



Nicholson GeoSolutions LLC

3433 East Lake Drive
Centennial, CO 80121

August 10, 2014

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

Subject: O-32 Reserve Pit Soil Sample Results

Dear Derek:

Nicholson GeoSolutions LLC was retained by Linn Energy, LLC (Linn) to conduct sampling of the soils beneath the former reserve pit on the O-32 well pad in the Garden Gulch area, Garfield County, Colorado.

Sampling was conducted on August 3, 2014. Impacted materials from the base and sidewalls of the pit had been previously excavated and stored in a bermed area on the well pad. During the inspection the perimeter and inner corners of the pit were mapped using a hand-held GPS unit and six discrete soil samples were collected to evaluate compliance with the COGCC Table 910-1 standards. In addition to the confirmation samples, a composite sample of the recently excavated spoils was also collected.

Figure 1 shows the approximate extent of the pit and the locations of the six confirmation samples collected. All samples were analyzed for Total Volatile Petroleum Hydrocarbons (TVPH – gasoline range), Total Extractable Petroleum Hydrocarbons (TEPH – diesel and motor oil range), BTEX (benzene, toluene, ethylbenzene, and xylenes), sodium adsorption ratio (SAR), pH, conductivity, metals, and PAHs to evaluate compliance with the Table 910-1 standards and treatment options.

Table 1 provides analytical results for the soil samples collected. The laboratory analytical report is contained in Appendix A. The combined TPH exceeded the standard for confirmation samples O-32 P1 (1,703.5 mg/kg) and O-32-P6 (1,130 mg/kg). SAR also exceeded the standard for confirmation samples O32-P1, O32-P4, O32-P5, and O32-P6, and conductivity exceeded the standard for samples O32-P5 and O32-P6; however, these samples were collected from greater than 3 feet depth so no action is required based on the SAR and conductivity results. For the spoils sample, TPH exceeded the standard at a combined 761 mg/kg and SAR exceeded the standard at 22. Arsenic ranged from 6.1 to 16 mg/kg for the seven samples, within the range of natural background concentrations for the Garden Gulch area.

Nicholson GeoSolutions LLC



David K. Nicholson, P.G.
Principal Geologist

Table 1 O-32 Sample Results – August 3, 2014

Parameter	Table 910-1 Standards	O32-P1	O32-P2	O32-P3	O32-P4	O32-P5	O32-P6	O32-SPOILS
sp. conductance (mmhos/cm)	<4	2.8	0.73	2.0	2.7	12	5.0	2.5
pH (standard units)	6-9	8.2	8.9	8.0	8.0	7.6	7.8	8.3
SAR (ratio)	<12	24	12	10	18	39	23	22
TVPH – gasoline range	500 ¹	3.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.0
TEPH – diesel/motor oil range	500 ¹	1,700	210	331	223	440	1,130	760
benzene	0.17	0.0089	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
toluene	85	0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
ethylbenzene	100	0.0079	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
xylenes	175	0.038	<0.0075	<0.0075	<0.0075	<0.0075	<0.0075	<0.0075
PAHs	various	All ok	All ok	All ok	All ok	All ok	All ok	All ok
arsenic	0.39	7.1	16	6.8	6.5	6.1	6.7	6.4

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



Figure 1

August
2014

GeoSolutions
NICHOLSON

Legend

- Sample Location
- Pit Boundary

0 75 150 300 Feet 1" = 150'

Berry Petroleum

**O-32
Pit Investigation**

APPENDIX A
Laboratory Report



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Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
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Dave Nicholson
Berry Petroleum Company - Denver, CO
1999 Broadway, Suite 3700
Denver, CO 80202

Report Summary

Thursday August 07, 2014

Report Number: L713759

Samples Received: 08/05/14

Client Project:

Description: Pit Reclamation

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Mark W. Beasley , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197,
FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016,
NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002,
SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612,
MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1,
TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364, EPA - TN002

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REPORT OF ANALYSIS

Dave Nicholson
Berry Petroleum Company - Denver, C
1999 Broadway, Suite 3700
Denver, CO 80202

August 07, 2014

Date Received : August 05, 2014
Description : Pit Reclamation
Sample ID : O-32 P1
Collected By : DK Nicholson
Collection Date : 08/03/14 12:00

ESC Sample # : L713759-09

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium,Hexavalent	BDL	2.0	mg/kg	3060A/7196A	08/07/14	1
ORP	140		mV	2580 B-2011	08/06/14	1
pH	8.2		su	9045D	08/07/14	1
Sodium Adsorption Ratio	24.			Calc.	08/06/14	1
Specific Conductance	2800		umhos/cm	9050AMod	08/06/14	1
Mercury	0.027	0.020	mg/kg	7471	08/06/14	1
Arsenic	7.1	2.0	mg/kg	6010B	08/06/14	1
Barium	630	0.50	mg/kg	6010B	08/06/14	1
Boron	19.	10.	mg/kg	6010B	08/06/14	1
Cadmium	BDL	0.50	mg/kg	6010B	08/06/14	1
Chromium	23.	1.0	mg/kg	6010B	08/06/14	1
Copper	23.	2.0	mg/kg	6010B	08/06/14	1
Lead	16.	0.50	mg/kg	6010B	08/06/14	1
Nickel	16.	2.0	mg/kg	6010B	08/06/14	1
Selenium	BDL	2.0	mg/kg	6010B	08/06/14	1
Silver	BDL	1.0	mg/kg	6010B	08/06/14	1
Zinc	51.	5.0	mg/kg	6010B	08/06/14	1
Benzene	0.0089	0.0025	mg/kg	8021	08/06/14	5
Toluene	0.025	0.025	mg/kg	8021	08/06/14	5
Ethylbenzene	0.0079	0.0025	mg/kg	8021	08/06/14	5
Total Xylene	0.038	0.0075	mg/kg	8021	08/06/14	5
TPH (GC/FID) Low Fraction	3.5	0.50	mg/kg	8015	08/06/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	96.3		% Rec.	8015	08/06/14	5
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	08/06/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	1700	200	mg/kg	8015	08/06/14	50
C28-C40 Oil Range	BDL	200	mg/kg	8015	08/06/14	50
Surrogate Recovery						
o-Terphenyl	0.00		% Rec.	8015	08/06/14	50
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Acenaphthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Acenaphthylene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(a)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L713759-09 (PH) - 8.2@20.1c
L713759-09 (DRORLA) - Dilution due to matrix
L713759-09 (SV8270PAHSIM) - Dilution due to matrix



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Collected By : DK Nicholson
Collection Date : 08/03/14 12:00

ESC Sample # : L713759-09

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(b)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(g,h,i)perylene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(k)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Chrysene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Dibenz(a,h)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Fluorene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Indeno(1,2,3-cd)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Naphthalene	0.23	0.20	mg/kg	8270C-SIM	08/06/14	10
Phenanthrene	0.21	0.060	mg/kg	8270C-SIM	08/06/14	10
Pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
1-Methylnaphthalene	0.26	0.20	mg/kg	8270C-SIM	08/06/14	10
2-Methylnaphthalene	0.52	0.20	mg/kg	8270C-SIM	08/06/14	10
2-Chloronaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
Surrogate Recovery						
p-Terphenyl-d14	82.3		% Rec.	8270C-SIM	08/06/14	10
Nitrobenzene-d5	161.		% Rec.	8270C-SIM	08/06/14	10
2-Fluorobiphenyl	79.0		% Rec.	8270C-SIM	08/06/14	10

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 08/07/14 16:32 Printed: 08/07/14 17:24

L713759-09 (PH) - 8.2@20.1c

L713759-09 (DRORLA) - Dilution due to matrix

L713759-09 (SV8270PAHSIM) - Dilution due to matrix



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REPORT OF ANALYSIS

Dave Nicholson
 Berry Petroleum Company - Denver, C
 1999 Broadway, Suite 3700
 Denver, CO 80202

August 07, 2014

Date Received : August 05, 2014
 Description : Pit Reclamation
 Sample ID : O-32 P2
 Collected By : DK Nicholson
 Collection Date : 08/03/14 12:10

ESC Sample # : L713759-10

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium,Hexavalent	BDL	2.0	mg/kg	3060A/7196A	08/07/14	1
ORP	120		mV	2580 B-2011	08/06/14	1
pH	8.9		su	9045D	08/07/14	1
Sodium Adsorption Ratio	12.			Calc.	08/06/14	1
Specific Conductance	730		umhos/cm	9050AMod	08/06/14	1
Mercury	0.026	0.020	mg/kg	7471	08/06/14	1
Arsenic	16.	2.0	mg/kg	6010B	08/06/14	1
Barium	640	0.50	mg/kg	6010B	08/06/14	1
Boron	18.	10.	mg/kg	6010B	08/06/14	1
Cadmium	BDL	0.50	mg/kg	6010B	08/06/14	1
Chromium	27.	1.0	mg/kg	6010B	08/06/14	1
Copper	22.	2.0	mg/kg	6010B	08/06/14	1
Lead	14.	0.50	mg/kg	6010B	08/06/14	1
Nickel	19.	2.0	mg/kg	6010B	08/06/14	1
Selenium	BDL	2.0	mg/kg	6010B	08/06/14	1
Silver	BDL	1.0	mg/kg	6010B	08/06/14	1
Zinc	56.	5.0	mg/kg	6010B	08/06/14	1
Benzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Toluene	BDL	0.025	mg/kg	8021	08/06/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	08/06/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	08/06/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	96.5		% Rec.	8015	08/06/14	5
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	08/06/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	210	200	mg/kg	8015	08/06/14	50
C28-C40 Oil Range	BDL	200	mg/kg	8015	08/06/14	50
Surrogate Recovery						
o-Terphenyl	398.		% Rec.	8015	08/06/14	50
Polynuclear Aromatic Hydrocarbons						
Anthracene	0.0067	0.0060	mg/kg	8270C-SIM	08/06/14	1
Acenaphthene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
Acenaphthylene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
Benzo(a)anthracene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1

