



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

Tuesday November 11, 2014

Report Number: L731355

Samples Received: 11/04/14

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

November 11, 2014

Date Received : November 04, 2014  
Description : Pit Reclamation  
Sample ID : O-36B  
Collected By : DK Nicholson  
Collection Date : 11/01/14 12:00

ESC Sample # : L731355-07

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	11/06/14	1
ORP	62.		mV	2580 B-2011	11/06/14	1
pH	11.		su	9045D	11/05/14	1
Sodium Adsorption Ratio	16.			Calc.	11/11/14	1
Specific Conductance	2700		umhos/cm	9050AMod	11/06/14	1
Mercury	0.020	0.020	mg/kg	7471	11/05/14	1
Arsenic	10.	2.0	mg/kg	6010B	11/10/14	1
Barium	5800	0.50	mg/kg	6010B	11/10/14	1
Boron	23.	10.	mg/kg	6010B	11/10/14	1
Cadmium	BDL	0.50	mg/kg	6010B	11/10/14	1
Chromium	16.	1.0	mg/kg	6010B	11/10/14	1
Copper	17.	2.0	mg/kg	6010B	11/10/14	1
Lead	16.	0.50	mg/kg	6010B	11/10/14	1
Nickel	14.	2.0	mg/kg	6010B	11/10/14	1
Selenium	BDL	2.0	mg/kg	6010B	11/10/14	1
Silver	BDL	1.0	mg/kg	6010B	11/10/14	1
Zinc	62.	5.0	mg/kg	6010B	11/10/14	1
Benzene	BDL	0.0025	mg/kg	8021	11/08/14	5
Toluene	BDL	0.025	mg/kg	8021	11/08/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	11/08/14	5
Total Xylene	0.014	0.0075	mg/kg	8021	11/08/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	11/08/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	94.1		% Rec.	8015	11/08/14	5
a,a,a-Trifluorotoluene(PID)	102.		% Rec.	8021	11/08/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	1800	40.	mg/kg	8015	11/10/14	10
C28-C40 Oil Range	60.	40.	mg/kg	8015	11/10/14	10
Surrogate Recovery						
o-Terphenyl	103.		% Rec.	8015	11/10/14	10
Polynuclear Aromatic Hydrocarbons						
Anthracene	0.070	0.012	mg/kg	8270C-SIM	11/07/14	2
Acenaphthene	0.16	0.012	mg/kg	8270C-SIM	11/07/14	2
Acenaphthylene	0.032	0.012	mg/kg	8270C-SIM	11/07/14	2
Benzo(a)anthracene	BDL	0.012	mg/kg	8270C-SIM	11/07/14	2

BDL - Below Detection Limit  
Det. Limit - Practical Quantitation Limit(PQL)  
L731355-07 (PH) - 11@21.1c



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November 11, 2014

Date Received : November 04, 2014  
Description : Pit Reclamation  
Sample ID : O-36B  
Collected By : DK Nicholson  
Collection Date : 11/01/14 12:00

ESC Sample # : L731355-07

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	BDL	0.012	mg/kg	8270C-SIM	11/07/14	2
Benzo(b)fluoranthene	BDL	0.012	mg/kg	8270C-SIM	11/07/14	2
Benzo(g,h,i)perylene	0.012	0.012	mg/kg	8270C-SIM	11/07/14	2
Benzo(k)fluoranthene	BDL	0.012	mg/kg	8270C-SIM	11/07/14	2
Chrysene	0.025	0.012	mg/kg	8270C-SIM	11/07/14	2
Dibenz(a,h)anthracene	BDL	0.012	mg/kg	8270C-SIM	11/07/14	2
Fluoranthene	0.025	0.012	mg/kg	8270C-SIM	11/07/14	2
Fluorene	0.17	0.012	mg/kg	8270C-SIM	11/07/14	2
Indeno(1,2,3-cd)pyrene	BDL	0.012	mg/kg	8270C-SIM	11/07/14	2
Naphthalene	0.50	0.040	mg/kg	8270C-SIM	11/07/14	2
Phenanthrene	0.70	0.012	mg/kg	8270C-SIM	11/07/14	2
Pyrene	0.23	0.012	mg/kg	8270C-SIM	11/07/14	2
1-Methylnaphthalene	1.0	0.040	mg/kg	8270C-SIM	11/07/14	2
2-Methylnaphthalene	1.4	0.040	mg/kg	8270C-SIM	11/07/14	2
2-Chloronaphthalene	BDL	0.040	mg/kg	8270C-SIM	11/07/14	2
Surrogate Recovery						
p-Terphenyl-d14	83.4		% Rec.	8270C-SIM	11/07/14	2
Nitrobenzene-d5	126.		% Rec.	8270C-SIM	11/07/14	2
2-Fluorobiphenyl	72.1		% Rec.	8270C-SIM	11/07/14	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: 11/11/14 15:47 Printed: 11/11/14 15:48  
L731355-07 (PH) - 11@21.1c

