



12065 Lebanon Rd.  
Mt. Juliet, TN 37122  
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Tax I.D. 62-0814289  
  
Est. 1970

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

## Report Summary

Friday August 09, 2013

Report Number: L648405

Samples Received: 07/25/13

Client Project:

Description: C-10

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

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

Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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# REPORT OF ANALYSIS

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

August 09, 2013

Date Received : July 25, 2013  
Description : C-10  
Sample ID : C-10-1  
Collected By :  
Collection Date : 07/23/13 15:10

ESC Sample # : L648405-01

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	07/30/13	1
ORP	190		mV	2580 B-2011	07/31/13	1
pH	8.3		su	9045D	07/31/13	1
Sodium Adsorption Ratio	9.2			Calc.	07/30/13	1
Specific Conductance	1100		umhos/cm	9050AMod	07/29/13	1
Mercury	0.031	0.020	mg/kg	7471	07/29/13	1
Arsenic	19.	1.0	mg/kg	6010B	07/30/13	1
Barium	600	0.25	mg/kg	6010B	07/30/13	1
Boron	BDL	10.	mg/kg	6010B	07/30/13	1
Cadmium	0.82	0.25	mg/kg	6010B	07/30/13	1
Chromium	38.	0.50	mg/kg	6010B	07/30/13	1
Copper	23.	1.0	mg/kg	6010B	07/31/13	1
Iron	23000	5.0	mg/kg	6010B	07/30/13	1
Lead	17.	0.25	mg/kg	6010B	07/30/13	1
Nickel	17.	1.0	mg/kg	6010B	07/30/13	1
Selenium	BDL	2.0	mg/kg	6010B	07/30/13	2
Silver	BDL	0.50	mg/kg	6010B	07/30/13	1
Zinc	60.	1.5	mg/kg	6010B	07/30/13	1
Benzene	BDL	0.0025	mg/kg	8021/8015	07/27/13	5
Toluene	BDL	0.025	mg/kg	8021/8015	07/27/13	5
Ethylbenzene	BDL	0.0025	mg/kg	8021/8015	07/27/13	5
Total Xylene	BDL	0.0075	mg/kg	8021/8015	07/27/13	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	GRO	07/27/13	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	104.		% Rec.	8021/8015	07/27/13	5
a,a,a-Trifluorotoluene(PID)	108.		% Rec.	8021/8015	07/27/13	5
TPH (GC/FID) High Fraction	580	10.	mg/kg	3546/DRO	08/01/13	2.5
Surrogate recovery(%)						
o-Terphenyl	107.		% Rec.	3546/DRO	08/01/13	2.5
Polynuclear Aromatic Hydrocarbons						
Anthracene	0.0086	0.0060	mg/kg	8270C-SIM	08/05/13	1
Acenaphthene	0.0063	0.0060	mg/kg	8270C-SIM	08/05/13	1
Acenaphthylene	0.016	0.0060	mg/kg	8270C-SIM	08/05/13	1
Benzo(a)anthracene	0.0094	0.0060	mg/kg	8270C-SIM	08/05/13	1
Benzo(a)pyrene	0.013	0.0060	mg/kg	8270C-SIM	08/05/13	1

BDL - Below Detection Limit  
Det. Limit - Practical Quantitation Limit(PQL)  
L648405-01 (PH) - 8.3@23.4c



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August 09, 2013

Date Received : July 25, 2013  
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Sample ID : C-10-1

