



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

Wednesday January 08, 2014

Report Number: L676583

Samples Received: 01/04/14

Client Project:

Description: O-29

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

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YOUR LAB OF CHOICE

REPORT OF ANALYSIS

January 08, 2014

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

Date Received : January 04, 2014
Description : O-29

Sample ID : O-29-C1

Collected By : Aaron Kelly
Collection Date : 01/03/14 00:00

ESC Sample # : L676583-01

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	6.4		su	9045D	01/07/14	1
Sodium Adsorption Ratio	1.8			Calc.	01/05/14	1
Specific Conductance	990		umhos/cm	9050AMod	01/08/14	1
Benzene	BDL	0.0025	mg/kg	8021/8015	01/04/14	5
Toluene	BDL	0.025	mg/kg	8021/8015	01/04/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021/8015	01/04/14	5
Total Xylene	BDL	0.0075	mg/kg	8021/8015	01/04/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	GRO	01/04/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	101.		% Rec.	8021/8015	01/04/14	5
a,a,a-Trifluorotoluene(PID)	102.		% Rec.	8021/8015	01/04/14	5
TPH (GC/FID) High Fraction	BDL	4.0	mg/kg	3546/DRO	01/06/14	1
Surrogate recovery(%)						
o-Terphenyl	105.		% Rec.	3546/DRO	01/06/14	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit (PQL)

Note:

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L676583-01 (PH) - 6.4 @ 18.8c



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REPORT OF ANALYSIS

January 08, 2014

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

ESC Sample # : L676583-02

Date Received : January 04, 2014
Description : O-29

Site ID :

Sample ID : O-29-C2

Project # :

Collected By : Aaron Kelly
Collection Date : 01/03/14 00:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	7.0		su	9045D	01/07/14	1
Sodium Adsorption Ratio	1.6			Calc.	01/05/14	1
Specific Conductance	580		umhos/cm	9050AMod	01/08/14	1
Benzene	BDL	0.0025	mg/kg	8021/8015	01/05/14	5
Toluene	BDL	0.025	mg/kg	8021/8015	01/05/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021/8015	01/05/14	5
Total Xylene	0.0083	0.0075	mg/kg	8021/8015	01/05/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	GRO	01/05/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	103.		% Rec.	8021/8015	01/05/14	5
a,a,a-Trifluorotoluene(PID)	103.		% Rec.	8021/8015	01/05/14	5
TPH (GC/FID) High Fraction	BDL	4.0	mg/kg	3546/DRO	01/06/14	1
Surrogate recovery(%)						
o-Terphenyl	94.9		% Rec.	3546/DRO	01/06/14	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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L676583-02 (PH) - 7.0 @ 18.8c



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Date Received : January 04, 2014
Description : O-29

Sample ID : O-29-C3

Collected By : Aaron Kelly
Collection Date : 01/03/14 00:00

ESC Sample # : L676583-03

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	7.7		su	9045D	01/07/14	1
Sodium Adsorption Ratio	1.4			Calc.	01/05/14	1
Specific Conductance	380		umhos/cm	9050AMod	01/08/14	1
Benzene	BDL	0.0025	mg/kg	8021/8015	01/05/14	5
Toluene	BDL	0.025	mg/kg	8021/8015	01/05/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021/8015	01/05/14	5
Total Xylene	0.11	0.0075	mg/kg	8021/8015	01/05/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	GRO	01/05/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	103.		% Rec.	8021/8015	01/05/14	5
a,a,a-Trifluorotoluene(PID)	104.		% Rec.	8021/8015	01/05/14	5
TPH (GC/FID) High Fraction	10.	4.0	mg/kg	3546/DRO	01/06/14	1
Surrogate recovery(%)						
o-Terphenyl	114.		% Rec.	3546/DRO	01/06/14	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit (PQL)

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L676583-03 (PH) - 7.7 @ 18.6c