Attachment A  
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L731355-01	WG753207	SAMP	Barium	R3003531	01V

Attachment B  
Explanation of QC Qualifier Codes

Qualifier	Meaning
01	(ESC) The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
V	(ESC) - Additional QC Info: The sample concentration is too high to evaluate accurate spike recoveries.

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.

Summary of Remarks For Samples Printed  
11/11/14 at 15:48:48

TSR Signing Reports: 134  
R5 - Desired TAT

Always log As, Cd, Cr, Cu, Ni, Pb, Se, Ag, & Zn GW by 6020 Log all PAHs by 8270-SIM

Sample: L731355-01 Account: BERPETDCO Received: 11/04/14 09:00 Due Date: 11/11/14 00:00 RPT Date: 11/11/14 15:47

Sample: L731355-02 Account: BERPETDCO Received: 11/04/14 09:00 Due Date: 11/11/14 00:00 RPT Date: 11/11/14 15:47

Sample: L731355-03 Account: BERPETDCO Received: 11/04/14 09:00 Due Date: 11/11/14 00:00 RPT Date: 11/11/14 15:47

Sample: L731355-04 Account: BERPETDCO Received: 11/04/14 09:00 Due Date: 11/11/14 00:00 RPT Date: 11/11/14 15:47

Sample: L731355-05 Account: BERPETDCO Received: 11/04/14 09:00 Due Date: 11/11/14 00:00 RPT Date: 11/11/14 15:47

Sample: L731355-06 Account: BERPETDCO Received: 11/04/14 09:00 Due Date: 11/11/14 00:00 RPT Date: 11/11/14 15:47

Sample: L731355-07 Account: BERPETDCO Received: 11/04/14 09:00 Due Date: 11/11/14 00:00 RPT Date: 11/11/14 15:47

Sample: L731355-08 Account: BERPETDCO Received: 11/04/14 09:00 Due Date: 11/11/14 00:00 RPT Date: 11/11/14 15:47

Sample: L731355-09 Account: BERPETDCO Received: 11/04/14 09:00 Due Date: 11/11/14 00:00 RPT Date: 11/11/14 15:47



