

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303)894-2100 Fax:(303)894-2109



FOR OGCC USE ONLY

Document 2315709
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REM 9314

SITE INVESTIGATION AND REMEDIATION WORKPLAN

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever possible. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED

Spill or Release Plug & Abandon Central Facility Closure Site/Facility Closure Other (describe): _____

OGCC Operator Number: _____	Contact Name and Telephone: _____
Name of Operator: _____	_____
Address: _____	No: _____
City: _____ State: _____ Zip: _____	Fax: _____
API Number: _____	County: _____
Facility Name: _____	Facility Number: _____ Location ID #335617
Well Name: _____	Well Number: _____ Pit Facility #415484
Location: (QtrQtr, Sec, Twp, Rng, Meridian): _____ Latitude: _____ Longitude: _____	

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): _____

Site Conditions: Is location within a sensitive area (according to Rule 901e)? Y N If yes, attach evaluation.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): _____

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: _____

Potential receptors (water wells within 1/4 mi, surface waters, etc.): _____

Description of Impact (if previously provided, refer to that form or document):

Impacted Media (check):	Extent of Impact:	How Determined:
Soils	_____	_____
Vegetation	_____	_____
Groundwater	_____	_____
Surface Water	_____	_____

REMEDIALTION WORKPLAN

Describe initial action taken (if previously provided, refer to that form or document):

Describe how source is to be removed:

Describe how remediation of existing impacts is to be accomplished, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oily vegetation, etc.:



Tracking Number: _____
Name of Operator: _____
OGCC Operator No: _____
Received Date: _____
Well Name & No: _____
Facility Name & No: _____

Page 2

REMEDIATION WORKPLAN (Cont.)

OGCC Employee: _____

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):

No groundwater impacts occurred, as the pit was drained and water hauled to disposal before pit liner was removed and soil in the pit bottom was sampled. Small amounts of water on the pit liner that could not be captured by vacuum truck likely had contact with soil, but not in any volume that could reach or impact groundwater through percolation.

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required.

- Spoil material that was treated on-site through land farming will be blended with clean fill and buried on location per COGCC standards.
- Exterior slopes on west and north sides shall be pulled up and materials shall be pushed into existing pit. Exterior slopes shall be laid back at a minimum 3:1 slope. Top soil will be spread over all slopes and will be seeded with the landowner's approved seed mix.
- Location will be fenced to keep cattle off revegetated area
- Linn Operating, Inc. has addressed all wildlife concerns during the site stabilization of this pad.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.

Is further site investigation required? ☐ Y ☒ N If yes, describe:

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):

Landtreated and disposed onsite.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 11-29-14	Date Site Investigation Completed: 6-18-15	Date Remediation Plan Submitted: 6-25-15
Remediation Start Date: 12-1-14	Anticipated Completion Date: 8-31-15	Actual Completion Date: _____

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name: Bryan Burns

Signed: _____

Title: Senior Environmental, Health, & Safety Representative

Date: 6/29/15

OGCC Approved: _____ Title: _____ Date: _____

LINN Energy

Linn Operating, Inc.
Piceance Asset
Parachute, Colorado

I02 696 Interim Site Stabilization Plan – 2015

- In 2014, the pit was drained; the liner was removed and disposed of at a certified land fill.
- Soil samples from bottom of pit were taken in May 2015 and were analyzed
 - Spoil did not meet COGCC 910-1 standards and will be land farmed on location until standards are met. Bi-annual sampling will be conducted until all land farming meet standards.
- Spoil material that is being treated on site by land farming has met COGCC minimum standards will be blended with clean on-site materials and will be buried on location per COGCC standards.
- Exterior slopes on west and north sides shall be pulled up and materials shall be pushed into existing pit. Exterior slopes shall be laid back at a minimum 3:1 slope. Top soil will be spread over all slopes and will be seeded with the landowner's approved seed mix.
- Location will be fenced to keep cattle off revegetated area
- Linn Operating, Inc. has addressed and will accommodate the wildlife concerns during the site stabilization of this pad.

INTERIM RECLAMATION PLAN

If fill slope is pulled up and contoured higher than the pad surface, recommend constructing a diversion ditch to convey pad stormwater to sediment trap @ North construction boundary

HILLSIDES SLOPED BACK TO MINIMUM 3:1

Recommend surface roughening (ie. Tracking, Cross Ripping, Pocking), and seed/mulch on all re-contoured/disturbed slopes.

Land Farm area with compacted earthen berm for containment.

LAND FARM

PROPOSED RECLAMATION

Flow direction

EXISTING WELLS & CONDUCTORS

Flow direction

BACKFILLED PIT AREA

Flow direction

EXISTING PRODUCTION EQUIPMENT

EXISTING TANKS

EXISTING PAD ACCESS ROAD

HILLSIDES SLOPED BACK TO MINIMUM 3:1

EXISTING ROAD

If necessary, sediment trap with rock armored inlets and outlets installed at low point in fill slope toe trench

Using structural material (ie. road base), construct a drive-over water bar to prevent all potential stormwater run-on from entering site

Legend

- Seed & Mulch
- Diversion Ditch
- Earthen Berm
- Fill Slope Toe Ditch
- Roadside Ditch
- Water Bar
- Rock Armor
- Sediment Trap

Summit SERVICES GROUP

ORIGINAL DISTURBED AREA = 4.51 AC
INTERIM RECLAIMED AREA = 2.89 AC

GRAPHIC SCALE IN FEET
1 INCH = 100 FEET

CONSTRUCTION SURVEYS, INC.
0012 SUNRISE BLVD.
SILT, CO 81652
(970)876-5753

Old Mountain 102-696
LOT 9, SECTION 2, T. 6 S., R. 96 W.
BERRY PETROLEUM COMPANY

DATE: 03/05/13 SHEET: 1 OF 1

CONSTRUCTION
BILT COLO.
SURVEYS

CONSTRUCTION SURVEYS, INC.
0012 SUNRISE BLVD.
SILT, CO 81652
(970)876-5753

Old Mountain 102-696
LOT 9, SECTION 2, T. 6 S., R. 96 W.
BERRY PETROLEUM COMPANY

DATE: 03/05/13

SHEET: 1 OF 1



June 18, 2015

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

Subject: Old Mountain I-02 Reserve Pit Soil Sample Results

Dear Derek:

Nicholson GeoSolutions LLC was retained by Linn Energy, LLC (Linn) to conduct soil sampling of the soils beneath the former reserve pit on the I-02 well pad on Old Mountain, Garfield County, Colorado.

Sampling was conducted on November 29th, 2014 and May 21st, 2015. Impacted materials from the base and sidewalls of the pit had been previously excavated and stored in a bermed area on the well pad. Figure 1 shows the approximate extent of the pit and the locations of the confirmation samples collected. Table 1 provides analytical results for the soil samples collected. The laboratory analytical reports are contained in Appendix A.

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.

During the initial sampling event the perimeter and inner corners of the pit were mapped using a hand-held GPS unit and six discrete soil samples (OM I-02-P1 through OM I-02-P6) were collected to evaluate compliance with COGCC Table 910-1 standards.

All parameters for pit wall confirmation samples OM I-02-P1, OM I-02-P2, OM I-02-P5, and OM I-02-P6 were below the COGCC standards, except for arsenic for all four samples and SAR for samples OM I-02-P1 and OM I-02-P2. TPH exceeded the standard for the two pit bottom confirmation samples OM I-02-P3 (987 mg/kg) and OM I-02-P4 (2,271.3 mg/kg). Arsenic ranged from 2.2 to 4.3 mg/kg for the six samples, within the range of natural background concentrations for the Garden Gulch area.

In response to the sample results, additional impacted materials were excavated from the base of the pit and stored in a bermed area on the well pad. Two additional discrete soil samples (OM I-02 P7 and OM I-02 P8) were collected in the same locations as previous samples OM I-02-P3 and OM I-02-P4 on May 21st, 2015 to evaluate compliance with the standards. All results for the two additional confirmation samples were below the COGCC standards, except for arsenic (6.6 and 3.8 mg/kg).

Nicholson GeoSolutions LLC



David K. Nicholson, P.G.
Principal Geologist

Table 1 OM I-02 Pit Sample Results – November 29, 2014 and May 21, 2015

Parameter	Table 910-1 Standards	OM I-02-P1	OM I-02-P2	OM I-02-P3	OM I-02-P4	OM I-02-P5	OM I-02-P6	OM I-02-P7	OM I-02-P8
sp. conductance (mmhos/cm)	<4	3.4	2.9	2.5	4.6	0.69	4.3	0.57	0.53
pH (standard units)	6-9	7.9	7.9	8.3	8.2	8.0	7.7	9.2	9.4
SAR (ratio)	<12	19	15	18	35	3.4	12	5.7	9.6
TVPH – gasoline range	500 ¹	<0.5	<0.5	92	8.3	<0.5	<0.5	<0.5	<0.5
TEPH – diesel/motor oil range	500 ¹	35	<200	845	2,263	<200	<200	146	86
benzene	0.17	<0.0025	<0.0025	0.14	0.0048	<0.0025	<0.0025	<0.0025	<0.0025
toluene	85	<0.025	<0.025	0.84	<0.025	<0.025	<0.025	<0.025	<0.025
ethylbenzene	100	<0.0025	<0.0025	0.23	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
xylenes	175	<0.0075	<0.0075	5.0	0.057	<0.0075	<0.0075	<0.0075	<0.0075
PAHs	various	All ND	All ND	All ok	All ok	All ok	All ok	All ok	All ok
arsenic	0.39	2.2	3.2	2.6	4.3	3.9	4.1	6.6	3.8

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

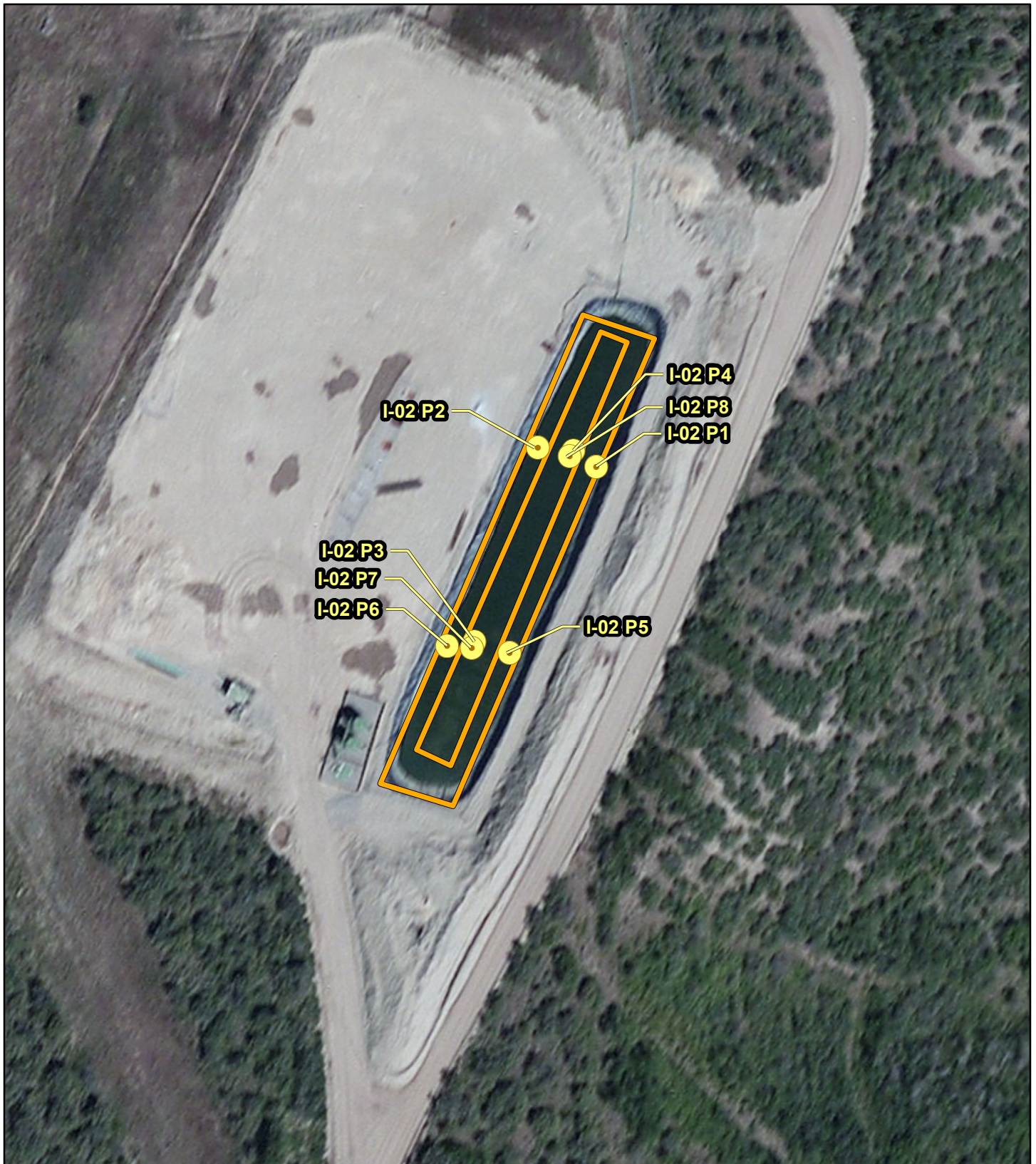


Figure 1

June
2015

GeoSolutions
NICHOLSON

Legend

- Sample Location
- Pit Boundary

0 30 60 120 180 Feet 1" = 60'