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Denver, CO 80202

January 08, 2014

Date Received : January 04, 2014
Description : O-29

ESC Sample # : L676583-04

Sample ID : O-29-C4

Site ID :

Collected By : Aaron Kelly
Collection Date : 01/03/14 00:00

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	7.8		su	9045D	01/07/14	1
Sodium Adsorption Ratio	0.88			Calc.	01/05/14	1
Specific Conductance	180		umhos/cm	9050AMod	01/08/14	1
Benzene	BDL	0.0025	mg/kg	8021/8015	01/05/14	5
Toluene	BDL	0.025	mg/kg	8021/8015	01/05/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021/8015	01/05/14	5
Total Xylene	0.011	0.0075	mg/kg	8021/8015	01/05/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	GRO	01/05/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	103.		% Rec.	8021/8015	01/05/14	5
a,a,a-Trifluorotoluene(PID)	104.		% Rec.	8021/8015	01/05/14	5
TPH (GC/FID) High Fraction	BDL	4.0	mg/kg	3546/DRO	01/06/14	1
Surrogate recovery(%)						
o-Terphenyl	95.1		% Rec.	3546/DRO	01/06/14	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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L676583-04 (PH) - 7.8 @ 18.4c



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Denver, CO 80202

January 08, 2014

Date Received : January 04, 2014
Description : O-29

ESC Sample # : L676583-05

Sample ID : O-29-SPOILS

Site ID :

Collected By : Aaron Kelly
Collection Date : 01/03/14 00:00

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	50.	mg/kg	3060A/7196A	01/07/14	25
ORP	130		mV	2580 B-2011	01/07/14	1
pH	7.7		su	9045D	01/07/14	1
Sodium Adsorption Ratio	18.			Calc.	01/06/14	1
Specific Conductance	1600		umhos/cm	9050AMod	01/08/14	1
Mercury	0.061	0.020	mg/kg	7471	01/07/14	1
Arsenic	22.	1.0	mg/kg	6010B	01/05/14	1
Barium	390	0.25	mg/kg	6010B	01/05/14	1
Boron	BDL	10.	mg/kg	6010B	01/05/14	1
Cadmium	0.28	0.25	mg/kg	6010B	01/05/14	1
Chromium	34.	0.50	mg/kg	6010B	01/05/14	1
Copper	36.	1.0	mg/kg	6010B	01/05/14	1
Iron	28000	5.0	mg/kg	6010B	01/05/14	1
Lead	20.	0.25	mg/kg	6010B	01/05/14	1
Nickel	23.	1.0	mg/kg	6010B	01/05/14	1
Selenium	2.1	1.0	mg/kg	6010B	01/05/14	1
Silver	BDL	0.50	mg/kg	6010B	01/05/14	1
Zinc	71.	1.5	mg/kg	6010B	01/05/14	1
Benzene	0.015	0.0025	mg/kg	8021/8015	01/05/14	5
Toluene	BDL	0.025	mg/kg	8021/8015	01/05/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021/8015	01/05/14	5
Total Xylene	0.39	0.0075	mg/kg	8021/8015	01/05/14	5
TPH (GC/FID) Low Fraction	3.1	0.50	mg/kg	GRO	01/05/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	101.		% Rec.	8021/8015	01/05/14	5
a,a,a-Trifluorotoluene(PID)	104.		% Rec.	8021/8015	01/05/14	5
TPH (GC/FID) High Fraction	82.	4.0	mg/kg	3546/DRO	01/06/14	1
Surrogate recovery(%)						
o-Terphenyl	119.		% Rec.	3546/DRO	01/06/14	1
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Acenaphthene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Acenaphthylene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Benzo(a)anthracene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Benzo(a)pyrene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L676583-05 (PH) - 7.7 @ 18.3c
L676583-05 (CR6) - diluted due to sample color



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January 08, 2014

Date Received : January 04, 2014
Description : O-29

ESC Sample # : L676583-05

Sample ID : O-29-SPOILS

Site ID :