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Level II

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November 11, 2014

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Mercury	< .02	mg/kg			WG752659	11/05/14 10:24
Specific Conductance	1.80	umhos/cm			WG752716	11/05/14 17:10
Chromium, Hexavalent	< 2	mg/kg			WG752636	11/06/14 10:06
Specific Conductance	1.20	umhos/cm			WG752819	11/06/14 10:31
C10-C28 Diesel Range	< 4	mg/kg			WG752693	11/06/14 08:06
C28-C40 Oil Range	< 4	mg/kg			WG752693	11/06/14 08:06
o-Terphenyl		% Rec.	89.60	50-150	WG752693	11/06/14 08:06
Benzene	< .0005	mg/kg			WG753113	11/08/14 20:58
Ethylbenzene	< .0005	mg/kg			WG753113	11/08/14 20:58
Toluene	< .005	mg/kg			WG753113	11/08/14 20:58
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG753113	11/08/14 20:58
Total Xylene	< .0015	mg/kg			WG753113	11/08/14 20:58
a,a,a-Trifluorotoluene(FID)		% Rec.	94.70	59-128	WG753113	11/08/14 20:58
a,a,a-Trifluorotoluene(PID)		% Rec.	102.0	54-144	WG753113	11/08/14 20:58
1-Methylnaphthalene	< .02	mg/kg			WG753074	11/07/14 10:47
2-Chloronaphthalene	< .02	mg/kg			WG753074	11/07/14 10:47
2-Methylnaphthalene	< .02	mg/kg			WG753074	11/07/14 10:47
Acenaphthene	< .006	mg/kg			WG753074	11/07/14 10:47
Acenaphthylene	< .006	mg/kg			WG753074	11/07/14 10:47
Anthracene	< .006	mg/kg			WG753074	11/07/14 10:47
Benzo(a)anthracene	< .006	mg/kg			WG753074	11/07/14 10:47
Benzo(a)pyrene	< .006	mg/kg			WG753074	11/07/14 10:47
Benzo(b)fluoranthene	< .006	mg/kg			WG753074	11/07/14 10:47
Benzo(g,h,i)perylene	< .006	mg/kg			WG753074	11/07/14 10:47
Benzo(k)fluoranthene	< .006	mg/kg			WG753074	11/07/14 10:47
Chrysene	< .006	mg/kg			WG753074	11/07/14 10:47
Dibenz(a,h)anthracene	< .006	mg/kg			WG753074	11/07/14 10:47
Fluoranthene	< .006	mg/kg			WG753074	11/07/14 10:47
Fluorene	< .006	mg/kg			WG753074	11/07/14 10:47
Indeno(1,2,3-cd)pyrene	< .006	mg/kg			WG753074	11/07/14 10:47
Naphthalene	< .02	mg/kg			WG753074	11/07/14 10:47
Phenanthrene	< .006	mg/kg			WG753074	11/07/14 10:47
Pyrene	< .006	mg/kg			WG753074	11/07/14 10:47
2-Fluorobiphenyl		% Rec.	83.30	38.2-135	WG753074	11/07/14 10:47
Nitrobenzene-d5		% Rec.	77.20	28.4-151	WG753074	11/07/14 10:47
p-Terphenyl-d14		% Rec.	96.10	34.2-141	WG753074	11/07/14 10:47
Benzene	< .0005	mg/kg			WG752647	11/08/14 20:37
Ethylbenzene	< .0005	mg/kg			WG752647	11/08/14 20:37
Toluene	< .005	mg/kg			WG752647	11/08/14 20:37
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG752647	11/08/14 20:37
Total Xylene	< .0015	mg/kg			WG752647	11/08/14 20:37
a,a,a-Trifluorotoluene(FID)		% Rec.	104.0	59-128	WG752647	11/08/14 20:37
a,a,a-Trifluorotoluene(PID)		% Rec.	105.0	54-144	WG752647	11/08/14 20:37

\* 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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Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Arsenic	< 2	mg/kg			WG753207	11/10/14 15:10
Barium	< .5	mg/kg			WG753207	11/10/14 15:10
Boron	< 10	mg/kg			WG753207	11/10/14 15:10
Cadmium	< .5	mg/kg			WG753207	11/10/14 15:10
Chromium	< 1	mg/kg			WG753207	11/10/14 15:10
Copper	< 2	mg/kg			WG753207	11/10/14 15:10
Lead	< .5	mg/kg			WG753207	11/10/14 15:10
Nickel	< 2	mg/kg			WG753207	11/10/14 15:10
Selenium	< 2	mg/kg			WG753207	11/10/14 15:10
Silver	< 1	mg/kg			WG753207	11/10/14 15:10
Zinc	< 5	mg/kg			WG753207	11/10/14 15:10
C10-C28 Diesel Range	< 4	mg/kg			WG753071	11/10/14 18:44
C28-C40 Oil Range	< 4	mg/kg			WG753071	11/10/14 18:44
o-Terphenyl		% Rec.	80.60	50-150	WG753071	11/10/14 18:44

Analyte	Units	Result	Duplicate		RPD	Limit	Ref Samp	Batch
			Duplicate					
pH	su	8.10	8.04		0.990	1	L731036-01	WG752638
pH	su	7.90	8.00		0.753	1	L731355-09	WG752638
Specific Conductance	umhos/cm	3200	3200		0.0	20	L731333-01	WG752716
Specific Conductance	umhos/cm	1400	1400		1.42	20	L731355-06	WG752716
Chromium, Hexavalent	mg/kg	0.0	0.0		0.0	20	L731355-09	WG752636
Chromium, Hexavalent	mg/kg	0.0	0.0		0.0	20	L731256-01	WG752636
Specific Conductance	umhos/cm	2800	2700		1.83	20	L731355-07	WG752819
ORP	mV	140.	140.		0.717	20	L731333-01	WG752822
ORP	mV	67.0	68.0		1.48	20	L731606-04	WG752822

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Mercury	mg/kg	12.4	10.4	84.0	71.6-128	WG752659
pH	su	6.33	6.40	101.	98.3-101.7	WG752638
Specific Conductance	umhos/cm	759	790.	104.	85-115	WG752716
Chromium, Hexavalent	mg/kg	187	176.	94.1	80-120	WG752636
Specific Conductance	umhos/cm	759	780.	103.	85-115	WG752819
ORP	mV	100	109.	109.	90-110	WG752822