BDL - Below Detection Limit
 Det. Limit - Practical Quantitation Limit(PQL)
 L713759-10 (PH) - 8.9@19.8c
 L713759-10 (DRORLA) - Dilution due to matrix



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 Denver, CO 80202

August 07, 2014

Date Received : August 05, 2014
 Description : Pit Reclamation
 Sample ID : O-32 P2
 Collected By : DK Nicholson
 Collection Date : 08/03/14 12:10

ESC Sample # : L713759-10

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
Benzo(b)fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
Benzo(g,h,i)perylene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
Benzo(k)fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
Chrysene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
Dibenz(a,h)anthracene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
Fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
Fluorene	0.047	0.0060	mg/kg	8270C-SIM	08/06/14	1
Indeno(1,2,3-cd)pyrene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
Naphthalene	BDL	0.020	mg/kg	8270C-SIM	08/06/14	1
Phenanthrene	0.066	0.0060	mg/kg	8270C-SIM	08/06/14	1
Pyrene	BDL	0.0060	mg/kg	8270C-SIM	08/06/14	1
1-Methylnaphthalene	BDL	0.020	mg/kg	8270C-SIM	08/06/14	1
2-Methylnaphthalene	0.024	0.020	mg/kg	8270C-SIM	08/06/14	1
2-Chloronaphthalene	BDL	0.020	mg/kg	8270C-SIM	08/06/14	1
Surrogate Recovery						
p-Terphenyl-d14	92.0		% Rec.	8270C-SIM	08/06/14	1
Nitrobenzene-d5	93.3		% Rec.	8270C-SIM	08/06/14	1
2-Fluorobiphenyl	86.8		% Rec.	8270C-SIM	08/06/14	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 08/07/14 16:32 Printed: 08/07/14 17:24

L713759-10 (PH) - 8.9@19.8c

L713759-10 (DRORLA) - Dilution due to matrix



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 Berry Petroleum Company - Denver, C
 1999 Broadway, Suite 3700
 Denver, CO 80202

August 07, 2014

Date Received : August 05, 2014
 Description : Pit Reclamation
 Sample ID : O-32 P3
 Collected By : DK Nicholson
 Collection Date : 08/03/14 12:30

ESC Sample # : L713759-11
 Site ID :
 Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium,Hexavalent	BDL	2.0	mg/kg	3060A/7196A	08/07/14	1
ORP	130		mV	2580 B-2011	08/06/14	1
pH	8.0		su	9045D	08/07/14	1
Sodium Adsorption Ratio	10.			Calc.	08/06/14	1
Specific Conductance	2000		umhos/cm	9050AMod	08/06/14	1
Mercury	0.024	0.020	mg/kg	7471	08/06/14	1
Arsenic	6.8	2.0	mg/kg	6010B	08/06/14	1
Barium	620	0.50	mg/kg	6010B	08/06/14	1
Boron	19.	10.	mg/kg	6010B	08/06/14	1
Cadmium	BDL	0.50	mg/kg	6010B	08/06/14	1
Chromium	18.	1.0	mg/kg	6010B	08/06/14	1
Copper	25.	2.0	mg/kg	6010B	08/06/14	1
Lead	14.	0.50	mg/kg	6010B	08/06/14	1
Nickel	15.	2.0	mg/kg	6010B	08/06/14	1
Selenium	BDL	2.0	mg/kg	6010B	08/06/14	1
Silver	BDL	1.0	mg/kg	6010B	08/06/14	1
Zinc	53.	5.0	mg/kg	6010B	08/06/14	1
Benzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Toluene	BDL	0.025	mg/kg	8021	08/06/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	08/06/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	08/06/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	95.8		% Rec.	8015	08/06/14	5
a,a,a-Trifluorotoluene(PID)	100.		% Rec.	8021	08/06/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	260	40.	mg/kg	8015	08/07/14	10
C28-C40 Oil Range	71.	40.	mg/kg	8015	08/07/14	10
Surrogate Recovery						
o-Terphenyl	50.4		% Rec.	8015	08/07/14	10
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Acenaphthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Acenaphthylene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(a)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10

BDL - Below Detection Limit
 Det. Limit - Practical Quantitation Limit(PQL)
 L713759-11 (DRORLA) - Cannot run at a lower dilution, dilution due to extractions process
 L713759-11 (PH) - 8.0@19.7c



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August 07, 2014

Date Received : August 05, 2014
 Description : Pit Reclamation
 Sample ID : O-32 P3
 Collected By : DK Nicholson
 Collection Date : 08/03/14 12:30

ESC Sample # : L713759-11

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(b)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(g,h,i)perylene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(k)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Chrysene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Dibenz(a,h)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Fluorene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Indeno(1,2,3-cd)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Naphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
Phenanthrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
1-Methylnaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
2-Methylnaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
2-Chloronaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
Surrogate Recovery						
p-Terphenyl-d14	73.1		% Rec.	8270C-SIM	08/06/14	10
Nitrobenzene-d5	77.2		% Rec.	8270C-SIM	08/06/14	10
2-Fluorobiphenyl	72.9		% Rec.	8270C-SIM	08/06/14	10

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 08/07/14 16:32 Printed: 08/07/14 17:24

L713759-11 (DRORLA) - Cannot run at a lower dilution, dilution due to extractions process

L713759-11 (PH) - 8.0@19.7c



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REPORT OF ANALYSIS

Dave Nicholson
Berry Petroleum Company - Denver, C
1999 Broadway, Suite 3700
Denver, CO 80202

August 07, 2014

Date Received : August 05, 2014
Description : Pit Reclamation
Sample ID : O-32 P4
Collected By : DK Nicholson
Collection Date : 08/03/14 12:40

ESC Sample # : L713759-12

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	08/07/14	1
ORP	130		mV	2580 B-2011	08/06/14	1
pH	8.0		su	9045D	08/07/14	1
Sodium Adsorption Ratio	18.			Calc.	08/06/14	1
Specific Conductance	2700		umhos/cm	9050AMod	08/06/14	1
Mercury	BDL	0.020	mg/kg	7471	08/06/14	1
Arsenic	6.5	2.0	mg/kg	6010B	08/06/14	1
Barium	340	0.50	mg/kg	6010B	08/06/14	1
Boron	21.	10.	mg/kg	6010B	08/06/14	1
Cadmium	BDL	0.50	mg/kg	6010B	08/06/14	1
Chromium	20.	1.0	mg/kg	6010B	08/06/14	1
Copper	18.	2.0	mg/kg	6010B	08/06/14	1
Lead	12.	0.50	mg/kg	6010B	08/06/14	1
Nickel	11.	2.0	mg/kg	6010B	08/06/14	1
Selenium	BDL	2.0	mg/kg	6010B	08/06/14	1
Silver	BDL	1.0	mg/kg	6010B	08/06/14	1
Zinc	43.	5.0	mg/kg	6010B	08/06/14	1
Benzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Toluene	BDL	0.025	mg/kg	8021	08/06/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	08/06/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	08/06/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	95.8		% Rec.	8015	08/06/14	5
a,a,a-Trifluorotoluene(PID)	100.		% Rec.	8021	08/06/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	160	40.	mg/kg	8015	08/07/14	10
C28-C40 Oil Range	63.	40.	mg/kg	8015	08/07/14	10
Surrogate Recovery						
o-Terphenyl	57.0		% Rec.	8015	08/07/14	10
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Acenaphthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Acenaphthylene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(a)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

L713759-12 (DRORLA) - Cannot run at a lower dilution, dilution due to extractions process

L713759-12 (PH) - 8.0@19.7c



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 Collection Date : 08/03/14 12:40

ESC Sample # : L713759-12

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(b)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(g,h,i)perylene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(k)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Chrysene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Dibenz(a,h)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Fluorene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Indeno(1,2,3-cd)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Naphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
Phenanthrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
1-Methylnaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
2-Methylnaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
2-Chloronaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
Surrogate Recovery						
p-Terphenyl-d14	76.7		% Rec.	8270C-SIM	08/06/14	10
Nitrobenzene-d5	64.4		% Rec.	8270C-SIM	08/06/14	10
2-Fluorobiphenyl	73.8		% Rec.	8270C-SIM	08/06/14	10

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 08/07/14 16:32 Printed: 08/07/14 17:24

L713759-12 (DRORLA) - Cannot run at a lower dilution, dilution due to extractions process

L713759-12 (PH) - 8.0@19.7c



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August 07, 2014

Date Received : August 05, 2014
 Description : Pit Reclamation
 Sample ID : O-32 P5
 Collected By : DK Nicholson
 Collection Date : 08/03/14 12:50

ESC Sample # : L713759-13

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	08/07/14	1
ORP	150		mV	2580 B-2011	08/06/14	1
pH	7.6		su	9045D	08/07/14	1
Sodium Adsorption Ratio	39.			Calc.	08/06/14	1
Specific Conductance	12000		umhos/cm	9050AMod	08/06/14	1
Mercury	0.023	0.020	mg/kg	7471	08/06/14	1
Arsenic	6.1	2.0	mg/kg	6010B	08/06/14	1
Barium	460	0.50	mg/kg	6010B	08/06/14	1
Boron	21.	10.	mg/kg	6010B	08/06/14	1
Cadmium	BDL	0.50	mg/kg	6010B	08/06/14	1
Chromium	21.	1.0	mg/kg	6010B	08/06/14	1
Copper	20.	2.0	mg/kg	6010B	08/06/14	1
Lead	16.	0.50	mg/kg	6010B	08/06/14	1
Nickel	12.	2.0	mg/kg	6010B	08/06/14	1
Selenium	BDL	2.0	mg/kg	6010B	08/06/14	1
Silver	BDL	1.0	mg/kg	6010B	08/06/14	1
Zinc	48.	5.0	mg/kg	6010B	08/06/14	1
Benzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Toluene	BDL	0.025	mg/kg	8021	08/06/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	08/06/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	08/06/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	96.1		% Rec.	8015	08/06/14	5
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	08/06/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	440	200	mg/kg	8015	08/06/14	50
C28-C40 Oil Range	BDL	200	mg/kg	8015	08/06/14	50
Surrogate Recovery						
o-Terphenyl	135.		% Rec.	8015	08/06/14	50
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Acenaphthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Acenaphthylene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(a)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10