Collected By : Aaron Kelly
Collection Date : 01/03/14 00:00

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(b)fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Benzo(g,h,i)perylene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Benzo(k)fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Chrysene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Dibenz(a,h)anthracene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Fluoranthene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Fluorene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Indeno(1,2,3-cd)pyrene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Naphthalene	BDL	0.020	mg/kg	8270C-SIM	01/06/14	1
Phenanthrene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
Pyrene	BDL	0.0060	mg/kg	8270C-SIM	01/06/14	1
1-Methylnaphthalene	BDL	0.020	mg/kg	8270C-SIM	01/06/14	1
2-Methylnaphthalene	BDL	0.020	mg/kg	8270C-SIM	01/06/14	1
2-Chloronaphthalene	BDL	0.020	mg/kg	8270C-SIM	01/06/14	1
Surrogate Recovery						
Nitrobenzene-d5	88.5		% Rec.	8270C-SIM	01/06/14	1
2-Fluorobiphenyl	83.4		% Rec.	8270C-SIM	01/06/14	1
p-Terphenyl-d14	78.3		% Rec.	8270C-SIM	01/06/14	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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L676583-05 (PH) - 7.7 @ 18.3c

L676583-05 (CR6) - diluted due to sample color

Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L676583-05	WG700232	SAMP	Chromium, Hexavalent	R2874326	0

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
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.

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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**Quality Assurance Report
Level II**

Denver, CO 80202

January 08, 2014

L676583

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Benzene	< .0005	mg/kg			WG700312	01/04/14 19:33
Ethylbenzene	< .0005	mg/kg			WG700312	01/04/14 19:33
Toluene	< .005	mg/kg			WG700312	01/04/14 19:33
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG700312	01/04/14 19:33
Total Xylene	< .0015	mg/kg			WG700312	01/04/14 19:33
a,a,a-Trifluorotoluene(FID)		% Rec.	103.0	59-128	WG700312	01/04/14 19:33
a,a,a-Trifluorotoluene(PID)		% Rec.	103.0	54-144	WG700312	01/04/14 19:33
Arsenic	< 1	mg/kg			WG700288	01/05/14 19:21
Barium	< .25	mg/kg			WG700288	01/05/14 19:21
Boron	< 10	mg/kg			WG700288	01/05/14 19:21
Cadmium	< .25	mg/kg			WG700288	01/05/14 19:21
Chromium	< .5	mg/kg			WG700288	01/05/14 19:21
Copper	< 1	mg/kg			WG700288	01/05/14 19:21
Iron	< 5	mg/kg			WG700288	01/05/14 19:21
Lead	< .25	mg/kg			WG700288	01/05/14 19:21
Nickel	< 1	mg/kg			WG700288	01/05/14 19:21
Selenium	< 1	mg/kg			WG700288	01/05/14 19:21
Silver	< .5	mg/kg			WG700288	01/05/14 19:21
Zinc	< 1.5	mg/kg			WG700288	01/05/14 19:21
TPH (GC/FID) High Fraction	< 4	mg/kg			WG700287	01/06/14 09:53
o-Terphenyl		% Rec.	101.0	50-150	WG700287	01/06/14 09:53
1-Methylnaphthalene	< .02	mg/kg			WG700297	01/06/14 15:10
2-Chloronaphthalene	< .02	mg/kg			WG700297	01/06/14 15:10
2-Methylnaphthalene	< .02	mg/kg			WG700297	01/06/14 15:10
Acenaphthene	< .006	mg/kg			WG700297	01/06/14 15:10
Acenaphthylene	< .006	mg/kg			WG700297	01/06/14 15:10
Anthracene	< .006	mg/kg			WG700297	01/06/14 15:10
Benzo(a)anthracene	< .006	mg/kg			WG700297	01/06/14 15:10
Benzo(a)pyrene	< .006	mg/kg			WG700297	01/06/14 15:10
Benzo(b)fluoranthene	< .006	mg/kg			WG700297	01/06/14 15:10
Benzo(g,h,i)perylene	< .006	mg/kg			WG700297	01/06/14 15:10
Benzo(k)fluoranthene	< .006	mg/kg			WG700297	01/06/14 15:10
Chrysene	< .006	mg/kg			WG700297	01/06/14 15:10
Dibenz(a,h)anthracene	< .006	mg/kg			WG700297	01/06/14 15:10
Fluoranthene	< .006	mg/kg			WG700297	01/06/14 15:10
Fluorene	< .006	mg/kg			WG700297	01/06/14 15:10
Indeno(1,2,3-cd)pyrene	< .006	mg/kg			WG700297	01/06/14 15:10
Naphthalene	< .02	mg/kg			WG700297	01/06/14 15:10
Phenanthrene	< .006	mg/kg			WG700297	01/06/14 15:10
Pyrene	< .006	mg/kg			WG700297	01/06/14 15:10
2-Fluorobiphenyl		% Rec.	80.20	51.1-131	WG700297	01/06/14 15:10
Nitrobenzene-d5		% Rec.	62.80	40.9-147	WG700297	01/06/14 15:10
p-Terphenyl-d14		% Rec.	61.30	45.3-138	WG700297	01/06/14 15:10
Chromium, Hexavalent	< 2	mg/kg			WG700232	01/07/14 09:49
Mercury	< .02	mg/kg			WG700347	01/07/14 08:58
Specific Conductance	1.30	umhos/cm			WG700517	01/08/14 13:28