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Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Benzene	mg/kg	.05	0.0500	100.	70-130	WG753113
Ethylbenzene	mg/kg	.05	0.0501	100.	70-130	WG753113
Toluene	mg/kg	.05	0.0500	100.	70-130	WG753113
Total Xylene	mg/kg	.15	0.151	101.	70-130	WG753113
a,a,a-Trifluorotoluene(PID)				101.0	54-144	WG753113
TPH (GC/FID) Low Fraction	mg/kg	5.5	4.03	73.3	63.5-137	WG753113
a,a,a-Trifluorotoluene(FID)				99.40	59-128	WG753113
1-Methylnaphthalene	mg/kg	.08	0.0702	87.7	48.9-127	WG753074
2-Chloronaphthalene	mg/kg	.08	0.0710	88.8	48.8-125	WG753074
2-Methylnaphthalene	mg/kg	.08	0.0697	87.1	45.7-131	WG753074
Acenaphthene	mg/kg	.08	0.0715	89.4	48.7-127	WG753074
Acenaphthylene	mg/kg	.08	0.0715	89.4	47.9-128	WG753074
Anthracene	mg/kg	.08	0.0744	93.0	51.3-136	WG753074
Benzo(a)anthracene	mg/kg	.08	0.0735	91.9	55-126	WG753074
Benzo(a)pyrene	mg/kg	.08	0.0697	87.1	51.9-127	WG753074
Benzo(b)fluoranthene	mg/kg	.08	0.0722	90.2	54-125	WG753074
Benzo(g,h,i)perylene	mg/kg	.08	0.0727	90.9	53.8-136	WG753074
Benzo(k)fluoranthene	mg/kg	.08	0.0696	87.0	53.9-132	WG753074
Chrysene	mg/kg	.08	0.0743	92.9	55.7-133	WG753074
Dibenz(a,h)anthracene	mg/kg	.08	0.0712	89.0	52.6-137	WG753074
Fluoranthene	mg/kg	.08	0.0722	90.2	54-132	WG753074
Fluorene	mg/kg	.08	0.0713	89.2	48.7-127	WG753074
Indeno(1,2,3-cd)pyrene	mg/kg	.08	0.0722	90.3	53.8-138	WG753074
Naphthalene	mg/kg	.08	0.0727	90.8	42-127	WG753074
Phenanthrene	mg/kg	.08	0.0724	90.5	49.6-126	WG753074
Pyrene	mg/kg	.08	0.0739	92.4	54-129	WG753074
2-Fluorobiphenyl				87.70	38.2-135	WG753074
Nitrobenzene-d5				91.20	28.4-151	WG753074
p-Terphenyl-d14				92.70	34.2-141	WG753074
Benzene	mg/kg	.05	0.0485	97.0	70-130	WG752647
Ethylbenzene	mg/kg	.05	0.0533	107.	70-130	WG752647
Toluene	mg/kg	.05	0.0524	105.	70-130	WG752647
Total Xylene	mg/kg	.15	0.163	109.	70-130	WG752647
a,a,a-Trifluorotoluene(PID)				105.0	54-144	WG752647
TPH (GC/FID) Low Fraction	mg/kg	5.5	4.62	83.9	63.5-137	WG752647
a,a,a-Trifluorotoluene(FID)				104.0	59-128	WG752647
Arsenic	mg/kg	237	243.	103.	83.1-117	WG753207
Barium	mg/kg	252	251.	100.	84.1-116	WG753207
Boron	mg/kg	118	134.	114.	74-126	WG753207
Cadmium	mg/kg	191	188.	98.0	83.2-117	WG753207
Chromium	mg/kg	128	131.	102.	81.3-118	WG753207
Copper	mg/kg	123	125.	101.	83.7-116	WG753207
Lead	mg/kg	103	102.	99.0	83.1-117	WG753207
Nickel	mg/kg	118	117.	99.0	82-118	WG753207
Selenium	mg/kg	110	113.	103.	78.7-122	WG753207
Silver	mg/kg	47.3	46.6	98.0	66.2-134	WG753207
Zinc	mg/kg	183	185.	101.	82-118	WG753207

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Mercury	mg/kg	11.0	10.4	89.0	71.6-128	6.00	20	WG752659

\* 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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Quality Assurance Report  
Level II

