of the deeper portion of the excavation to evaluate compliance with COGCC standards (samples L4-C-1 through L4-C-7).

Figure 1 shows the approximate extent and depth of the excavation and the locations of the seven confirmation samples collected. The depth of the initial excavation ranged from about 0.5 feet in the shallow portion to about 5 feet. Additional confirmation samples were collected on March 22nd, 2017. 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, and conductivity. In addition, three spoils samples were collected on April 19th, 2017. The spoils samples were also analyzed for metals and PAHs to evaluate compliance with the Table 910-1 standards and treatment options. The laboratory analytical reports are contained in Appendix A.

Table 1 provides analytical results for the initial confirmation samples. The combined TPH for four of the seven samples exceeded the COGCC standards. In addition, benzene also exceeded the standards for these four samples and SAR, toluene, and xylenes exceeded the standards for one sample. Based on these results, additional excavation was conducted in the deeper portion

of the excavation and four additional confirmation samples were collected from the west, east, and north walls and the base of the excavation on March 22nd, 2017. Table 2 provides the results for the additional confirmation samples. All results for the additional confirmation samples were below the COGCC standards, except for SAR from the sample from the north wall at four feet depth.

Table 3 provides the results for the three spoils samples collected. For the spoils samples, TPH exceeded the standards for the north and middle piles at 1,342 mg/kg and 1,615.5 mg/kg. Benzene also exceeded the standard for the sample from the north pile. All other parameters were below the standards, except for SAR for the north pile at 12.2 and arsenic at 8.66, 10.7, and 6.24 mg/kg.

Sincerely,



David K. Nicholson, P.G.
Nicholson GeoSolutions LLC

Table 1 L4 Confirmation Sample Results – March 9th, 2017

Parameter	Table 910-1 Standards	Sample ID and Location						
		L4-C-1 (top, 0.5 ft)	L4-C-2 (top, 0.5 ft)	L4-C-3 (north wall, 2 ft)	L4-C-4 (east wall, 2 ft)	L4-C-5 (west wall, 2 ft)	L4-C-6 (base, 5 ft)	L4-C-7 (west wall, 2 ft)
sp. conductance (mmhos/cm)	<4	0.413	0.874	0.297	0.305	1.46	0.378	0.468
pH (standard units)	6-9	9.04	8.61	8.03	8.10	8.16	7.50	8.56
SAR (ratio)	<12	6.30	9.83	8.27	7.17	27.9	5.68	8.06
TVPH – gasoline range	500 ¹	0.341	1.15	484	873	6,990	2,500	2.52
TEPH – diesel/motor oilrange	500 ¹	170.9	129	832.3	634.5	6,410	691	114.7
benzene	0.17	0.00306	0.0103	0.398	0.976	5.99	3.50	0.0484
toluene	85	0.0078	0.0292	<0.485	2.61	98.2	43.2	0.0656
ethylbenzene	100	0.00244	0.00968	1.39	2.50	25.9	10.2	0.00974
xylenes	175	0.00951	0.045	23.2	40.0	281	138	0.0777

¹The 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

Table 2 L4 Confirmation Sample Results – March 22nd, 2017

Parameter	Table 910-1 Standards	L4-C-8 (north wall, 4 ft)	L4-C-9 (east wall, 4 ft)	L4-C-10 (base, 8 ft)	L4-C-11 (west wall, 4 ft)
sp. conductance (mmhos/cm)	<4	0.411	0.385	0.377	0.386
pH (standard units)	6-9	8.22	8.68	8.33	8.52
SAR (ratio)	<12	13.9	10.8	8.40	5.08
TVPH – gasoline range	500 ¹	1.55	2.11	3.19	2.60
TEPH – diesel/motor oil range	500 ¹	55.2	85.6	185.3	105.7
benzene	0.17	0.0075	0.0192	0.00765	0.0456
toluene	85	0.0194	0.0235	0.0226	0.108
ethylbenzene	100	0.0117	0.0254	0.0197	0.00854
xylenes	175	0.019	0.116	0.0327	0.0503

¹The 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

Table 3 L4 Spoils Sample Results – April 19th, 2017

Parameter	Table 910-1 Standards	L4-SP-1 (North Pile)	L4-SP-2 (Middle Pile)	L4-SP-3 (South Pile)
sp. conductance (mmhos/cm)	<4	1.79	1.05	1.24
pH (standard units)	6-9	8.20	8.29	8.15
SAR (ratio)	<12	12.2	10.5	7.02
TVPH – gasoline range	500 ¹	406	1,010	77.4
TEPH – diesel/motor oil range	500 ¹	936	605.5	303.1
benzene	0.17	0.232	0.0934	0.0134
toluene	85	3.11	0.41	<0.125
ethylbenzene	100	0.609	0.945	<0.0125
xylenes	175	12.6	14.4	1.23
PAHs	various	All ok	All ok	All ok
arsenic	0.39	8.66	10.7	6.24

¹The 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



Legend



- Confirmation Sample Location
- 8'** Approximate Depth of Excavation

Berry Petroleum Corporation

L4 Well Pad
Spill Excavation
and Confirmation Samples

March
2017
FIGURE 1

APPENDIX A
Laboratory Reports

March 16, 2017

Linn Energy - Denver, CO

Sample Delivery Group: L895426
Samples Received: 03/11/2017
Project Number:
Description: L4 Spill Response

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.



¹ Cp: Cover Page	1
² Tc: Table of Contents	2
³ Ss: Sample Summary	3
⁴ Cn: Case Narrative	5
⁵ Sr: Sample Results	6
L4-C-1 L895426-01	6
L4-C-2 L895426-02	7
L4-C-3 L895426-03	8
L4-C-4 L895426-04	9
L4-C-5 L895426-05	10
L4-C-6 L895426-06	11
L4-C-7 L895426-07	12
⁶ Qc: Quality Control Summary	13
Wet Chemistry by Method 9045D	13
Wet Chemistry by Method 9050AMod	15
Volatile Organic Compounds (GC) by Method 8015/8021	16
Semi-Volatile Organic Compounds (GC) by Method 8015	18
⁷ Gl: Glossary of Terms	19
⁸ Al: Accreditations & Locations	20
⁹ Sc: Chain of Custody	21



SAMPLE SUMMARY



L4-C-1 L895426-01 Solid

Collected by
DK Nicholson
Collected date/time
03/09/17 13:50
Received date/time
03/11/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG960277	1	03/15/17 14:25	03/16/17 12:58	CCE
Wet Chemistry by Method 9045D	WG960149	1	03/14/17 08:30	03/14/17 09:48	MA
Wet Chemistry by Method 9050AMod	WG959952	1	03/11/17 18:40	03/11/17 18:40	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	2	03/13/17 09:04	03/13/17 20:51	KLM
Volatile Organic Compounds (GC) by Method 8015/8021	WG960372	1	03/13/17 00:45	03/14/17 18:46	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	2	03/13/17 09:04	03/13/17 20:51	KLM

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L4-C-2 L895426-02 Solid

Collected by
DK Nicholson
Collected date/time
03/09/17 14:00
Received date/time
03/11/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG960277	1	03/15/17 14:25	03/16/17 13:01	CCE
Wet Chemistry by Method 9045D	WG960149	1	03/14/17 08:30	03/14/17 09:48	MA
Wet Chemistry by Method 9050AMod	WG959952	1	03/11/17 18:40	03/11/17 18:40	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	1	03/13/17 09:04	03/13/17 20:17	KLM
Volatile Organic Compounds (GC) by Method 8015/8021	WG960372	1	03/13/17 00:45	03/14/17 19:07	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	1	03/13/17 09:04	03/13/17 20:17	KLM

L4-C-3 L895426-03 Solid

Collected by
DK Nicholson
Collected date/time
03/09/17 14:10
Received date/time
03/11/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG960277	1	03/15/17 14:25	03/16/17 13:04	CCE
Wet Chemistry by Method 9045D	WG960149	1	03/14/17 08:30	03/14/17 09:48	MA
Wet Chemistry by Method 9050AMod	WG959952	1	03/11/17 18:40	03/11/17 18:40	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	10	03/13/17 09:04	03/13/17 21:25	KLM
Volatile Organic Compounds (GC) by Method 8015/8021	WG960372	97	03/13/17 00:45	03/14/17 16:36	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	10	03/13/17 09:04	03/13/17 21:25	KLM

L4-C-4 L895426-04 Solid

Collected by
DK Nicholson
Collected date/time
03/09/17 14:20
Received date/time
03/11/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG960277	1	03/15/17 14:25	03/16/17 13:06	CCE
Wet Chemistry by Method 9045D	WG960149	1	03/14/17 08:30	03/14/17 09:48	MA
Wet Chemistry by Method 9050AMod	WG959952	1	03/11/17 18:40	03/11/17 18:40	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	10	03/13/17 09:04	03/13/17 21:42	KLM
Volatile Organic Compounds (GC) by Method 8015/8021	WG960372	500	03/13/17 00:45	03/14/17 19:29	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	10	03/13/17 09:04	03/13/17 21:42	KLM

L4-C-5 L895426-05 Solid

Collected by
DK Nicholson
Collected date/time
03/09/17 14:30
Received date/time
03/11/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG960277	1	03/15/17 14:25	03/16/17 13:09	CCE
Wet Chemistry by Method 9045D	WG960149	1	03/14/17 08:30	03/14/17 09:48	MA
Wet Chemistry by Method 9050AMod	WG959952	1	03/11/17 18:40	03/11/17 18:40	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	20	03/13/17 09:04	03/13/17 21:59	KLM
Volatile Organic Compounds (GC) by Method 8015/8021	WG960372	960	03/13/17 00:45	03/14/17 19:57	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	20	03/13/17 09:04	03/13/17 21:59	KLM

SAMPLE SUMMARY



L4-C-6 L895426-06 Solid

Collected by
DK Nicholson Collected date/time
03/09/17 14:40 Received date/time
03/11/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG960277	1	03/15/17 14:25	03/16/17 13:12	CCE
Wet Chemistry by Method 9045D	WG960149	1	03/14/17 08:30	03/14/17 09:48	MA
Wet Chemistry by Method 9050AMod	WG959952	1	03/11/17 18:40	03/11/17 18:40	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	10	03/13/17 09:04	03/13/17 21:08	KLM
Volatile Organic Compounds (GC) by Method 8015/8021	WG960372	970	03/13/17 00:45	03/14/17 20:19	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	10	03/13/17 09:04	03/13/17 21:08	KLM

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

L4-C-7 L895426-07 Solid

Collected by
DK Nicholson Collected date/time
03/09/17 14:50 Received date/time
03/11/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG960277	1	03/15/17 14:25	03/16/17 13:15	CCE
Wet Chemistry by Method 9045D	WG960160	1	03/16/17 13:15	03/16/17 14:18	MA
Wet Chemistry by Method 9050AMod	WG959952	1	03/11/17 18:40	03/11/17 18:40	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	1	03/13/17 09:04	03/13/17 20:34	KLM
Volatile Organic Compounds (GC) by Method 8015/8021	WG960372	1	03/13/17 00:45	03/14/17 20:41	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG960541	1	03/13/17 09:04	03/13/17 20:34	KLM