Linn Energy, LLC

**Old Mountain I-02
Pit Investigation**

APPENDIX A

Laboratory Reports



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

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

Report Summary

Thursday December 04, 2014

Report Number: L736337

Samples Received: 12/02/14

Client Project:

Description: Old Mt 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

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

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REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation
Sample ID : I-02 P1
Collected By : DK Nicholson
Collection Date : 11/29/14 13:20

ESC Sample # : L736337-01

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	12/04/14	1
Chromium, Trivalent	46.	2.0	mg/kg	Calc.	12/04/14	1
ORP	130		mV	2580 B-2011	12/03/14	1
pH	7.9		su	9045D	12/03/14	1
Sodium Adsorption Ratio	19.			Calc.	12/04/14	1
Specific Conductance	3400		umhos/cm	9050AMod	12/04/14	1
Mercury	BDL	0.020	mg/kg	7471	12/03/14	1
Arsenic	2.2	2.0	mg/kg	6010B	12/04/14	1
Barium	250	0.50	mg/kg	6010B	12/04/14	1
Boron	15.	10.	mg/kg	6010B	12/04/14	1
Cadmium	BDL	0.50	mg/kg	6010B	12/04/14	1
Chromium	46.	1.0	mg/kg	6010B	12/04/14	1
Copper	16.	2.0	mg/kg	6010B	12/04/14	1
Lead	12.	0.50	mg/kg	6010B	12/04/14	1
Nickel	28.	2.0	mg/kg	6010B	12/04/14	1
Selenium	BDL	2.0	mg/kg	6010B	12/04/14	1
Silver	BDL	1.0	mg/kg	6010B	12/04/14	1
Zinc	48.	5.0	mg/kg	6010B	12/04/14	1
Benzene	BDL	0.0025	mg/kg	8021	12/04/14	5
Toluene	BDL	0.025	mg/kg	8021	12/04/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	12/04/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	12/04/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	12/04/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	97.9		% Rec.	8015	12/04/14	5
a,a,a-Trifluorotoluene(PID)	99.9		% Rec.	8021	12/04/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	35.	20.	mg/kg	8015	12/03/14	5
C28-C40 Oil Range	BDL	20.	mg/kg	8015	12/03/14	5
Surrogate Recovery						
o-Terphenyl	73.1		% Rec.	8015	12/03/14	5
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Acenaphthene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L736337-01 (PH) - 7.9@20.9c



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REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation

Sample ID : I-02 P1

Collected By : DK Nicholson
Collection Date : 11/29/14 13:20

ESC Sample # : L736337-01

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Acenaphthylene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Benzo(a)anthracene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Benzo(a)pyrene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Benzo(b)fluoranthene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Benzo(g,h,i)perylene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Benzo(k)fluoranthene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Chrysene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Dibenz(a,h)anthracene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Fluoranthene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Fluorene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Indeno(1,2,3-cd)pyrene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Naphthalene	BDL	0.040	mg/kg	8270C-SIM	12/03/14	2
Phenanthrene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Pyrene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
1-Methylnaphthalene	BDL	0.040	mg/kg	8270C-SIM	12/03/14	2
2-Methylnaphthalene	BDL	0.040	mg/kg	8270C-SIM	12/03/14	2
2-Chloronaphthalene	BDL	0.040	mg/kg	8270C-SIM	12/03/14	2
Surrogate Recovery						
p-Terphenyl-d14	70.5		% Rec.	8270C-SIM	12/03/14	2
Nitrobenzene-d5	84.6		% Rec.	8270C-SIM	12/03/14	2
2-Fluorobiphenyl	77.3		% Rec.	8270C-SIM	12/03/14	2

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: 12/04/14 15:30 Printed: 12/04/14 17:31
L736337-01 (PH) - 7.9@20.9c



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Est. 1970

REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation
Sample ID : I-02 P2
Collected By : DK Nicholson
Collection Date : 11/29/14 13:30

ESC Sample # : L736337-02

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	12/04/14	1
Chromium, Trivalent	46.	2.0	mg/kg	Calc.	12/04/14	1
ORP	120		mV	2580 B-2011	12/03/14	1
pH	7.9		su	9045D	12/03/14	1
Sodium Adsorption Ratio	15.			Calc.	12/04/14	1
Specific Conductance	2900		umhos/cm	9050AMod	12/04/14	1
Mercury	BDL	0.020	mg/kg	7471	12/03/14	1
Arsenic	3.2	2.0	mg/kg	6010B	12/04/14	1
Barium	340	0.50	mg/kg	6010B	12/04/14	1
Boron	18.	10.	mg/kg	6010B	12/04/14	1
Cadmium	BDL	0.50	mg/kg	6010B	12/04/14	1
Chromium	46.	1.0	mg/kg	6010B	12/04/14	1
Copper	18.	2.0	mg/kg	6010B	12/04/14	1
Lead	13.	0.50	mg/kg	6010B	12/04/14	1
Nickel	28.	2.0	mg/kg	6010B	12/04/14	1
Selenium	BDL	2.0	mg/kg	6010B	12/04/14	1
Silver	BDL	1.0	mg/kg	6010B	12/04/14	1
Zinc	56.	5.0	mg/kg	6010B	12/04/14	1
Benzene	BDL	0.0025	mg/kg	8021	12/04/14	5
Toluene	BDL	0.025	mg/kg	8021	12/04/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	12/04/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	12/04/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	12/04/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	97.8		% Rec.	8015	12/04/14	5
a,a,a-Trifluorotoluene(PID)	99.0		% Rec.	8021	12/04/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	BDL	200	mg/kg	8015	12/03/14	50
C28-C40 Oil Range	BDL	200	mg/kg	8015	12/03/14	50
Surrogate Recovery						
o-Terphenyl	84.7		% Rec.	8015	12/03/14	50
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Acenaphthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L736337-02 (PH) - 7.9@21.0c



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REPORT OF ANALYSIS

Dave Nicholson
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1999 Broadway, Suite 3700
Denver, CO 80202

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation

ESC Sample # : L736337-02

Sample ID : I-02 P2

Site ID :

Collected By : DK Nicholson
Collection Date : 11/29/14 13:30

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Acenaphthylene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Benzo(a)anthracene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Benzo(a)pyrene	BDL	0.0030	mg/kg	8270C-SIM	12/03/14	5
Benzo(b)fluoranthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Benzo(g,h,i)perylene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Benzo(k)fluoranthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Chrysene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Dibenz(a,h)anthracene	BDL	0.0030	mg/kg	8270C-SIM	12/03/14	5
Fluoranthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Fluorene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Indeno(1,2,3-cd)pyrene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Naphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
Phenanthrene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Pyrene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
1-Methylnaphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
2-Methylnaphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
2-Chloronaphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
Surrogate Recovery						
p-Terphenyl-d14	73.2		% Rec.	8270C-SIM	12/03/14	5
Nitrobenzene-d5	83.3		% Rec.	8270C-SIM	12/03/14	5
2-Fluorobiphenyl	79.4		% Rec.	8270C-SIM	12/03/14	5

BDL - Below Detection Limit

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Note:

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Reported: 12/04/14 15:30 Printed: 12/04/14 17:32
L736337-02 (PH) - 7.9@21.0c



12065 Lebanon Rd.
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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation
Sample ID : I-02 P3
Collected By : DK Nicholson
Collection Date : 11/29/14 13:40

ESC Sample # : L736337-03

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	12/04/14	1
Chromium, Trivalent	38.	2.0	mg/kg	Calc.	12/04/14	1
ORP	69.		mV	2580 B-2011	12/03/14	1
pH	8.3		su	9045D	12/03/14	1
Sodium Adsorption Ratio	18.			Calc.	12/04/14	1
Specific Conductance	2500		umhos/cm	9050AMod	12/04/14	1
Mercury	0.076	0.020	mg/kg	7471	12/03/14	1
Arsenic	2.6	2.0	mg/kg	6010B	12/04/14	1
Barium	600	0.50	mg/kg	6010B	12/04/14	1
Boron	15.	10.	mg/kg	6010B	12/04/14	1
Cadmium	BDL	0.50	mg/kg	6010B	12/04/14	1
Chromium	38.	1.0	mg/kg	6010B	12/04/14	1
Copper	17.	2.0	mg/kg	6010B	12/04/14	1
Lead	9.9	0.50	mg/kg	6010B	12/04/14	1
Nickel	22.	2.0	mg/kg	6010B	12/04/14	1
Selenium	BDL	2.0	mg/kg	6010B	12/04/14	1
Silver	BDL	1.0	mg/kg	6010B	12/04/14	1
Zinc	42.	5.0	mg/kg	6010B	12/04/14	1
Benzene	0.14	0.0025	mg/kg	8021	12/04/14	5
Toluene	0.84	0.025	mg/kg	8021	12/04/14	5
Ethylbenzene	0.23	0.0025	mg/kg	8021	12/04/14	5
Total Xylene	5.0	0.0075	mg/kg	8021	12/04/14	5
TPH (GC/FID) Low Fraction	92.	0.50	mg/kg	8015	12/04/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	82.1		% Rec.	8015	12/04/14	5
a,a,a-Trifluorotoluene(PID)	103.		% Rec.	8021	12/04/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	840	80.	mg/kg	8015	12/03/14	20
C28-C40 Oil Range	45.	4.0	mg/kg	8015	12/03/14	1
Surrogate Recovery						
o-Terphenyl	165.		% Rec.	8015	12/03/14	20
Polynuclear Aromatic Hydrocarbons						
Anthracene	0.028	0.0060	mg/kg	8270C-SIM	12/03/14	1
Acenaphthene	0.044	0.0060	mg/kg	8270C-SIM	12/03/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L736337-03 (PH) - 8.3@21.2c
L736337-03 (BTEXGRO) - E BJAAMCFOH TPH,14,15



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REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation
Sample ID : I-02 P3
Collected By : DK Nicholson
Collection Date : 11/29/14 13:40

ESC Sample # : L736337-03

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Acenaphthylene	0.0063	0.0060	mg/kg	8270C-SIM	12/03/14	1
Benzo(a)anthracene	BDL	0.0060	mg/kg	8270C-SIM	12/03/14	1
Benzo(a)pyrene	BDL	0.0060	mg/kg	8270C-SIM	12/03/14	1
Benzo(b)fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	12/03/14	1
Benzo(g,h,i)perylene	BDL	0.0060	mg/kg	8270C-SIM	12/03/14	1
Benzo(k)fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	12/03/14	1
Chrysene	0.0062	0.0060	mg/kg	8270C-SIM	12/03/14	1
Dibenz(a,h)anthracene	BDL	0.0060	mg/kg	8270C-SIM	12/03/14	1
Fluoranthene	0.0083	0.0060	mg/kg	8270C-SIM	12/03/14	1
Fluorene	0.24	0.0060	mg/kg	8270C-SIM	12/03/14	1
Indeno(1,2,3-cd)pyrene	BDL	0.0060	mg/kg	8270C-SIM	12/03/14	1
Naphthalene	BDL	0.40	mg/kg	8270C-SIM	12/03/14	20
Phenanthrene	0.13	0.0060	mg/kg	8270C-SIM	12/03/14	1
Pyrene	0.012	0.0060	mg/kg	8270C-SIM	12/03/14	1
1-Methylnaphthalene	BDL	0.40	mg/kg	8270C-SIM	12/03/14	20
2-Methylnaphthalene	0.82	0.40	mg/kg	8270C-SIM	12/03/14	20
2-Chloronaphthalene	BDL	0.020	mg/kg	8270C-SIM	12/03/14	1
Surrogate Recovery						
p-Terphenyl-d14	68.5		% Rec.	8270C-SIM	12/03/14	1
Nitrobenzene-d5	282.		% Rec.	8270C-SIM	12/03/14	20
2-Fluorobiphenyl	72.5		% Rec.	8270C-SIM	12/03/14	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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L736337-03 (PH) - 8.3@21.2c