* 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

Denver, CO 80202

January 08, 2014

L676583

Analyte	Units	Duplicate		RPD	Limit	Ref Samp	Batch
		Result	Duplicate				
Arsenic	mg/kg	5.40	4.44	20.0	20	L676586-01	WG700288
Barium	mg/kg	990.	365.	93.0*	20	L676586-01	WG700288
Boron	mg/kg	17.0	15.7	8.00	20	L676586-01	WG700288
Cadmium	mg/kg	0.480	0.478	0.0	20	L676586-01	WG700288
Chromium	mg/kg	15.0	14.2	5.00	20	L676586-01	WG700288
Copper	mg/kg	13.0	11.8	12.0	20	L676586-01	WG700288
Iron	mg/kg	15000	12300	21.0*	20	L676586-01	WG700288
Lead	mg/kg	7.40	7.21	3.00	20	L676586-01	WG700288
Nickel	mg/kg	15.0	14.2	4.00	20	L676586-01	WG700288
Selenium	mg/kg	1.20	0.876	31.0*	20	L676586-01	WG700288
Silver	mg/kg	0.0	0.172	89.0*	20	L676586-01	WG700288
Zinc	mg/kg	58.0	55.9	4.00	20	L676586-01	WG700288
Chromium, Hexavalent	mg/kg	0.0	0.0	0.0	20	L676415-01	WG700232
Mercury	mg/kg	0.0300	0.0549	58.0*	20	L676548-01	WG700347
pH	su	5.20	5.20	0.0	1	L676304-02	WG700427
ORP	mV	61.0	60.0	1.65	20	L674903-04	WG700450
Specific Conductance	umhos/cm	340.	330.	1.80	20	L676173-01	WG700517
Specific Conductance	umhos/cm	2300	2300	1.89	20	L676767-01	WG700517