BDL - Below Detection Limit
 Det. Limit - Practical Quantitation Limit(PQL)
 L713759-13 (PH) - 7.6@19.8c
 L713759-13 (DRORLA) - Dilution due to matrix



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 Collected By : DK Nicholson
 Collection Date : 08/03/14 12:50

ESC Sample # : L713759-13

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(b)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(g,h,i)perylene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(k)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Chrysene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Dibenz(a,h)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Fluorene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Indeno(1,2,3-cd)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Naphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
Phenanthrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
1-Methylnaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
2-Methylnaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
2-Chloronaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
Surrogate Recovery						
p-Terphenyl-d14	71.5		% Rec.	8270C-SIM	08/06/14	10
Nitrobenzene-d5	66.3		% Rec.	8270C-SIM	08/06/14	10
2-Fluorobiphenyl	69.4		% Rec.	8270C-SIM	08/06/14	10

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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L713759-13 (PH) - 7.6@19.8c

L713759-13 (DRORLA) - Dilution due to matrix



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 1999 Broadway, Suite 3700
 Denver, CO 80202

August 07, 2014

Date Received : August 05, 2014
 Description : Pit Reclamation
 Sample ID : O-32 P6
 Collected By : DK Nicholson
 Collection Date : 08/03/14 13:00

ESC Sample # : L713759-14

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	08/07/14	1
ORP	130		mV	2580 B-2011	08/06/14	1
pH	7.8		su	9045D	08/07/14	1
Sodium Adsorption Ratio	23.			Calc.	08/06/14	1
Specific Conductance	5000		umhos/cm	9050AMod	08/06/14	1
Mercury	0.024	0.020	mg/kg	7471	08/06/14	1
Arsenic	6.7	2.0	mg/kg	6010B	08/06/14	1
Barium	490	0.50	mg/kg	6010B	08/06/14	1
Boron	21.	10.	mg/kg	6010B	08/06/14	1
Cadmium	BDL	0.50	mg/kg	6010B	08/06/14	1
Chromium	21.	1.0	mg/kg	6010B	08/06/14	1
Copper	26.	2.0	mg/kg	6010B	08/06/14	1
Lead	15.	0.50	mg/kg	6010B	08/06/14	1
Nickel	12.	2.0	mg/kg	6010B	08/06/14	1
Selenium	2.1	2.0	mg/kg	6010B	08/06/14	1
Silver	BDL	1.0	mg/kg	6010B	08/06/14	1
Zinc	50.	5.0	mg/kg	6010B	08/06/14	1
Benzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Toluene	BDL	0.025	mg/kg	8021	08/06/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	08/06/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	08/06/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	95.6		% Rec.	8015	08/06/14	5
a,a,a-Trifluorotoluene(PID)	100.		% Rec.	8021	08/06/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	840	40.	mg/kg	8015	08/07/14	10
C28-C40 Oil Range	290	40.	mg/kg	8015	08/07/14	10
Surrogate Recovery						
o-Terphenyl	61.2		% Rec.	8015	08/07/14	10
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Acenaphthene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Acenaphthylene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Benzo(a)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

L713759-14 (PH) - 7.8@19.9c

L713759-14 (DRORLA) - Cannot run at a lower dilution, dilution due to extractions process



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 Sample ID : O-32 P6
 Collected By : DK Nicholson
 Collection Date : 08/03/14 13:00

ESC Sample # : L713759-14

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Benzo(b)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Benzo(g,h,i)perylene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Benzo(k)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Chrysene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Dibenz(a,h)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Fluorene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Indeno(1,2,3-cd)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Naphthalene	BDL	0.20	mg/kg	8270C-SIM	08/07/14	10
Phenanthrene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
Pyrene	BDL	0.060	mg/kg	8270C-SIM	08/07/14	10
1-Methylnaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/07/14	10
2-Methylnaphthalene	0.31	0.20	mg/kg	8270C-SIM	08/07/14	10
2-Chloronaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/07/14	10
Surrogate Recovery						
p-Terphenyl-d14	71.6		% Rec.	8270C-SIM	08/07/14	10
Nitrobenzene-d5	89.7		% Rec.	8270C-SIM	08/07/14	10
2-Fluorobiphenyl	71.4		% Rec.	8270C-SIM	08/07/14	10

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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L713759-14 (PH) - 7.8@19.9c

L713759-14 (DRORLA) - Cannot run at a lower dilution, dilution due to extractions process



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August 07, 2014

Date Received : August 05, 2014
Description : Pit Reclamation
Sample ID : O-32 SPOILS
Collected By : DK Nicholson
Collection Date : 08/03/14 13:20

ESC Sample # : L713759-15

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	08/07/14	1
ORP	120		mV	2580 B-2011	08/06/14	1
pH	8.3		su	9045D	08/07/14	1
Sodium Adsorption Ratio	22.			Calc.	08/06/14	1
Specific Conductance	2500		umhos/cm	9050AMod	08/06/14	1
Mercury	0.072	0.020	mg/kg	7471	08/06/14	1
Arsenic	6.4	2.0	mg/kg	6010B	08/06/14	1
Barium	470	0.50	mg/kg	6010B	08/06/14	1
Boron	18.	10.	mg/kg	6010B	08/06/14	1
Cadmium	BDL	0.50	mg/kg	6010B	08/06/14	1
Chromium	17.	1.0	mg/kg	6010B	08/06/14	1
Copper	19.	2.0	mg/kg	6010B	08/06/14	1
Lead	12.	0.50	mg/kg	6010B	08/06/14	1
Nickel	14.	2.0	mg/kg	6010B	08/06/14	1
Selenium	BDL	2.0	mg/kg	6010B	08/06/14	1
Silver	BDL	1.0	mg/kg	6010B	08/06/14	1
Zinc	49.	5.0	mg/kg	6010B	08/06/14	1
Benzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Toluene	BDL	0.025	mg/kg	8021	08/06/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	08/06/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	08/06/14	5
TPH (GC/FID) Low Fraction	1.0	0.50	mg/kg	8015	08/06/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	95.3		% Rec.	8015	08/06/14	5
a,a,a-Trifluorotoluene(PID)	99.7		% Rec.	8021	08/06/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	760	200	mg/kg	8015	08/06/14	50
C28-C40 Oil Range	BDL	200	mg/kg	8015	08/06/14	50
Surrogate Recovery						
o-Terphenyl	184.		% Rec.	8015	08/06/14	50
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Acenaphthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Acenaphthylene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(a)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L713759-15 (PH) - 8.3@19.8c
L713759-15 (DRORLA) - Dilution due to matrix



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Description : Pit Reclamation
Sample ID : O-32 SPOILS
Collected By : DK Nicholson
Collection Date : 08/03/14 13:20

ESC Sample # : L713759-15

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(b)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(g,h,i)perylene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Benzo(k)fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Chrysene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Dibenz(a,h)anthracene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Fluoranthene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Fluorene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Indeno(1,2,3-cd)pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Naphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
Phenanthrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
Pyrene	BDL	0.060	mg/kg	8270C-SIM	08/06/14	10
1-Methylnaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
2-Methylnaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
2-Chloronaphthalene	BDL	0.20	mg/kg	8270C-SIM	08/06/14	10
Surrogate Recovery						
p-Terphenyl-d14	71.3		% Rec.	8270C-SIM	08/06/14	10
Nitrobenzene-d5	116.		% Rec.	8270C-SIM	08/06/14	10
2-Fluorobiphenyl	70.7		% Rec.	8270C-SIM	08/06/14	10

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Reported: 08/07/14 16:32 Printed: 08/07/14 17:24