L736337-03 (BTEXGRO) - E BJAAMCFOH TPH,14,15



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REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation
Sample ID : I-02 P4
Collected By : DK Nicholson
Collection Date : 11/29/14 13:50

ESC Sample # : L736337-04

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	12/04/14	1
Chromium, Trivalent	49.	2.0	mg/kg	Calc.	12/04/14	1
ORP	22.		mV	2580 B-2011	12/03/14	1
pH	8.2		su	9045D	12/03/14	1
Sodium Adsorption Ratio	35.			Calc.	12/04/14	1
Specific Conductance	4600		umhos/cm	9050AMod	12/04/14	1
Mercury	0.046	0.020	mg/kg	7471	12/03/14	1
Arsenic	4.3	2.0	mg/kg	6010B	12/04/14	1
Barium	390	0.50	mg/kg	6010B	12/04/14	1
Boron	17.	10.	mg/kg	6010B	12/04/14	1
Cadmium	BDL	0.50	mg/kg	6010B	12/04/14	1
Chromium	49.	1.0	mg/kg	6010B	12/04/14	1
Copper	19.	2.0	mg/kg	6010B	12/04/14	1
Lead	13.	0.50	mg/kg	6010B	12/04/14	1
Nickel	30.	2.0	mg/kg	6010B	12/04/14	1
Selenium	BDL	2.0	mg/kg	6010B	12/04/14	1
Silver	BDL	1.0	mg/kg	6010B	12/04/14	1
Zinc	54.	5.0	mg/kg	6010B	12/04/14	1
Benzene	0.0048	0.0025	mg/kg	8021	12/04/14	5
Toluene	BDL	0.025	mg/kg	8021	12/04/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	12/04/14	5
Total Xylene	0.057	0.0075	mg/kg	8021	12/04/14	5
TPH (GC/FID) Low Fraction	8.3	0.50	mg/kg	8015	12/04/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	94.4		% Rec.	8015	12/04/14	5
a,a,a-Trifluorotoluene(PID)	99.5		% Rec.	8021	12/04/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	2200	100	mg/kg	8015	12/03/14	25
C28-C40 Oil Range	63.	20.	mg/kg	8015	12/03/14	5
Surrogate Recovery						
o-Terphenyl	0.00		% Rec.	8015	12/03/14	25
Polynuclear Aromatic Hydrocarbons						
Anthracene	0.16	0.012	mg/kg	8270C-SIM	12/03/14	2
Acenaphthene	0.086	0.012	mg/kg	8270C-SIM	12/03/14	2

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L736337-04 (PH) - 8.2@20.6c



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REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation

Sample ID : I-02 P4

Collected By : DK Nicholson
Collection Date : 11/29/14 13:50

ESC Sample # : L736337-04

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Acenaphthylene	0.017	0.012	mg/kg	8270C-SIM	12/03/14	2
Benzo(a)anthracene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Benzo(a)pyrene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Benzo(b)fluoranthene	0.013	0.012	mg/kg	8270C-SIM	12/03/14	2
Benzo(g,h,i)perylene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Benzo(k)fluoranthene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Chrysene	0.022	0.012	mg/kg	8270C-SIM	12/03/14	2
Dibenz(a,h)anthracene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Fluoranthene	0.024	0.012	mg/kg	8270C-SIM	12/03/14	2
Fluorene	0.66	0.012	mg/kg	8270C-SIM	12/03/14	2
Indeno(1,2,3-cd)pyrene	BDL	0.012	mg/kg	8270C-SIM	12/03/14	2
Naphthalene	BDL	0.40	mg/kg	8270C-SIM	12/03/14	20
Phenanthrene	0.32	0.012	mg/kg	8270C-SIM	12/03/14	2
Pyrene	0.050	0.012	mg/kg	8270C-SIM	12/03/14	2
1-Methylnaphthalene	BDL	0.40	mg/kg	8270C-SIM	12/03/14	20
2-Methylnaphthalene	1.0	0.40	mg/kg	8270C-SIM	12/03/14	20
2-Chloronaphthalene	BDL	0.040	mg/kg	8270C-SIM	12/03/14	2
Surrogate Recovery						
p-Terphenyl-d14	68.7		% Rec.	8270C-SIM	12/03/14	2
Nitrobenzene-d5	329.		% Rec.	8270C-SIM	12/03/14	20
2-Fluorobiphenyl	68.3		% Rec.	8270C-SIM	12/03/14	2

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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L736337-04 (PH) - 8.2@20.6c



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REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation
Sample ID : I-02 P5
Collected By : DK Nicholson
Collection Date : 11/29/14 14:00

ESC Sample # : L736337-05

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	12/04/14	1
Chromium, Trivalent	46.	2.0	mg/kg	Calc.	12/04/14	1
ORP	33.		mV	2580 B-2011	12/03/14	1
pH	8.0		su	9045D	12/03/14	1
Sodium Adsorption Ratio	3.4			Calc.	12/04/14	1
Specific Conductance	690		umhos/cm	9050AMod	12/04/14	1
Mercury	BDL	0.020	mg/kg	7471	12/03/14	1
Arsenic	3.9	2.0	mg/kg	6010B	12/04/14	1
Barium	430	0.50	mg/kg	6010B	12/04/14	1
Boron	16.	10.	mg/kg	6010B	12/04/14	1
Cadmium	BDL	0.50	mg/kg	6010B	12/04/14	1
Chromium	46.	1.0	mg/kg	6010B	12/04/14	1
Copper	18.	2.0	mg/kg	6010B	12/04/14	1
Lead	13.	0.50	mg/kg	6010B	12/04/14	1
Nickel	28.	2.0	mg/kg	6010B	12/04/14	1
Selenium	BDL	2.0	mg/kg	6010B	12/04/14	1
Silver	BDL	1.0	mg/kg	6010B	12/04/14	1
Zinc	51.	5.0	mg/kg	6010B	12/04/14	1
Benzene	BDL	0.0025	mg/kg	8021	12/04/14	5
Toluene	BDL	0.025	mg/kg	8021	12/04/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	12/04/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	12/04/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	12/04/14	5
Surrogate Recovery-% a,a,a-Trifluorotoluene(PID)	106.		% Rec.	8021	12/04/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	BDL	200	mg/kg	8015	12/03/14	50
C28-C40 Oil Range	BDL	200	mg/kg	8015	12/03/14	50
Surrogate Recovery o-Terphenyl	104.		% Rec.	8015	12/03/14	50
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Acenaphthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Acenaphthylene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L736337-05 (PH) - 8.0@20.9c



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REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation

Sample ID : I-02 P5

Collected By : DK Nicholson
Collection Date : 11/29/14 14:00

ESC Sample # : L736337-05

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)anthracene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Benzo(a)pyrene	0.0037	0.0030	mg/kg	8270C-SIM	12/03/14	5
Benzo(b)fluoranthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Benzo(g,h,i)perylene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Benzo(k)fluoranthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Chrysene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Dibenz(a,h)anthracene	BDL	0.0030	mg/kg	8270C-SIM	12/03/14	5
Fluoranthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Fluorene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Indeno(1,2,3-cd)pyrene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Naphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
Phenanthrene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Pyrene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
1-Methylnaphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
2-Methylnaphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
2-Chloronaphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
Surrogate Recovery						
p-Terphenyl-d14	67.7		% Rec.	8270C-SIM	12/03/14	5
Nitrobenzene-d5	77.0		% Rec.	8270C-SIM	12/03/14	5
2-Fluorobiphenyl	76.2		% Rec.	8270C-SIM	12/03/14	5

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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L736337-05 (PH) - 8.0@20.9c



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REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation
Sample ID : I-02 P6
Collected By : DK Nicholson
Collection Date : 11/29/14 14:10

ESC Sample # : L736337-06

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	12/04/14	1
Chromium, Trivalent	46.	2.0	mg/kg	Calc.	12/04/14	1
ORP	52.		mV	2580 B-2011	12/03/14	1
pH	7.7		su	9045D	12/03/14	1
Sodium Adsorption Ratio	12.			Calc.	12/04/14	1
Specific Conductance	4300		umhos/cm	9050AMod	12/04/14	1
Mercury	BDL	0.020	mg/kg	7471	12/03/14	1
Arsenic	4.1	2.0	mg/kg	6010B	12/04/14	1
Barium	340	0.50	mg/kg	6010B	12/04/14	1
Boron	20.	10.	mg/kg	6010B	12/04/14	1
Cadmium	BDL	0.50	mg/kg	6010B	12/04/14	1
Chromium	46.	1.0	mg/kg	6010B	12/04/14	1
Copper	21.	2.0	mg/kg	6010B	12/04/14	1
Lead	12.	0.50	mg/kg	6010B	12/04/14	1
Nickel	30.	2.0	mg/kg	6010B	12/04/14	1
Selenium	BDL	2.0	mg/kg	6010B	12/04/14	1
Silver	BDL	1.0	mg/kg	6010B	12/04/14	1
Zinc	52.	5.0	mg/kg	6010B	12/04/14	1
Benzene	BDL	0.0025	mg/kg	8021	12/04/14	5
Toluene	BDL	0.025	mg/kg	8021	12/04/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	12/04/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	12/04/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	12/04/14	5
Surrogate Recovery-% a,a,a-Trifluorotoluene(PID)	106.		% Rec.	8021	12/04/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	BDL	200	mg/kg	8015	12/03/14	50
C28-C40 Oil Range	BDL	200	mg/kg	8015	12/03/14	50
Surrogate Recovery o-Terphenyl	87.3		% Rec.	8015	12/03/14	50
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Acenaphthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Acenaphthylene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L736337-06 (PH) - 7.7@21.3c



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Est. 1970

REPORT OF ANALYSIS

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

December 04, 2014

Date Received : December 02, 2014
Description : Old Mt Pit Reclamation

Sample ID : I-02 P6

Collected By : DK Nicholson
Collection Date : 11/29/14 14:10

ESC Sample # : L736337-06

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)anthracene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Benzo(a)pyrene	0.0032	0.0030	mg/kg	8270C-SIM	12/03/14	5
Benzo(b)fluoranthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Benzo(g,h,i)perylene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Benzo(k)fluoranthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Chrysene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Dibenz(a,h)anthracene	BDL	0.0030	mg/kg	8270C-SIM	12/03/14	5
Fluoranthene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Fluorene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Indeno(1,2,3-cd)pyrene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Naphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
Phenanthrene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
Pyrene	BDL	0.030	mg/kg	8270C-SIM	12/03/14	5
1-Methylnaphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
2-Methylnaphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
2-Chloronaphthalene	BDL	0.10	mg/kg	8270C-SIM	12/03/14	5
Surrogate Recovery						
p-Terphenyl-d14	78.9		% Rec.	8270C-SIM	12/03/14	5
Nitrobenzene-d5	82.1		% Rec.	8270C-SIM	12/03/14	5
2-Fluorobiphenyl	81.6		% Rec.	8270C-SIM	12/03/14	5

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: 12/04/14 15:30 Printed: 12/04/14 17:32
L736337-06 (PH) - 7.7@21.3c

Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L736337-01	WG757730	SAMP	Lead	R3008153	B
L736337-02	WG757743	SAMP	o-Terphenyl	R3007855	J7
	WG757749	SAMP	Benzo(a)pyrene	R3007997	U
	WG757749	SAMP	Dibenz(a,h)anthracene	R3007997	U
	WG757730	SAMP	Lead	R3008153	B
L736337-03	WG757743	SAMP	o-Terphenyl	R3007855	J7
	WG757749	SAMP	Nitrobenzene-d5	R3007997	J7
	WG757730	SAMP	Lead	R3008153	B
	WG757992	SAMP	Total Xylene	R3008168	E
	WG757992	SAMP	TPH (GC/FID) Low Fraction	R3008168	E
L736337-04	WG757743	SAMP	o-Terphenyl	R3007855	J7
	WG757749	SAMP	Nitrobenzene-d5	R3007997	J7
	WG757730	SAMP	Lead	R3008153	B
L736337-05	WG757743	SAMP	o-Terphenyl	R3007855	J7
	WG757749	SAMP	Benzo(a)pyrene	R3007997	J
	WG757749	SAMP	Dibenz(a,h)anthracene	R3007997	U
	WG757730	SAMP	Lead	R3008153	B
L736337-06	WG757743	SAMP	o-Terphenyl	R3007855	J7
	WG757749	SAMP	Benzo(a)pyrene	R3007997	J
	WG757749	SAMP	Dibenz(a,h)anthracene	R3007997	U
	WG757730	SAMP	Barium	R3008153	J6
	WG757730	SAMP	Silver	R3008153	J6J3

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
B	(EPA) - The indicated compound was found in the associated method blank as well as the laboratory sample.
E	GTL (EPA) - Greater than upper calibration limit: Actual value is known to be greater than the upper calibration range.
J	(EPA) - Estimated value below the lowest calibration point. Confidence correlates with concentration.
J3	The associated batch QC was outside the established quality control range for precision.
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.
U	BDL (EPA) - Below Detectable Limits: Indicates that the compound was analyzed but not detected.