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Benzene	mg/kg	.05	0.0594	119.	70-130	WG700312
Ethylbenzene	mg/kg	.05	0.0588	118.	70-130	WG700312
Toluene	mg/kg	.05	0.0573	115.	70-130	WG700312
Total Xylene	mg/kg	.15	0.177	118.	70-130	WG700312
a,a,a-Trifluorotoluene(PID)				102.0	54-144	WG700312
TPH (GC/FID) Low Fraction	mg/kg	5.5	5.00	90.9	63.5-137	WG700312
a,a,a-Trifluorotoluene(FID)				103.0	59-128	WG700312
Arsenic	mg/kg	237	250.	105.	83.1-117	WG700288
Barium	mg/kg	252	268.	106.	84.1-116	WG700288
Boron	mg/kg	118	128.	108.	74-126	WG700288
Cadmium	mg/kg	191	199.	104.	83.2-117	WG700288
Chromium	mg/kg	128	136.	106.	81.3-118	WG700288
Copper	mg/kg	123	133.	108.	83.7-116	WG700288
Iron	mg/kg	13100	13400	102.	50.8-150	WG700288
Lead	mg/kg	103	108.	105.	83.1-117	WG700288
Nickel	mg/kg	118	117.	99.0	82-118	WG700288
Selenium	mg/kg	110	116.	105.	78.7-122	WG700288
Silver	mg/kg	47.3	51.1	108.	66.2-134	WG700288
Zinc	mg/kg	183	193.	106.	82-118	WG700288
TPH (GC/FID) High Fraction	mg/kg	60	45.5	75.8	50-150	WG700287
o-Terphenyl				89.90	50-150	WG700287
1-Methylnaphthalene	mg/kg	.08	0.0601	75.2	62.5-121	WG700297

* Performance of this Analyte is outside of established criteria.

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Analyte	Units	Laboratory Control Known Val	Sample Result	% Rec	Limit	Batch
2-Chloronaphthalene	mg/kg	.08	0.0636	79.5	62.1-120	WG700297
2-Methylnaphthalene	mg/kg	.08	0.0595	74.3	62.5-121	WG700297
Acenaphthene	mg/kg	.08	0.0574	71.8	62.4-121	WG700297
Acenaphthylene	mg/kg	.08	0.0558	69.8	62.9-123	WG700297
Anthracene	mg/kg	.08	0.0706	88.2	64.9-129	WG700297
Benzo (a) anthracene	mg/kg	.08	0.0556	69.5	61.8-125	WG700297
Benzo (a) pyrene	mg/kg	.08	0.0566	70.7	63.4-119	WG700297
Benzo (b) fluoranthene	mg/kg	.08	0.0572	71.5	62.7-119	WG700297
Benzo (g, h, i) perylene	mg/kg	.08	0.0574	71.8	68.2-129	WG700297
Benzo (k) fluoranthene	mg/kg	.08	0.0662	82.8	64.5-128	WG700297
Chrysene	mg/kg	.08	0.0613	76.6	64.4-128	WG700297
Dibenz (a, h) anthracene	mg/kg	.08	0.0573	71.6	65.3-128	WG700297
Fluoranthene	mg/kg	.08	0.0718	89.8	61.8-129	WG700297
Fluorene	mg/kg	.08	0.0606	75.7	60.8-121	WG700297
Indeno (1, 2, 3-cd) pyrene	mg/kg	.08	0.0580	72.5	67.6-129	WG700297
Naphthalene	mg/kg	.08	0.0531	66.4	59.5-116	WG700297
Phenanthrene	mg/kg	.08	0.0564	70.5	59.4-121	WG700297
Pyrene	mg/kg	.08	0.0554	69.3	61.2-130	WG700297
2-Fluorobiphenyl				82.60	51.1-131	WG700297
Nitrobenzene-d5				66.70	40.9-147	WG700297
p-Terphenyl-d14				65.10	45.3-138	WG700297
Chromium, Hexavalent	mg/kg	125	142.	114.	80-120	WG700232
Mercury	mg/kg	12.4	14.8	120.	71.6-128	WG700347
pH	su	5.93	5.90	99.5	98.3-101.7	WG700427
pH	su	5.93	6.00	101.	98.3-101.7	WG700427
ORP	mV	100	110.	110.	90-110	WG700450
Specific Conductance	umhos/cm	510	510.	100.	85-115	WG700517