L713759-15 (PH) - 8.3@19.8c

L713759-15 (DRORLA) - Dilution due to matrix

Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L713759-01	WG735604	SAMP	o-Terphenyl	R2973092	J7
	WG735524	SAMP	Mercury	R2972616	P1
L713759-02	WG735618	SAMP	Anthracene	R2972966	O
	WG735618	SAMP	Acenaphthene	R2972966	O
	WG735618	SAMP	Acenaphthylene	R2972966	O
	WG735618	SAMP	Benzo(a)anthracene	R2972966	O
	WG735618	SAMP	Benzo(a)pyrene	R2972966	O
	WG735618	SAMP	Benzo(b)fluoranthene	R2972966	O
	WG735618	SAMP	Benzo(g,h,i)perylene	R2972966	O
	WG735618	SAMP	Benzo(k)fluoranthene	R2972966	O
	WG735618	SAMP	Chrysene	R2972966	O
	WG735618	SAMP	Dibenz(a,h)anthracene	R2972966	O
	WG735618	SAMP	Fluoranthene	R2972966	O
	WG735618	SAMP	Fluorene	R2972966	O
	WG735618	SAMP	Indeno(1,2,3-cd)pyrene	R2972966	O
	WG735618	SAMP	Naphthalene	R2972966	O
	WG735618	SAMP	Phenanthrene	R2972966	O
	WG735618	SAMP	Pyrene	R2972966	O
	WG735618	SAMP	1-Methylnaphthalene	R2972966	O
	WG735618	SAMP	2-Methylnaphthalene	R2972966	O
	WG735618	SAMP	2-Chloronaphthalene	R2972966	O
L713759-03	WG735526	SAMP	Chromium,Hexavalent	R2973185	T9
L713759-07	WG735526	SAMP	Chromium,Hexavalent	R2973185	T9
L713759-09	WG735604	SAMP	o-Terphenyl	R2973092	J7
	WG735618	SAMP	Nitrobenzene-d5	R2972966	J1
L713759-10	WG735604	SAMP	o-Terphenyl	R2973092	J7
L713759-11	WG735618	SAMP	Anthracene	R2972966	O
	WG735618	SAMP	Acenaphthene	R2972966	O
	WG735618	SAMP	Acenaphthylene	R2972966	O
	WG735618	SAMP	Benzo(a)anthracene	R2972966	O
	WG735618	SAMP	Benzo(a)pyrene	R2972966	O
	WG735618	SAMP	Benzo(b)fluoranthene	R2972966	O
	WG735618	SAMP	Benzo(g,h,i)perylene	R2972966	O
	WG735618	SAMP	Benzo(k)fluoranthene	R2972966	O
	WG735618	SAMP	Chrysene	R2972966	O
	WG735618	SAMP	Dibenz(a,h)anthracene	R2972966	O
	WG735618	SAMP	Fluoranthene	R2972966	O
	WG735618	SAMP	Fluorene	R2972966	O
	WG735618	SAMP	Indeno(1,2,3-cd)pyrene	R2972966	O
	WG735618	SAMP	Naphthalene	R2972966	O
	WG735618	SAMP	Phenanthrene	R2972966	O
	WG735618	SAMP	Pyrene	R2972966	O
	WG735618	SAMP	1-Methylnaphthalene	R2972966	O
	WG735618	SAMP	2-Methylnaphthalene	R2972966	O
	WG735618	SAMP	2-Chloronaphthalene	R2972966	O
	WG735526	SAMP	Chromium,Hexavalent	R2973185	T9
L713759-12	WG735618	SAMP	Anthracene	R2972966	O
	WG735618	SAMP	Acenaphthene	R2972966	O
	WG735618	SAMP	Acenaphthylene	R2972966	O
	WG735618	SAMP	Benzo(a)anthracene	R2972966	O
	WG735618	SAMP	Benzo(a)pyrene	R2972966	O
	WG735618	SAMP	Benzo(b)fluoranthene	R2972966	O
	WG735618	SAMP	Benzo(g,h,i)perylene	R2972966	O
	WG735618	SAMP	Benzo(k)fluoranthene	R2972966	O
	WG735618	SAMP	Chrysene	R2972966	O
	WG735618	SAMP	Dibenz(a,h)anthracene	R2972966	O
	WG735618	SAMP	Fluoranthene	R2972966	O
	WG735618	SAMP	Fluorene	R2972966	O
	WG735618	SAMP	Indeno(1,2,3-cd)pyrene	R2972966	O
	WG735618	SAMP	Naphthalene	R2972966	O
	WG735618	SAMP	Phenanthrene	R2972966	O
	WG735618	SAMP	Pyrene	R2972966	O
	WG735618	SAMP	1-Methylnaphthalene	R2972966	O
	WG735618	SAMP	2-Methylnaphthalene	R2972966	O
	WG735618	SAMP	2-Chloronaphthalene	R2972966	O
	WG735526	SAMP	Chromium,Hexavalent	R2973185	T9
L713759-13	WG735604	SAMP	o-Terphenyl	R2973092	J7
	WG735618	SAMP	Anthracene	R2972966	O
	WG735618	SAMP	Acenaphthene	R2972966	O

Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
	WG735618	SAMP	Acenaphthylene	R2972966	0
	WG735618	SAMP	Benzo(a)anthracene	R2972966	0
	WG735618	SAMP	Benzo(a)pyrene	R2972966	0
	WG735618	SAMP	Benzo(b)fluoranthene	R2972966	0
	WG735618	SAMP	Benzo(g,h,i)perylene	R2972966	0
	WG735618	SAMP	Benzo(k)fluoranthene	R2972966	0
	WG735618	SAMP	Chrysene	R2972966	0
	WG735618	SAMP	Dibenz(a,h)anthracene	R2972966	0
	WG735618	SAMP	Fluoranthene	R2972966	0
	WG735618	SAMP	Fluorene	R2972966	0
	WG735618	SAMP	Indeno(1,2,3-cd)pyrene	R2972966	0
	WG735618	SAMP	Naphthalene	R2972966	0
	WG735618	SAMP	Phenanthrene	R2972966	0
	WG735618	SAMP	Pyrene	R2972966	0
	WG735618	SAMP	1-Methylnaphthalene	R2972966	0
	WG735618	SAMP	2-Methylnaphthalene	R2972966	0
	WG735618	SAMP	2-Chloronaphthalene	R2972966	0
L713759-14	WG735526	SAMP	Chromium, Hexavalent	R2973185	T9
	WG735618	SAMP	Naphthalene	R2973098	J5J3
	WG735618	SAMP	Phenanthrene	R2973098	J5J3
	WG735618	SAMP	1-Methylnaphthalene	R2973098	J6J3
L713759-15	WG735618	SAMP	2-Methylnaphthalene	R2973098	J6J5J3
	WG735604	SAMP	o-Terphenyl	R2973092	J7
	WG735618	SAMP	Anthracene	R2972966	0
	WG735618	SAMP	Acenaphthene	R2972966	0
	WG735618	SAMP	Acenaphthylene	R2972966	0
	WG735618	SAMP	Benzo(a)anthracene	R2972966	0
	WG735618	SAMP	Benzo(a)pyrene	R2972966	0
	WG735618	SAMP	Benzo(b)fluoranthene	R2972966	0
	WG735618	SAMP	Benzo(g,h,i)perylene	R2972966	0
	WG735618	SAMP	Benzo(k)fluoranthene	R2972966	0
	WG735618	SAMP	Chrysene	R2972966	0
	WG735618	SAMP	Dibenz(a,h)anthracene	R2972966	0
	WG735618	SAMP	Fluoranthene	R2972966	0
	WG735618	SAMP	Fluorene	R2972966	0
	WG735618	SAMP	Indeno(1,2,3-cd)pyrene	R2972966	0
	WG735618	SAMP	Naphthalene	R2972966	0
	WG735618	SAMP	Phenanthrene	R2972966	0
	WG735618	SAMP	Pyrene	R2972966	0
	WG735618	SAMP	1-Methylnaphthalene	R2972966	0
	WG735618	SAMP	2-Methylnaphthalene	R2972966	0
	WG735618	SAMP	2-Chloronaphthalene	R2972966	0
L713759-17	WG735526	SAMP	Chromium, Hexavalent	R2973185	T9
L713759-18	WG735526	SAMP	Chromium, Hexavalent	R2973185	T9

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
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
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.
O	(ESC) Sample diluted due to matrix interferences that impaired the ability to make an accurate analytical determination. The detection limit is elevated in order to reflect the necessary dilution.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
T9	(ESC) - Additional method/sample information: The sample result represents blank correction

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

- Accuracy** - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.
- Precision** - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Difference.
- Surrogate** - Organic compounds that are similar in chemical composition, extraction, and chromatography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.
- TIC** - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.



YOUR LAB OF CHOICE

Berry Petroleum Company - Denver, CO
 Dave Nicholson
 1999 Broadway, Suite 3700

Denver, CO 80202

Quality Assurance Report
 Level II

L713759

12065 Lebanon Rd.
 Mt. Juliet, TN 37122
 (615) 758-5858
 1-800-767-5859
 Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

August 07, 2014

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Arsenic	< 1	mg/kg			WG735567	08/06/14 01:37
Barium	< .25	mg/kg			WG735567	08/06/14 01:37
Boron	< 10	mg/kg			WG735567	08/06/14 01:37
Cadmium	< .25	mg/kg			WG735567	08/06/14 01:37
Chromium	< .5	mg/kg			WG735567	08/06/14 01:37
Copper	< 1	mg/kg			WG735567	08/06/14 01:37
Lead	< .25	mg/kg			WG735567	08/06/14 01:37
Nickel	< 1	mg/kg			WG735567	08/06/14 01:37
Selenium	< 1	mg/kg			WG735567	08/06/14 01:37
Silver	< .5	mg/kg			WG735567	08/06/14 01:37
Zinc	< 5	mg/kg			WG735567	08/06/14 01:37
Mercury	< .02	mg/kg			WG735524	08/06/14 09:26
Benzene	< .0005	mg/kg			WG735485	08/06/14 03:23
Ethylbenzene	< .0005	mg/kg			WG735485	08/06/14 03:23
Toluene	< .005	mg/kg			WG735485	08/06/14 03:23
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG735485	08/06/14 03:23
Total Xylene	< .0015	mg/kg			WG735485	08/06/14 03:23
a,a,a-Trifluorotoluene(FID)		% Rec.	97.70	59-128	WG735485	08/06/14 03:23
a,a,a-Trifluorotoluene(PID)		% Rec.	103.0	54-144	WG735485	08/06/14 03:23
Specific Conductance	1.46	umhos/cm			WG735785	08/06/14 16:04
Arsenic	< 1	mg/kg			WG735569	08/06/14 19:22
Barium	< .25	mg/kg			WG735569	08/06/14 19:22
Boron	< 10	mg/kg			WG735569	08/06/14 19:22
Cadmium	< .25	mg/kg			WG735569	08/06/14 19:22
Chromium	< .5	mg/kg			WG735569	08/06/14 19:22
Copper	< 1	mg/kg			WG735569	08/06/14 19:22
Lead	< .25	mg/kg			WG735569	08/06/14 19:22
Nickel	< 1	mg/kg			WG735569	08/06/14 19:22
Selenium	< 1	mg/kg			WG735569	08/06/14 19:22
Silver	< .5	mg/kg			WG735569	08/06/14 19:22
Zinc	< 5	mg/kg			WG735569	08/06/14 19:22
1-Methylnaphthalene	< .02	mg/kg			WG735618	08/06/14 13:08
2-Chloronaphthalene	< .02	mg/kg			WG735618	08/06/14 13:08
2-Methylnaphthalene	< .02	mg/kg			WG735618	08/06/14 13:08
Acenaphthene	< .006	mg/kg			WG735618	08/06/14 13:08
Acenaphthylene	< .006	mg/kg			WG735618	08/06/14 13:08
Anthracene	< .006	mg/kg			WG735618	08/06/14 13:08
Benzo(a)anthracene	< .006	mg/kg			WG735618	08/06/14 13:08
Benzo(a)pyrene	< .006	mg/kg			WG735618	08/06/14 13:08
Benzo(b)fluoranthene	< .006	mg/kg			WG735618	08/06/14 13:08
Benzo(g,h,i)perylene	< .006	mg/kg			WG735618	08/06/14 13:08
Benzo(k)fluoranthene	< .006	mg/kg			WG735618	08/06/14 13:08
Chrysene	< .006	mg/kg			WG735618	08/06/14 13:08
Dibenz(a,h)anthracene	< .006	mg/kg			WG735618	08/06/14 13:08
Fluoranthene	< .006	mg/kg			WG735618	08/06/14 13:08
Fluorene	< .006	mg/kg			WG735618	08/06/14 13:08
Indeno(1,2,3-cd)pyrene	< .006	mg/kg			WG735618	08/06/14 13:08
Naphthalene	< .02	mg/kg			WG735618	08/06/14 13:08
Phenanthrene	< .006	mg/kg			WG735618	08/06/14 13:08