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

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

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>
L895426-01	L4-C-1	9045D
L895426-02	L4-C-2	9045D
L895426-03	L4-C-3	9045D
L895426-04	L4-C-4	9045D
L895426-05	L4-C-5	9045D
L895426-06	L4-C-6	9045D
L895426-07	L4-C-7	9045D



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	6.30		1	03/16/2017 12:58	WG960277

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	9.04		1	03/14/2017 09:48	WG960149

3 Ss

4 Cn

Sample Narrative:

9045D L895426-01 WG960149: 9.04 at 19.4c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	413 umhos/cm		1	03/11/2017 18:40	WG959952

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00306 mg/kg		0.000500 mg/kg	1	03/14/2017 18:46	WG960372
Toluene	0.00780		0.00500	1	03/14/2017 18:46	WG960372
Ethylbenzene	0.00244		0.000500	1	03/14/2017 18:46	WG960372
Total Xylene	0.00951		0.00150	1	03/14/2017 18:46	WG960372
TPH (GC/FID) Low Fraction	0.341		0.100	1	03/14/2017 18:46	WG960372
(S) a,a,a-Trifluorotoluene(FID)	92.8		77.0-120		03/14/2017 18:46	WG960372
(S) a,a,a-Trifluorotoluene(PID)	88.0		75.0-128		03/14/2017 18:46	WG960372

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	53.9 mg/kg		8.00 mg/kg	2	03/13/2017 20:51	WG960541
C28-C40 Oil Range	117		8.00	2	03/13/2017 20:51	WG960541
(S) o-Terphenyl	70.3		18.0-148		03/13/2017 20:51	WG960541



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	9.83		1	03/16/2017 13:01	WG960277

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.61		1	03/14/2017 09:48	WG960149

3 Ss

4 Cn

Sample Narrative:

9045D L895426-02 WG960149: 8.61 at 19.8c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	874		1	03/11/2017 18:40	WG959952

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.0103		0.000500	1	03/14/2017 19:07	WG960372
Toluene	0.0292		0.00500	1	03/14/2017 19:07	WG960372
Ethylbenzene	0.00968		0.000500	1	03/14/2017 19:07	WG960372
Total Xylene	0.0450		0.00150	1	03/14/2017 19:07	WG960372
TPH (GC/FID) Low Fraction	1.15		0.100	1	03/14/2017 19:07	WG960372
(S) a,a,a-Trifluorotoluene(FID)	91.7		77.0-120		03/14/2017 19:07	WG960372
(S) a,a,a-Trifluorotoluene(PID)	89.8		75.0-128		03/14/2017 19:07	WG960372

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	65.2		4.00	1	03/13/2017 20:17	WG960541
C28-C40 Oil Range	63.8		4.00	1	03/13/2017 20:17	WG960541
(S) o-Terphenyl	56.0		18.0-148		03/13/2017 20:17	WG960541



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	8.27		1	03/16/2017 13:04	WG960277

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.03		1	03/14/2017 09:48	WG960149

3 Ss

4 Cn

Sample Narrative:

9045D L895426-03 WG960149: 8.03 at 20.0c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	297		1	03/11/2017 18:40	WG959952

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.398		0.0485	97	03/14/2017 16:36	WG960372
Toluene	ND		0.485	97	03/14/2017 16:36	WG960372
Ethylbenzene	1.39		0.0485	97	03/14/2017 16:36	WG960372
Total Xylene	23.2	<u>J6</u>	0.146	97	03/14/2017 16:36	WG960372
TPH (GC/FID) Low Fraction	484		9.70	97	03/14/2017 16:36	WG960372
(S) a,a,a-Trifluorotoluene(FID)	96.3		77.0-120		03/14/2017 16:36	WG960372
(S) a,a,a-Trifluorotoluene(PID)	91.5		75.0-128		03/14/2017 16:36	WG960372

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	779		40.0	10	03/13/2017 21:25	WG960541
C28-C40 Oil Range	53.3		40.0	10	03/13/2017 21:25	WG960541
(S) o-Terphenyl	113		18.0-148		03/13/2017 21:25	WG960541

Sample Narrative:

8015 L895426-03 WG960541: Dilution due to matrix



Collected date/time: 03/09/17 14:20

L895426

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	7.17		1	03/16/2017 13:06	WG960277

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.10		1	03/14/2017 09:48	WG960149

3 Ss

4 Cn

Sample Narrative:

9045D L895426-04 WG960149: 8.10 at 19.6c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	305 umhos/cm		1	03/11/2017 18:40	WG959952

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.976 mg/kg		0.250 mg/kg	500	03/14/2017 19:29	WG960372
Toluene	2.61 mg/kg		2.50 mg/kg	500	03/14/2017 19:29	WG960372
Ethylbenzene	2.50 mg/kg		0.250 mg/kg	500	03/14/2017 19:29	WG960372
Total Xylene	40.0 mg/kg		0.750 mg/kg	500	03/14/2017 19:29	WG960372
TPH (GC/FID) Low Fraction	873 mg/kg		50.0 mg/kg	500	03/14/2017 19:29	WG960372
(S) a,a,a-Trifluorotoluene(FID)	96.2 mg/kg		77.0-120 mg/kg		03/14/2017 19:29	WG960372
(S) a,a,a-Trifluorotoluene(PID)	90.6 mg/kg		75.0-128 mg/kg		03/14/2017 19:29	WG960372

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	571 mg/kg		40.0 mg/kg	10	03/13/2017 21:42	WG960541
C28-C40 Oil Range	63.5 mg/kg		40.0 mg/kg	10	03/13/2017 21:42	WG960541
(S) o-Terphenyl	87.5 mg/kg		18.0-148 mg/kg		03/13/2017 21:42	WG960541

Sample Narrative:

8015 L895426-04 WG960541: Dilution due to matrix



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	27.9		1	03/16/2017 13:09	WG960277

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.16		1	03/14/2017 09:48	WG960149

3 Ss

4 Cn

Sample Narrative:

9045D L895426-05 WG960149: 8.16 at 19.4c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	1460 umhos/cm		1	03/11/2017 18:40	WG959952

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	5.99 mg/kg		0.480 mg/kg	960	03/14/2017 19:57	WG960372
Toluene	98.2		4.80	960	03/14/2017 19:57	WG960372
Ethylbenzene	25.9		0.480	960	03/14/2017 19:57	WG960372
Total Xylene	281		1.44	960	03/14/2017 19:57	WG960372
TPH (GC/FID) Low Fraction	6990		96.0	960	03/14/2017 19:57	WG960372
(S) a,a,a-Trifluorotoluene(FID)	94.9		77.0-120		03/14/2017 19:57	WG960372
(S) a,a,a-Trifluorotoluene(PID)	92.0		75.0-128		03/14/2017 19:57	WG960372

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	6410 mg/kg		80.0 mg/kg	20	03/13/2017 21:59	WG960541
C28-C40 Oil Range	ND		80.0	20	03/13/2017 21:59	WG960541
(S) o-Terphenyl	121	J7	18.0-148		03/13/2017 21:59	WG960541

Sample Narrative:

8015 L895426-05 WG960541: Dilution due to matrix



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	5.68		1	03/16/2017 13:12	WG960277

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.50		1	03/14/2017 09:48	WG960149

3 Ss

4 Cn

Sample Narrative:

9045D L895426-06 WG960149: 7.50 at 19.3c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	378		1	03/11/2017 18:40	WG959952

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	3.50		0.485	970	03/14/2017 20:19	WG960372
Toluene	43.2		4.85	970	03/14/2017 20:19	WG960372
Ethylbenzene	10.2		0.485	970	03/14/2017 20:19	WG960372
Total Xylene	138		1.46	970	03/14/2017 20:19	WG960372
TPH (GC/FID) Low Fraction	2500		97.0	970	03/14/2017 20:19	WG960372
(S) a,a,a-Trifluorotoluene(FID)	97.3		77.0-120		03/14/2017 20:19	WG960372
(S) a,a,a-Trifluorotoluene(PID)	91.5		75.0-128		03/14/2017 20:19	WG960372

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	691		40.0	10	03/13/2017 21:08	WG960541
C28-C40 Oil Range	ND		40.0	10	03/13/2017 21:08	WG960541
(S) o-Terphenyl	80.7		18.0-148		03/13/2017 21:08	WG960541

Sample Narrative:

8015 L895426-06 WG960541: Dilution due to matrix



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	8.06		1	03/16/2017 13:15	WG960277

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.56		1	03/16/2017 14:18	WG960160

3 Ss

4 Cn

Sample Narrative:

9045D L895426-07 WG960160: 8.56 at 17.9c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	468 umhos/cm		1	03/11/2017 18:40	WG959952

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.0484 mg/kg		0.000500 mg/kg	1	03/14/2017 20:41	WG960372
Toluene	0.0656 mg/kg		0.00500 mg/kg	1	03/14/2017 20:41	WG960372
Ethylbenzene	0.00974 mg/kg		0.000500 mg/kg	1	03/14/2017 20:41	WG960372
Total Xylene	0.0777 mg/kg		0.00150 mg/kg	1	03/14/2017 20:41	WG960372
TPH (GC/FID) Low Fraction	2.52 mg/kg		0.100 mg/kg	1	03/14/2017 20:41	WG960372
(S) a,a,a-Trifluorotoluene(FID)	90.2 mg/kg		77.0-120 mg/kg		03/14/2017 20:41	WG960372
(S) a,a,a-Trifluorotoluene(PID)	98.9 mg/kg		75.0-128 mg/kg		03/14/2017 20:41	WG960372

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	57.5 mg/kg		4.00 mg/kg	1	03/13/2017 20:34	WG960541
C28-C40 Oil Range	57.2 mg/kg		4.00 mg/kg	1	03/13/2017 20:34	WG960541
(S) o-Terphenyl	58.0 mg/kg		18.0-148 mg/kg		03/13/2017 20:34	WG960541



L894266-01 Original Sample (OS) • Duplicate (DUP)

(OS) L894266-01 03/14/17 09:48 • (DUP) WG960149-3 03/14/17 09:48

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.67	7.66	1	0.130		1

¹Cp

²Tc

³Ss

L895426-06 Original Sample (OS) • Duplicate (DUP)

(OS) L895426-06 03/14/17 09:48 • (DUP) WG960149-4 03/14/17 09:48

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.50	7.49	1	0.133		1

⁴Cn

⁵Sr

⁶Qc

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

(LCS) WG960149-1 03/14/17 09:48 • (LCSD) WG960149-2 03/14/17 09:48

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.07	6.07	6.07	100	100	98.4-102			0.000	1

⁷Gl

⁸Al

⁹Sc



L894941-02 Original Sample (OS) • Duplicate (DUP)

(OS) L894941-02 03/16/17 14:18 • (DUP) WG960160-3 03/16/17 14:18

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.03	7.05	1	0.284		1

L895426-07 Original Sample (OS) • Duplicate (DUP)