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.



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Est. 1970

December 04, 2014

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Mercury	< .02	mg/kg			WG757703	12/03/14 07:01
C10-C28 Diesel Range	< 4	mg/kg			WG757743	12/03/14 09:43
C28-C40 Oil Range	< 4	mg/kg			WG757743	12/03/14 09:43
o-Terphenyl		% Rec.	88.10	50-150	WG757743	12/03/14 09:43
1-Methylnaphthalene	< .02	mg/kg			WG757749	12/03/14 05:03
2-Chloronaphthalene	< .02	mg/kg			WG757749	12/03/14 05:03
2-Methylnaphthalene	< .02	mg/kg			WG757749	12/03/14 05:03
Acenaphthene	< .006	mg/kg			WG757749	12/03/14 05:03
Acenaphthylene	< .006	mg/kg			WG757749	12/03/14 05:03
Anthracene	< .006	mg/kg			WG757749	12/03/14 05:03
Benzo(a)anthracene	< .006	mg/kg			WG757749	12/03/14 05:03
Benzo(a)pyrene	< .006	mg/kg			WG757749	12/03/14 05:03
Benzo(b)fluoranthene	< .006	mg/kg			WG757749	12/03/14 05:03
Benzo(g,h,i)perylene	< .006	mg/kg			WG757749	12/03/14 05:03
Benzo(k)fluoranthene	< .006	mg/kg			WG757749	12/03/14 05:03
Chrysene	< .006	mg/kg			WG757749	12/03/14 05:03
Dibenz(a,h)anthracene	< .006	mg/kg			WG757749	12/03/14 05:03
Fluoranthene	< .006	mg/kg			WG757749	12/03/14 05:03
Fluorene	< .006	mg/kg			WG757749	12/03/14 05:03
Indeno(1,2,3-cd)pyrene	< .006	mg/kg			WG757749	12/03/14 05:03
Naphthalene	< .02	mg/kg			WG757749	12/03/14 05:03
Phenanthrene	< .006	mg/kg			WG757749	12/03/14 05:03
Pyrene	< .006	mg/kg			WG757749	12/03/14 05:03
2-Fluorobiphenyl		% Rec.	83.60	38.2-135	WG757749	12/03/14 05:03
Nitrobenzene-d5		% Rec.	93.30	28.4-151	WG757749	12/03/14 05:03
p-Terphenyl-d14		% Rec.	79.00	34.2-141	WG757749	12/03/14 05:03
Chromium,Hexavalent	< 2	mg/kg			WG757701	12/04/14 08:50
Specific Conductance	1.64	umhos/cm			WG757968	12/04/14 11:06
Benzene	< .0005	mg/kg			WG757433	12/04/14 01:33
Ethylbenzene	< .0005	mg/kg			WG757433	12/04/14 01:33
Toluene	< .005	mg/kg			WG757433	12/04/14 01:33
Total Xylene	< .0015	mg/kg			WG757433	12/04/14 01:33
a,a,a-Trifluorotoluene(FID)		% Rec.	98.70	59-128	WG757433	12/04/14 01:33
a,a,a-Trifluorotoluene(PID)		% Rec.	106.0	54-144	WG757433	12/04/14 01:33
Arsenic	< 2	mg/kg			WG757730	12/04/14 09:47
Barium	< .5	mg/kg			WG757730	12/04/14 09:47
Boron	< 10	mg/kg			WG757730	12/04/14 09:47
Cadmium	< .5	mg/kg			WG757730	12/04/14 09:47
Chromium	< 1	mg/kg			WG757730	12/04/14 09:47
Copper	< 2	mg/kg			WG757730	12/04/14 09:47
Lead	< .5	mg/kg			WG757730	12/04/14 09:47
Nickel	< 2	mg/kg			WG757730	12/04/14 09:47
Selenium	< 2	mg/kg			WG757730	12/04/14 09:47
Silver	< 1	mg/kg			WG757730	12/04/14 09:47
Zinc	< 5	mg/kg			WG757730	12/04/14 09:47

* Performance of this Analyte is outside of established criteria.

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Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Benzene	< .0005	mg/kg			WG757992	12/04/14 03:03
Ethylbenzene	< .0005	mg/kg			WG757992	12/04/14 03:03
Toluene	< .005	mg/kg			WG757992	12/04/14 03:03
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG757992	12/04/14 03:03
Total Xylene	< .0015	mg/kg			WG757992	12/04/14 03:03
a,a,a-Trifluorotoluene(FID)		% Rec.	98.20	59-128	WG757992	12/04/14 03:03
a,a,a-Trifluorotoluene(PID)		% Rec.	101.0	54-144	WG757992	12/04/14 03:03
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG758078	12/04/14 11:36
a,a,a-Trifluorotoluene(FID)		% Rec.	98.30	59-128	WG758078	12/04/14 11:36
a,a,a-Trifluorotoluene(PID)		% Rec.	104.0	54-144	WG758078	12/04/14 11:36

Analyte	Units	Result	Duplicate		Limit	Ref Samp	Batch
			Duplicate	RPD			
pH	su	4.60	4.60	0.866	1	L736197-01	WG757763
pH	su	7.10	7.10	0.282	1	L736475-02	WG757763
ORP	mV	160.	170.	2.99	20	L736252-01	WG757828
ORP	mV	170.	170.	1.17	20	L736252-04	WG757828
Chromium,Hexavalent	mg/kg	4.50	4.20	6.90	20	L736475-02	WG757701
Chromium,Hexavalent	mg/kg	0.0	0.0	0.0	20	L736200-01	WG757701
Specific Conductance	umhos/cm	810.	810.	0.493	20	L736281-01	WG757968
Specific Conductance	umhos/cm	540.	550.	1.10	20	L736562-07	WG757968

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Mercury	mg/kg	.5	0.438	88.0	80-120	WG757703
pH	su	5.9	5.90	100.	98.3-101.7	WG757763
ORP	mV	100	99.0	99.0	90-110	WG757828
1-Methylnaphthalene	mg/kg	.08	0.0540	67.5	48.9-127	WG757749
2-Chloronaphthalene	mg/kg	.08	0.0532	66.5	48.8-125	WG757749
2-Methylnaphthalene	mg/kg	.08	0.0516	64.5	45.7-131	WG757749
Acenaphthene	mg/kg	.08	0.0505	63.1	48.7-127	WG757749
Acenaphthylene	mg/kg	.08	0.0513	64.1	47.9-128	WG757749
Anthracene	mg/kg	.08	0.0521	65.2	51.3-136	WG757749
Benzo(a)anthracene	mg/kg	.08	0.0495	61.9	55-126	WG757749
Benzo(a)pyrene	mg/kg	.08	0.0505	63.1	51.9-127	WG757749
Benzo(b)fluoranthene	mg/kg	.08	0.0500	62.5	54-125	WG757749
Benzo(g,h,i)perylene	mg/kg	.08	0.0497	62.1	53.8-136	WG757749
Benzo(k)fluoranthene	mg/kg	.08	0.0509	63.7	53.9-132	WG757749
Chrysene	mg/kg	.08	0.0515	64.4	55.7-133	WG757749
Dibenz(a,h)anthracene	mg/kg	.08	0.0554	69.3	52.6-137	WG757749
Fluoranthene	mg/kg	.08	0.0564	70.5	54-132	WG757749
Fluorene	mg/kg	.08	0.0523	65.3	48.7-127	WG757749
Indeno(1,2,3-cd)pyrene	mg/kg	.08	0.0538	67.3	53.8-138	WG757749

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Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Naphthalene	mg/kg	.08	0.0489	61.2	42-127	WG757749
Phenanthrene	mg/kg	.08	0.0467	58.3	49.6-126	WG757749
Pyrene	mg/kg	.08	0.0477	59.6	54-129	WG757749
2-Fluorobiphenyl				76.80	38.2-135	WG757749
Nitrobenzene-d5				88.80	28.4-151	WG757749
p-Terphenyl-d14				69.40	34.2-141	WG757749
Chromium, Hexavalent	mg/kg	187	160.	85.6	80-120	WG757701
Specific Conductance	umhos/cm	759	780.	103.	85-115	WG757968
Benzene	mg/kg	.05	0.0564	113.	70-130	WG757433
Ethylbenzene	mg/kg	.05	0.0549	110.	70-130	WG757433
Toluene	mg/kg	.05	0.0553	111.	70-130	WG757433
Total Xylene	mg/kg	.15	0.165	110.	70-130	WG757433
a,a,a-Trifluorotoluene(FID)				98.40	59-128	WG757433
a,a,a-Trifluorotoluene(PID)				106.0	54-144	WG757433
Arsenic	mg/kg	100	103.	103.	80-120	WG757730
Barium	mg/kg	100	103.	103.	80-120	WG757730
Boron	mg/kg	100	99.3	99.0	80-120	WG757730
Cadmium	mg/kg	100	103.	103.	80-120	WG757730
Chromium	mg/kg	100	102.	102.	80-120	WG757730
Copper	mg/kg	100	97.4	97.0	80-120	WG757730
Lead	mg/kg	100	104.	104.	80-120	WG757730
Nickel	mg/kg	100	97.6	98.0	80-120	WG757730
Selenium	mg/kg	100	101.	101.	80-120	WG757730
Silver	mg/kg	100	81.6	82.0	80-120	WG757730
Zinc	mg/kg	100	101.	101.	80-120	WG757730
TPH (GC/FID) Low Fraction	mg/kg	5.5	4.66	84.7	63.5-137	WG757992
a,a,a-Trifluorotoluene(FID)				98.70	59-128	WG757992
Benzene	mg/kg	.05	0.0485	97.0	70-130	WG757992
Ethylbenzene	mg/kg	.05	0.0470	93.9	70-130	WG757992
Toluene	mg/kg	.05	0.0475	95.0	70-130	WG757992
Total Xylene	mg/kg	.15	0.142	94.6	70-130	WG757992
a,a,a-Trifluorotoluene(PID)				99.90	54-144	WG757992
TPH (GC/FID) Low Fraction	mg/kg	5.5	4.94	89.9	63.5-137	WG758078
a,a,a-Trifluorotoluene(FID)				102.0	59-128	WG758078

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Mercury	mg/kg	0.433	0.438	87.0	80-120	1.00	20	WG757703
pH	su	5.90	5.90	100.	98.3-101.7	0.0	20	WG757763
ORP	mV	100.	99.0	100.	90-110	1.01	20	WG757828