* Performance of this Analyte is outside of established criteria.
 For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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Est. 1970

August 07, 2014

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Pyrene	< .006	mg/kg			WG735618	08/06/14 13:08
2-Fluorobiphenyl		% Rec.	85.40	38.2-135	WG735618	08/06/14 13:08
Nitrobenzene-d5		% Rec.	87.90	28.4-151	WG735618	08/06/14 13:08
p-Terphenyl-d14		% Rec.	91.80	34.2-141	WG735618	08/06/14 13:08
Benzene	< .0005	mg/kg			WG735574	08/06/14 18:54
Ethylbenzene	< .0005	mg/kg			WG735574	08/06/14 18:54
Toluene	< .005	mg/kg			WG735574	08/06/14 18:54
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG735574	08/06/14 18:54
Total Xylene	< .0015	mg/kg			WG735574	08/06/14 18:54
a,a,a-Trifluorotoluene(FID)		% Rec.	97.90	59-128	WG735574	08/06/14 18:54
a,a,a-Trifluorotoluene(PID)		% Rec.	103.0	54-144	WG735574	08/06/14 18:54
1-Methylnaphthalene	< .02	mg/kg			WG735619	08/07/14 00:29
2-Chloronaphthalene	< .02	mg/kg			WG735619	08/07/14 00:29
2-Methylnaphthalene	< .02	mg/kg			WG735619	08/07/14 00:29
Acenaphthene	< .006	mg/kg			WG735619	08/07/14 00:29
Acenaphthylene	< .006	mg/kg			WG735619	08/07/14 00:29
Anthracene	< .006	mg/kg			WG735619	08/07/14 00:29
Benzo(a)anthracene	< .006	mg/kg			WG735619	08/07/14 00:29
Benzo(a)pyrene	< .006	mg/kg			WG735619	08/07/14 00:29
Benzo(b)fluoranthene	< .006	mg/kg			WG735619	08/07/14 00:29
Benzo(g,h,i)perylene	< .006	mg/kg			WG735619	08/07/14 00:29
Benzo(k)fluoranthene	< .006	mg/kg			WG735619	08/07/14 00:29
Chrysene	< .006	mg/kg			WG735619	08/07/14 00:29
Dibenz(a,h)anthracene	< .006	mg/kg			WG735619	08/07/14 00:29
Fluoranthene	< .006	mg/kg			WG735619	08/07/14 00:29
Fluorene	< .006	mg/kg			WG735619	08/07/14 00:29
Indeno(1,2,3-cd)pyrene	< .006	mg/kg			WG735619	08/07/14 00:29
Naphthalene	< .02	mg/kg			WG735619	08/07/14 00:29
Phenanthrene	< .006	mg/kg			WG735619	08/07/14 00:29
Pyrene	< .006	mg/kg			WG735619	08/07/14 00:29
2-Fluorobiphenyl		% Rec.	84.10	38.2-135	WG735619	08/07/14 00:29
Nitrobenzene-d5		% Rec.	84.80	28.4-151	WG735619	08/07/14 00:29
p-Terphenyl-d14		% Rec.	86.30	34.2-141	WG735619	08/07/14 00:29
C10-C28 Diesel Range	< 4	mg/kg			WG735604	08/06/14 14:56
C28-C40 Oil Range	< 4	mg/kg			WG735604	08/06/14 14:56
o-Terphenyl		% Rec.	90.20	50-150	WG735604	08/06/14 14:56
Chromium,Hexavalent	< 2	mg/kg			WG735526	08/07/14 12:09

Analyte	Units	Result	Duplicate		RPD	Limit	Ref Samp	Batch
			Duplicate					
Mercury	mg/kg	0.0230	0.0295		23.0*	20	L713759-01	WG735524
ORP	mV	120.	120.		2.47	20	L713203-01	WG735646
ORP	mV	120.	120.		1.65	20	L713759-18	WG735646
Specific Conductance	umhos/cm	140.	140.		0.712	20	L713695-01	WG735785
Specific Conductance	umhos/cm	2200	2200		1.80	20	L713759-18	WG735785

* Performance of this Analyte is outside of established criteria.

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Est. 1970

August 07, 2014

Analyte	Units	Duplicate		RPD	Limit	Ref Samp	Batch
		Result	Duplicate				
pH	su	8.50	8.50	0.354	1	L713596-05	WG735617
pH	su	9.50	9.50	0.105	1	L713782-01	WG735617
Chromium,Hexavalent	mg/kg	0.0	0.0	0.0	20	L713759-18	WG735526
Chromium,Hexavalent	mg/kg	0.0	0.0	0.0	20	L713759-01	WG735526

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Arsenic	mg/kg	237	237.	100.	83.1-117	WG735567
Barium	mg/kg	252	259.	103.	84.1-116	WG735567
Boron	mg/kg	118	134.	113.	74-126	WG735567
Cadmium	mg/kg	191	188.	99.0	83.2-117	WG735567
Chromium	mg/kg	128	133.	104.	81.3-118	WG735567
Copper	mg/kg	123	125.	102.	83.7-116	WG735567
Lead	mg/kg	103	103.	100.	83.1-117	WG735567
Nickel	mg/kg	118	120.	101.	82-118	WG735567
Selenium	mg/kg	110	113.	103.	78.7-122	WG735567
Silver	mg/kg	47.3	45.7	97.0	66.2-134	WG735567
Zinc	mg/kg	183	184.	101.	82-118	WG735567
Mercury	mg/kg	12.4	9.62	78.0	71.6-128	WG735524
ORP	mV	100	103.	103.	90-110	WG735646
Benzene	mg/kg	.05	0.0448	89.6	70-130	WG735485
Ethylbenzene	mg/kg	.05	0.0472	94.5	70-130	WG735485
Toluene	mg/kg	.05	0.0464	92.8	70-130	WG735485
Total Xylene	mg/kg	.15	0.143	95.5	70-130	WG735485
a,a,a-Trifluorotoluene(FID)				98.10	59-128	WG735485
a,a,a-Trifluorotoluene(PID)				102.0	54-144	WG735485
TPH (GC/FID) Low Fraction	mg/kg	5.5	4.94	89.8	63.5-137	WG735485
a,a,a-Trifluorotoluene(FID)				97.40	59-128	WG735485
a,a,a-Trifluorotoluene(PID)				109.0	54-144	WG735485
Specific Conductance	umhos/cm	1040	999.	96.1	85-115	WG735785
Arsenic	mg/kg	237	261.	110.	83.1-117	WG735569
Barium	mg/kg	252	261.	104.	84.1-116	WG735569
Boron	mg/kg	118	111.	94.0	74-126	WG735569
Cadmium	mg/kg	191	209.	110.	83.2-117	WG735569
Chromium	mg/kg	128	133.	104.	81.3-118	WG735569
Copper	mg/kg	123	131.	107.	83.7-116	WG735569
Lead	mg/kg	103	109.	106.	83.1-117	WG735569
Nickel	mg/kg	118	131.	111.	82-118	WG735569
Selenium	mg/kg	110	120.	109.	78.7-122	WG735569
Silver	mg/kg	47.3	50.2	106.	66.2-134	WG735569
Zinc	mg/kg	183	189.	104.	82-118	WG735569
1-Methylnaphthalene	mg/kg	.08	0.0701	87.6	48.9-127	WG735618
2-Chloronaphthalene	mg/kg	.08	0.0754	94.2	48.8-125	WG735618

* Performance of this Analyte is outside of established criteria.