L731355

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Tax I.D. 62-0814289

Est. 1970

November 11, 2014

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
pH	su	6.40	6.40	101.	98.3-101.7	0.0	20	WG752638
Specific Conductance	umhos/	790.	790.	104.	85-115	0.0	20	WG752716
Chromium, Hexavalent	mg/kg	176.	176.	94.0	80-120	0.0	20	WG752636
Specific Conductance	umhos/	780.	780.	103.	85-115	0.0	20	WG752819
ORP	mV	108.	109.	108.	90-110	0.922	20	WG752822
Benzene	mg/kg	0.0496	0.0500	99.0	70-130	0.780	20	WG753113
Ethylbenzene	mg/kg	0.0496	0.0501	99.0	70-130	0.910	20	WG753113
Toluene	mg/kg	0.0492	0.0500	98.0	70-130	1.66	20	WG753113
Total Xylene	mg/kg	0.150	0.151	100.	70-130	1.06	20	WG753113
a,a,a-Trifluorotoluene(PID)				101.0	54-144			WG753113
TPH (GC/FID) Low Fraction	mg/kg	4.12	4.03	75.0	63.5-137	2.18	20	WG753113
a,a,a-Trifluorotoluene(FID)				99.60	59-128			WG753113
1-Methylnaphthalene	mg/kg	0.0709	0.0702	89.0	48.9-127	1.00	20	WG753074
2-Chloronaphthalene	mg/kg	0.0720	0.0710	90.0	48.8-125	1.34	20	WG753074
2-Methylnaphthalene	mg/kg	0.0706	0.0697	88.0	45.7-131	1.20	20	WG753074
Acenaphthene	mg/kg	0.0727	0.0715	91.0	48.7-127	1.65	20	WG753074
Acenaphthylene	mg/kg	0.0718	0.0715	90.0	47.9-128	0.490	20	WG753074
Anthracene	mg/kg	0.0755	0.0744	94.0	51.3-136	1.44	20	WG753074
Benzo(a)anthracene	mg/kg	0.0739	0.0735	92.0	55-126	0.590	20	WG753074
Benzo(a)pyrene	mg/kg	0.0711	0.0697	89.0	51.9-127	1.92	20	WG753074
Benzo(b)fluoranthene	mg/kg	0.0741	0.0722	93.0	54-125	2.67	20	WG753074
Benzo(g,h,i)perylene	mg/kg	0.0736	0.0727	92.0	53.8-136	1.23	20	WG753074
Benzo(k)fluoranthene	mg/kg	0.0701	0.0696	88.0	53.9-132	0.790	20	WG753074
Chrysene	mg/kg	0.0745	0.0743	93.0	55.7-133	0.230	20	WG753074
Dibenz(a,h)anthracene	mg/kg	0.0722	0.0712	90.0	52.6-137	1.41	20	WG753074
Fluoranthene	mg/kg	0.0727	0.0722	91.0	54-132	0.650	20	WG753074
Fluorene	mg/kg	0.0722	0.0713	90.0	48.7-127	1.23	20	WG753074
Indeno(1,2,3-cd)pyrene	mg/kg	0.0731	0.0722	91.0	53.8-138	1.12	20	WG753074
Naphthalene	mg/kg	0.0737	0.0727	92.0	42-127	1.47	20	WG753074
Phenanthrene	mg/kg	0.0728	0.0724	91.0	49.6-126	0.620	20	WG753074
Pyrene	mg/kg	0.0741	0.0739	92.0	54-129	0.190	20	WG753074
2-Fluorobiphenyl				86.70	38.2-135			WG753074
Nitrobenzene-d5				89.60	28.4-151			WG753074
p-Terphenyl-d14				92.80	34.2-141			WG753074
Benzene	mg/kg	0.0488	0.0485	98.0	70-130	0.560	20	WG752647
Ethylbenzene	mg/kg	0.0535	0.0533	107.	70-130	0.400	20	WG752647
Toluene	mg/kg	0.0525	0.0524	105.	70-130	0.180	20	WG752647
Total Xylene	mg/kg	0.163	0.163	109.	70-130	0.360	20	WG752647
a,a,a-Trifluorotoluene(PID)				105.0	54-144			WG752647
TPH (GC/FID) Low Fraction	mg/kg	4.58	4.62	83.0	63.5-137	0.820	20	WG752647
a,a,a-Trifluorotoluene(FID)				104.0	59-128			WG752647
Arsenic	mg/kg	247.	243.	104.	83.1-117	1.00	20	WG753207