Collected By :  
Collection Date : 07/23/13 15:10

ESC Sample # : L648405-01

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(b)fluoranthene	0.025	0.0060	mg/kg	8270C-SIM	08/05/13	1
Benzo(g,h,i)perylene	0.018	0.0060	mg/kg	8270C-SIM	08/05/13	1
Benzo(k)fluoranthene	0.0069	0.0060	mg/kg	8270C-SIM	08/05/13	1
Chrysene	0.016	0.0060	mg/kg	8270C-SIM	08/05/13	1
Dibenz(a,h)anthracene	BDL	0.0060	mg/kg	8270C-SIM	08/05/13	1
Fluoranthene	0.012	0.0060	mg/kg	8270C-SIM	08/05/13	1
Fluorene	0.012	0.0060	mg/kg	8270C-SIM	08/05/13	1
Indeno(1,2,3-cd)pyrene	0.012	0.0060	mg/kg	8270C-SIM	08/05/13	1
Naphthalene	BDL	0.020	mg/kg	8270C-SIM	08/05/13	1
Phenanthrene	0.017	0.0060	mg/kg	8270C-SIM	08/05/13	1
Pyrene	0.014	0.0060	mg/kg	8270C-SIM	08/05/13	1
1-Methylnaphthalene	BDL	0.020	mg/kg	8270C-SIM	08/05/13	1
2-Methylnaphthalene	0.035	0.020	mg/kg	8270C-SIM	08/05/13	1
2-Chloronaphthalene	BDL	0.020	mg/kg	8270C-SIM	08/05/13	1
Surrogate Recovery						
Nitrobenzene-d5	132.		% Rec.	8270C-SIM	08/05/13	1
2-Fluorobiphenyl	87.2		% Rec.	8270C-SIM	08/05/13	1
p-Terphenyl-d14	106.		% Rec.	8270C-SIM	08/05/13	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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Reported: 08/07/13 17:28 Revised: 08/09/13 08:27  
L648405-01 (PH) - 8.3@23.4c



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August 09, 2013

Date Received : July 25, 2013  
Description : C-10  
Sample ID : C-10-2  
Collected By :  
Collection Date : 07/23/13 15:20

ESC Sample # : L648405-02

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	07/30/13	1
ORP	190		mV	2580 B-2011	07/31/13	1
pH	8.3		su	9045D	07/31/13	1
Sodium Adsorption Ratio	15.			Calc.	07/30/13	1
Specific Conductance	1600		umhos/cm	9050AMod	07/29/13	1
Mercury	0.044	0.020	mg/kg	7471	07/29/13	1
Arsenic	24.	1.0	mg/kg	6010B	07/30/13	1
Barium	1100	0.25	mg/kg	6010B	07/30/13	1
Boron	BDL	10.	mg/kg	6010B	07/30/13	1
Cadmium	1.0	0.25	mg/kg	6010B	07/30/13	1
Chromium	38.	0.50	mg/kg	6010B	07/30/13	1
Copper	24.	1.0	mg/kg	6010B	07/31/13	1
Iron	26000	5.0	mg/kg	6010B	07/30/13	1
Lead	17.	0.25	mg/kg	6010B	07/30/13	1
Nickel	15.	1.0	mg/kg	6010B	07/30/13	1
Selenium	BDL	2.0	mg/kg	6010B	07/30/13	2
Silver	BDL	0.50	mg/kg	6010B	07/30/13	1
Zinc	62.	1.5	mg/kg	6010B	07/30/13	1
Benzene	BDL	0.0025	mg/kg	8021/8015	07/27/13	5
Toluene	BDL	0.025	mg/kg	8021/8015	07/27/13	5
Ethylbenzene	BDL	0.0025	mg/kg	8021/8015	07/27/13	5
Total Xylene	BDL	0.0075	mg/kg	8021/8015	07/27/13	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	GRO	07/27/13	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	104.		% Rec.	8021/8015	07/27/13	5
a,a,a-Trifluorotoluene(PID)	108.		% Rec.	8021/8015	07/27/13	5
TPH (GC/FID) High Fraction	2100	80.	mg/kg	3546/DRO	08/05/13	20
Surrogate recovery(%)						
o-Terphenyl	0.00		% Rec.	3546/DRO	08/05/13	20
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Acenaphthene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Acenaphthylene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Benzo(a)anthracene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Benzo(a)pyrene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5

BDL - Below Detection Limit  
Det. Limit - Practical Quantitation Limit(PQL)  
L648405-02 (PH) - 8.3@23.3c



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August 09, 2013

Date Received : July 25, 2013  
Description : C-10

Sample ID : C-10-2

Collected By :  
Collection Date : 07/23/13 15:20

ESC Sample # : L648405-02

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(b)fluoranthene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Benzo(g,h,i)perylene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Benzo(k)fluoranthene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Chrysene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Dibenz(a,h)anthracene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Fluoranthene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Fluorene	0.037	0.030	mg/kg	8270C-SIM	08/07/13	5
Indeno(1,2,3-cd)pyrene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
Naphthalene	BDL	0.10	mg/kg	8270C-SIM	08/07/13	5
Phenanthrene	0.028	0.020	mg/kg	8270C-SIM	08/07/13	5
Pyrene	BDL	0.020	mg/kg	8270C-SIM	08/07/13	5
1-Methylnaphthalene	BDL	0.10	mg/kg	8270C-SIM	08/07/13	5
2-Methylnaphthalene	BDL	0.10	mg/kg	8270C-SIM	08/07/13	5
2-Chloronaphthalene	BDL	0.10	mg/kg	8270C-SIM	08/07/13	5
Surrogate Recovery						
Nitrobenzene-d5	77.7		% Rec.	8270C-SIM	08/07/13	5
2-Fluorobiphenyl	83.7		% Rec.	8270C-SIM	08/07/13	5
p-Terphenyl-d14	88.2		% Rec.	8270C-SIM	08/07/13	5