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Quality Assurance Report
 Level II

L713759

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 1-800-767-5859
 Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

August 07, 2014

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
2-Methylnaphthalene	mg/kg	.08	0.0690	86.2	45.7-131	WG735618
Acenaphthene	mg/kg	.08	0.0715	89.3	48.7-127	WG735618
Acenaphthylene	mg/kg	.08	0.0697	87.1	47.9-128	WG735618
Anthracene	mg/kg	.08	0.0730	91.3	51.3-136	WG735618
Benzo(a)anthracene	mg/kg	.08	0.0705	88.1	55-126	WG735618
Benzo(a)pyrene	mg/kg	.08	0.0746	93.3	51.9-127	WG735618
Benzo(b)fluoranthene	mg/kg	.08	0.0739	92.4	54-125	WG735618
Benzo(g,h,i)perylene	mg/kg	.08	0.0747	93.3	53.8-136	WG735618
Benzo(k)fluoranthene	mg/kg	.08	0.0741	92.7	53.9-132	WG735618
Chrysene	mg/kg	.08	0.0759	94.9	55.7-133	WG735618
Dibenz(a,h)anthracene	mg/kg	.08	0.0738	92.2	52.6-137	WG735618
Fluoranthene	mg/kg	.08	0.0719	89.9	54-132	WG735618
Fluorene	mg/kg	.08	0.0692	86.5	48.7-127	WG735618
Indeno(1,2,3-cd)pyrene	mg/kg	.08	0.0751	93.9	53.8-138	WG735618
Naphthalene	mg/kg	.08	0.0682	85.3	42-127	WG735618
Phenanthrene	mg/kg	.08	0.0674	84.3	49.6-126	WG735618
Pyrene	mg/kg	.08	0.0708	88.5	54-129	WG735618
2-Fluorobiphenyl				85.30	38.2-135	WG735618
Nitrobenzene-d5				86.70	28.4-151	WG735618
p-Terphenyl-d14				88.60	34.2-141	WG735618
Benzene	mg/kg	.05	0.0405	81.0	70-130	WG735574
Ethylbenzene	mg/kg	.05	0.0430	86.1	70-130	WG735574
Toluene	mg/kg	.05	0.0419	83.7	70-130	WG735574
Total Xylene	mg/kg	.15	0.131	87.3	70-130	WG735574
a,a,a-Trifluorotoluene(PID)				102.0	54-144	WG735574
TPH (GC/FID) Low Fraction	mg/kg	5.5	4.73	86.0	63.5-137	WG735574
a,a,a-Trifluorotoluene(FID)				97.60	59-128	WG735574
1-Methylnaphthalene	mg/kg	.08	0.0675	84.4	48.9-127	WG735619
2-Chloronaphthalene	mg/kg	.08	0.0722	90.2	48.8-125	WG735619
2-Methylnaphthalene	mg/kg	.08	0.0665	83.1	45.7-131	WG735619
Acenaphthene	mg/kg	.08	0.0687	85.9	48.7-127	WG735619
Acenaphthylene	mg/kg	.08	0.0693	86.6	47.9-128	WG735619
Anthracene	mg/kg	.08	0.0722	90.2	51.3-136	WG735619
Benzo(a)anthracene	mg/kg	.08	0.0686	85.7	55-126	WG735619
Benzo(a)pyrene	mg/kg	.08	0.0736	92.1	51.9-127	WG735619
Benzo(b)fluoranthene	mg/kg	.08	0.0683	85.3	54-125	WG735619
Benzo(g,h,i)perylene	mg/kg	.08	0.0721	90.1	53.8-136	WG735619
Benzo(k)fluoranthene	mg/kg	.08	0.0753	94.1	53.9-132	WG735619
Chrysene	mg/kg	.08	0.0746	93.3	55.7-133	WG735619
Dibenz(a,h)anthracene	mg/kg	.08	0.0707	88.4	52.6-137	WG735619
Fluoranthene	mg/kg	.08	0.0701	87.7	54-132	WG735619
Fluorene	mg/kg	.08	0.0670	83.7	48.7-127	WG735619
Indeno(1,2,3-cd)pyrene	mg/kg	.08	0.0726	90.8	53.8-138	WG735619
Naphthalene	mg/kg	.08	0.0656	82.0	42-127	WG735619
Phenanthrene	mg/kg	.08	0.0679	84.9	49.6-126	WG735619
Pyrene	mg/kg	.08	0.0688	86.0	54-129	WG735619
2-Fluorobiphenyl				77.00	38.2-135	WG735619
Nitrobenzene-d5				83.30	28.4-151	WG735619
p-Terphenyl-d14				78.60	34.2-141	WG735619
pH	su	6.33	6.31	99.7	98.3-101.7	WG735617
Chromium,Hexavalent	mg/kg	187	207.	111.	80-120	WG735526

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Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Arsenic	mg/kg	233.	237.	98.0	83.1-117	2.00	20	WG735567
Barium	mg/kg	254.	259.	101.	84.1-116	2.00	20	WG735567
Boron	mg/kg	131.	134.	111.	74-126	2.00	20	WG735567
Cadmium	mg/kg	180.	188.	94.0	83.2-117	5.00	20	WG735567
Chromium	mg/kg	127.	133.	99.0	81.3-118	5.00	20	WG735567
Copper	mg/kg	120.	125.	98.0	83.7-116	4.00	20	WG735567
Lead	mg/kg	99.0	103.	96.0	83.1-117	4.00	20	WG735567
Nickel	mg/kg	113.	120.	96.0	82-118	6.00	20	WG735567
Selenium	mg/kg	112.	113.	102.	78.7-122	1.00	20	WG735567
Silver	mg/kg	46.0	45.7	97.0	66.2-134	1.00	20	WG735567
Zinc	mg/kg	179.	184.	98.0	82-118	3.00	20	WG735567
ORP	mV	101.	103.	101.	90-110	1.96	20	WG735646
Benzene	mg/kg	0.0460	0.0448	92.0	70-130	2.56	20	WG735485
Ethylbenzene	mg/kg	0.0477	0.0472	95.0	70-130	0.990	20	WG735485
Toluene	mg/kg	0.0467	0.0464	93.0	70-130	0.560	20	WG735485
Total Xylene	mg/kg	0.144	0.143	96.0	70-130	0.550	20	WG735485
a,a,a-Trifluorotoluene(FID)				98.00	59-128			WG735485
a,a,a-Trifluorotoluene(PID)				101.0	54-144			WG735485
TPH (GC/FID) Low Fraction	mg/kg	5.10	4.94	93.0	63.5-137	3.30	20	WG735485
a,a,a-Trifluorotoluene(FID)				97.40	59-128			WG735485
a,a,a-Trifluorotoluene(PID)				110.0	54-144			WG735485
Specific Conductance	umhos/	1000	999.	96.0	85-115	0.100	20	WG735785
Arsenic	mg/kg	259.	261.	109.	83.1-117	1.00	20	WG735569
Barium	mg/kg	253.	261.	100.	84.1-116	3.00	20	WG735569
Boron	mg/kg	106.	111.	89.0	74-126	5.00	20	WG735569
Cadmium	mg/kg	202.	209.	106.	83.2-117	4.00	20	WG735569
Chromium	mg/kg	129.	133.	101.	81.3-118	2.00	20	WG735569
Copper	mg/kg	126.	131.	103.	83.7-116	4.00	20	WG735569
Lead	mg/kg	107.	109.	104.	83.1-117	2.00	20	WG735569
Nickel	mg/kg	126.	131.	107.	82-118	4.00	20	WG735569
Selenium	mg/kg	118.	120.	107.	78.7-122	1.00	20	WG735569
Silver	mg/kg	49.2	50.2	104.	66.2-134	2.00	20	WG735569
Zinc	mg/kg	182.	189.	100.	82-118	4.00	20	WG735569
1-Methylnaphthalene	mg/kg	0.0696	0.0701	87.0	48.9-127	0.640	20	WG735618
2-Chloronaphthalene	mg/kg	0.0748	0.0754	94.0	48.8-125	0.740	20	WG735618
2-Methylnaphthalene	mg/kg	0.0684	0.0690	85.0	45.7-131	0.870	20	WG735618
Acenaphthene	mg/kg	0.0706	0.0715	88.0	48.7-127	1.19	20	WG735618
Acenaphthylene	mg/kg	0.0698	0.0697	87.0	47.9-128	0.220	20	WG735618
Anthracene	mg/kg	0.0772	0.0730	96.0	51.3-136	5.48	20	WG735618
Benzo(a)anthracene	mg/kg	0.0709	0.0705	89.0	55-126	0.660	20	WG735618
Benzo(a)pyrene	mg/kg	0.0749	0.0746	94.0	51.9-127	0.340	20	WG735618
Benzo(b)fluoranthene	mg/kg	0.0737	0.0739	92.0	54-125	0.380	20	WG735618
Benzo(g,h,i)perylene	mg/kg	0.0745	0.0747	93.0	53.8-136	0.220	20	WG735618
Benzo(k)fluoranthene	mg/kg	0.0749	0.0741	94.0	53.9-132	1.03	20	WG735618
Chrysene	mg/kg	0.0760	0.0759	95.0	55.7-133	0.130	20	WG735618
Dibenz(a,h)anthracene	mg/kg	0.0735	0.0738	92.0	52.6-137	0.350	20	WG735618
Fluoranthene	mg/kg	0.0749	0.0719	94.0	54-132	4.07	20	WG735618
Fluorene	mg/kg	0.0689	0.0692	86.0	48.7-127	0.410	20	WG735618
Indeno(1,2,3-cd)pyrene	mg/kg	0.0750	0.0751	94.0	53.8-138	0.210	20	WG735618