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Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Barium	mg/kg	263.	251.	104.	84.1-116	4.00	20	WG753207
Boron	mg/kg	142.	134.	120.	74-126	5.00	20	WG753207
Cadmium	mg/kg	202.	188.	106.	83.2-117	7.00	20	WG753207
Chromium	mg/kg	135.	131.	106.	81.3-118	3.00	20	WG753207
Copper	mg/kg	133.	125.	108.	83.7-116	6.00	20	WG753207
Lead	mg/kg	104.	102.	101.	83.1-117	2.00	20	WG753207
Nickel	mg/kg	125.	117.	106.	82-118	6.00	20	WG753207
Selenium	mg/kg	116.	113.	106.	78.7-122	3.00	20	WG753207
Silver	mg/kg	46.3	46.6	98.0	66.2-134	1.00	20	WG753207
Zinc	mg/kg	192.	185.	105.	82-118	3.00	20	WG753207

Analyte	Units	Matrix Spike			% Rec	Limit	Ref Samp	Batch
		MS Res	Ref Res	TV				
Mercury	mg/kg	0.526	0.00661	.5	100.	80-120	L731371-01	WG752659
Chromium, Hexavalent	mg/kg	22.0	0.0	20	110.	75-125	L731355-09	WG752636
Benzene	mg/kg	0.242	0.000313	.05	97.0	49.7-127	L731641-05	WG753113
Ethylbenzene	mg/kg	0.240	0.000400	.05	96.0	40.8-141	L731641-05	WG753113
Toluene	mg/kg	0.242	0.00115	.05	96.0	49.8-132	L731641-05	WG753113
Total Xylene	mg/kg	0.723	0.00230	.15	96.0	41.2-140	L731641-05	WG753113
a,a,a-Trifluorotoluene(PID)					101.0	54-144		WG753113
TPH (GC/FID) Low Fraction	mg/kg	17.6	0.0	5.5	64.0	28.5-138	L731641-05	WG753113
a,a,a-Trifluorotoluene(FID)					97.70	59-128		WG753113
1-Methylnaphthalene	mg/kg	0.164	0.0919	.04	90.0	41.8-133	L731355-03	WG753074
2-Chloronaphthalene	mg/kg	0.0638	0.0	.04	80.0	42.4-129	L731355-03	WG753074
2-Methylnaphthalene	mg/kg	0.254	0.174	.04	100.	37.5-137	L731355-03	WG753074
Acenaphthene	mg/kg	0.0705	0.00624	.04	80.0	39.4-132	L731355-03	WG753074
Acenaphthylene	mg/kg	0.0700	0.0	.04	88.0	41.3-132	L731355-03	WG753074
Anthracene	mg/kg	0.0766	0.00903	.04	84.0	36.7-144	L731355-03	WG753074
Benzo(a)anthracene	mg/kg	0.108	0.0446	.04	79.0	28-144	L731355-03	WG753074
Benzo(a)pyrene	mg/kg	0.115	0.0554	.04	75.0	23.8-147	L731355-03	WG753074
Benzo(b)fluoranthene	mg/kg	0.168	0.106	.04	78.0	18.2-147	L731355-03	WG753074
Benzo(g,h,i)perylene	mg/kg	0.136	0.0705	.04	82.0	9.2-155	L731355-03	WG753074
Benzo(k)fluoranthene	mg/kg	0.0915	0.0325	.04	74.0	26.5-143	L731355-03	WG753074
Chrysene	mg/kg	0.123	0.0673	.04	70.0	27.4-150	L731355-03	WG753074
Dibenz(a,h)anthracene	mg/kg	0.0890	0.0221	.04	84.0	13.8-150	L731355-03	WG753074
Fluoranthene	mg/kg	0.116	0.0485	.04	84.0	23.2-158	L731355-03	WG753074
Fluorene	mg/kg	0.0794	0.0131	.04	83.0	30.8-139	L731355-03	WG753074
Indeno(1,2,3-cd)pyrene	mg/kg	0.113	0.0505	.04	78.0	10.7-155	L731355-03	WG753074
Naphthalene	mg/kg	0.175	0.0972	.04	97.0	34.9-133	L731355-03	WG753074
Phenanthrene	mg/kg	0.128	0.0617	.04	83.0	20.2-150	L731355-03	WG753074
Pyrene	mg/kg	0.109	0.0456	.04	80.0	22.6-151	L731355-03	WG753074
2-Fluorobiphenyl					85.50	38.2-135		WG753074
Nitrobenzene-d5					83.00	28.4-151		WG753074
p-Terphenyl-d14					90.30	34.2-141		WG753074
Benzene	mg/kg	0.224	0.000186	.05	90.0	49.7-127	L731334-01	WG752647
Ethylbenzene	mg/kg	0.238	0.000699	.05	95.0	40.8-141	L731334-01	WG752647
Toluene	mg/kg	0.240	0.000405	.05	96.0	49.8-132	L731334-01	WG752647
Total Xylene	mg/kg	0.731	0.000673	.15	97.0	41.2-140	L731334-01	WG752647
a,a,a-Trifluorotoluene(PID)					104.0	54-144		WG752647
TPH (GC/FID) Low Fraction	mg/kg	18.2	0.0	5.5	66.0	28.5-138	L731334-01	WG752647