(OS) L895426-07 03/16/17 14:18 • (DUP) WG960160-4 03/16/17 14:18

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.56	8.54	1	0.234		1

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

(LCS) WG960160-1 03/16/17 14:18 • (LCSD) WG960160-2 03/16/17 14:18

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.07	6.00	6.02	98.8	99.2	98.4-102			0.333	1

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) WG959952-5 03/11/17 18:40

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Specific Conductance	umhos/cm		umhos/cm	umhos/cm
	1.65			

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L895196-01 Original Sample (OS) • Duplicate (DUP)

(OS) L895196-01 03/11/17 18:40 • (DUP) WG959952-1 03/11/17 18:40

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Specific Conductance	umhos/cm	umhos/cm		%		%
	3560	3550	1	0.281		20

L895426-07 Original Sample (OS) • Duplicate (DUP)

(OS) L895426-07 03/11/17 18:40 • (DUP) WG959952-4 03/11/17 18:40

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Specific Conductance	umhos/cm	umhos/cm		%		%
	468	465	1	0.643		20

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

(LCS) WG959952-2 03/11/17 18:40 • (LCSD) WG959952-3 03/11/17 18:40

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Specific Conductance	umhos/cm	umhos/cm	umhos/cm	%	%	%			%	%
	542	547	546	101	101	90.0-110			0.183	20



Method Blank (MB)

(MB) R3203387-5 03/14/17 13:04

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000188	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)	99.9			77.0-120
(S) a,a,a-Trifluorotoluene(PID)	92.1			75.0-128

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

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

(LCS) R3203387-1 03/14/17 11:15 • (LCSD) R3203387-2 03/14/17 11:37

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Benzene	0.0500	0.0570	0.0560	114	112	71.0-121			1.77	20
Toluene	0.0500	0.0559	0.0549	112	110	72.0-120			1.73	20
Ethylbenzene	0.0500	0.0570	0.0562	114	112	76.0-121			1.29	20
Total Xylene	0.150	0.178	0.173	118	115	75.0-124			2.85	20
(S) a,a,a-Trifluorotoluene(FID)				99.2	99.3	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				99.1	101	75.0-128				

6 Qc

7 Gl

8 Al

9 Sc

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

(LCS) R3203387-3 03/14/17 11:59 • (LCSD) R3203387-4 03/14/17 12:21

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TPH (GC/FID) Low Fraction	5.50	5.32	5.36	96.7	97.4	70.0-136			0.720	20
(S) a,a,a-Trifluorotoluene(FID)				101	100	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				109	108	75.0-128				

L895426-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L895426-03 03/14/17 16:36 • (MS) R3203387-6 03/14/17 16:57 • (MSD) R3203387-7 03/14/17 17:19

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	%	%		%			%	%
Benzene	0.0500	0.398	5.36	5.87	102	113	97	10.0-146			9.07	29
Toluene	0.0500	ND	5.11	5.60	98.4	109	97	10.0-143			9.15	30
Ethylbenzene	0.0500	1.39	6.94	7.57	114	128	97	10.0-147			8.78	31
Total Xylene	0.150	23.2	31.5	33.6	57.4	71.5	97	10.0-149	J6	J6	6.30	30
(S) a,a,a-Trifluorotoluene(FID)					95.9	97.1		77.0-120				



L895426-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L895426-03 03/14/17 16:36 • (MS) R3203387-6 03/14/17 16:57 • (MSD) R3203387-7 03/14/17 17:19

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) a,a,a-Trifluorotoluene(PID)					100	101		75.0-128				

L895426-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L895426-03 03/14/17 16:36 • (MS) R3203387-8 03/14/17 17:41 • (MSD) R3203387-9 03/14/17 18:02

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	484	722	747	44.7	49.5	97	10.0-147			3.45	30
(S) a,a,a-Trifluorotoluene(FID)					99.4	99.8		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					108	110		75.0-128				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3202955-1 03/13/17 18:01

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	81.1			18.0-148

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

(LCS) R3202955-2 03/13/17 18:18 • (LCSD) R3202955-3 03/13/17 18:35

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
C10-C28 Diesel Range	60.0	47.2	45.7	78.7	76.2	50.0-150			3.24	20
(S) o-Terphenyl				94.5	92.8	18.0-148				

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.
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.
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.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.
 * Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

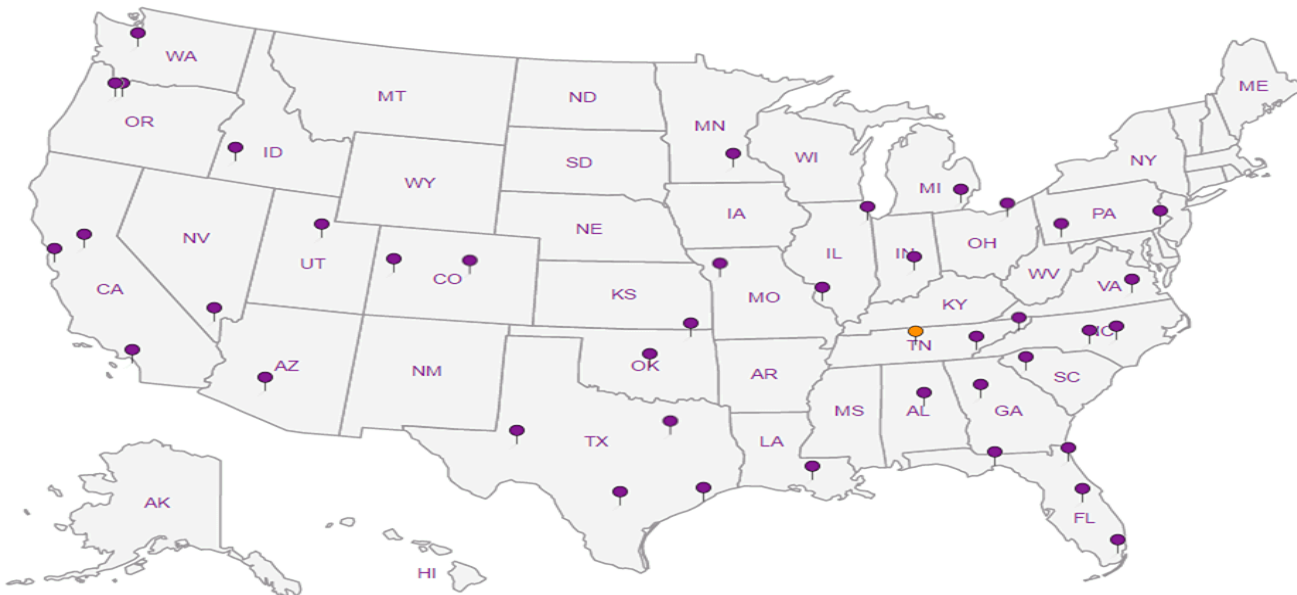
Third Party & Federal Accreditations

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

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

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Company Name/Address:
Nicholson GeoSolutions. LLC.
 3433 E. Lake Dr.
 Centennial, CO 80121

Billing Information:
 Tom Hogelin
 Berry Petroleum (Linn)
 235 Callahan Ave
 Parachute, CO

Report to:
Dave Nicholson

Email To:
dknicholson@q.com

Project Description:
L4 Spill Response

City/State Collected:

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

Client Project #

Lab Project #

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):
DK Nicholson

Rush? (Lab MUST Be Notified)
 Same Day200%
 Next Day100%
 Two Day50%
 Three Day25%

Date Results Needed
 Email? No Yes
 FAX? No Yes

No. of Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	TVPH/BTEX	TEPA (diesel + motor oil)	SPCON, pH	SAR									
L4-C-1		SS		3/9	1350	4	X	X	X	X									-01
L4-C-2					1400	4	X	X	X	X									02
L4-C-3					1410	4	X	X	X	X									03
L4-C-4					1420	4	X	X	X	X									04
L4-C-5					1430	4	X	X	X	X									05
L4-C-6					1440	4	X	X	X	X									06
L4-C-7					1450	4	X	X	X	X									07

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

pH _____ Temp _____
 Flow _____ Other _____

Remarks: **TRK# 0827 1107 8695**

Relinquished by: (Signature)
DK Nicholson
 Date: **3/10/17**
 Time: **1400**

Received by: (Signature)
Fedor
 Received by: (Signature)
[Signature]
 Received for lab by: (Signature)
[Signature]

Samples returned via: UPS
 FedEx Courier _____
 Temp: **2.1** °C Bottles Received: **28402**
 Date: **3-11-17** Time: **0900**

Hold # _____
 Condition: (lab use only) **OK**
 COC Seal Intact: Y N NA
 pH Checked: _____ NCF: _____

Analysis / Container / Preservative

Chain of Custody Page 1 of 1



YOUR LAB OF CHOICE

12065 Lebanon Rd
 Mount Juliet, TN 37122
 Phone: 615-758-5858
 Phone: 800-767-5859
 Fax: 615-758-5859


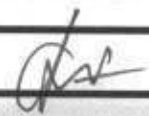


L# **L 895426**
D077

Acctnum: **NICGEOCCO**
 Template:
 Prelogin:
 TSR:
 Cooler:
 Shipped Via:

Rem./Contaminant Sample # (lab only)

ESC LAB SCIENCES Cooler Receipt Form

Client:	BERPETDCO	SDG#	LG95426	
Cooler Received/Opened On: 3/ 11 /17	Temperature:	2.1		
Received By: Timiesha Scott				
Signature:  				
Receipt Check List		NP	Yes	No
COC Seal Present / Intact?		✓		
COC Signed / Accurate?			✓	
Bottles arrive intact?			✓	
Correct bottles used?			✓	
Sufficient volume sent?			✓	
If Applicable				
VOA Zero headspace?				
Preservation Correct / Checked?				