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Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
1-Methylnaphthalene	mg/kg	0.0616	0.0540	77.0	48.9-127	13.2	20	WG757749
2-Chloronaphthalene	mg/kg	0.0590	0.0532	74.0	48.8-125	10.4	20	WG757749
2-Methylnaphthalene	mg/kg	0.0590	0.0516	74.0	45.7-131	13.2	20	WG757749
Acenaphthene	mg/kg	0.0566	0.0505	71.0	48.7-127	11.3	20	WG757749
Acenaphthylene	mg/kg	0.0570	0.0513	71.0	47.9-128	10.5	20	WG757749
Anthracene	mg/kg	0.0583	0.0521	73.0	51.3-136	11.1	20	WG757749
Benzo(a)anthracene	mg/kg	0.0569	0.0495	71.0	55-126	13.9	20	WG757749
Benzo(a)pyrene	mg/kg	0.0570	0.0505	71.0	51.9-127	12.2	20	WG757749
Benzo(b)fluoranthene	mg/kg	0.0544	0.0500	68.0	54-125	8.49	20	WG757749
Benzo(g,h,i)perylene	mg/kg	0.0559	0.0497	70.0	53.8-136	11.9	20	WG757749
Benzo(k)fluoranthene	mg/kg	0.0602	0.0509	75.0	53.9-132	16.6	20	WG757749
Chrysene	mg/kg	0.0570	0.0515	71.0	55.7-133	10.0	20	WG757749
Dibenz(a,h)anthracene	mg/kg	0.0619	0.0554	77.0	52.6-137	11.1	20	WG757749
Fluoranthene	mg/kg	0.0603	0.0564	75.0	54-132	6.58	20	WG757749
Fluorene	mg/kg	0.0583	0.0523	73.0	48.7-127	10.8	20	WG757749
Indeno(1,2,3-cd)pyrene	mg/kg	0.0604	0.0538	75.0	53.8-138	11.5	20	WG757749
Naphthalene	mg/kg	0.0555	0.0489	69.0	42-127	12.5	20	WG757749
Phenanthrene	mg/kg	0.0510	0.0467	64.0	49.6-126	8.81	20	WG757749
Pyrene	mg/kg	0.0549	0.0477	68.0	54-129	14.0	20	WG757749
2-Fluorobiphenyl				83.70	38.2-135			WG757749
Nitrobenzene-d5				97.20	28.4-151			WG757749
p-Terphenyl-d14				76.60	34.2-141			WG757749
Chromium, Hexavalent	mg/kg	160.	160.	86.0	80-120	0.0	20	WG757701
Specific Conductance	umhos/	778.	780.	102.	85-115	0.257	20	WG757968
Benzene	mg/kg	0.0564	0.0564	113.	70-130	0.0400	20	WG757433
Ethylbenzene	mg/kg	0.0550	0.0549	110.	70-130	0.150	20	WG757433
Toluene	mg/kg	0.0553	0.0553	111.	70-130	0.0500	20	WG757433
Total Xylene	mg/kg	0.165	0.165	110.	70-130	0.300	20	WG757433
a,a,a-Trifluorotoluene (FID)				98.50	59-128			WG757433
a,a,a-Trifluorotoluene (PID)				106.0	54-144			WG757433
Arsenic	mg/kg	101.	103.	101.	80-120	2.00	20	WG757730
Barium	mg/kg	102.	103.	102.	80-120	1.00	20	WG757730
Boron	mg/kg	98.7	99.3	99.0	80-120	1.00	20	WG757730
Cadmium	mg/kg	102.	103.	102.	80-120	1.00	20	WG757730
Chromium	mg/kg	100.	102.	100.	80-120	1.00	20	WG757730
Copper	mg/kg	95.7	97.4	96.0	80-120	2.00	20	WG757730
Lead	mg/kg	102.	104.	102.	80-120	2.00	20	WG757730
Nickel	mg/kg	95.8	97.6	96.0	80-120	2.00	20	WG757730
Selenium	mg/kg	99.0	101.	99.0	80-120	2.00	20	WG757730
Silver	mg/kg	92.7	81.6	93.0	80-120	13.0	20	WG757730
Zinc	mg/kg	99.6	101.	100.	80-120	1.00	20	WG757730
TPH (GC/FID) Low Fraction	mg/kg	4.91	4.66	89.0	63.5-137	5.23	20	WG757992
a,a,a-Trifluorotoluene (FID)				98.30	59-128			WG757992
Benzene	mg/kg	0.0584	0.0485	117.	70-130	18.5	20	WG757992
Ethylbenzene	mg/kg	0.0552	0.0470	110.	70-130	16.1	20	WG757992
Toluene	mg/kg	0.0554	0.0475	111.	70-130	15.3	20	WG757992
Total Xylene	mg/kg	0.165	0.142	110.	70-130	15.0	20	WG757992
a,a,a-Trifluorotoluene (PID)				101.0	54-144			WG757992

* Performance of this Analyte is outside of established criteria.

For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



YOUR LAB OF CHOICE

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

Denver, CO 80202

Quality Assurance Report
Level II

L736337

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

December 04, 2014

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
TPH (GC/FID) Low Fraction	mg/kg	4.99	4.94	91.0	63.5-137	1.05	20	WG758078
a,a,a-Trifluorotoluene(FID)				98.60	59-128			WG758078

Analyte	Units	Matrix Spike			% Rec	Limit	Ref Samp	Batch
		MS Res	Ref Res	TV				
Mercury	mg/kg	0.461	0.0263	.5	87.0	75-125	L736225-05	WG757703
1-Methylnaphthalene	mg/kg	0.0572	0.00601	.04	64.0	41.8-133	L736337-01	WG757749
2-Chloronaphthalene	mg/kg	0.0492	0.0	.04	62.0	42.4-129	L736337-01	WG757749
2-Methylnaphthalene	mg/kg	0.0626	0.0146	.04	60.0	37.5-137	L736337-01	WG757749
Acenaphthene	mg/kg	0.0466	0.0	.04	58.0	39.4-132	L736337-01	WG757749
Acenaphthylene	mg/kg	0.0491	0.0	.04	61.0	41.3-132	L736337-01	WG757749
Anthracene	mg/kg	0.0434	0.00265	.04	51.0	36.7-144	L736337-01	WG757749
Benzo(a)anthracene	mg/kg	0.0364	0.00167	.04	43.0	28-144	L736337-01	WG757749
Benzo(a)pyrene	mg/kg	0.0352	0.0	.04	44.0	23.8-147	L736337-01	WG757749
Benzo(b)fluoranthene	mg/kg	0.0313	0.00139	.04	37.0	18.2-147	L736337-01	WG757749
Benzo(g,h,i)perylene	mg/kg	0.0326	0.0	.04	41.0	9.2-155	L736337-01	WG757749
Benzo(k)fluoranthene	mg/kg	0.0369	0.0	.04	46.0	26.5-143	L736337-01	WG757749
Chrysene	mg/kg	0.0382	0.00162	.04	46.0	27.4-150	L736337-01	WG757749
Dibenz(a,h)anthracene	mg/kg	0.0394	0.0	.04	49.0	13.8-150	L736337-01	WG757749
Fluoranthene	mg/kg	0.0427	0.0	.04	53.0	23.2-158	L736337-01	WG757749
Fluorene	mg/kg	0.0512	0.00465	.04	58.0	30.8-139	L736337-01	WG757749
Indeno(1,2,3-cd)pyrene	mg/kg	0.0356	0.0	.04	44.0	10.7-155	L736337-01	WG757749
Naphthalene	mg/kg	0.0611	0.0116	.04	62.0	34.9-133	L736337-01	WG757749
Phenanthrene	mg/kg	0.0419	0.00562	.04	45.0	20.2-150	L736337-01	WG757749
Pyrene	mg/kg	0.0396	0.00319	.04	46.0	22.6-151	L736337-01	WG757749
2-Fluorobiphenyl					76.10	38.2-135		WG757749
Nitrobenzene-d5					95.50	28.4-151		WG757749
p-Terphenyl-d14					65.90	34.2-141		WG757749

Chromium,Hexavalent	mg/kg	18.3	0.0	20	92.0	75-125	L736200-01	WG757701
Benzene	mg/kg	0.273	0.000361	.05	110.	49.7-127	L735742-01	WG757433
Ethylbenzene	mg/kg	0.259	0.000356	.05	100.	40.8-141	L735742-01	WG757433
Toluene	mg/kg	0.264	0.000649	.05	100.	49.8-132	L735742-01	WG757433
Total Xylene	mg/kg	0.776	0.00144	.15	100.	41.2-140	L735742-01	WG757433
a,a,a-Trifluorotoluene(FID)					97.90	59-128		WG757433
a,a,a-Trifluorotoluene(PID)					105.0	54-144		WG757433
Arsenic	mg/kg	106.	4.09	100	100.	75-125	L736337-06	WG757730
Barium	mg/kg	353.	336.	100	17.0*	75-125	L736337-06	WG757730
Boron	mg/kg	111.	19.8	100	91.0	75-125	L736337-06	WG757730
Cadmium	mg/kg	98.1	0.468	100	98.0	75-125	L736337-06	WG757730
Chromium	mg/kg	138.	45.8	100	93.0	75-125	L736337-06	WG757730
Copper	mg/kg	119.	20.8	100	98.0	75-125	L736337-06	WG757730
Lead	mg/kg	111.	12.1	100	99.0	75-125	L736337-06	WG757730
Nickel	mg/kg	123.	30.1	100	92.0	75-125	L736337-06	WG757730
Selenium	mg/kg	99.3	1.48	100	98.0	75-125	L736337-06	WG757730
Silver	mg/kg	59.2	-0.287	100	59.0*	75-125	L736337-06	WG757730
Zinc	mg/kg	148.	52.5	100	96.0	75-125	L736337-06	WG757730

Benzene	mg/kg	0.240	0.000232	.05	96.0	49.7-127	L735658-05	WG757992
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Est. 1970

December 04, 2014

Analyte	Units	MS Res	Matrix Spike		% Rec	Limit	Ref Samp	Batch
			Ref Res	TV				
Ethylbenzene	mg/kg	0.221	0.000439	.05	88.0	40.8-141	L735658-05	WG757992
Toluene	mg/kg	0.221	0.00135	.05	88.0	49.8-132	L735658-05	WG757992
Total Xylene	mg/kg	0.628	0.00227	.15	83.0	41.2-140	L735658-05	WG757992
a,a,a-Trifluorotoluene(PID)					102.0	54-144		WG757992
TPH (GC/FID) Low Fraction	mg/kg	16.3	0.0686	5.5	59.0	28.5-138	L735658-05	WG757992
a,a,a-Trifluorotoluene(FID)					97.80	59-128		WG757992
TPH (GC/FID) Low Fraction	mg/kg	22.4	0.0680	5.5	81.0	28.5-138	L735957-20	WG758078
a,a,a-Trifluorotoluene(FID)					98.80	59-128		WG758078

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Mercury	mg/kg	0.478	0.461	90.4	75-125	4.00	20	L736225-05	WG757703
1-Methylnaphthalene	mg/kg	0.0649	0.0572	73.6	41.8-133	12.6	20.9	L736337-01	WG757749
2-Chloronaphthalene	mg/kg	0.0554	0.0492	69.3	42.4-129	11.9	20	L736337-01	WG757749
2-Methylnaphthalene	mg/kg	0.0699	0.0626	69.1	37.5-137	11.0	20.4	L736337-01	WG757749
Acenaphthene	mg/kg	0.0532	0.0466	66.5	39.4-132	13.2	20	L736337-01	WG757749
Acenaphthylene	mg/kg	0.0553	0.0491	69.1	41.3-132	11.9	20	L736337-01	WG757749
Anthracene	mg/kg	0.0509	0.0434	60.4	36.7-144	16.1	20.7	L736337-01	WG757749
Benzo(a)anthracene	mg/kg	0.0426	0.0364	51.1	28-144	15.6	24.7	L736337-01	WG757749
Benzo(a)pyrene	mg/kg	0.0396	0.0352	49.5	23.8-147	11.9	25.3	L736337-01	WG757749
Benzo(b)fluoranthene	mg/kg	0.0341	0.0313	40.9	18.2-147	8.79	29.5	L736337-01	WG757749
Benzo(g,h,i)perylene	mg/kg	0.0361	0.0326	45.1	9.2-155	10.1	29.2	L736337-01	WG757749
Benzo(k)fluoranthene	mg/kg	0.0409	0.0369	51.1	26.5-143	10.3	26.1	L736337-01	WG757749
Chrysene	mg/kg	0.0443	0.0382	53.4	27.4-150	14.8	25.7	L736337-01	WG757749
Dibenz(a,h)anthracene	mg/kg	0.0437	0.0394	54.6	13.8-150	10.3	25.8	L736337-01	WG757749
Fluoranthene	mg/kg	0.0501	0.0427	62.6	23.2-158	15.8	26	L736337-01	WG757749
Fluorene	mg/kg	0.0580	0.0512	66.7	30.8-139	12.5	20	L736337-01	WG757749
Indeno(1,2,3-cd)pyrene	mg/kg	0.0393	0.0356	49.1	10.7-155	9.75	26.9	L736337-01	WG757749
Naphthalene	mg/kg	0.0733	0.0611	77.1	34.9-133	18.3	20.4	L736337-01	WG757749
Phenanthrene	mg/kg	0.0495	0.0419	54.8	20.2-150	16.6	24.6	L736337-01	WG757749
Pyrene	mg/kg	0.0463	0.0396	54.0	22.6-151	15.8	25.1	L736337-01	WG757749
2-Fluorobiphenyl				83.90	38.2-135				WG757749
Nitrobenzene-d5				101.0	28.4-151				WG757749
p-Terphenyl-d14				77.10	34.2-141				WG757749
Chromium, Hexavalent	mg/kg	18.5	18.3	92.5	75-125	1.09	20	L736200-01	WG757701
Benzene	mg/kg	0.275	0.273	110.	49.7-127	0.590	23.5	L735742-01	WG757433
Ethylbenzene	mg/kg	0.261	0.259	104.	40.8-141	0.590	23.8	L735742-01	WG757433
Toluene	mg/kg	0.265	0.264	106.	49.8-132	0.520	23.5	L735742-01	WG757433
Total Xylene	mg/kg	0.781	0.776	104.	41.2-140	0.630	23.7	L735742-01	WG757433
a,a,a-Trifluorotoluene(FID)				98.20	59-128				WG757433
a,a,a-Trifluorotoluene(PID)				106.0	54-144				WG757433
Arsenic	mg/kg	103.	106.	99.3	75-125	3.00	20	L736337-06	WG757730
Barium	mg/kg	373.	353.	37.4*	75-125	6.00	20	L736337-06	WG757730
Boron	mg/kg	111.	111.	91.6	75-125	0.0	20	L736337-06	WG757730
Cadmium	mg/kg	98.2	98.1	97.8	75-125	0.0	20	L736337-06	WG757730
Chromium	mg/kg	141.	138.	95.5	75-125	2.00	20	L736337-06	WG757730
Copper	mg/kg	116.	119.	95.1	75-125	2.00	20	L736337-06	WG757730
Lead	mg/kg	108.	111.	96.2	75-125	2.00	20	L736337-06	WG757730