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Analyte	Units	MS Res	Matrix Spike		% Rec	Limit	Ref Samp	Batch
			Ref Res	TV				
a,a,a-Trifluorotoluene(FID)					103.0	59-128		
Arsenic	mg/kg	107.	7.65	100	100.	75-125	L731355-01	WG753207
Barium	mg/kg	704.	403.	100	300.*	75-125	L731355-01	WG753207
Boron	mg/kg	110.	12.8	100	97.0	75-125	L731355-01	WG753207
Cadmium	mg/kg	88.2	0.0427	100	88.0	75-125	L731355-01	WG753207
Chromium	mg/kg	114.	14.5	100	100.	75-125	L731355-01	WG753207
Copper	mg/kg	115.	13.7	100	100.	75-125	L731355-01	WG753207
Lead	mg/kg	101.	8.11	100	93.0	75-125	L731355-01	WG753207
Nickel	mg/kg	108.	12.4	100	95.0	75-125	L731355-01	WG753207
Selenium	mg/kg	92.0	-0.564	100	92.0	75-125	L731355-01	WG753207
Silver	mg/kg	91.4	-0.989	100	91.0	75-125	L731355-01	WG753207
Zinc	mg/kg	141.	32.0	100	110.	75-125	L731355-01	WG753207

  

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Mercury	mg/kg	0.518	0.526	102.	80-120	2.00	20	L731371-01	WG752659
Chromium,Hexavalent	mg/kg	22.0	22.0	110.	75-125	0.0	20	L731355-09	WG752636
Benzene	mg/kg	0.239	0.242	95.4	49.7-127	1.19	23.5	L731641-05	WG753113
Ethylbenzene	mg/kg	0.237	0.240	94.6	40.8-141	1.36	23.8	L731641-05	WG753113
Toluene	mg/kg	0.236	0.242	94.1	49.8-132	2.45	23.5	L731641-05	WG753113
Total Xylene	mg/kg	0.712	0.723	94.6	41.2-140	1.60	23.7	L731641-05	WG753113
a,a,a-Trifluorotoluene(PID)				101.0	54-144				WG753113
TPH (GC/FID) Low Fraction	mg/kg	17.9	17.6	65.0	28.5-138	1.22	23.6	L731641-05	WG753113
a,a,a-Trifluorotoluene(FID)				98.00	59-128				WG753113
1-Methylnaphthalene	mg/kg	0.168	0.164	94.9	41.8-133	2.55	20.9	L731355-03	WG753074
2-Chloronaphthalene	mg/kg	0.0641	0.0638	80.2	42.4-129	0.500	20	L731355-03	WG753074
2-Methylnaphthalene	mg/kg	0.258	0.254	105.	37.5-137	1.45	20.4	L731355-03	WG753074
Acenaphthene	mg/kg	0.0711	0.0705	81.1	39.4-132	0.850	20	L731355-03	WG753074
Acenaphthylene	mg/kg	0.0709	0.0700	88.7	41.3-132	1.29	20	L731355-03	WG753074
Anthracene	mg/kg	0.0734	0.0766	80.5	36.7-144	4.31	20.7	L731355-03	WG753074
Benzo(a)anthracene	mg/kg	0.104	0.108	74.1	28-144	3.62	24.7	L731355-03	WG753074
Benzo(a)pyrene	mg/kg	0.112	0.115	70.3	23.8-147	3.07	25.3	L731355-03	WG753074
Benzo(b)fluoranthene	mg/kg	0.167	0.168	77.2	18.2-147	0.280	29.5	L731355-03	WG753074
Benzo(g,h,i)perylene	mg/kg	0.130	0.136	74.4	9.2-155	4.35	29.2	L731355-03	WG753074
Benzo(k)fluoranthene	mg/kg	0.0840	0.0915	64.3	26.5-143	8.63	26.1	L731355-03	WG753074
Chrysene	mg/kg	0.122	0.123	68.5	27.4-150	1.01	25.7	L731355-03	WG753074
Dibenz(a,h)anthracene	mg/kg	0.0833	0.0890	76.4	13.8-150	6.64	25.8	L731355-03	WG753074
Fluoranthene	mg/kg	0.115	0.116	82.6	23.2-158	1.26	26	L731355-03	WG753074
Fluorene	mg/kg	0.0790	0.0794	82.4	30.8-139	0.500	20	L731355-03	WG753074
Indeno(1,2,3-cd)pyrene	mg/kg	0.108	0.113	71.8	10.7-155	4.86	26.9	L731355-03	WG753074
Naphthalene	mg/kg	0.181	0.175	104.	34.9-133	3.31	20.4	L731355-03	WG753074
Phenanthrene	mg/kg	0.130	0.128	85.7	20.2-150	1.44	24.6	L731355-03	WG753074
Pyrene	mg/kg	0.107	0.109	76.7	22.6-151	2.22	25.1	L731355-03	WG753074
2-Fluorobiphenyl				85.40	38.2-135				WG753074
Nitrobenzene-d5				81.10	28.4-151				WG753074
p-Terphenyl-d14				89.70	34.2-141				WG753074
Benzene	mg/kg	0.225	0.224	89.9	49.7-127	0.270	23.5	L731334-01	WG752647
Ethylbenzene	mg/kg	0.234	0.238	93.7	40.8-141	1.70	23.8	L731334-01	WG752647
Toluene	mg/kg	0.237	0.240	94.8	49.8-132	0.970	23.5	L731334-01	WG752647
Total Xylene	mg/kg	0.715	0.731	95.2	41.2-140	2.16	23.7	L731334-01	WG752647