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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L648405-02 (PH) - 8.3@23.3c



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Denver, CO 80202

August 09, 2013

Date Received : July 25, 2013  
Description : C-10  
Sample ID : C-10-3  
Collected By :  
Collection Date : 07/23/13 15:50

ESC Sample # : L648405-03

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.0	mg/kg	3060A/7196A	07/30/13	1
ORP	170		mV	2580 B-2011	07/31/13	1
pH	8.4		su	9045D	07/31/13	1
Sodium Adsorption Ratio	7.8			Calc.	07/30/13	1
Specific Conductance	440		umhos/cm	9050AMod	07/29/13	1
Mercury	0.023	0.020	mg/kg	7471	07/29/13	1
Arsenic	20.	1.0	mg/kg	6010B	07/30/13	1
Barium	870	0.25	mg/kg	6010B	07/30/13	1
Boron	BDL	10.	mg/kg	6010B	07/30/13	1
Cadmium	0.92	0.25	mg/kg	6010B	07/30/13	1
Chromium	30.	0.50	mg/kg	6010B	07/30/13	1
Copper	22.	1.0	mg/kg	6010B	07/31/13	1
Iron	22000	5.0	mg/kg	6010B	07/30/13	1
Lead	15.	0.25	mg/kg	6010B	07/30/13	1
Nickel	12.	1.0	mg/kg	6010B	07/30/13	1
Selenium	BDL	2.0	mg/kg	6010B	07/30/13	2
Silver	BDL	0.50	mg/kg	6010B	07/30/13	1
Zinc	53.	1.5	mg/kg	6010B	07/30/13	1
Benzene	BDL	0.0025	mg/kg	8021/8015	07/27/13	5
Toluene	BDL	0.025	mg/kg	8021/8015	07/27/13	5
Ethylbenzene	BDL	0.0025	mg/kg	8021/8015	07/27/13	5
Total Xylene	BDL	0.0075	mg/kg	8021/8015	07/27/13	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	GRO	07/27/13	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	104.		% Rec.	8021/8015	07/27/13	5
a,a,a-Trifluorotoluene(PID)	108.		% Rec.	8021/8015	07/27/13	5
TPH (GC/FID) High Fraction	180	20.	mg/kg	3546/DRO	08/05/13	5
Surrogate recovery(%)						
o-Terphenyl	136.		% Rec.	3546/DRO	08/05/13	5
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.012	mg/kg	8270C-SIM	08/08/13	2
Acenaphthene	BDL	0.012	mg/kg	8270C-SIM	08/08/13	2
Acenaphthylene	BDL	0.012	mg/kg	8270C-SIM	08/08/13	2
Benzo(a)anthracene	0.038	0.012	mg/kg	8270C-SIM	08/08/13	2
Benzo(a)pyrene	0.044	0.012	mg/kg	8270C-SIM	08/08/13	2

BDL - Below Detection Limit  
Det. Limit - Practical Quantitation Limit(PQL)  
L648405-03 (PH) - 8.4@23.3c  
L648405-03 (SV8270PAHSIM) - Dilution due to matrix