* Performance of this Analyte is outside of established criteria.

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Tax I.D. 62-0814289

Est. 1970

December 04, 2014

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Nickel	mg/kg	123.	123.	92.8	75-125	0.0	20	L736337-06	WG757730
Selenium	mg/kg	99.1	99.3	97.6	75-125	0.0	20	L736337-06	WG757730
Silver	mg/kg	39.5	59.2	39.8*	75-125	40.0*	20	L736337-06	WG757730
Zinc	mg/kg	149.	148.	96.3	75-125	0.0	20	L736337-06	WG757730
Benzene	mg/kg	0.247	0.240	98.8	49.7-127	3.07	23.5	L735658-05	WG757992
Ethylbenzene	mg/kg	0.226	0.221	90.2	40.8-141	2.02	23.8	L735658-05	WG757992
Toluene	mg/kg	0.226	0.221	90.0	49.8-132	2.36	23.5	L735658-05	WG757992
Total Xylene	mg/kg	0.643	0.628	85.5	41.2-140	2.48	23.7	L735658-05	WG757992
a,a,a-Trifluorotoluene(PID)				102.0	54-144				WG757992
TPH (GC/FID) Low Fraction	mg/kg	19.6	16.3	71.0	28.5-138	18.6	23.6	L735658-05	WG757992
a,a,a-Trifluorotoluene(FID)				97.80	59-128				WG757992
TPH (GC/FID) Low Fraction	mg/kg	21.6	22.4	78.3	28.5-138	3.71	23.6	L735957-20	WG758078
a,a,a-Trifluorotoluene(FID)				98.40	59-128				WG758078

Post Spike

Serial Dilution

Batch number /Run number / Sample number cross reference

WG757703: R3007805: L736337-01 02 03 04 05 06
WG757743: R3007855: L736337-01 02 03 04 05 06
WG757763: R3007869: L736337-01 02 03 04 05 06
WG757828: R3007938: L736337-01 02 03 04 05 06
WG757749: R3007997: L736337-01 02 03 04 05 06

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WG757757: R3008013 R3008095: L736337-01 02 03 04 05 06
WG757701: R3008059: L736337-01 02 03 04 05 06
WG757968: R3008117: L736337-01 02 03 04 05 06
WG757433: R3008135: L736337-05 06
WG757730: R3008153 R3008210: L736337-01 02 03 04 05 06
WG757992: R3008168: L736337-01 02 03 04
WG758078: R3008169: L736337-05 06

* * Calculations are performed prior to rounding of reported values.

* Performance of this Analyte is outside of established criteria.

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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.



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Dave Nicholson
Linn Energy - Denver, CO
1999 Broadway, Suite 3700
Denver, CO 80202

Report Summary

Friday May 29, 2015

Report Number: L766925

Samples Received: 05/22/15

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
Linn Energy - Denver, CO
1999 Broadway, Suite 3700
Denver, CO 80202

May 29, 2015

Date Received : May 22, 2015
Description : Pit and Landfarm Soil Sampling
Sample ID : OM I-02-P7
Collected By : DK Nicholson
Collection Date : 05/21/15 11:40

ESC Sample # : L766925-01

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	05/28/15	1
ORP	80.		mV	2580 B-2011	05/28/15	1
pH	9.2	0.10	su	9045D	05/27/15	1
Sodium Adsorption Ratio	5.7			Calc.	05/27/15	1
Specific Conductance	570		umhos/cm	9050AMod	05/26/15	1
Mercury	0.025	0.020	mg/kg	7471A	05/27/15	1
Arsenic	6.6	2.0	mg/kg	6010B	05/28/15	1
Barium	550	0.50	mg/kg	6010B	05/28/15	1
Boron	11.	10.	mg/kg	6010B	05/28/15	1
Cadmium	BDL	0.50	mg/kg	6010B	05/28/15	1
Chromium	46.	1.0	mg/kg	6010B	05/28/15	1
Copper	15.	2.0	mg/kg	6010B	05/28/15	1
Lead	11.	0.50	mg/kg	6010B	05/28/15	1
Nickel	25.	2.0	mg/kg	6010B	05/28/15	1
Selenium	BDL	2.0	mg/kg	6010B	05/28/15	1
Silver	BDL	1.0	mg/kg	6010B	05/28/15	1
Zinc	47.	5.0	mg/kg	6010B	05/28/15	1
Benzene	BDL	0.0025	mg/kg	8021	05/27/15	5
Toluene	BDL	0.025	mg/kg	8021	05/27/15	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	05/27/15	5
Total Xylene	BDL	0.0075	mg/kg	8021	05/27/15	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	05/27/15	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	108.		% Rec.	8015	05/27/15	1
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	05/27/15	1
Diesel and Oil Ranges						
C10-C28 Diesel Range	110	8.0	mg/kg	8015	05/26/15	2
C28-C40 Oil Range	36.	8.0	mg/kg	8015	05/26/15	2
Surrogate Recovery						
o-Terphenyl	89.1		% Rec.	8015	05/26/15	2
Polynuclear Aromatic Hydrocarbons						
Anthracene	0.013	0.0060	mg/kg	8270C-SIM	05/26/15	1
Acenaphthene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Acenaphthylene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Benzo(a)anthracene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L766925-01 (PH) - 9.2 at 20.7c



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REPORT OF ANALYSIS

Dave Nicholson
Linn Energy - Denver, CO
1999 Broadway, Suite 3700
Denver, CO 80202

May 29, 2015

Date Received : May 22, 2015
Description : Pit and Landfarm Soil Sampling
Sample ID : OM I-02-P7
Collected By : DK Nicholson
Collection Date : 05/21/15 11:40

ESC Sample # : L766925-01

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Benzo(b)fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Benzo(g,h,i)perylene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Benzo(k)fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Chrysene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Dibenz(a,h)anthracene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Fluorene	0.021	0.0060	mg/kg	8270C-SIM	05/26/15	1
Indeno(1,2,3-cd)pyrene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Naphthalene	0.022	0.020	mg/kg	8270C-SIM	05/26/15	1
Phenanthrene	0.022	0.0060	mg/kg	8270C-SIM	05/26/15	1
Pyrene	0.018	0.0060	mg/kg	8270C-SIM	05/26/15	1
1-Methylnaphthalene	BDL	0.020	mg/kg	8270C-SIM	05/26/15	1
2-Methylnaphthalene	0.039	0.020	mg/kg	8270C-SIM	05/26/15	1
2-Chloronaphthalene	BDL	0.020	mg/kg	8270C-SIM	05/26/15	1
Surrogate Recovery						
p-Terphenyl-d14	88.2		% Rec.	8270C-SIM	05/26/15	1
Nitrobenzene-d5	76.9		% Rec.	8270C-SIM	05/26/15	1
2-Fluorobiphenyl	69.3		% Rec.	8270C-SIM	05/26/15	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 05/29/15 16:36 Printed: 05/29/15 16:37
L766925-01 (PH) - 9.2 at 20.7c



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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Dave Nicholson
Linn Energy - Denver, CO
1999 Broadway, Suite 3700
Denver, CO 80202

May 29, 2015

Date Received : May 22, 2015
Description : Pit and Landfarm Soil Sampling
Sample ID : OM I-02-P8
Collected By : DK Nicholson
Collection Date : 05/21/15 11:50

ESC Sample # : L766925-02

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	05/28/15	1
ORP	70.		mV	2580 B-2011	05/28/15	1
pH	9.4	0.10	su	9045D	05/27/15	1
Sodium Adsorption Ratio	9.6			Calc.	05/27/15	1
Specific Conductance	530		umhos/cm	9050AMod	05/26/15	1
Mercury	BDL	0.020	mg/kg	7471A	05/27/15	1
Arsenic	3.8	2.0	mg/kg	6010B	05/28/15	1
Barium	330	0.50	mg/kg	6010B	05/28/15	1
Boron	11.	10.	mg/kg	6010B	05/28/15	1
Cadmium	BDL	0.50	mg/kg	6010B	05/28/15	1
Chromium	55.	1.0	mg/kg	6010B	05/28/15	1
Copper	12.	2.0	mg/kg	6010B	05/28/15	1
Lead	9.4	0.50	mg/kg	6010B	05/28/15	1
Nickel	24.	2.0	mg/kg	6010B	05/28/15	1
Selenium	BDL	2.0	mg/kg	6010B	05/28/15	1
Silver	BDL	1.0	mg/kg	6010B	05/28/15	1
Zinc	44.	5.0	mg/kg	6010B	05/28/15	1
Benzene	BDL	0.0025	mg/kg	8021	05/27/15	5
Toluene	BDL	0.025	mg/kg	8021	05/27/15	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	05/27/15	5
Total Xylene	BDL	0.0075	mg/kg	8021	05/27/15	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	05/27/15	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	110.		% Rec.	8015	05/27/15	1
a,a,a-Trifluorotoluene(PID)	103.		% Rec.	8021	05/27/15	1
Diesel and Oil Ranges						
C10-C28 Diesel Range	67.	16.	mg/kg	8015	05/26/15	4
C28-C40 Oil Range	19.	16.	mg/kg	8015	05/26/15	4
Surrogate Recovery						
o-Terphenyl	88.8		% Rec.	8015	05/26/15	4
Polynuclear Aromatic Hydrocarbons						
Anthracene	0.012	0.0060	mg/kg	8270C-SIM	05/26/15	1
Acenaphthene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Acenaphthylene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Benzo(a)anthracene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L766925-02 (PH) - 9.4 at 21.0c



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REPORT OF ANALYSIS

Dave Nicholson
Linn Energy - Denver, CO
1999 Broadway, Suite 3700
Denver, CO 80202

May 29, 2015

Date Received : May 22, 2015
Description : Pit and Landfarm Soil Sampling
Sample ID : OM I-02-P8
Collected By : DK Nicholson
Collection Date : 05/21/15 11:50