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Est. 1970

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Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Naphthalene	mg/kg	0.0680	0.0682	85.0	42-127	0.320	20	WG735618
Phenanthrene	mg/kg	0.0704	0.0674	88.0	49.6-126	4.26	20	WG735618
Pyrene	mg/kg	0.0710	0.0708	89.0	54-129	0.260	20	WG735618
2-Fluorobiphenyl				84.60	38.2-135			WG735618
Nitrobenzene-d5				87.20	28.4-151			WG735618
p-Terphenyl-d14				88.70	34.2-141			WG735618
Benzene	mg/kg	0.0407	0.0405	81.0	70-130	0.500	20	WG735574
Ethylbenzene	mg/kg	0.0427	0.0430	85.0	70-130	0.830	20	WG735574
Toluene	mg/kg	0.0415	0.0419	83.0	70-130	0.960	20	WG735574
Total Xylene	mg/kg	0.129	0.131	86.0	70-130	1.66	20	WG735574
a,a,a-Trifluorotoluene(PID)				103.0	54-144			WG735574
TPH (GC/FID) Low Fraction	mg/kg	4.52	4.73	82.0	63.5-137	4.56	20	WG735574
a,a,a-Trifluorotoluene(FID)				96.90	59-128			WG735574
1-Methylnaphthalene	mg/kg	0.0772	0.0675	96.0	48.9-127	13.5	20	WG735619
2-Chloronaphthalene	mg/kg	0.0795	0.0722	99.0	48.8-125	9.62	20	WG735619
2-Methylnaphthalene	mg/kg	0.0748	0.0665	93.0	45.7-131	11.8	20	WG735619
Acenaphthene	mg/kg	0.0758	0.0687	95.0	48.7-127	9.81	20	WG735619
Acenaphthylene	mg/kg	0.0760	0.0693	95.0	47.9-128	9.19	20	WG735619
Anthracene	mg/kg	0.0829	0.0722	104.	51.3-136	13.8	20	WG735619
Benzo(a)anthracene	mg/kg	0.0744	0.0686	93.0	55-126	8.13	20	WG735619
Benzo(a)pyrene	mg/kg	0.0809	0.0736	101.	51.9-127	9.33	20	WG735619
Benzo(b)fluoranthene	mg/kg	0.0763	0.0683	95.0	54-125	11.1	20	WG735619
Benzo(g,h,i)perylene	mg/kg	0.0798	0.0721	100.	53.8-136	10.2	20	WG735619
Benzo(k)fluoranthene	mg/kg	0.0826	0.0753	103.	53.9-132	9.24	20	WG735619
Chrysene	mg/kg	0.0825	0.0746	103.	55.7-133	9.99	20	WG735619
Dibenz(a,h)anthracene	mg/kg	0.0784	0.0707	98.0	52.6-137	10.2	20	WG735619
Fluoranthene	mg/kg	0.0769	0.0701	96.0	54-132	9.20	20	WG735619
Fluorene	mg/kg	0.0737	0.0670	92.0	48.7-127	9.49	20	WG735619
Indeno(1,2,3-cd)pyrene	mg/kg	0.0807	0.0726	101.	53.8-138	10.6	20	WG735619
Naphthalene	mg/kg	0.0736	0.0656	92.0	42-127	11.5	20	WG735619
Phenanthrene	mg/kg	0.0749	0.0679	94.0	49.6-126	9.71	20	WG735619
Pyrene	mg/kg	0.0753	0.0688	94.0	54-129	9.04	20	WG735619
2-Fluorobiphenyl				84.50	38.2-135			WG735619
Nitrobenzene-d5				89.50	28.4-151			WG735619
p-Terphenyl-d14				86.00	34.2-141			WG735619
pH	su	6.30	6.31	100.	98.3-101.7	0.159	20	WG735617
Chromium,Hexavalent	mg/kg	207.	207.	111.	80-120	0.0	20	WG735526

Analyte	Units	MS Res	Matrix Spike			Limit	Ref Samp	Batch
			Ref Res	TV	% Rec			
Lead	mg/kg	112.	5.26	100	110.	75-125	L713686-01	WG735567
Mercury	mg/kg	0.475	0.0295	.5	89.0	80-120	L713759-01	WG735524
Benzene	mg/kg	0.170	0.000356	.05	68.0	49.7-127	L713117-02	WG735485
Ethylbenzene	mg/kg	0.194	0.000533	.05	78.0	40.8-141	L713117-02	WG735485
Toluene	mg/kg	0.180	0.00136	.05	71.0	49.8-132	L713117-02	WG735485
Total Xylene	mg/kg	0.581	0.00211	.15	77.0	41.2-140	L713117-02	WG735485

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Analyte	Units	MS Res	Matrix Spike		% Rec	Limit	Ref Samp	Batch
			Ref Res	TV				
a,a,a-Trifluorotoluene(FID)					97.60	59-128		
a,a,a-Trifluorotoluene(PID)					102.0	54-144		
TPH (GC/FID) Low Fraction	mg/kg	20.9	0.114	5.5	76.0	28.5-138	L713117-02	WG735485
a,a,a-Trifluorotoluene(FID)					97.60	59-128		WG735485
a,a,a-Trifluorotoluene(PID)					108.0	54-144		WG735485
Barium	mg/kg	133.	41.3	100	92.0	75-125	L713203-06	WG735569
Chromium	mg/kg	107.	11.5	100	96.0	75-125	L713203-06	WG735569
Copper	mg/kg	119.	18.9	100	100.	75-125	L713203-06	WG735569
Lead	mg/kg	115.	8.16	100	110.	75-125	L713203-06	WG735569
Benzene	mg/kg	0.196	0.000739	.05	78.0	49.7-127	L713786-03	WG735574
Ethylbenzene	mg/kg	0.202	0.00124	.05	80.0	40.8-141	L713786-03	WG735574
Toluene	mg/kg	0.205	0.00182	.05	81.0	49.8-132	L713786-03	WG735574
Total Xylene	mg/kg	0.613	0.00435	.15	81.0	41.2-140	L713786-03	WG735574
a,a,a-Trifluorotoluene(PID)					101.0	54-144		WG735574
TPH (GC/FID) Low Fraction	mg/kg	20.2	0.209	5.5	73.0	28.5-138	L713786-03	WG735574
a,a,a-Trifluorotoluene(FID)					97.60	59-128		WG735574
1-Methylnaphthalene	mg/kg	0.0724	0.	.08	90.5	41.8-133	L713407-03	WG735619
2-Chloronaphthalene	mg/kg	0.0756	0.	.08	94.5	42.4-129	L713407-03	WG735619
2-Methylnaphthalene	mg/kg	0.0714	0.	.08	89.2	37.5-137	L713407-03	WG735619
Acenaphthene	mg/kg	0.0718	0.	.08	89.8	39.4-132	L713407-03	WG735619
Acenaphthylene	mg/kg	0.0733	0.	.08	91.6	41.3-132	L713407-03	WG735619
Anthracene	mg/kg	0.0738	0.	.08	92.3	36.7-144	L713407-03	WG735619
Benzo(a)anthracene	mg/kg	0.0758	0.00284	.08	91.2	28-144	L713407-03	WG735619
Benzo(a)pyrene	mg/kg	0.0777	0.00714	.08	88.2	23.8-147	L713407-03	WG735619
Benzo(b)fluoranthene	mg/kg	0.0740	0.00648	.08	84.4	18.2-147	L713407-03	WG735619
Benzo(g,h,i)perylene	mg/kg	0.0787	0.00689	.08	89.8	9.2-155	L713407-03	WG735619
Benzo(k)fluoranthene	mg/kg	0.0736	0.00457	.08	86.2	26.5-143	L713407-03	WG735619
Chrysene	mg/kg	0.0757	0.00567	.08	87.6	27.4-150	L713407-03	WG735619
Dibenz(a,h)anthracene	mg/kg	0.0749	0.00132	.08	92.0	13.8-150	L713407-03	WG735619
Fluoranthene	mg/kg	0.0793	0.00661	.08	90.8	23.2-158	L713407-03	WG735619
Fluorene	mg/kg	0.0703	0.	.08	87.9	30.8-139	L713407-03	WG735619
Indeno(1,2,3-cd)pyrene	mg/kg	0.0779	0.00390	.08	92.5	10.7-155	L713407-03	WG735619
Naphthalene	mg/kg	0.0693	0.000650	.08	85.8	34.9-133	L713407-03	WG735619
Phenanthrene	mg/kg	0.0717	0.00274	.08	86.2	20.2-150	L713407-03	WG735619
Pyrene	mg/kg	0.0763	0.00801	.08	85.3	22.6-151	L713407-03	WG735619
2-Fluorobiphenyl					83.90	38.2-135		WG735619
Nitrobenzene-d5					93.00	28.4-151		WG735619
p-Terphenyl-d14					81.80	34.2-141		WG735619
1-Methylnaphthalene	mg/kg	0.149	0.124	.007999	31.3*	41.8-133	L713759-14	WG735618
2-Chloronaphthalene	mg/kg	0.0627	0.	.007999	78.4	42.4-129	L713759-14	WG735618
2-Methylnaphthalene	mg/kg	0.311	0.314	.007999	0.00*	37.5-137	L713759-14	WG735618
Acenaphthene	mg/kg	0.0735	0.	.007999	91.9	39.4-132	L713759-14	WG735618
Acenaphthylene	mg/kg	0.0699	0.	.007999	87.3	41.3-132	L713759-14	WG735618
Anthracene	mg/kg	0.0698	0.	.007999	87.3	36.7-144	L713759-14	WG735618
Benzo(a)anthracene	mg/kg	0.0700	0.	.007999	87.5	28-144	L713759-14	WG735618
Benzo(a)pyrene	mg/kg	0.0659	0.	.007999	82.3	23.8-147	L713759-14	WG735618
Benzo(b)fluoranthene	mg/kg	0.0667	0.	.007999	83.3	18.2-147	L713759-14	WG735618
Benzo(g,h,i)perylene	mg/kg	0.0697	0.	.007999	87.1	9.2-155	L713759-14	WG735618
Benzo(k)fluoranthene	mg/kg	0.0627	0.	.007999	78.3	26.5-143	L713759-14	WG735618
Chrysene	mg/kg	0.0737	0.	.007999	92.2	27.4-150	L713759-14	WG735618
Dibenz(a,h)anthracene	mg/kg	0.0684	0.	.007999	85.5	13.8-150	L713759-14	WG735618