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August 09, 2013

Date Received : July 25, 2013  
Description : C-10

Sample ID : C-10-3

Collected By :  
Collection Date : 07/23/13 15:50

ESC Sample # : L648405-03

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(b)fluoranthene	0.098	0.012	mg/kg	8270C-SIM	08/08/13	2
Benzo(g,h,i)perylene	0.065	0.012	mg/kg	8270C-SIM	08/08/13	2
Benzo(k)fluoranthene	0.025	0.012	mg/kg	8270C-SIM	08/08/13	2
Chrysene	0.057	0.012	mg/kg	8270C-SIM	08/08/13	2
Dibenz(a,h)anthracene	0.018	0.012	mg/kg	8270C-SIM	08/08/13	2
Fluoranthene	0.034	0.012	mg/kg	8270C-SIM	08/08/13	2
Fluorene	0.013	0.012	mg/kg	8270C-SIM	08/08/13	2
Indeno(1,2,3-cd)pyrene	0.046	0.012	mg/kg	8270C-SIM	08/08/13	2
Naphthalene	BDL	0.040	mg/kg	8270C-SIM	08/08/13	2
Phenanthrene	0.025	0.012	mg/kg	8270C-SIM	08/08/13	2
Pyrene	0.035	0.012	mg/kg	8270C-SIM	08/08/13	2
1-Methylnaphthalene	BDL	0.040	mg/kg	8270C-SIM	08/08/13	2
2-Methylnaphthalene	0.068	0.040	mg/kg	8270C-SIM	08/08/13	2
2-Chloronaphthalene	BDL	0.040	mg/kg	8270C-SIM	08/08/13	2
Surrogate Recovery						
Nitrobenzene-d5	147.		% Rec.	8270C-SIM	08/08/13	2
2-Fluorobiphenyl	103.		% Rec.	8270C-SIM	08/08/13	2
p-Terphenyl-d14	112.		% Rec.	8270C-SIM	08/08/13	2

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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L648405-03 (PH) - 8.4@23.3c

L648405-03 (SV8270PAHSIM) - Dilution due to matrix

Attachment A  
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L648405-01	WG673941	SAMP	Selenium	R2762400	O
	WG673941	SAMP	Zinc	R2762400	B
L648405-02	WG673941	SAMP	Selenium	R2762400	O
	WG673941	SAMP	Zinc	R2762400	B
	WG674370	SAMP	Anthracene	R2771840	U
	WG674370	SAMP	Acenaphthene	R2771840	U
	WG674370	SAMP	Acenaphthylene	R2771840	U
	WG674370	SAMP	Benzo(a)anthracene	R2771840	U
	WG674370	SAMP	Benzo(a)pyrene	R2771840	U
	WG674370	SAMP	Benzo(b)fluoranthene	R2771840	U
	WG674370	SAMP	Benzo(g,h,i)perylene	R2771840	U
	WG674370	SAMP	Benzo(k)fluoranthene	R2771840	U
	WG674370	SAMP	Chrysene	R2771840	U
	WG674370	SAMP	Dibenz(a,h)anthracene	R2771840	U
	WG674370	SAMP	Fluoranthene	R2771840	U
	WG674370	SAMP	Indeno(1,2,3-cd)pyrene	R2771840	U
	WG674370	SAMP	Phenanthrene	R2771840	J
	WG674370	SAMP	Pyrene	R2771840	U
	WG674374	SAMP	o-Terphenyl	R2769544	J7
L648405-03	WG673941	SAMP	Selenium	R2762400	O
	WG673941	SAMP	Zinc	R2762400	B

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.
J	(EPA) - Estimated value below the lowest calibration point. Confidence correlates with concentration.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.
O	(ESC) Sample diluted due to matrix interferences that impaired the ability to make an accurate analytical determination. The detection limit is elevated in order to reflect the necessary dilution.
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.

Summary of Remarks For Samples Printed  
08/09/13 at 08:27:29

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: L648405-01 Account: BERPETDCO Received: 07/25/13 09:30 Due Date: 08/02/13 00:00 RPT Date: 08/07/13 17:28

Sample: L648405-02 Account: BERPETDCO Received: 07/25/13 09:30 Due Date: 08/02/13 00:00 RPT Date: 08/07/13 17:28

Sample: L648405-03 Account: BERPETDCO Received: 07/25/13 09:30 Due Date: 08/02/13 00:00 RPT Date: 08/07/13 17:28