April 07, 2017

Linn Energy - Denver, CO

Sample Delivery Group: L898405
Samples Received: 03/25/2017
Project Number:
Description: L4 Spill

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



L4-C-8 L898405-01 Solid

Collected by
DK Nicholson
Collected date/time
03/22/17 11:00
Received date/time
03/25/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG964479	1	03/27/17 22:18	03/28/17 23:57	LTB
Wet Chemistry by Method 9045D	WG963431	1	03/29/17 11:30	03/29/17 12:38	MA
Wet Chemistry by Method 9050AMod	WG965086	1	03/29/17 17:17	03/29/17 17:17	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG965630	1	03/30/17 13:36	03/31/17 08:35	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG966293	1	03/30/17 11:09	04/01/17 19:19	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG965630	1	03/30/17 13:36	03/31/17 08:35	ACM

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

L4-C-9 L898405-02 Solid

Collected by
DK Nicholson
Collected date/time
03/22/17 11:10
Received date/time
03/25/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG964479	1	03/27/17 22:18	03/29/17 00:00	LTB
Wet Chemistry by Method 9045D	WG963431	1	03/29/17 11:30	03/29/17 12:38	MA
Wet Chemistry by Method 9050AMod	WG965086	1	03/29/17 17:17	03/29/17 17:17	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG965630	1	03/30/17 13:36	03/31/17 08:51	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG966293	1	03/30/17 11:09	04/01/17 19:41	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG965630	1	03/30/17 13:36	03/31/17 08:51	ACM

L4-C-10 L898405-03 Solid

Collected by
DK Nicholson
Collected date/time
03/22/17 11:20
Received date/time
03/25/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG964479	1	03/27/17 22:18	03/29/17 00:03	LTB
Wet Chemistry by Method 9045D	WG964743	1	03/29/17 10:15	03/29/17 11:23	MA
Wet Chemistry by Method 9050AMod	WG965086	1	03/29/17 17:17	03/29/17 17:17	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG965630	1	03/30/17 13:36	04/03/17 20:11	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG966293	1	03/30/17 11:09	04/01/17 20:03	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG965630	1	03/30/17 13:36	04/03/17 20:11	ACM

L4-C-11 L898405-04 Solid

Collected by
DK Nicholson
Collected date/time
03/22/17 11:30
Received date/time
03/25/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG964479	1	03/27/17 22:18	03/29/17 00:11	LTB
Wet Chemistry by Method 9045D	WG964743	1	03/29/17 10:15	03/29/17 11:23	MA
Wet Chemistry by Method 9050AMod	WG965086	1	03/29/17 17:17	03/29/17 17:17	MAJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG965630	1	03/30/17 13:36	04/03/17 20:28	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG966293	1	03/30/17 11:09	04/01/17 20:26	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG965630	1	03/30/17 13:36	04/03/17 20:28	ACM

L4-SPOILS-2 L898405-05 Solid

Collected by
DK Nicholson
Collected date/time
03/22/17 11:40
Received date/time
03/25/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG964479	1	03/27/17 22:18	03/29/17 00:14	LTB
Calculated Results	WG964478	1	03/27/17 18:09	03/31/17 14:30	MA
Wet Chemistry by Method 3060A/7196A	WG965982	1	03/31/17 08:42	03/31/17 14:30	MA
Wet Chemistry by Method 9045D	WG964743	1	03/29/17 10:15	03/29/17 11:23	MA
Wet Chemistry by Method 9050AMod	WG965086	1	03/29/17 17:17	03/29/17 17:17	MAJ
Mercury by Method 7471A	WG964936	1	03/28/17 14:56	03/29/17 09:27	NJB
Metals (ICP) by Method 6010B	WG964478	1	03/27/17 18:09	03/28/17 18:35	ST

SAMPLE SUMMARY



L4-SPOILS-2 L898405-05 Solid

Collected by: DK Nicholson
 Collected date/time: 03/22/17 11:40
 Received date/time: 03/25/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method 8015	WG965630	1	03/30/17 13:36	04/03/17 20:45	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG966293	1	03/30/17 11:09	04/01/17 20:48	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG965630	1	03/30/17 13:36	04/03/17 20:45	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG965806	1	03/31/17 10:33	04/01/17 05:45	CLG

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



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

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	13.9		1	03/28/2017 23:57	WG964479

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.22	<u>T8</u>	1	03/29/2017 12:38	WG963431

3 Ss

4 Cn

Sample Narrative:

9045D L898405-01 WG963431: 8.22 at 21.0c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	411		1	03/29/2017 17:17	WG965086

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00750		0.000500	1	04/01/2017 19:19	WG966293
Toluene	0.0194		0.00500	1	04/01/2017 19:19	WG966293
Ethylbenzene	0.0117		0.000500	1	04/01/2017 19:19	WG966293
Total Xylene	0.0190	<u>B</u>	0.00150	1	04/01/2017 19:19	WG966293
TPH (GC/FID) Low Fraction	1.55		0.100	1	04/01/2017 19:19	WG966293
(S) a,a,a-Trifluorotoluene(FID)	84.1		77.0-120		04/01/2017 19:19	WG966293
(S) a,a,a-Trifluorotoluene(PID)	97.8		75.0-128		04/01/2017 19:19	WG966293

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	32.4		4.00	1	03/31/2017 08:35	WG965630
C28-C40 Oil Range	22.8		4.00	1	03/31/2017 08:35	WG965630
(S) o-Terphenyl	72.6		18.0-148		03/31/2017 08:35	WG965630



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	10.8		1	03/29/2017 00:00	WG964479

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.68	T8	1	03/29/2017 12:38	WG963431

3 Ss

4 Cn

Sample Narrative:

9045D L898405-02 WG963431: 8.68 at 20.6c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	385		1	03/29/2017 17:17	WG965086

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.0192		0.000500	1	04/01/2017 19:41	WG966293
Toluene	0.0235		0.00500	1	04/01/2017 19:41	WG966293
Ethylbenzene	0.0254		0.000500	1	04/01/2017 19:41	WG966293
Total Xylene	0.116		0.00150	1	04/01/2017 19:41	WG966293
TPH (GC/FID) Low Fraction	2.11		0.100	1	04/01/2017 19:41	WG966293
(S) a,a,a-Trifluorotoluene(FID)	87.9		77.0-120		04/01/2017 19:41	WG966293
(S) a,a,a-Trifluorotoluene(PID)	97.8		75.0-128		04/01/2017 19:41	WG966293

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	46.9		4.00	1	03/31/2017 08:51	WG965630
C28-C40 Oil Range	38.7		4.00	1	03/31/2017 08:51	WG965630
(S) o-Terphenyl	61.0		18.0-148		03/31/2017 08:51	WG965630



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	8.40		1	03/29/2017 00:03	WG964479

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.33	T8	1	03/29/2017 11:23	WG964743

3 Ss

4 Cn

Sample Narrative:

9045D L898405-03 WG964743: 8.33 at 19.8c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	377		1	03/29/2017 17:17	WG965086

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00765		0.000500	1	04/01/2017 20:03	WG966293
Toluene	0.0226		0.00500	1	04/01/2017 20:03	WG966293
Ethylbenzene	0.0197		0.000500	1	04/01/2017 20:03	WG966293
Total Xylene	0.0327		0.00150	1	04/01/2017 20:03	WG966293
TPH (GC/FID) Low Fraction	3.19		0.100	1	04/01/2017 20:03	WG966293
(S) a,a,a-Trifluorotoluene(FID)	88.8		77.0-120		04/01/2017 20:03	WG966293
(S) a,a,a-Trifluorotoluene(PID)	98.8		75.0-128		04/01/2017 20:03	WG966293

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	152		4.00	1	04/03/2017 20:11	WG965630
C28-C40 Oil Range	33.3		4.00	1	04/03/2017 20:11	WG965630
(S) o-Terphenyl	104		18.0-148		04/03/2017 20:11	WG965630



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	5.08		1	03/29/2017 00:11	WG964479

1 Cp

2 Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.52	T8	1	03/29/2017 11:23	WG964743

3 Ss

4 Cn

Sample Narrative:

9045D L898405-04 WG964743: 8.52 at 19.6c

5 Sr

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	386		1	03/29/2017 17:17	WG965086

6 Qc

7 Gl

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.0456		0.000500	1	04/01/2017 20:26	WG966293
Toluene	0.108		0.00500	1	04/01/2017 20:26	WG966293
Ethylbenzene	0.00854		0.000500	1	04/01/2017 20:26	WG966293
Total Xylene	0.0503		0.00150	1	04/01/2017 20:26	WG966293
TPH (GC/FID) Low Fraction	2.60		0.100	1	04/01/2017 20:26	WG966293
(S) a,a,a-Trifluorotoluene(FID)	83.0		77.0-120		04/01/2017 20:26	WG966293
(S) a,a,a-Trifluorotoluene(PID)	95.4		75.0-128		04/01/2017 20:26	WG966293

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	34.8		4.00	1	04/03/2017 20:28	WG965630
C28-C40 Oil Range	70.9		4.00	1	04/03/2017 20:28	WG965630
(S) o-Terphenyl	76.4		18.0-148		04/03/2017 20:28	WG965630



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	9.91		1	03/29/2017 00:14	WG964479

1 Cp

2 Tc

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Trivalent	14.4		2.00	1	03/31/2017 14:30	WG964478

3 Ss

4 Cn

Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	03/31/2017 14:30	WG965982

5 Sr

6 Qc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.18	<u>T8</u>	1	03/29/2017 11:23	WG964743

7 Gl

8 Al

Sample Narrative:

9045D L898405-05 WG964743: 8.18 at 19.6c

9 Sc

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	546		1	03/29/2017 17:17	WG965086

Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	0.0353		0.0200	1	03/29/2017 09:27	WG964936

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	10.3		2.00	1	03/28/2017 18:35	WG964478
Barium	929		0.500	1	03/28/2017 18:35	WG964478
Boron	14.4		10.0	1	03/28/2017 18:35	WG964478
Cadmium	ND		0.500	1	03/28/2017 18:35	WG964478
Chromium	14.4		1.00	1	03/28/2017 18:35	WG964478
Copper	15.5		2.00	1	03/28/2017 18:35	WG964478
Lead	11.8		0.500	1	03/28/2017 18:35	WG964478
Nickel	14.9		2.00	1	03/28/2017 18:35	WG964478
Selenium	ND		2.00	1	03/28/2017 18:35	WG964478
Silver	ND		1.00	1	03/28/2017 18:35	WG964478
Zinc	47.8		5.00	1	03/28/2017 18:35	WG964478

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00856		0.000500	1	04/01/2017 20:48	WG966293
Toluene	0.0222		0.00500	1	04/01/2017 20:48	WG966293
Ethylbenzene	0.0406		0.000500	1	04/01/2017 20:48	WG966293
Total Xylene	0.0667		0.00150	1	04/01/2017 20:48	WG966293



Collected date/time: 03/22/17 11:40

L898405

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	10.3		0.100	1	04/01/2017 20:48	WG966293
(S) a,a,a-Trifluorotoluene(FID)	81.4		77.0-120		04/01/2017 20:48	WG966293
(S) a,a,a-Trifluorotoluene(PID)	96.3		75.0-128		04/01/2017 20:48	WG966293

1 Cp

2 Tc

3 Ss

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	117		4.00	1	04/03/2017 20:45	WG965630
C28-C40 Oil Range	12.0		4.00	1	04/03/2017 20:45	WG965630
(S) o-Terphenyl	109		18.0-148		04/03/2017 20:45	WG965630

4 Cn

5 Sr

6 Qc

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	04/01/2017 05:45	WG965806
Acenaphthene	ND		0.00600	1	04/01/2017 05:45	WG965806
Acenaphthylene	ND		0.00600	1	04/01/2017 05:45	WG965806
Benzo(a)anthracene	ND		0.00600	1	04/01/2017 05:45	WG965806
Benzo(a)pyrene	ND		0.00600	1	04/01/2017 05:45	WG965806
Benzo(b)fluoranthene	ND		0.00600	1	04/01/2017 05:45	WG965806
Benzo(g,h,i)perylene	ND		0.00600	1	04/01/2017 05:45	WG965806
Benzo(k)fluoranthene	ND		0.00600	1	04/01/2017 05:45	WG965806
Chrysene	ND		0.00600	1	04/01/2017 05:45	WG965806
Dibenz(a,h)anthracene	ND		0.00600	1	04/01/2017 05:45	WG965806
Fluoranthene	ND		0.00600	1	04/01/2017 05:45	WG965806
Fluorene	0.00869		0.00600	1	04/01/2017 05:45	WG965806
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	04/01/2017 05:45	WG965806
Naphthalene	0.0630		0.0200	1	04/01/2017 05:45	WG965806
Phenanthrene	ND		0.00600	1	04/01/2017 05:45	WG965806
Pyrene	ND		0.00600	1	04/01/2017 05:45	WG965806
1-Methylnaphthalene	0.0814		0.0200	1	04/01/2017 05:45	WG965806
2-Methylnaphthalene	0.187		0.0200	1	04/01/2017 05:45	WG965806
2-Chloronaphthalene	ND		0.0200	1	04/01/2017 05:45	WG965806
(S) p-Terphenyl-d14	98.3		23.0-120		04/01/2017 05:45	WG965806
(S) Nitrobenzene-d5	145		14.0-149		04/01/2017 05:45	WG965806
(S) 2-Fluorobiphenyl	93.8		34.0-125		04/01/2017 05:45	WG965806