ESC Sample # : L766925-02

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Benzo(b)fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Benzo(g,h,i)perylene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Benzo(k)fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Chrysene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Dibenz(a,h)anthracene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Fluorene	0.019	0.0060	mg/kg	8270C-SIM	05/26/15	1
Indeno(1,2,3-cd)pyrene	BDL	0.0060	mg/kg	8270C-SIM	05/26/15	1
Naphthalene	BDL	0.020	mg/kg	8270C-SIM	05/26/15	1
Phenanthrene	0.020	0.0060	mg/kg	8270C-SIM	05/26/15	1
Pyrene	0.010	0.0060	mg/kg	8270C-SIM	05/26/15	1
1-Methylnaphthalene	BDL	0.020	mg/kg	8270C-SIM	05/26/15	1
2-Methylnaphthalene	0.028	0.020	mg/kg	8270C-SIM	05/26/15	1
2-Chloronaphthalene	BDL	0.020	mg/kg	8270C-SIM	05/26/15	1
Surrogate Recovery						
p-Terphenyl-d14	61.9		% Rec.	8270C-SIM	05/26/15	1
Nitrobenzene-d5	46.0		% Rec.	8270C-SIM	05/26/15	1
2-Fluorobiphenyl	64.7		% Rec.	8270C-SIM	05/26/15	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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L766925-02 (PH) - 9.4 at 21.0c



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Quality Assurance Report
Level II

L766925

May 29, 2015

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Specific Conductance	1.40	umhos/cm			WG791437	05/26/15 14:50
C10-C28 Diesel Range	< 4	mg/kg			WG791395	05/26/15 14:46
C28-C40 Oil Range	< 4	mg/kg			WG791395	05/26/15 14:46
o-Terphenyl		% Rec.	95.10	50-150	WG791395	05/26/15 14:46
1-Methylnaphthalene	< .02	mg/kg			WG791310	05/26/15 13:19
2-Chloronaphthalene	< .02	mg/kg			WG791310	05/26/15 13:19
2-Methylnaphthalene	< .02	mg/kg			WG791310	05/26/15 13:19
Acenaphthene	< .006	mg/kg			WG791310	05/26/15 13:19
Acenaphthylene	< .006	mg/kg			WG791310	05/26/15 13:19
Anthracene	< .006	mg/kg			WG791310	05/26/15 13:19
Benzo(a)anthracene	< .006	mg/kg			WG791310	05/26/15 13:19
Benzo(a)pyrene	< .006	mg/kg			WG791310	05/26/15 13:19
Benzo(b)fluoranthene	< .006	mg/kg			WG791310	05/26/15 13:19
Benzo(g,h,i)perylene	< .006	mg/kg			WG791310	05/26/15 13:19
Benzo(k)fluoranthene	< .006	mg/kg			WG791310	05/26/15 13:19
Chrysene	< .006	mg/kg			WG791310	05/26/15 13:19
Dibenz(a,h)anthracene	< .006	mg/kg			WG791310	05/26/15 13:19
Fluoranthene	< .006	mg/kg			WG791310	05/26/15 13:19
Fluorene	< .006	mg/kg			WG791310	05/26/15 13:19
Indeno(1,2,3-cd)pyrene	< .006	mg/kg			WG791310	05/26/15 13:19
Naphthalene	< .02	mg/kg			WG791310	05/26/15 13:19
Phenanthrene	< .006	mg/kg			WG791310	05/26/15 13:19
Pyrene	< .006	mg/kg			WG791310	05/26/15 13:19
2-Fluorobiphenyl		% Rec.	61.40	40.6-122	WG791310	05/26/15 13:19
Nitrobenzene-d5		% Rec.	53.90	22.1-146	WG791310	05/26/15 13:19
p-Terphenyl-d14		% Rec.	59.20	32.2-131	WG791310	05/26/15 13:19
Mercury	< .02	mg/kg			WG791407	05/27/15 08:23
Benzene	< .0005	mg/kg			WG791271	05/27/15 09:06
Ethylbenzene	< .0005	mg/kg			WG791271	05/27/15 09:06
Toluene	< .005	mg/kg			WG791271	05/27/15 09:06
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG791271	05/27/15 09:06
Total Xylene	< .0015	mg/kg			WG791271	05/27/15 09:06
a,a,a-Trifluorotoluene(FID)		% Rec.	111.0	59-128	WG791271	05/27/15 09:06
a,a,a-Trifluorotoluene(PID)		% Rec.	103.0	54-144	WG791271	05/27/15 09:06
Arsenic	< 2	mg/kg			WG791725	05/28/15 02:14
Barium	< .5	mg/kg			WG791725	05/28/15 02:14
Boron	< 10	mg/kg			WG791725	05/28/15 02:14
Cadmium	< .5	mg/kg			WG791725	05/28/15 02:14
Chromium	< 1	mg/kg			WG791725	05/28/15 02:14
Copper	< 2	mg/kg			WG791725	05/28/15 02:14
Lead	< .5	mg/kg			WG791725	05/28/15 02:14
Nickel	< 2	mg/kg			WG791725	05/28/15 02:14
Selenium	< 2	mg/kg			WG791725	05/28/15 02:14
Silver	< 1	mg/kg			WG791725	05/28/15 02:14
Zinc	< 5	mg/kg			WG791725	05/28/15 02:14
Chromium,Hexavalent	< 2	mg/kg			WG791117	05/28/15 05:06

* Performance of this Analyte is outside of established criteria.

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Quality Assurance Report
Level II

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Est. 1970

May 29, 2015

Analyte	Units	Duplicate		RPD	Limit	Ref Samp	Batch
		Result	Duplicate				
Specific Conductance	umhos/cm	770.	770.	0.518	20	L766923-01	WG791437
Specific Conductance	umhos/cm	68.0	68.0	0.0	20	L767102-04	WG791437
pH	su	5.50	5.50	0.547	1	L766837-01	WG791116
pH	su	2.40	2.40	0.418	1	L766992-03	WG791116
Chromium, Hexavalent	mg/kg	0.0	0.0	0.0	20	L766923-01	WG791117
ORP	mV	110.	110.	2.76	20	L766227-04	WG791753
ORP	mV	78.0	80.0	2.53	20	L766982-02	WG791753

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Specific Conductance	umhos/cm	534	550.	103.	85-115	WG791437
C10-C28 Diesel Range	mg/kg	60	40.8	68.0	50-100	WG791395
o-Terphenyl				92.50	50-150	WG791395
1-Methylnaphthalene	mg/kg	.08	0.0599	74.9	50.6-122	WG791310
2-Chloronaphthalene	mg/kg	.08	0.0549	68.7	53.9-121	WG791310
2-Methylnaphthalene	mg/kg	.08	0.0580	72.5	50.4-120	WG791310
Acenaphthene	mg/kg	.08	0.0531	66.3	52.4-120	WG791310
Acenaphthylene	mg/kg	.08	0.0548	68.5	49.6-120	WG791310
Anthracene	mg/kg	.08	0.0592	74.0	50.3-130	WG791310
Benzo(a)anthracene	mg/kg	.08	0.0578	72.2	46.7-125	WG791310
Benzo(a)pyrene	mg/kg	.08	0.0576	72.0	42.3-119	WG791310
Benzo(b)fluoranthene	mg/kg	.08	0.0544	67.9	43.6-124	WG791310
Benzo(g,h,i)perylene	mg/kg	.08	0.0591	73.8	45.1-132	WG791310
Benzo(k)fluoranthene	mg/kg	.08	0.0536	67.0	46.1-131	WG791310
Chrysene	mg/kg	.08	0.0582	72.7	49.5-131	WG791310
Dibenz(a,h)anthracene	mg/kg	.08	0.0585	73.1	44.8-133	WG791310
Fluoranthene	mg/kg	.08	0.0596	74.5	49.3-128	WG791310
Fluorene	mg/kg	.08	0.0525	65.6	50.6-121	WG791310
Indeno(1,2,3-cd)pyrene	mg/kg	.08	0.0594	74.2	46.1-135	WG791310
Naphthalene	mg/kg	.08	0.0562	70.2	49.6-115	WG791310
Phenanthrene	mg/kg	.08	0.0514	64.3	48.8-121	WG791310
Pyrene	mg/kg	.08	0.0633	79.2	44.7-130	WG791310
2-Fluorobiphenyl				64.10	40.6-122	WG791310
Nitrobenzene-d5				55.60	22.1-146	WG791310
p-Terphenyl-d14				59.20	32.2-131	WG791310
Mercury	mg/kg	.3	0.273	91.0	80-120	WG791407
Benzene	mg/kg	.05	0.0519	104.	70-130	WG791271
Ethylbenzene	mg/kg	.05	0.0535	107.	70-130	WG791271
Toluene	mg/kg	.05	0.0524	105.	70-130	WG791271
Total Xylene	mg/kg	.15	0.161	107.	70-130	WG791271
a,a,a-Trifluorotoluene(PID)				111.0	54-144	WG791271
TPH (GC/FID) Low Fraction	mg/kg	5.5	6.26	114.	63.5-137	WG791271
a,a,a-Trifluorotoluene(FID)				111.0	59-128	WG791271

* Performance of this Analyte is outside of established criteria.
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May 29, 2015

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
pH	su	7.84	7.76	99.0	98.3-101.7	WG791116
Arsenic	mg/kg	100	102.	102.	80-120	WG791725
Barium	mg/kg	100	103.	103.	80-120	WG791725
Boron	mg/kg	100	99.4	99.0	80-120	WG791725
Cadmium	mg/kg	100	99.9	100.	80-120	WG791725
Chromium	mg/kg	100	106.	106.	80-120	WG791725
Copper	mg/kg	100	96.4	96.0	80-120	WG791725
Lead	mg/kg	100	103.	103.	80-120	WG791725
Nickel	mg/kg	100	101.	101.	80-120	WG791725
Selenium	mg/kg	100	104.	104.	80-120	WG791725
Silver	mg/kg	100	99.2	99.0	80-120	WG791725
Zinc	mg/kg	100	99.8	100.	80-120	WG791725
Chromium, Hexavalent	mg/kg	59.8	62.2	104.	80-120	WG791117
ORP	mV	100	107.	107.	90-110	WG791753

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Specific Conductance	umhos/	550.	550.	103.	85-115	0.0	20	WG791437
C10-C28 Diesel Range	mg/kg	43.1	40.8	72.0	50-100	5.51	20	WG791395
o-Terphenyl				96.80	50-150			WG791395
1-Methylnaphthalene	mg/kg	0.0603	0.0599	75.0	50.6-122	0.710	20	WG791310
2-Chloronaphthalene	mg/kg	0.0555	0.0549	69.0	53.9-121	1.11	20	WG791310
2-Methylnaphthalene	mg/kg	0.0584	0.0580	73.0	50.4-120	0.640	20	WG791310
Acenaphthene	mg/kg	0.0539	0.0531	67.0	52.4-120	1.59	20	WG791310
Acenaphthylene	mg/kg	0.0558	0.0548	70.0	49.6-120	1.85	20	WG791310
Anthracene	mg/kg	0.0591	0.0592	74.0	50.3-130	0.130	20	WG791310
Benzo(a)anthracene	mg/kg	0.0574	0.0578	72.0	46.7-125	0.570	20	WG791310
Benzo(a)pyrene	mg/kg	0.0572	0.0576	72.0	42.3-119	0.720	20	WG791310
Benzo(b)fluoranthene	mg/kg	0.0591	0.0544	74.0	43.6-124	8.30	20	WG791310
Benzo(g,h,i)perylene	mg/kg	0.0617	0.0591	77.0	45.1-132	4.40	20	WG791310
Benzo(k)fluoranthene	mg/kg	0.0547	0.0536	68.0	46.1-131	1.99	20	WG791310
Chrysene	mg/kg	0.0582	0.0582	73.0	49.5-131	0.0500	20	WG791310
Dibenz(a,h)anthracene	mg/kg	0.0586	0.0585	73.0	44.8-133	0.270	20	WG791310
Fluoranthene	mg/kg	0.0591	0.0596	74.0	49.3-128	0.770	20	WG791310
Fluorene	mg/kg	0.0531	0.0525	66.0	50.6-121	1.12	20	WG791310
Indeno(1,2,3-cd)pyrene	mg/kg	0.0593	0.0594	74.0	46.1-135	0.0900	20	WG791310
Naphthalene	mg/kg	0.0565	0.0562	70.0	49.6-115	0.520	20	WG791310
Phenanthrene	mg/kg	0.0521	0.0514	65.0	48.8-121	1.24	20	WG791310
Pyrene	mg/kg	0.0630	0.0633	79.0	44.7-130	0.580	20	WG791310
2-Fluorobiphenyl				67.60	40.6-122			WG791310
Nitrobenzene-d5				59.70	22.1-146			WG791310
p-Terphenyl-d14				61.60	32.2-131			WG791310
Mercury	mg/kg	0.269	0.273	90.0	80-120	2.00	20	WG791407
Benzene	mg/kg	0.0499	0.0519	100.	70-130	4.06	20	WG791271

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Quality Assurance Report
Level II