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Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
a,a,a-Trifluorotoluene(PID)				104.0	54-144				
TPH (GC/FID) Low Fraction	mg/kg	18.0	18.2	65.5	28.5-138	1.16	23.6	L731334-01	WG752647
a,a,a-Trifluorotoluene(FID)				101.0	59-128				WG752647
Arsenic	mg/kg	108.	107.	101.	75-125	1.00	20	L731355-01	WG753207
Barium	mg/kg	716.	704.	313.*	75-125	2.00	20	L731355-01	WG753207
Boron	mg/kg	114.	110.	101.	75-125	4.00	20	L731355-01	WG753207
Cadmium	mg/kg	90.4	88.2	90.4	75-125	3.00	20	L731355-01	WG753207
Chromium	mg/kg	118.	114.	103.	75-125	3.00	20	L731355-01	WG753207
Copper	mg/kg	120.	115.	106.	75-125	5.00	20	L731355-01	WG753207
Lead	mg/kg	104.	101.	95.5	75-125	3.00	20	L731355-01	WG753207
Nickel	mg/kg	110.	108.	98.0	75-125	3.00	20	L731355-01	WG753207
Selenium	mg/kg	95.8	92.0	96.4	75-125	4.00	20	L731355-01	WG753207
Silver	mg/kg	93.7	91.4	94.6	75-125	2.00	20	L731355-01	WG753207
Zinc	mg/kg	144.	141.	112.	75-125	2.00	20	L731355-01	WG753207

Post Spike

Serial Dilution

Batch number /Run number / Sample number cross reference

WG752659: R3002459: L731355-01 02 03 04 05 06 07 08 09  
WG752638: R3002504: L731355-01 02 03 04 05 06 07 08 09  
WG752716: R3002581: L731355-01 02 03 04 05 06  
WG752636: R3002657: L731355-01 02 03 04 05 06 07 08 09  
WG752819: R3002734: L731355-07 08 09  
WG752822: R3002739: L731355-01 02 03 04 05 06 07 08 09

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WG752693: R3002978: L731355-01 02  
WG753113: R3003317: L731355-04 05 06 07 08 09  
WG753074: R3003413 R3003628: L731355-01 02 03 04 05 06 07 08 09  
WG752647: R3003490: L731355-01 02 03  
WG753207: R3003531: L731355-01 02 03 04 05 06 07 08 09  
WG753071: R3003718: L731355-03 04 05 06 07 08 09  
WG753442: R3003721: L731355-01 02 03 04 05 06 07 08 09

\* \* 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.