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3207413-1 03/31/17 14:12

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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

L898008-03 Original Sample (OS) • Duplicate (DUP)

(OS) L898008-03 03/31/17 14:14 • (DUP) R3207413-4 03/31/17 14:15

Analyte	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Chromium,Hexavalent	ND	0	1	0		20

L898405-05 Original Sample (OS) • Duplicate (DUP)

(OS) L898405-05 03/31/17 14:30 • (DUP) R3207413-8 03/31/17 14:30

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Chromium,Hexavalent	ND	0.680	1	0		20

⁷ Gl

⁸ Al

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

(LCS) R3207413-2 03/31/17 14:12 • (LCSD) R3207413-3 03/31/17 14:13

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Chromium,Hexavalent	56.9	57.4	57.6	101	101	80-120			0	20

⁹ Sc

L898008-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L898008-04 03/31/17 14:16 • (MS) R3207413-5 03/31/17 14:16 • (MSD) R3207413-6 03/31/17 14:17

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Chromium,Hexavalent	26.1	ND	23.3	22.5	89	86	1	75-125			3	20



L897593-01 Original Sample (OS) • Duplicate (DUP)

(OS) L897593-01 03/29/17 12:38 • (DUP) WG963431-3 03/29/17 12:38

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	10.1	10.1	1	0.297	<u>T8</u>	1

L898478-02 Original Sample (OS) • Duplicate (DUP)

(OS) L898478-02 03/29/17 12:38 • (DUP) WG963431-4 03/29/17 12:38

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.53	8.54	1	0.117	<u>T8</u>	1

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

(LCS) WG963431-1 03/29/17 12:38 • (LCSD) WG963431-2 03/29/17 12:37

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	7.42	7.46	98.9	99.5	98.7-101			0.538	1

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



L898275-01 Original Sample (OS) • Duplicate (DUP)

(OS) L898275-01 03/29/17 11:23 • (DUP) WG964743-3 03/29/17 11:23

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	9.29	9.28	1	0.108	<u>T8</u>	1

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

(LCS) WG964743-1 03/29/17 11:23 • (LCSD) WG964743-2 03/29/17 11:23

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	7.43	7.44	99.1	99.2	98.7-101			0.134	1

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) WG965086-4 03/29/17 17:17

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Specific Conductance	umhos/cm		umhos/cm	umhos/cm
	2.18			

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L898404-01 Original Sample (OS) • Duplicate (DUP)

(OS) L898404-01 03/29/17 17:17 • (DUP) WG965086-1 03/29/17 17:17

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Specific Conductance	umhos/cm	umhos/cm		%		%
	176	177	1	0.510		20

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

(LCS) WG965086-2 03/29/17 17:17 • (LCSD) WG965086-3 03/29/17 17:17

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Specific Conductance	umhos/cm	umhos/cm	umhos/cm	%	%	%			%	%
	542	549	548	101	101	90.0-110			0.182	20



Method Blank (MB)

(MB) R3206740-1 03/29/17 08:41

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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3206740-2 03/29/17 08:44 • (LCSD) R3206740-3 03/29/17 08:46

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.300	0.279	0.280	93	93	80-120			0	20

L898421-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L898421-03 03/29/17 08:49 • (MS) R3206740-4 03/29/17 08:51 • (MSD) R3206740-5 03/29/17 08:54

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.315	U	0.296	0.318	94	101	1	75-125			7	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3206502-1 03/28/17 17:16

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	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	1.8	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) R3206502-2 03/28/17 17:18 • (LCSD) R3206502-3 03/28/17 17:21

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Arsenic	100	96.9	96.6	97	97	80-120			0	20
Barium	100	99.3	98.8	99	99	80-120			1	20
Boron	100	96.4	97.4	96	97	80-120			1	20
Cadmium	100	96.5	96.0	97	96	80-120			1	20
Chromium	100	97.5	97.2	97	97	80-120			0	20
Copper	100	98.8	98.1	99	98	80-120			1	20
Lead	100	96.7	96.7	97	97	80-120			0	20
Nickel	100	97.8	97.2	98	97	80-120			1	20
Selenium	100	96.5	96.0	96	96	80-120			1	20
Silver	20.0	18.0	17.9	90	90	80-120			0	20
Zinc	100	96.4	96.0	96	96	80-120			0	20

L898332-23 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L898332-23 03/28/17 17:24 • (MS) R3206502-6 03/28/17 17:31 • (MSD) R3206502-7 03/28/17 17:34

Analyte	Spike Amount	Original Result	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Arsenic	104	1.31	99.4	99.5	95	95	1	75-125			0	20
Barium	104	U	105	105	98	98	1	75-125			0	20
Boron	104	U	98	99.7	95	96	1	75-125			2	20
Cadmium	104	U	98.2	98.4	95	95	1	75-125			0	20



L898332-23 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L898332-23 03/28/17 17:24 • (MS) R3206502-6 03/28/17 17:31 • (MSD) R3206502-7 03/28/17 17:34

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	104	U	100	101	95	96	1	75-125			1	20
Copper	104	U	101	101	98	98	1	75-125			0	20
Lead	104	U	101	100	96	96	1	75-125			0	20
Nickel	104	U	101	101	97	97	1	75-125			0	20
Selenium	104	U	97.8	98.6	94	95	1	75-125			1	20
Silver	20.7	U	18.3	18.3	88	88	1	75-125			0	20
Zinc	104	U	99	99	93	93	1	75-125			0	20

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



Method Blank (MB)

(MB) R3207687-5 04/01/17 17:50

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000579	↓	0.000150	0.00500
Ethylbenzene	0.000209	↓	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)	94.8			77.0-120
(S) a,a,a-Trifluorotoluene(PID)	104			75.0-128

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

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

(LCS) R3207687-1 04/01/17 15:59 • (LCSD) R3207687-2 04/01/17 16:21

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Benzene	0.0500	0.0503	0.0492	101	98.5	71.0-121			2.16	20
Toluene	0.0500	0.0499	0.0482	99.8	96.4	72.0-120			3.45	20
Ethylbenzene	0.0500	0.0499	0.0486	99.8	97.1	76.0-121			2.70	20
Total Xylene	0.150	0.153	0.148	102	98.7	75.0-124			3.32	20
(S) a,a,a-Trifluorotoluene(FID)				94.4	94.3	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				102	102	75.0-128				

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

(LCS) R3207687-3 04/01/17 16:43 • (LCSD) R3207687-4 04/01/17 17:05

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TPH (GC/FID) Low Fraction	5.50	5.80	5.84	105	106	70.0-136			0.720	20
(S) a,a,a-Trifluorotoluene(FID)				105	105	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				112	112	75.0-128				

L898671-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L898671-05 04/02/17 00:08 • (MS) R3207687-6 04/02/17 00:30 • (MSD) R3207687-7 04/02/17 00:52

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	%	%		%			%	%
Benzene	0.0500	ND	0.665	0.612	55.4	51.0	24	10.0-146			8.36	29
Toluene	0.0500	ND	0.729	0.675	60.7	56.3	24	10.0-143			7.68	30
Ethylbenzene	0.0500	ND	0.871	0.807	72.6	67.2	24	10.0-147			7.63	31
Total Xylene	0.150	ND	2.69	2.50	74.7	69.6	24	10.0-149		J6	7.09	30
(S) a,a,a-Trifluorotoluene(FID)					94.3	94.0		77.0-120				



L898671-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L898671-05 04/02/17 00:08 • (MS) R3207687-6 04/02/17 00:30 • (MSD) R3207687-7 04/02/17 00:52

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) a,a,a-Trifluorotoluene(PID)					102	102		75.0-128				

L898671-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L898671-05 04/02/17 00:08 • (MS) R3207687-8 04/02/17 01:15 • (MSD) R3207687-9 04/02/17 01:37

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	ND	41.7	43.2	31.6	32.7	24	10.0-147			3.35	30
(S) a,a,a-Trifluorotoluene(FID)					94.4	94.2		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					104	104		75.0-128				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3207284-1 03/30/17 20:09

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	126			18.0-148

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

(LCS) R3207284-2 03/30/17 20:26 • (LCSD) R3207284-3 03/30/17 20:43

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
C10-C28 Diesel Range	60.0	58.8	68.6	98.0	114	50.0-150			15.4	20
(S) o-Terphenyl				129	134	18.0-148				

L898668-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L898668-01 04/01/17 01:27 • (MS) R3207801-1 04/01/17 01:43 • (MSD) R3207801-2 04/01/17 01:59

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
C10-C28 Diesel Range	60.0	ND	51.7	43.7	86.1	72.9	1	50.0-150			16.7	20
(S) o-Terphenyl					106	85.9		18.0-148				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3207826-3 04/01/17 02:25

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	105			23.0-120
(S) Nitrobenzene-d5	87.6			14.0-149
(S) 2-Fluorobiphenyl	104			34.0-125

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) R3207826-1 04/01/17 01:42 • (LCSD) R3207826-2 04/01/17 02:04

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.0800	0.0821	0.0797	103	99.6	50.0-125			2.96	20
Acenaphthene	0.0800	0.0778	0.0742	97.2	92.7	52.0-120			4.73	20
Acenaphthylene	0.0800	0.0783	0.0750	97.8	93.7	51.0-120			4.27	20
Benzo(a)anthracene	0.0800	0.0762	0.0734	95.2	91.8	46.0-121			3.70	20
Benzo(a)pyrene	0.0800	0.0791	0.0747	98.9	93.3	42.0-121			5.77	20
Benzo(b)fluoranthene	0.0800	0.0763	0.0758	95.4	94.7	42.0-123			0.680	20
Benzo(g,h,i)perylene	0.0800	0.0839	0.0775	105	96.9	43.0-128			7.94	20
Benzo(k)fluoranthene	0.0800	0.0842	0.0788	105	98.5	45.0-128			6.62	20
Chrysene	0.0800	0.0783	0.0754	97.8	94.3	48.0-127			3.67	20
Dibenz(a,h)anthracene	0.0800	0.0854	0.0805	107	101	43.0-132			5.88	20
Fluoranthene	0.0800	0.0838	0.0797	105	99.6	49.0-129			5.06	20