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 Level II

L713759

12065 Lebanon Rd.
 Mt. Juliet, TN 37122
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Est. 1970

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Analyte	Units	MS Res	Matrix Spike			% Rec	Limit	Ref Samp	Batch
			Ref Res	TV					
Fluoranthene	mg/kg	0.0736	0.	.007999	92.0	23.2-158	L713759-14	WG735618	
Fluorene	mg/kg	0.0839	0.	.007999	105.	30.8-139	L713759-14	WG735618	
Indeno(1,2,3-cd)pyrene	mg/kg	0.0651	0.	.007999	81.3	10.7-155	L713759-14	WG735618	
Naphthalene	mg/kg	0.185	0.155	.007999	36.9	34.9-133	L713759-14	WG735618	
Phenanthrene	mg/kg	0.108	0.	.007999	136.	20.2-150	L713759-14	WG735618	
Pyrene	mg/kg	0.0829	0.	.007999	104.	22.6-151	L713759-14	WG735618	
2-Fluorobiphenyl					78.40	38.2-135		WG735618	
Nitrobenzene-d5					87.50	28.4-151		WG735618	
p-Terphenyl-d14					76.30	34.2-141		WG735618	
Chromium, Hexavalent	mg/kg	20.4	0.0	20	100.	75-125	L713759-05	WG735526	

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Lead	mg/kg	116.	112.	110.	75-125	3.00	20	L713686-01	WG735567
Mercury	mg/kg	0.494	0.475	93.0	80-120	4.00	20	L713759-01	WG735524
Benzene	mg/kg	0.184	0.170	73.6	49.7-127	8.45	23.5	L713117-02	WG735485
Ethylbenzene	mg/kg	0.199	0.194	79.3	40.8-141	2.26	23.8	L713117-02	WG735485
Toluene	mg/kg	0.189	0.180	75.0	49.8-132	4.89	23.5	L713117-02	WG735485
Total Xylene	mg/kg	0.592	0.581	78.7	41.2-140	1.93	23.7	L713117-02	WG735485
a,a,a-Trifluorotoluene(FID)				97.60	59-128				WG735485
a,a,a-Trifluorotoluene(PID)				102.0	54-144				WG735485
TPH (GC/FID) Low Fraction	mg/kg	20.2	20.9	73.0	28.5-138	3.28	23.6	L713117-02	WG735485
a,a,a-Trifluorotoluene(FID)				97.80	59-128				WG735485
a,a,a-Trifluorotoluene(PID)				108.0	54-144				WG735485
Barium	mg/kg	127.	133.	85.4	75-125	5.00	20	L713203-06	WG735569
Chromium	mg/kg	104.	107.	92.2	75-125	3.00	20	L713203-06	WG735569
Copper	mg/kg	116.	119.	96.8	75-125	3.00	20	L713203-06	WG735569
Lead	mg/kg	108.	115.	99.5	75-125	6.00	20	L713203-06	WG735569
Benzene	mg/kg	0.198	0.196	78.9	49.7-127	0.800	23.5	L713786-03	WG735574
Ethylbenzene	mg/kg	0.204	0.202	81.2	40.8-141	1.08	23.8	L713786-03	WG735574
Toluene	mg/kg	0.212	0.205	84.0	49.8-132	3.18	23.5	L713786-03	WG735574
Total Xylene	mg/kg	0.622	0.613	82.3	41.2-140	1.47	23.7	L713786-03	WG735574
a,a,a-Trifluorotoluene(PID)				101.0	54-144				WG735574
TPH (GC/FID) Low Fraction	mg/kg	20.5	20.2	73.9	28.5-138	1.70	23.6	L713786-03	WG735574
a,a,a-Trifluorotoluene(FID)				98.30	59-128				WG735574
1-Methylnaphthalene	mg/kg	0.0739	0.0724	92.4	41.8-133	2.10	20.9	L713407-03	WG735619
2-Chloronaphthalene	mg/kg	0.0766	0.0756	95.7	42.4-129	1.29	20	L713407-03	WG735619
2-Methylnaphthalene	mg/kg	0.0721	0.0714	90.1	37.5-137	0.930	20.4	L713407-03	WG735619
Acenaphthene	mg/kg	0.0729	0.0718	91.1	39.4-132	1.42	20	L713407-03	WG735619
Acenaphthylene	mg/kg	0.0730	0.0733	91.3	41.3-132	0.320	20	L713407-03	WG735619
Anthracene	mg/kg	0.0672	0.0738	84.0	36.7-144	9.34	20.7	L713407-03	WG735619
Benzo(a)anthracene	mg/kg	0.0790	0.0758	95.2	28-144	4.13	24.7	L713407-03	WG735619
Benzo(a)pyrene	mg/kg	0.0798	0.0777	90.8	23.8-147	2.64	25.3	L713407-03	WG735619
Benzo(b)fluoranthene	mg/kg	0.0767	0.0740	87.7	18.2-147	3.53	29.5	L713407-03	WG735619
Benzo(g,h,i)perylene	mg/kg	0.0818	0.0787	93.6	9.2-155	3.82	29.2	L713407-03	WG735619
Benzo(k)fluoranthene	mg/kg	0.0747	0.0736	87.7	26.5-143	1.58	26.1	L713407-03	WG735619

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Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Chrysene	mg/kg	0.0795	0.0757	92.2	27.4-150	4.79	25.7	L713407-03	WG735619
Dibenz(a,h)anthracene	mg/kg	0.0759	0.0749	93.3	13.8-150	1.37	25.8	L713407-03	WG735619
Fluoranthene	mg/kg	0.0822	0.0793	94.5	23.2-158	3.64	26	L713407-03	WG735619
Fluorene	mg/kg	0.0710	0.0703	88.8	30.8-139	1.06	20	L713407-03	WG735619
Indeno(1,2,3-cd)pyrene	mg/kg	0.0799	0.0779	95.0	10.7-155	2.52	26.9	L713407-03	WG735619
Naphthalene	mg/kg	0.0706	0.0693	87.5	34.9-133	1.94	20.4	L713407-03	WG735619
Phenanthrene	mg/kg	0.0732	0.0717	88.1	20.2-150	2.06	24.6	L713407-03	WG735619
Pyrene	mg/kg	0.0807	0.0763	90.9	22.6-151	5.68	25.1	L713407-03	WG735619
2-Fluorobiphenyl				85.70	38.2-135				WG735619
Nitrobenzene-d5				92.70	28.4-151				WG735619
p-Terphenyl-d14				84.70	34.2-141				WG735619
1-Methylnaphthalene	mg/kg	0.228	0.149	131.	41.8-133	42.3*	20.9	L713759-14	WG735618
2-Chloronaphthalene	mg/kg	0.0643	0.0627	80.4	42.4-129	2.47	20	L713759-14	WG735618
2-Methylnaphthalene	mg/kg	0.481	0.311	208.*	37.5-137	42.7*	20.4	L713759-14	WG735618
Acenaphthene	mg/kg	0.0777	0.0735	97.1	39.4-132	5.44	20	L713759-14	WG735618
Acenaphthylene	mg/kg	0.0738	0.0699	92.2	41.3-132	5.44	20	L713759-14	WG735618
Anthracene	mg/kg	0.0736	0.0698	92.0	36.7-144	5.25	20.7	L713759-14	WG735618
Benzo(a)anthracene	mg/kg	0.0717	0.0700	89.6	28-144	2.28	24.7	L713759-14	WG735618
Benzo(a)pyrene	mg/kg	0.0672	0.0659	84.0	23.8-147	1.96	25.3	L713759-14	WG735618
Benzo(b)fluoranthene	mg/kg	0.0716	0.0667	89.5	18.2-147	7.15	29.5	L713759-14	WG735618
Benzo(g,h,i)perylene	mg/kg	0.0720	0.0697	90.0	9.2-155	3.19	29.2	L713759-14	WG735618
Benzo(k)fluoranthene	mg/kg	0.0618	0.0627	77.3	26.5-143	1.33	26.1	L713759-14	WG735618
Chrysene	mg/kg	0.0800	0.0737	100.	27.4-150	8.10	25.7	L713759-14	WG735618
Dibenz(a,h)anthracene	mg/kg	0.0677	0.0684	84.6	13.8-150	1.03	25.8	L713759-14	WG735618
Fluoranthene	mg/kg	0.0795	0.0736	99.4	23.2-158	7.78	26	L713759-14	WG735618
Fluorene	mg/kg	0.0967	0.0839	121.	30.8-139	14.2	20	L713759-14	WG735618
Indeno(1,2,3-cd)pyrene	mg/kg	0.0654	0.0651	81.8	10.7-155	0.550	26.9	L713759-14	WG735618
Naphthalene	mg/kg	0.267	0.185	139.*	34.9-133	36.3*	20.4	L713759-14	WG735618
Phenanthrene	mg/kg	0.140	0.108	175.*	20.2-150	25.7*	24.6	L713759-14	WG735618
Pyrene	mg/kg	0.0908	0.0829	114.	22.6-151	9.14	25.1	L713759-14	WG735618
2-Fluorobiphenyl				80.30	38.2-135				WG735618
Nitrobenzene-d5				97.00	28.4-151				WG735618
p-Terphenyl-d14				77.90	34.2-141				WG735618
Chromium,Hexavalent	mg/kg	20.3	20.4	102.	75-125	0.491	20	L713759-05	WG735526

Post Spike

Serial Dilution

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Denver, CO 80202

August 07, 2014

L713759

Serial Dilution

Batch number /Run number / Sample number cross reference

WG735567: R2972545: L713759-01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17
 WG735524: R2972616: L713759-01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18
 WG735646: R2972645: L713759-01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18
 WG735573: R2972720: L713759-01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18
 WG735485: R2972722: L713759-01 02 03 04 05 06 07 08 09 10 11 12 13 14 16 17 18
 WG735785: R2972769: L713759-01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18
 WG735569: R2972806: L713759-18
 WG735618: R2972966 R2972995 R2973098: L713759-01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
 WG735574: R2972970: L713759-15
 WG735619: R2972972: L713759-17 18
 WG735604: R2973092: L713759-01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18
 WG735617: R2973112: L713759-01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18
 WG735526: R2973185: L713759-01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18

* * Calculations are performed prior to rounding of reported values.
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The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.