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Tax I.D. 62-0814289

Est. 1970

August 09, 2013

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Benzene	< .0005	mg/kg			WG673831	07/26/13 13:42
Ethylbenzene	< .0005	mg/kg			WG673831	07/26/13 13:42
Toluene	< .005	mg/kg			WG673831	07/26/13 13:42
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG673831	07/26/13 13:42
Total Xylene	< .0015	mg/kg			WG673831	07/26/13 13:42
a,a,a-Trifluorotoluene(FID)		% Rec.	103.6	59-128	WG673831	07/26/13 13:42
a,a,a-Trifluorotoluene(PID)		% Rec.	107.5	54-144	WG673831	07/26/13 13:42
Mercury	< .02	mg/kg			WG673897	07/29/13 12:29
Specific Conductance	1.00	umhos/cm			WG674190	07/29/13 14:40
Chromium,Hexavalent	< 2	mg/kg			WG673578	07/30/13 12:34
Arsenic	< 1	mg/kg			WG673941	07/30/13 10:41
Barium	< .25	mg/kg			WG673941	07/30/13 10:41
Boron	< 10	mg/kg			WG673941	07/30/13 10:41
Cadmium	< .25	mg/kg			WG673941	07/30/13 10:41
Chromium	< .5	mg/kg			WG673941	07/30/13 10:41
Iron	< 5	mg/kg			WG673941	07/30/13 10:41
Lead	< .25	mg/kg			WG673941	07/30/13 10:41
Nickel	< 1	mg/kg			WG673941	07/30/13 10:41
Selenium	< 1	mg/kg			WG673941	07/30/13 10:41
Silver	< .5	mg/kg			WG673941	07/30/13 10:41
Zinc	1.80	mg/kg			WG673941	07/30/13 10:41
Copper	< 1	mg/kg			WG673941	07/30/13 23:50
TPH (GC/FID) High Fraction	< 4	mg/kg			WG674374	08/01/13 19:59
o-Terphenyl		% Rec.	109.0	50-150	WG674374	08/01/13 19:59

Analyte	Units	Result	Duplicate		RPD	Limit	Ref Samp	Batch
			Duplicate					
Mercury	mg/kg	0.0290	0.0326		11.7	20	L648400-08	WG673897
Specific Conductance	umhos/cm	340.	320.		4.88	20	L648353-01	WG674190
Specific Conductance	umhos/cm	650.	670.		3.03	20	L648646-06	WG674190
Chromium,Hexavalent	mg/kg	0	0		0	20	L647970-05	WG673578
Chromium,Hexavalent	mg/kg	0	0		0	20	L648401-03	WG673578
pH	su	12.0	12.0		1.65*	1	L648407-02	WG674532
pH	su	8.20	8.20		0.365	1	L648446-06	WG674532
Arsenic	mg/kg	7.60	7.60		0	20	L648446-01	WG673941
Barium	mg/kg	100.	100.		0	20	L648446-01	WG673941
Boron	mg/kg	0	0		0	20	L648446-01	WG673941
Cadmium	mg/kg	0.650	0.780		18.2	20	L648446-01	WG673941
Chromium	mg/kg	14.0	15.0		6.90	20	L648446-01	WG673941
Iron	mg/kg	14000	13200		5.88	20	L648446-01	WG673941

\* Performance of this Analyte is outside of established criteria.

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Analyte	Units	Result	Duplicate		RPD	Limit	Ref Samp	Batch
			Duplicate					
Lead	mg/kg	10.0	9.90	1.01	20		L648446-01	WG673941
Nickel	mg/kg	8.80	9.40	6.59	20		L648446-01	WG673941
Silver	mg/kg	0	0	0	20		L648446-01	WG673941
Zinc	mg/kg	47.0	47.0	0	20		L648446-01	WG673941
Selenium	mg/kg	0	0	0	20		L648446-01	WG673941
ORP	mV	190.	190.	0.525	20		L648405-01	WG674566
ORP	mV	150.	150.	0.669	20		L648948-05	WG674566
Copper	mg/kg	12.0	12.0	0	20		L648446-01	WG673941

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Benzene	mg/kg	.05	0.0501	100.	70-130	WG673831
Ethylbenzene	mg/kg	.05	0.0523	105.	70-130	WG673831
Toluene	mg/kg	.05	0.0509	102.	70-130	WG673831
Total Xylene	mg/kg	.15	0.154	103.	70-130	WG673831
a,a,a-Trifluorotoluene(PID)				107.4	54-144	WG673831
TPH (GC/FID) Low Fraction	mg/kg	5.5	5.33	96.9	63.6-136	WG673831
a,a,a-Trifluorotoluene(FID)				106.9	59-128	WG673831
Mercury	mg/kg	12.4	13.8	111.	71.6-128	WG673897
Specific Conductance	umhos/cm	1140	1200	105.	85-115	WG674190
Chromium,Hexavalent	mg/kg	146	136.	93.2	80-120	WG673578
pH	su	6.96	6.90	99.1	98.3-101.7	WG674532
Arsenic	mg/kg	237	260.	110.	83.1-117	WG673941
Barium	mg/kg	252	275.	109.	84.1-116	WG673941
Boron	mg/kg	118	120.	102.	74-126	WG673941
Cadmium	mg/kg	191	195.	102.	83.2-117	WG673941
Chromium	mg/kg	128	138.	108.	81.3-118	WG673941
Iron	mg/kg	13100	13800	105.	50.8-150	WG673941
Lead	mg/kg	103	105.	102.	83.1-117	WG673941
Nickel	mg/kg	118	116.	98.3	82-118	WG673941
Selenium	mg/kg	110	112.	102.	78.7-122	WG673941
Silver	mg/kg	47.3	45.3	95.8	66.2-134	WG673941
Zinc	mg/kg	183	192.	105.	82-118	WG673941
ORP	mV	228	220.	96.5	95.6-104.	WG674566
Copper	mg/kg	123	126.	102.	83.7-116	WG673941
TPH (GC/FID) High Fraction	mg/kg	60	56.8	94.7	50-150	WG674374
o-Terphenyl				106.0	50-150	WG674374