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

(LCS) R3207826-1 04/01/17 01:42 • (LCSD) R3207826-2 04/01/17 02:04

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Fluorene	0.0800	0.0813	0.0736	102	92.0	50.0-120			9.89	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0858	0.0801	107	100	44.0-131			6.85	20
Naphthalene	0.0800	0.0727	0.0692	90.9	86.5	50.0-120			4.91	20
Phenanthrene	0.0800	0.0765	0.0726	95.6	90.7	48.0-120			5.30	20
Pyrene	0.0800	0.0811	0.0755	101	94.4	48.0-135			7.18	20
1-Methylnaphthalene	0.0800	0.0763	0.0750	95.4	93.8	52.0-122			1.72	20
2-Methylnaphthalene	0.0800	0.0741	0.0715	92.6	89.4	52.0-120			3.53	20
2-Chloronaphthalene	0.0800	0.0778	0.0741	97.2	92.6	50.0-120			4.88	20
(S) p-Terphenyl-d14				99.3	92.5	23.0-120				
(S) Nitrobenzene-d5				89.9	88.7	14.0-149				
(S) 2-Fluorobiphenyl				100	96.2	34.0-125				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L899154-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L899154-01 04/01/17 06:07 • (MS) R3207826-4 04/01/17 06:29 • (MSD) R3207826-5 04/01/17 06:51

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	0.107	U	0.0793	0.0701	74.3	65.7	1	20.0-136			12.3	24
Acenaphthene	0.107	U	0.0836	0.0779	78.3	73.0	1	29.0-124			7.02	20
Acenaphthylene	0.107	U	0.0908	0.0845	85.1	79.1	1	35.0-120			7.22	20
Benzo(a)anthracene	0.107	U	0.0618	0.0517	57.9	48.5	1	13.0-132			17.7	27
Benzo(a)pyrene	0.107	U	0.0647	0.0551	60.6	51.6	1	14.0-138			16.1	27
Benzo(b)fluoranthene	0.107	0.00111	0.0574	0.0495	52.7	45.3	1	10.0-129			14.7	31
Benzo(g,h,i)perylene	0.107	U	0.0602	0.0500	56.4	46.8	1	10.0-133			18.6	30
Benzo(k)fluoranthene	0.107	U	0.0685	0.0578	64.1	54.2	1	15.0-131			16.9	27
Chrysene	0.107	U	0.0654	0.0561	61.3	52.5	1	15.0-137			15.4	25
Dibenz(a,h)anthracene	0.107	U	0.0642	0.0535	60.1	50.1	1	15.0-132			18.3	27
Fluoranthene	0.107	U	0.0717	0.0608	67.2	56.9	1	13.0-139			16.5	28
Fluorene	0.107	U	0.0811	0.0718	76.0	67.2	1	27.0-122			12.3	22
Indeno(1,2,3-cd)pyrene	0.107	U	0.0629	0.0527	58.9	49.4	1	11.0-133			17.6	29
Naphthalene	0.107	U	0.0854	0.0844	80.0	79.0	1	18.0-136			1.16	21
Phenanthrene	0.107	0.000943	0.0720	0.0646	66.5	59.6	1	15.0-133			10.9	25
Pyrene	0.107	U	0.0697	0.0598	65.2	56.0	1	11.0-146			15.2	29
1-Methylnaphthalene	0.107	U	0.0896	0.0855	83.9	80.1	1	24.0-137			4.74	22
2-Methylnaphthalene	0.107	U	0.0853	0.0805	79.8	75.4	1	23.0-136			5.74	22
2-Chloronaphthalene	0.107	U	0.0858	0.0820	80.4	76.8	1	36.0-120			4.59	20
(S) p-Terphenyl-d14					77.8	77.1		23.0-120				
(S) Nitrobenzene-d5					83.0	81.0		14.0-149				
(S) 2-Fluorobiphenyl					89.1	90.5		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.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.
 * Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

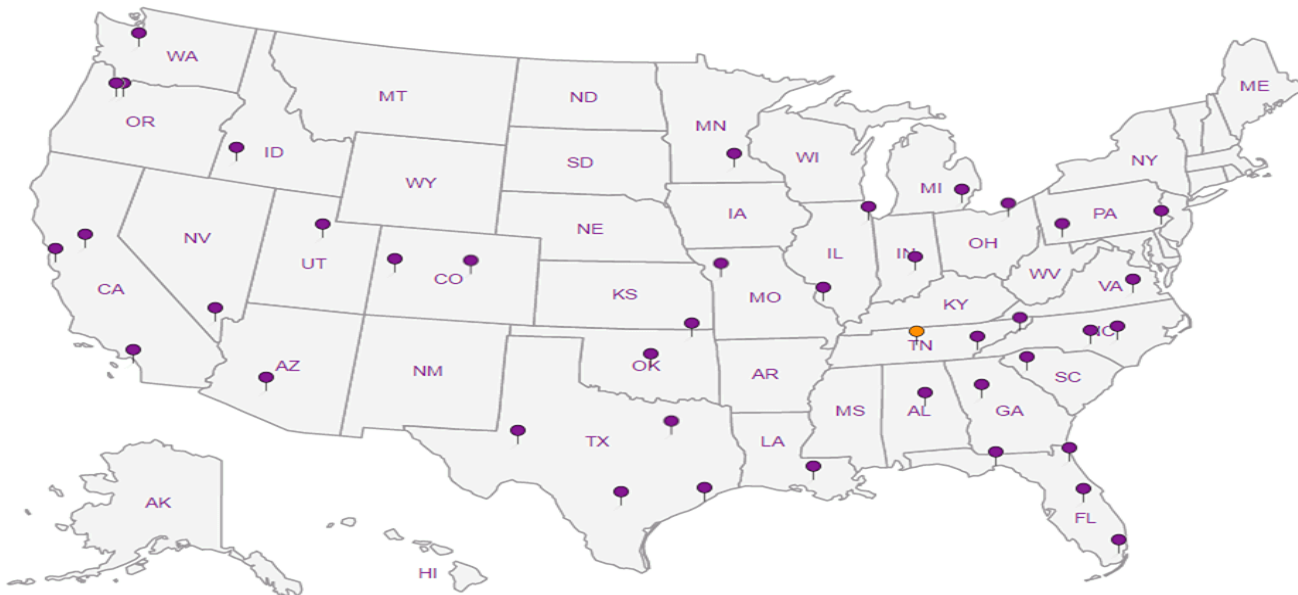
Third Party & Federal Accreditations

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

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

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

TRK # 12827 1109 9443

Company Name/Address:
~~Berry Petroleum Company - Denver, CO~~
 Nicholson
 1999 Broadway, Suite 3700
 Denver, CO 80202
 GeoSolutions

Billing Information: *Tan Hoge Sin*
Linn Energy
 Accounts Payable
 1999 Broadway, Suite 3700
 Denver, CO 80202
 Paradise, CO

Analysis/Container/Preservative

X TPH/BTEX
 X TEPA (Diesel + motor oil)
 SPCON, pH
 SAR
 SAR, metals, Cr VI
 PATHS 8020 SIM

Chain of Custody Page 1 of 1

1235

ESC
 L.A.B S.C.I.E.N.C.E.S

12065 Lebanon Road
 Mt. Juliet, TN 37122

Phone: (800) 767-5859
 Phone: (615) 758-5858
 Fax: (615) 758-5859

Report to: *Dave Nicholson*

Email to: *dknicholson@g.com*

Project Description: *L4 Spill*

Phone: ~~(303) 999-1100~~
 FAX: ~~(303) 999-1401~~

City/State Collected:

Client Project #: ESC Key:
BERPET00306155

Collected by: (print)

Site/Facility ID#: P.O.#:

Collected by (signature):
DK Nicholson

Immediately Packed on Ice *(Y)*

Rush? (Lab MUST Be Notified)

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

Date Results Needed:
 Email? No Yes
 FAX? No Yes

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs								
							X TPH/BTEX	X TEPA (Diesel + motor oil)	SPCON, pH	SAR	SAR, metals, Cr VI	PATHS 8020 SIM		
L4-C-8		SS		3/22	1100	4	X	X	X	X				
L4-C-9		↓		↓	1110	4	X	X	X	X				
L4-C-10		↓		↓	1120	4	X	X	X	X				
L4-C-11		↓		↓	1130	4	X	X	X	X				
L4-Spoils-2		↓		↓	1140	5	X	X	X	X	X			

CoCode **BERPETDCC** (lab use only)

Template/Prelogin

Shipped Via:

Remarks/Contaminant

Sample # (lab only)

L 098465-01

02

03

04

05

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

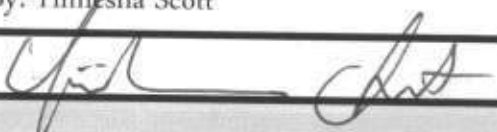
Remarks: *Metals: As, Ba, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn, + Cr VI*

pH _____ Temp _____

Flow _____ Other _____

Relinquished by: (Signature) <i>DK Nicholson</i>	Date: <i>3/23</i>	Time: <i>1600</i>	Received by: (Signature) <i>Fedex</i>	Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier	Condition: (lab use only) <i>(OC) Tail</i>
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: <i>2.1°C</i>	Bottles Received: <i>21/402</i>
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) <i>[Signature]</i>	Date: <i>3-25-17</i>	Time: <i>9:00</i>
				pH Checked:	NCF:

ESC LAB SCIENCES Cooler Receipt Form

Client: BERPETCO	SDG#	L898405		
Cooler Received/Opened On: 3/25/17	Temperature:	24		
Received By: Timiesha Scott				
Signature: 				
Receipt Check List		NP	Yes	No
COC Seal Present / Intact?		✓		
COC Signed / Accurate?			✓	
Bottles arrive intact?			✓	
Correct bottles used?			✓	
Sufficient volume sent?			✓	
If Applicable				
VOA Zero headspace?				
Preservation Correct / Checked?				