L766925

May 29, 2015

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Ethylbenzene	mg/kg	0.0514	0.0535	103.	70-130	3.92	20	WG791271
Toluene	mg/kg	0.0504	0.0524	101.	70-130	3.92	20	WG791271
Total Xylene	mg/kg	0.153	0.161	102.	70-130	4.76	20	WG791271
a,a,a-Trifluorotoluene(PID)				109.0	54-144			WG791271
TPH (GC/FID) Low Fraction	mg/kg	6.10	6.26	111.	63.5-137	2.58	20	WG791271
a,a,a-Trifluorotoluene(FID)				111.0	59-128			WG791271
pH	su	7.77	7.76	99.0	98.3-101.7	0.129	20	WG791116
Arsenic	mg/kg	92.3	102.	92.0	80-120	10.0	20	WG791725
Barium	mg/kg	94.5	103.	94.0	80-120	9.00	20	WG791725
Boron	mg/kg	91.0	99.4	91.0	80-120	9.00	20	WG791725
Cadmium	mg/kg	90.9	99.9	91.0	80-120	9.00	20	WG791725
Chromium	mg/kg	96.0	106.	96.0	80-120	10.0	20	WG791725
Copper	mg/kg	88.1	96.4	88.0	80-120	9.00	20	WG791725
Lead	mg/kg	93.3	103.	93.0	80-120	10.0	20	WG791725
Nickel	mg/kg	91.3	101.	91.0	80-120	10.0	20	WG791725
Selenium	mg/kg	94.0	104.	94.0	80-120	10.0	20	WG791725
Silver	mg/kg	90.6	99.2	90.0	80-120	9.00	20	WG791725
Zinc	mg/kg	90.4	99.8	90.0	80-120	10.0	20	WG791725
Chromium,Hexavalent	mg/kg	62.4	62.2	104.	80-120	0.321	20	WG791117
ORP	mV	108.	107.	108.	90-110	0.930	20	WG791753

Analyte	Units	Matrix Spike			% Rec	Limit	Ref Samp	Batch
		MS Res	Ref Res	TV				
1-Methylnaphthalene	mg/kg	0.0587	0.0	.08	73.0	28.4-137	L766765-01	WG791310
2-Chloronaphthalene	mg/kg	0.0538	0.0	.08	67.0	38.6-126	L766765-01	WG791310
2-Methylnaphthalene	mg/kg	0.0569	0.0	.08	71.0	26.6-137	L766765-01	WG791310
Acenaphthene	mg/kg	0.0526	0.0	.08	66.0	31.9-130	L766765-01	WG791310
Acenaphthylene	mg/kg	0.0534	0.0	.08	67.0	33.7-129	L766765-01	WG791310
Anthracene	mg/kg	0.0586	0.0	.08	73.0	26.5-141	L766765-01	WG791310
Benzo(a)anthracene	mg/kg	0.0562	0.0	.08	70.0	18.3-136	L766765-01	WG791310
Benzo(a)pyrene	mg/kg	0.0577	0.0	.08	72.0	16.9-135	L766765-01	WG791310
Benzo(b)fluoranthene	mg/kg	0.0578	0.0	.08	72.0	10-134	L766765-01	WG791310
Benzo(g,h,i)perylene	mg/kg	0.0336	0.0	.08	42.0	14.1-140	L766765-01	WG791310
Benzo(k)fluoranthene	mg/kg	0.0625	0.0	.08	78.0	18.2-138	L766765-01	WG791310
Chrysene	mg/kg	0.0582	0.0	.08	73.0	17.1-145	L766765-01	WG791310
Dibenz(a,h)anthracene	mg/kg	0.0352	0.0	.08	44.0	18.5-138	L766765-01	WG791310
Fluoranthene	mg/kg	0.0573	0.0	.08	72.0	15.4-144	L766765-01	WG791310
Fluorene	mg/kg	0.0501	0.0	.08	63.0	23.5-136	L766765-01	WG791310
Indeno(1,2,3-cd)pyrene	mg/kg	0.0352	0.0	.08	44.0	14.5-142	L766765-01	WG791310
Naphthalene	mg/kg	0.0552	0.0	.08	69.0	29.2-128	L766765-01	WG791310
Phenanthrene	mg/kg	0.0505	0.0	.08	63.0	20.1-134	L766765-01	WG791310
Pyrene	mg/kg	0.0658	0.0	.08	82.0	11-148	L766765-01	WG791310
2-Fluorobiphenyl					66.90	40.6-122		WG791310
Nitrobenzene-d5					44.70	22.1-146		WG791310
p-Terphenyl-d14					64.10	32.2-131		WG791310
Mercury	mg/kg	0.289	0.0249	.3	88.0	75-125	L766925-01	WG791407

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Analyte	Units	MS Res	Matrix Spike		% Rec	Limit	Ref Samp	Batch
			Ref Res	TV				
Arsenic	mg/kg	105.	0.477	100	100.	75-125	L766921-05	WG791725
Barium	mg/kg	118.	4.61	100	110.	75-125	L766921-05	WG791725
Boron	mg/kg	103.	3.03	100	100.	75-125	L766921-05	WG791725
Cadmium	mg/kg	102.	0.0308	100	100.	75-125	L766921-05	WG791725
Chromium	mg/kg	117.	4.81	100	110.	75-125	L766921-05	WG791725
Copper	mg/kg	103.	0.0452	100	100.	75-125	L766921-05	WG791725
Lead	mg/kg	110.	2.82	100	110.	75-125	L766921-05	WG791725
Nickel	mg/kg	105.	1.22	100	100.	75-125	L766921-05	WG791725
Selenium	mg/kg	106.	0.427	100	110.	75-125	L766921-05	WG791725
Silver	mg/kg	103.	0.225	100	100.	75-125	L766921-05	WG791725
Zinc	mg/kg	102.	8.32	100	94.0	75-125	L766921-05	WG791725
Chromium,Hexavalent	mg/kg	19.8	0.0	20	99.0	75-125	L766923-01	WG791117
Benzene	mg/kg	0.230	0.0	.05	92.0	49.7-127	L766925-01	WG791271
Ethylbenzene	mg/kg	0.188	0.0	.05	75.0	40.8-141	L766925-01	WG791271
Toluene	mg/kg	0.216	0.0	.05	86.0	49.8-132	L766925-01	WG791271
Total Xylene	mg/kg	0.621	0.000731	.15	83.0	41.2-140	L766925-01	WG791271
a,a,a-Trifluorotoluene(FID)					110.0	59-128		WG791271
a,a,a-Trifluorotoluene(PID)					109.0	54-144		WG791271
TPH (GC/FID) Low Fraction	mg/kg	22.0	0.0	5.5	80.0	28.5-138	L766925-01	WG791271
a,a,a-Trifluorotoluene(FID)					109.0	59-128		WG791271
a,a,a-Trifluorotoluene(PID)					116.0	54-144		WG791271

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
1-Methylnaphthalene	mg/kg	0.0556	0.0587	69.4	28.4-137	5.52	20	L766765-01	WG791310
2-Chloronaphthalene	mg/kg	0.0509	0.0538	63.7	38.6-126	5.50	20	L766765-01	WG791310
2-Methylnaphthalene	mg/kg	0.0537	0.0569	67.1	26.6-137	5.79	20	L766765-01	WG791310
Acenaphthene	mg/kg	0.0494	0.0526	61.7	31.9-130	6.38	20	L766765-01	WG791310
Acenaphthylene	mg/kg	0.0500	0.0534	62.5	33.7-129	6.55	20	L766765-01	WG791310
Anthracene	mg/kg	0.0544	0.0586	68.0	26.5-141	7.35	21.2	L766765-01	WG791310
Benzo(a)anthracene	mg/kg	0.0526	0.0562	65.7	18.3-136	6.62	24.6	L766765-01	WG791310
Benzo(a)pyrene	mg/kg	0.0535	0.0577	66.8	16.9-135	7.70	25.2	L766765-01	WG791310
Benzo(b)fluoranthene	mg/kg	0.0548	0.0578	68.5	10-134	5.41	30.9	L766765-01	WG791310
Benzo(g,h,i)perylene	mg/kg	0.0255	0.0336	31.8	14.1-140	27.5*	25.5	L766765-01	WG791310
Benzo(k)fluoranthene	mg/kg	0.0617	0.0625	77.1	18.2-138	1.25	25.6	L766765-01	WG791310
Chrysene	mg/kg	0.0549	0.0582	68.6	17.1-145	5.75	24.2	L766765-01	WG791310
Dibenz(a,h)anthracene	mg/kg	0.0257	0.0352	32.1	18.5-138	31.2*	24.3	L766765-01	WG791310
Fluoranthene	mg/kg	0.0540	0.0573	67.4	15.4-144	5.95	27.1	L766765-01	WG791310
Fluorene	mg/kg	0.0467	0.0501	58.3	23.5-136	7.17	20	L766765-01	WG791310
Indeno(1,2,3-cd)pyrene	mg/kg	0.0263	0.0352	32.8	14.5-142	29.1*	25.8	L766765-01	WG791310
Naphthalene	mg/kg	0.0523	0.0552	65.3	29.2-128	5.53	20	L766765-01	WG791310
Phenanthrene	mg/kg	0.0479	0.0505	59.9	20.1-134	5.32	23.6	L766765-01	WG791310
Pyrene	mg/kg	0.0614	0.0658	76.8	11-148	6.91	26.1	L766765-01	WG791310
2-Fluorobiphenyl				63.50	40.6-122				WG791310
Nitrobenzene-d5				44.20	22.1-146				WG791310
p-Terphenyl-d14				60.60	32.2-131				WG791310
Mercury	mg/kg	0.288	0.289	87.6	75-125	1.00	20	L766925-01	WG791407
Arsenic	mg/kg	99.5	105.	99.0	75-125	6.00	20	L766921-05	WG791725
Barium	mg/kg	114.	118.	110.	75-125	3.00	20	L766921-05	WG791725
Boron	mg/kg	101.	103.	98.4	75-125	1.00	20	L766921-05	WG791725

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Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Cadmium	mg/kg	101.	102.	101.	75-125	2.00	20	L766921-05	WG791725
Chromium	mg/kg	110.	117.	105.	75-125	6.00	20	L766921-05	WG791725
Copper	mg/kg	101.	103.	101.	75-125	2.00	20	L766921-05	WG791725
Lead	mg/kg	105.	110.	102.	75-125	5.00	20	L766921-05	WG791725
Nickel	mg/kg	99.8	105.	98.6	75-125	5.00	20	L766921-05	WG791725
Selenium	mg/kg	102.	106.	101.	75-125	4.00	20	L766921-05	WG791725
Silver	mg/kg	101.	103.	101.	75-125	2.00	20	L766921-05	WG791725
Zinc	mg/kg	101.	102.	92.3	75-125	1.00	20	L766921-05	WG791725
Chromium,Hexavalent	mg/kg	19.6	19.8	97.8	75-125	1.02	20	L766923-01	WG791117
Benzene	mg/kg	0.247	0.230	98.9	49.7-127	7.41	23.5	L766925-01	WG791271
Ethylbenzene	mg/kg	0.193	0.188	77.1	40.8-141	2.23	23.8	L766925-01	WG791271
Toluene	mg/kg	0.231	0.216	92.6	49.8-132	6.89	23.5	L766925-01	WG791271
Total Xylene	mg/kg	0.662	0.621	88.2	41.2-140	6.39	23.7	L766925-01	WG791271
a,a,a-Trifluorotoluene(FID)				109.0	59-128				WG791271
a,a,a-Trifluorotoluene(PID)				108.0	54-144				WG791271
TPH (GC/FID) Low Fraction	mg/kg	20.9	22.0	76.0	28.5-138	5.10	23.6	L766925-01	WG791271
a,a,a-Trifluorotoluene(FID)				108.0	59-128				WG791271
a,a,a-Trifluorotoluene(PID)				117.0	54-144				WG791271

Post Spike

Serial Dilution

Batch number /Run number / Sample number cross reference

WG791437: R3039290: L766925-01 02

WG791395: R3039348: L766925-01 02

WG791310: R3039378 R3039379 R3039699: L766925-01 02

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WG791409: R3039482: L766925-01 02
WG791407: R3039487: L766925-01 02
WG791271: R3039562: L766925-01 02
WG791116: R3039626: L766925-01 02
WG791725: R3039677: L766925-01 02
WG791117: R3039678: L766925-01 02
WG791753: R3039889: L766925-01 02

* * 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.