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Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Benzene	mg/kg	0.0514	0.0501	103.	70-130	2.55	20	WG673831
Ethylbenzene	mg/kg	0.0539	0.0523	108.	70-130	3.13	20	WG673831
Toluene	mg/kg	0.0522	0.0509	104.	70-130	2.52	20	WG673831
Total Xylene	mg/kg	0.159	0.154	106.	70-130	3.05	20	WG673831
a,a,a-Trifluorotoluene(PID)				107.2	54-144			WG673831
TPH (GC/FID) Low Fraction	mg/kg	5.18	5.33	94.0	63.6-136	2.87	20	WG673831
a,a,a-Trifluorotoluene(FID)				107.0	59-128			WG673831
Specific Conductance	umhos/	1200	1200	105.	85-115	0	20	WG674190
Chromium, Hexavalent	mg/kg	132.	136.	90.0	80-120	2.99	20	WG673578
pH	su	6.90	6.90	99.0	98.3-101.7	0	20	WG674532
ORP	mV	220.	220.	96.0	95.6-104.	0	20	WG674566
TPH (GC/FID) High Fraction	mg/kg	59.9	56.8	100.	50-150	5.35	20	WG674374
o-Terphenyl				111.0	50-150			WG674374

Analyte	Units	MS Res	Matrix Spike		% Rec	Limit	Ref Samp	Batch
			Ref Res	TV				
Benzene	mg/kg	0.251	0.000280	.05	100.	49.7-127	L648384-01	WG673831
Ethylbenzene	mg/kg	0.241	0.000664	.05	96.2	40.8-141	L648384-01	WG673831
Toluene	mg/kg	0.243	0.000327	.05	97.2	49.8-132	L648384-01	WG673831
Total Xylene	mg/kg	0.752	0.0151	.15	98.2	41.2-140	L648384-01	WG673831
a,a,a-Trifluorotoluene(PID)					103.9	54-144		WG673831
TPH (GC/FID) Low Fraction	mg/kg	104.	28.4	5.5	276.*	29-139	L648384-01	WG673831
a,a,a-Trifluorotoluene(FID)					104.1	59-128		WG673831
Mercury	mg/kg	0.248	0.0326	.25	86.3	80-120	L648400-08	WG673897
Chromium, Hexavalent	mg/kg	18.5	2.40	20	80.5	75-125	L647970-06	WG673578
Arsenic	mg/kg	57.7	7.60	50	100.	75-125	L648446-01	WG673941
Barium	mg/kg	150.	100.	50	100.	75-125	L648446-01	WG673941
Boron	mg/kg	66.4	0	50	133.*	75-125	L648446-01	WG673941
Cadmium	mg/kg	50.2	0.780	50	98.8	75-125	L648446-01	WG673941
Chromium	mg/kg	64.1	15.0	50	98.2	75-125	L648446-01	WG673941
Iron	mg/kg	13000	13200	50	0*	75-125	L648446-01	WG673941
Lead	mg/kg	59.0	9.90	50	98.2	75-125	L648446-01	WG673941
Nickel	mg/kg	53.9	9.40	50	89.0	75-125	L648446-01	WG673941
Silver	mg/kg	45.4	0	50	90.8	75-125	L648446-01	WG673941
Zinc	mg/kg	94.8	47.0	50	95.6	75-125	L648446-01	WG673941
Selenium	mg/kg	48.0	0	50	48.0*	75-125	L648446-01	WG673941
Copper	mg/kg	58.2	12.0	50	92.4	75-125	L648446-01	WG673941
1-Methylnaphthalene	mg/kg	0.0827	0.0188	.08	79.9	58.9-123	L648405-01	WG674370
2-Chloronaphthalene	mg/kg	0.0673	0	.08	84.2	61.6-120	L648405-01	WG674370
2-Methylnaphthalene	mg/kg	0.119	0.0349	.08	106.	50.7-129	L648405-01	WG674370
Acenaphthene	mg/kg	0.0793	0.00630	.08	91.2	51.6-124	L648405-01	WG674370