April 28, 2017

Linn Energy - Denver, CO

Sample Delivery Group: L903864
Samples Received: 04/20/2017
Project Number:
Description: L4 Spill Response

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



L4-SP-1 L903864-01 Solid

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

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG972407	1	04/21/17 11:41	04/25/17 16:28	ST
Calculated Results	WG972559	1	04/22/17 08:58	04/25/17 16:54	MA
Wet Chemistry by Method 3060A/7196A	WG972776	1	04/25/17 09:10	04/25/17 16:54	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	WG972733	1	04/21/17 14:22	04/24/17 12:31	JGC
Metals (ICP) by Method 6010B	WG972559	1	04/22/17 08:58	04/25/17 12:32	CCE
Volatile Organic Compounds (GC) by Method 8015	WG973483	100	04/24/17 12:53	04/28/17 01:57	JAH
Volatile Organic Compounds (GC) by Method 8021	WG973483	25	04/24/17 12:53	04/25/17 14:00	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG973159	10	04/25/17 08:47	04/25/17 22:56	KLM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG973164	1	04/24/17 14:51	04/25/17 14:45	CLG

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

L4-SP-2 L903864-02 Solid

Collected by
DK Nicholson Collected date/time
04/19/17 08:50 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 16:31	ST
Calculated Results	WG972559	1	04/22/17 08:58	04/25/17 16:54	MA
Wet Chemistry by Method 3060A/7196A	WG972776	1	04/25/17 09:10	04/25/17 16:54	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	WG972733	1	04/21/17 14:22	04/24/17 12:34	JGC
Metals (ICP) by Method 6010B	WG972559	1	04/22/17 08:58	04/25/17 12:35	CCE
Volatile Organic Compounds (GC) by Method 8015	WG973483	100	04/24/17 12:53	04/28/17 02:19	JAH
Volatile Organic Compounds (GC) by Method 8021	WG973483	25	04/24/17 12:53	04/25/17 17:15	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG973159	5	04/25/17 08:47	04/25/17 22:43	KLM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG973164	1	04/24/17 14:51	04/25/17 15:06	CLG

L4-SP-3 L903864-03 Solid

Collected by
DK Nicholson Collected date/time
04/19/17 09:00 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 16:34	ST
Calculated Results	WG972559	1	04/22/17 08:58	04/25/17 16:54	MA
Wet Chemistry by Method 3060A/7196A	WG972776	1	04/25/17 09:10	04/25/17 16:54	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	WG972666	1	04/21/17 11:41	04/22/17 06:53	TRB
Metals (ICP) by Method 6010B	WG972559	1	04/22/17 08:58	04/25/17 12:38	CCE
Volatile Organic Compounds (GC) by Method 8015/8021	WG973483	25	04/24/17 12:53	04/25/17 17:36	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG973159	10	04/25/17 08:47	04/25/17 21:34	KLM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG973164	1	04/24/17 14:51	04/25/17 15:27	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

- 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	12.2		1	04/25/2017 16:28	WG972407

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Trivalent	15.9		1.00	1	04/25/2017 16:54	WG972559

Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	04/25/2017 16:54	WG972776

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.20	<u>T8</u>	1	04/21/2017 09:40	WG972465

Sample Narrative:

9045D L903864-01 WG972465: 8.20 at 20.2c

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	1790		1	04/25/2017 17:30	WG973401

Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	04/24/2017 12:31	WG972733

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	8.66		2.00	1	04/25/2017 12:32	WG972559
Barium	699		0.500	1	04/25/2017 12:32	WG972559
Boron	17.4		10.0	1	04/25/2017 12:32	WG972559
Cadmium	0.564		0.500	1	04/25/2017 12:32	WG972559
Chromium	15.9		1.00	1	04/25/2017 12:32	WG972559
Copper	17.1		2.00	1	04/25/2017 12:32	WG972559
Lead	11.7		0.500	1	04/25/2017 12:32	WG972559
Nickel	16.1		2.00	1	04/25/2017 12:32	WG972559
Selenium	ND		2.00	1	04/25/2017 12:32	WG972559
Silver	ND		1.00	1	04/25/2017 12:32	WG972559
Zinc	54.9		5.00	1	04/25/2017 12:32	WG972559

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.232		0.0125	25	04/25/2017 14:00	WG973483
Toluene	3.11		0.125	25	04/25/2017 14:00	WG973483
Ethylbenzene	0.609		0.0125	25	04/25/2017 14:00	WG973483
Total Xylene	12.6	<u>J6</u>	0.0375	25	04/25/2017 14:00	WG973483

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 04/19/17 08:40

L903864

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	406		10.0	100	04/28/2017 01:57	WG973483
(S) a,a,a-Trifluorotoluene(FID)	86.2		77.0-120		04/25/2017 14:00	WG973483
(S) a,a,a-Trifluorotoluene(FID)	89.0		77.0-120		04/28/2017 01:57	WG973483
(S) a,a,a-Trifluorotoluene(PID)	91.0		75.0-128		04/25/2017 14:00	WG973483
(S) a,a,a-Trifluorotoluene(PID)	104		75.0-128		04/28/2017 01:57	WG973483

1 Cp

2 Tc

3 Ss

4 Cn

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	936		40.0	10	04/25/2017 22:56	WG973159
C28-C40 Oil Range	ND		40.0	10	04/25/2017 22:56	WG973159
(S) o-Terphenyl	87.1		18.0-148		04/25/2017 22:56	WG973159

5 Sr

6 Qc

7 Gl

Sample Narrative:

8015 L903864-01 WG973159: Dilution due to matrix

8 Al

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND		0.00600	1	04/25/2017 14:45	WG973164
Acenaphthene	0.00655		0.00600	1	04/25/2017 14:45	WG973164
Acenaphthylene	ND		0.00600	1	04/25/2017 14:45	WG973164
Benzo(a)anthracene	ND		0.00600	1	04/25/2017 14:45	WG973164
Benzo(a)pyrene	ND		0.00600	1	04/25/2017 14:45	WG973164
Benzo(b)fluoranthene	ND		0.00600	1	04/25/2017 14:45	WG973164
Benzo(g,h,i)perylene	ND		0.00600	1	04/25/2017 14:45	WG973164
Benzo(k)fluoranthene	ND		0.00600	1	04/25/2017 14:45	WG973164
Chrysene	ND		0.00600	1	04/25/2017 14:45	WG973164
Dibenz(a,h)anthracene	ND		0.00600	1	04/25/2017 14:45	WG973164
Fluoranthene	ND		0.00600	1	04/25/2017 14:45	WG973164
Fluorene	0.0142		0.00600	1	04/25/2017 14:45	WG973164
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	04/25/2017 14:45	WG973164
Naphthalene	0.103		0.0200	1	04/25/2017 14:45	WG973164
Phenanthrene	0.00816		0.00600	1	04/25/2017 14:45	WG973164
Pyrene	ND		0.00600	1	04/25/2017 14:45	WG973164
1-Methylnaphthalene	0.124		0.0200	1	04/25/2017 14:45	WG973164
2-Methylnaphthalene	0.299		0.0200	1	04/25/2017 14:45	WG973164
2-Chloronaphthalene	ND		0.0200	1	04/25/2017 14:45	WG973164
(S) p-Terphenyl-d14	47.0		23.0-120		04/25/2017 14:45	WG973164
(S) Nitrobenzene-d5	332	<u>J1</u>	14.0-149		04/25/2017 14:45	WG973164
(S) 2-Fluorobiphenyl	55.3		34.0-125		04/25/2017 14:45	WG973164

9 Sc



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	10.5		1	04/25/2017 16:31	WG972407

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Trivalent	12.0		1.00	1	04/25/2017 16:54	WG972559

Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	04/25/2017 16:54	WG972776

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.29	<u>T8</u>	1	04/21/2017 09:40	WG972465

Sample Narrative:

9045D L903864-02 WG972465: 8.29 at 20.2c

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	1050		1	04/25/2017 17:30	WG973401

Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	04/24/2017 12:34	WG972733

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	10.7		2.00	1	04/25/2017 12:35	WG972559
Barium	776		0.500	1	04/25/2017 12:35	WG972559
Boron	15.1		10.0	1	04/25/2017 12:35	WG972559
Cadmium	ND		0.500	1	04/25/2017 12:35	WG972559
Chromium	12.0		1.00	1	04/25/2017 12:35	WG972559
Copper	13.1		2.00	1	04/25/2017 12:35	WG972559
Lead	9.54		0.500	1	04/25/2017 12:35	WG972559
Nickel	13.9		2.00	1	04/25/2017 12:35	WG972559
Selenium	ND		2.00	1	04/25/2017 12:35	WG972559
Silver	ND		1.00	1	04/25/2017 12:35	WG972559
Zinc	47.4		5.00	1	04/25/2017 12:35	WG972559

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.0934		0.0125	25	04/25/2017 17:15	WG973483
Toluene	0.410		0.125	25	04/25/2017 17:15	WG973483
Ethylbenzene	0.945		0.0125	25	04/25/2017 17:15	WG973483
Total Xylene	14.4		0.0375	25	04/25/2017 17:15	WG973483

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 04/19/17 08:50

L903864

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	1010		10.0	100	04/28/2017 02:19	WG973483
(S) a,a,a-Trifluorotoluene(FID)	87.5		77.0-120		04/28/2017 02:19	WG973483
(S) a,a,a-Trifluorotoluene(FID)	92.1		77.0-120		04/25/2017 17:15	WG973483
(S) a,a,a-Trifluorotoluene(PID)	90.4		75.0-128		04/25/2017 17:15	WG973483
(S) a,a,a-Trifluorotoluene(PID)	101		75.0-128		04/28/2017 02:19	WG973483

1 Cp

2 Tc

3 Ss

4 Cn

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	583		20.0	5	04/25/2017 22:43	WG973159
C28-C40 Oil Range	22.5		20.0	5	04/25/2017 22:43	WG973159
(S) o-Terphenyl	84.0		18.0-148		04/25/2017 22:43	WG973159

5 Sr

6 Qc

7 Gl

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	0.00814		0.00600	1	04/25/2017 15:06	WG973164
Acenaphthene	0.0163		0.00600	1	04/25/2017 15:06	WG973164
Acenaphthylene	ND		0.00600	1	04/25/2017 15:06	WG973164
Benzo(a)anthracene	ND		0.00600	1	04/25/2017 15:06	WG973164
Benzo(a)pyrene	ND		0.00600	1	04/25/2017 15:06	WG973164
Benzo(b)fluoranthene	ND		0.00600	1	04/25/2017 15:06	WG973164
Benzo(g,h,i)perylene	ND		0.00600	1	04/25/2017 15:06	WG973164
Benzo(k)fluoranthene	ND		0.00600	1	04/25/2017 15:06	WG973164
Chrysene	ND		0.00600	1	04/25/2017 15:06	WG973164
Dibenz(a,h)anthracene	ND		0.00600	1	04/25/2017 15:06	WG973164
Fluoranthene	ND		0.00600	1	04/25/2017 15:06	WG973164
Fluorene	0.0416		0.00600	1	04/25/2017 15:06	WG973164
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	04/25/2017 15:06	WG973164
Naphthalene	0.221		0.0200	1	04/25/2017 15:06	WG973164
Phenanthrene	0.0311		0.00600	1	04/25/2017 15:06	WG973164
Pyrene	ND		0.00600	1	04/25/2017 15:06	WG973164
1-Methylnaphthalene	0.383		0.0200	1	04/25/2017 15:06	WG973164
2-Methylnaphthalene	0.616		0.0200	1	04/25/2017 15:06	WG973164
2-Chloronaphthalene	ND		0.0200	1	04/25/2017 15:06	WG973164
(S) p-Terphenyl-d14	61.3		23.0-120		04/25/2017 15:06	WG973164
(S) Nitrobenzene-d5	972	<u>J1</u>	14.0-149		04/25/2017 15:06	WG973164
(S) 2-Fluorobiphenyl	71.1		34.0-125		04/25/2017 15:06	WG973164

8 Al

9 Sc



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	7.02		1	04/25/2017 16:34	WG972407

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Trivalent	12.8		1.00	1	04/25/2017 16:54	WG972559

Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	04/25/2017 16:54	WG972776

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.15	<u>T8</u>	1	04/21/2017 09:40	WG972465

Sample Narrative:

9045D L903864-03 WG972465: 8.15 at 20.0c

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	1240		1	04/25/2017 17:30	WG973401

Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	04/22/2017 06:53	WG972666

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	6.24		2.00	1	04/25/2017 12:38	WG972559
Barium	652		0.500	1	04/25/2017 12:38	WG972559
Boron	13.5		10.0	1	04/25/2017 12:38	WG972559
Cadmium	ND		0.500	1	04/25/2017 12:38	WG972559
Chromium	12.8		1.00	1	04/25/2017 12:38	WG972559
Copper	11.6		2.00	1	04/25/2017 12:38	WG972559
Lead	9.07		0.500	1	04/25/2017 12:38	WG972559
Nickel	13.1		2.00	1	04/25/2017 12:38	WG972559
Selenium	ND		2.00	1	04/25/2017 12:38	WG972559
Silver	ND		1.00	1	04/25/2017 12:38	WG972559
Zinc	45.4		5.00	1	04/25/2017 12:38	WG972559

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.0134		0.0125	25	04/25/2017 17:36	WG973483
Toluene	ND		0.125	25	04/25/2017 17:36	WG973483
Ethylbenzene	ND		0.0125	25	04/25/2017 17:36	WG973483
Total Xylene	1.23		0.0375	25	04/25/2017 17:36	WG973483

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 04/19/17 09:00

L903864

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	77.4		2.50	25	04/25/2017 17:36	WG973483
(S) a,a,a-Trifluorotoluene(FID)	99.6		77.0-120		04/25/2017 17:36	WG973483
(S) a,a,a-Trifluorotoluene(PID)	90.8		75.0-128		04/25/2017 17:36	WG973483

1 Cp

2 Tc

3 Ss

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	236		40.0	10	04/25/2017 21:34	WG973159
C28-C40 Oil Range	67.1		40.0	10	04/25/2017 21:34	WG973159
(S) o-Terphenyl	96.6		18.0-148		04/25/2017 21:34	WG973159

4 Cn

5 Sr

6 Qc

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	04/25/2017 15:27	WG973164
Acenaphthene	0.00679		0.00600	1	04/25/2017 15:27	WG973164
Acenaphthylene	ND		0.00600	1	04/25/2017 15:27	WG973164
Benzo(a)anthracene	ND		0.00600	1	04/25/2017 15:27	WG973164
Benzo(a)pyrene	ND		0.00600	1	04/25/2017 15:27	WG973164
Benzo(b)fluoranthene	ND		0.00600	1	04/25/2017 15:27	WG973164
Benzo(g,h,i)perylene	ND		0.00600	1	04/25/2017 15:27	WG973164
Benzo(k)fluoranthene	ND		0.00600	1	04/25/2017 15:27	WG973164
Chrysene	ND		0.00600	1	04/25/2017 15:27	WG973164
Dibenz(a,h)anthracene	ND		0.00600	1	04/25/2017 15:27	WG973164
Fluoranthene	ND		0.00600	1	04/25/2017 15:27	WG973164
Fluorene	0.0181		0.00600	1	04/25/2017 15:27	WG973164
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	04/25/2017 15:27	WG973164
Naphthalene	0.0492		0.0200	1	04/25/2017 15:27	WG973164
Phenanthrene	0.0171		0.00600	1	04/25/2017 15:27	WG973164
Pyrene	0.00648		0.00600	1	04/25/2017 15:27	WG973164
1-Methylnaphthalene	0.0842		0.0200	1	04/25/2017 15:27	WG973164
2-Methylnaphthalene	0.143		0.0200	1	04/25/2017 15:27	WG973164
2-Chloronaphthalene	ND		0.0200	1	04/25/2017 15:27	WG973164
(S) p-Terphenyl-d14	60.8		23.0-120		04/25/2017 15:27	WG973164
(S) Nitrobenzene-d5	164	J1	14.0-149		04/25/2017 15:27	WG973164
(S) 2-Fluorobiphenyl	70.4		34.0-125		04/25/2017 15:27	WG973164

7 Gl

8 Al

9 Sc



Method Blank (MB)

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

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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

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

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

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

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

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

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

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

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Chromium,Hexavalent	56.9	53.6	53.6	94	94	80-120			0	20

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

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

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Chromium,Hexavalent	25.5	U	24.2	24.2	95	95	1	75-125			0	20



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

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

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	10.7	10.7	1	0.280	<u>T8</u>	1

¹ Cp

² Tc

³ Ss

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	<u>T8</u>	1

⁴ Cn

⁵ Sr

⁶ Qc

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

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

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

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

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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

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

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

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

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

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



Method Blank (MB)

(MB) R3212689-1 04/22/17 06:35

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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3212689-2 04/22/17 06:38 • (LCSD) R3212689-3 04/22/17 06:40

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.300	0.271	0.283	90	94	80-120			4	20

L904020-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L904020-01 04/22/17 06:43 • (MS) R3212689-4 04/22/17 06:45 • (MSD) R3212689-5 04/22/17 06:48

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.321	ND	0.298	0.302	93	94	1	75-125			2	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3212959-1 04/24/17 12:11

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

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

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

(LCS) R3212959-2 04/24/17 12:14 • (LCSD) R3212959-3 04/24/17 12:21

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.300	0.283	0.274	94	91	80-120			3	20

L904054-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L904054-01 04/24/17 12:24 • (MS) R3212959-4 04/24/17 12:26 • (MSD) R3212959-5 04/24/17 12:29

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.310	0.0239	0.326	0.32	97	96	1	75-125			2	20

7 Gl

8 Al

9 Sc



Method Blank (MB)

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

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	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

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

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
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	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	%	%		%			%	%
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

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



Method Blank (MB)

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

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	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

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
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				

6 Qc

7 Gl

8 Al

9 Sc

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



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

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

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) a,a,a-Trifluorotoluene(PID)					100	103		75.0-128				

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

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

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	314	278	373	0.000	43.0	25	10.0-147	E J6	E	29.0	30
(S) a,a,a-Trifluorotoluene(FID)					90.0	99.8		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					103	111		75.0-128				

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



Method Blank (MB)

(MB) R3213427-1 04/25/17 17:54

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	94.5			18.0-148

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

(LCS) R3213427-2 04/25/17 18:10 • (LCSD) R3213427-3 04/25/17 18:24

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	50.6	49.3	84.3	82.2	50.0-150			2.53	20
(S) o-Terphenyl				115	110	18.0-148				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



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

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) 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				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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

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

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



Abbreviations and Definitions

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

Qualifier	Description
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.
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.

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



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.
 * Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

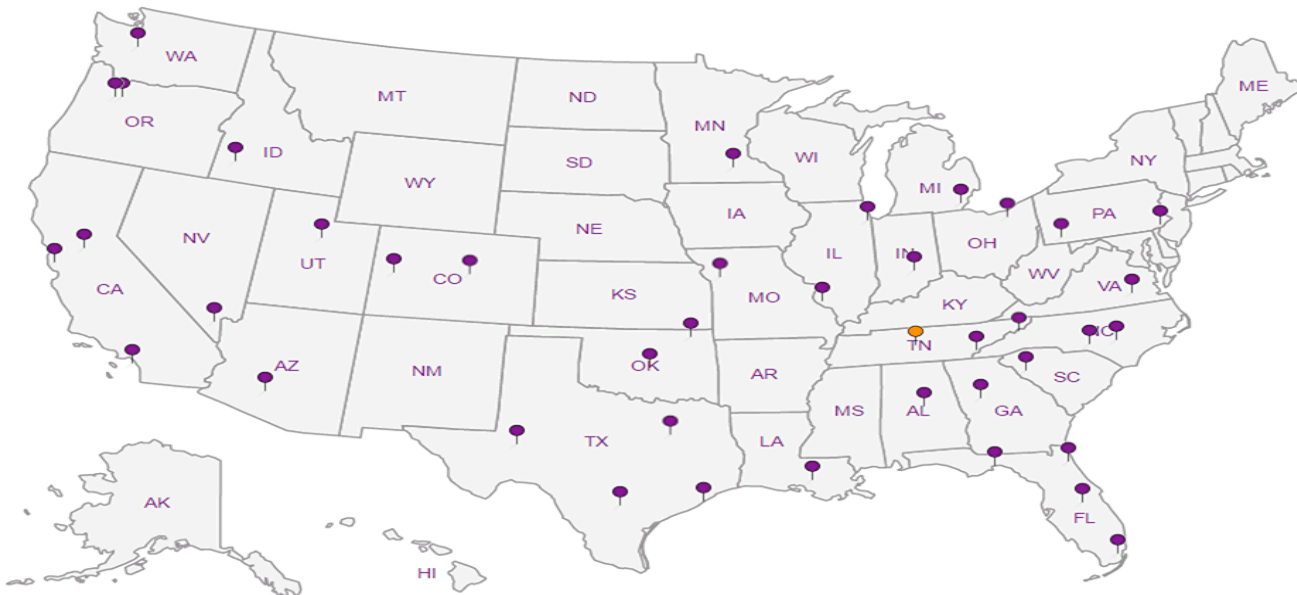
Third Party & Federal Accreditations

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

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

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Company Name/Address:
Nicholson GeoSolutions, LLC
 3413 E. Lake Dr.
 Centennial, CO 80121

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

Analysis / Container / Preservative



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



Report to:
Daye Nicholson

Email To:
dknicholson@q.com

Project Description:
~~Rit Reclamation~~ **L4 Spill Response**

City/State Collected:
 Lab Project #
BERPETDCO030615S

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

Client Project #

P.O. #

Collected by (print):

Site/Facility ID #

Date Results Needed

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

Rush? (Lab MUST Be Notified)
 ___ Same Day200%
 ___ Next Day100%
 ___ Two Day50%
 ___ Three Day25%

Email? ___ No X Yes
 FAX? X No ___ Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs
L4-SP-1		SS		4/19	0840	5
L4-SP-2		SS		↓	0850	5
L4-SP-3		SS		↓	0900	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 & Oil Range (1) 4oz Clear-No Pres	SPCON, pH (1) 4oz Clear - No Pres	PAHSIM 8270 (1) 4oz Soil Jar
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X

L# **L903864**
1069
 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 _____

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

Relinquished by: (Signature)
DK Nicholson
 Relinquished by: (Signature)
 Relinquished by: (Signature)

Date: **4/19/17**
 Time: **1630**

Received by: (Signature)
Fedex
 Received by: (Signature)
7215 4519 2868
 Received for lab by: (Signature)
[Signature]

Samples returned via: UPS
 FedEx Courier _____
 Temp: _____ °C Bottles Received:
2.1 M **15-4oz**
 Date: **4/20/17** Time: **0845**

Hold #
 Condition: (lab use only) **OK**
 COC Seal Intact: ___ Y ___ N ___ NA
 pH Checked: NCF:

ESC LAB SCIENCES Cooler Receipt Form

Client: BERPETDCO	SDG#	L903864	
Cooler Received/Opened On: 4/20/17	Temperature:	2.1	
Received By: Myra "Katie" Ingram			
Signature: <i>Myra</i>			
Receipt Check List	NP	Yes	No
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?			