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Analyte	Units	MS Res	Matrix Spike		% Rec	Limit	Ref Samp	Batch
			Ref Res	TV				
Acenaphthylene	mg/kg	0.0732	0.0159	.08	71.6	58.3-126	L648405-01	WG674370
Anthracene	mg/kg	0.0875	0.00865	.08	98.6	47.9-137	L648405-01	WG674370
Benzo(a)anthracene	mg/kg	0.0945	0.00944	.08	106.	34.2-138	L648405-01	WG674370
Benzo(a)pyrene	mg/kg	0.0973	0.0133	.08	105.	34.6-133	L648405-01	WG674370
Benzo(b)fluoranthene	mg/kg	0.101	0.0254	.08	94.1	19.8-142	L648405-01	WG674370
Benzo(g,h,i)perylene	mg/kg	0.0864	0.0175	.08	86.1	20-149	L648405-01	WG674370
Benzo(k)fluoranthene	mg/kg	0.0809	0.00690	.08	92.5	32.1-137	L648405-01	WG674370
Chrysene	mg/kg	0.0895	0.0158	.08	92.2	36.6-137	L648405-01	WG674370
Dibenz(a,h)anthracene	mg/kg	0.0813	0.00550	.08	94.7	27.1-145	L648405-01	WG674370
Fluoranthene	mg/kg	0.100	0.0117	.08	110.	39.8-141	L648405-01	WG674370
Fluorene	mg/kg	0.0921	0.0126	.08	99.3	42.5-130	L648405-01	WG674370
Indeno(1,2,3-cd)pyrene	mg/kg	0.0883	0.0115	.08	96.0	19-151	L648405-01	WG674370
Naphthalene	mg/kg	0.0762	0.0177	.08	73.1	40.6-135	L648405-01	WG674370
Phenanthrene	mg/kg	0.0931	0.0168	.08	95.3	39.7-129	L648405-01	WG674370
Pyrene	mg/kg	0.0944	0.0139	.08	101.	31.5-141	L648405-01	WG674370
2-Fluorobiphenyl					87.80	51.1-131		WG674370
Nitrobenzene-d5					111.0	40.9-147		WG674370
p-Terphenyl-d14					106.0	45.3-138		WG674370

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Benzene	mg/kg	0.255	0.251	102.	49.7-127	1.69	23.5	L648384-01	WG673831
Ethylbenzene	mg/kg	0.237	0.241	94.6	40.8-141	1.67	23.8	L648384-01	WG673831
Toluene	mg/kg	0.241	0.243	96.2	49.8-132	1.03	23.5	L648384-01	WG673831
Total Xylene	mg/kg	0.746	0.752	97.4	41.2-140	0.820	23.7	L648384-01	WG673831
a,a,a-Trifluorotoluene(PID)				105.6	54-144				WG673831
TPH (GC/FID) Low Fraction	mg/kg	57.5	104.	106.	29-139	57.7*	22.4	L648384-01	WG673831
a,a,a-Trifluorotoluene(FID)				103.1	59-128				WG673831
Mercury	mg/kg	0.258	0.248	90.1	80-120	3.73	20	L648400-08	WG673897
Chromium,Hexavalent	mg/kg	19.1	18.5	83.5	75-125	3.19	20	L647970-06	WG673578
Arsenic	mg/kg	57.4	57.7	99.6	75-125	0.521	20	L648446-01	WG673941
Barium	mg/kg	152.	150.	104.	75-125	1.32	20	L648446-01	WG673941
Boron	mg/kg	68.1	66.4	136.*	75-125	2.53	20	L648446-01	WG673941
Cadmium	mg/kg	49.8	50.2	98.0	75-125	0.800	20	L648446-01	WG673941
Chromium	mg/kg	64.6	64.1	99.2	75-125	0.777	20	L648446-01	WG673941
Iron	mg/kg	13400	13000	400.*	75-125	3.03	20	L648446-01	WG673941
Lead	mg/kg	58.1	59.0	96.4	75-125	1.54	20	L648446-01	WG673941
Nickel	mg/kg	53.4	53.9	88.0	75-125	0.932	20	L648446-01	WG673941
Silver	mg/kg	45.0	45.4	90.0	75-125	0.885	20	L648446-01	WG673941
Zinc	mg/kg	95.1	94.8	96.2	75-125	0.316	20	L648446-01	WG673941
Selenium	mg/kg	47.4	48.0	47.4*	75-125	1.26	20	L648446-01	WG673941
Copper	mg/kg	58.5	58.2	93.0	75-125	0.514	20	L648446-01	WG673941
1-Methylnaphthalene	mg/kg	0.0801	0.0827	76.5	58.9-123	3.25	20	L648405-01	WG674370
2-Chloronaphthalene	mg/kg	0.0710	0.0673	88.8	61.6-120	5.37	20	L648405-01	WG674370
2-Methylnaphthalene	mg/kg	0.0994	0.119	80.6	50.7-129	18.3	20	L648405-01	WG674370
Acenaphthene	mg/kg	0.0810	0.0793	93.4	51.6-124	2.16	20	L648405-01	WG674370
Acenaphthylene	mg/kg	0.0779	0.0732	77.5	58.3-126	6.16	20	L648405-01	WG674370
Anthracene	mg/kg	0.0887	0.0875	100.	47.9-137	1.40	20	L648405-01	WG674370
Benzo(a)anthracene	mg/kg	0.0948	0.0945	107.	34.2-138	0.330	22.8	L648405-01	WG674370
Benzo(a)pyrene	mg/kg	0.0921	0.0973	98.6	34.6-133	5.43	26.3	L648405-01	WG674370

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Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref	Samp	Batch
			Ref	%Rec						
Benzo(b)fluoranthene	mg/kg	0.0996	0.101	92.8	19.8-142	1.06	30.3	L648405-01		WG674370
Benzo(g,h,i)perylene	mg/kg	0.0846	0.0864	83.9	20-149	2.07	27.1	L648405-01		WG674370
Benzo(k)fluoranthene	mg/kg	0.0772	0.0809	87.9	32.1-137	4.65	24.6	L648405-01		WG674370
Chrysene	mg/kg	0.0819	0.0895	82.6	36.6-137	8.93	22.7	L648405-01		WG674370
Dibenz(a,h)anthracene	mg/kg	0.0845	0.0813	98.8	27.1-145	3.94	21.9	L648405-01		WG674370
Fluoranthene	mg/kg	0.0954	0.100	105.	39.8-141	4.72	22.2	L648405-01		WG674370
Fluorene	mg/kg	0.0952	0.0921	103.	42.5-130	3.37	20	L648405-01		WG674370
Indeno(1,2,3-cd)pyrene	mg/kg	0.0870	0.0883	94.4	19-151	1.50	25	L648405-01		WG674370
Naphthalene	mg/kg	0.0741	0.0762	70.5	40.6-135	2.78	20	L648405-01		WG674370
Phenanthrene	mg/kg	0.0899	0.0931	91.4	39.7-129	3.43	20	L648405-01		WG674370
Pyrene	mg/kg	0.0838	0.0944	87.3	31.5-141	11.8	23.5	L648405-01		WG674370
2-Fluorobiphenyl				94.20	51.1-131					WG674370
Nitrobenzene-d5				111.0	40.9-147					WG674370
p-Terphenyl-d14				102.0	45.3-138					WG674370

Serial Dilution

Batch number /Run number / Sample number cross reference

WG673831: R2759163: L648405-01 02 03  
WG673897: R2759861: L648405-01 02 03  
WG674190: R2759901: L648405-01 02 03  
WG674045: R2760723: L648405-01 02 03  
WG673578: R2760820: L648405-01 02 03  
WG674532: R2762221: L648405-01 02 03  
WG673941: R2762400: L648405-01 02 03  
WG674566: R2762560: L648405-01 02 03  
WG674374: R2766680 R2769544: L648405-01 02 03  
WG674370: R2768280 R2771840 R2773482: L648405-01 02 03

\* \* Calculations are performed prior to rounding of reported values.  
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August 09, 2013

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.