Analyte	Units	Laboratory Control Result	Sample Ref	Duplicate %Rec	Limit	RPD	Limit	Batch
Benzene	mg/kg	0.0510	0.0594	102.	70-130	15.2	20	WG700312
Ethylbenzene	mg/kg	0.0523	0.0588	105.	70-130	11.7	20	WG700312
Toluene	mg/kg	0.0505	0.0573	101.	70-130	12.7	20	WG700312
Total Xylene	mg/kg	0.157	0.177	105.	70-130	11.9	20	WG700312
a, a, a-Trifluorotoluene (PID)				103.0	54-144			WG700312
TPH (GC/FID) Low Fraction	mg/kg	5.11	5.00	93.0	63.5-137	2.16	20	WG700312
a, a, a-Trifluorotoluene (FID)				103.0	59-128			WG700312
TPH (GC/FID) High Fraction	mg/kg	49.9	45.5	83.0	50-150	9.32	20	WG700287
o-Terphenyl				96.80	50-150			WG700287
1-Methylnaphthalene	mg/kg	0.0597	0.0601	74.0	62.5-121	0.790	20	WG700297
2-Chloronaphthalene	mg/kg	0.0625	0.0636	78.0	62.1-120	1.81	20	WG700297
2-Methylnaphthalene	mg/kg	0.0590	0.0595	74.0	62.5-121	0.790	20	WG700297
Acenaphthene	mg/kg	0.0571	0.0574	71.0	62.4-121	0.680	20	WG700297
Acenaphthylene	mg/kg	0.0551	0.0558	69.0	62.9-123	1.39	20	WG700297

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Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Anthracene	mg/kg	0.0702	0.0706	88.0	64.9-129	0.570	20	WG700297
Benzo(a)anthracene	mg/kg	0.0549	0.0556	69.0	61.8-125	1.32	20	WG700297
Benzo(a)pyrene	mg/kg	0.0579	0.0566	72.0	63.4-119	2.27	20	WG700297
Benzo(b)fluoranthene	mg/kg	0.0571	0.0572	71.0	62.7-119	0.150	20	WG700297
Benzo(g,h,i)perylene	mg/kg	0.0564	0.0574	70.0	68.2-129	1.78	20	WG700297
Benzo(k)fluoranthene	mg/kg	0.0632	0.0662	79.0	64.5-128	4.67	20	WG700297
Chrysene	mg/kg	0.0601	0.0613	75.0	64.4-128	1.97	20	WG700297
Dibenz(a,h)anthracene	mg/kg	0.0561	0.0573	70.0	65.3-128	2.02	20	WG700297
Fluoranthene	mg/kg	0.0714	0.0718	89.0	61.8-129	0.570	20	WG700297
Fluorene	mg/kg	0.0600	0.0606	75.0	60.8-121	0.980	20	WG700297
Indeno(1,2,3-cd)pyrene	mg/kg	0.0569	0.0580	71.0	67.6-129	2.00	20	WG700297
Naphthalene	mg/kg	0.0526	0.0531	66.0	59.5-116	0.960	20	WG700297
Phenanthrene	mg/kg	0.0561	0.0564	70.0	59.4-121	0.630	20	WG700297
Pyrene	mg/kg	0.0549	0.0554	69.0	61.2-130	0.840	20	WG700297
2-Fluorobiphenyl				78.30	51.1-131			WG700297
Nitrobenzene-d5				65.50	40.9-147			WG700297
p-Terphenyl-d14				61.60	45.3-138			WG700297
Chromium, Hexavalent	mg/kg	141.	142.	113.	80-120	0.707	20	WG700232
ORP	mV	110.	110.	110.	90-110	0.0	20	WG700450
Specific Conductance	umhos/	510.	510.	100.	85-115	0.0	20	WG700517

Analyte	Units	Matrix Spike				Limit	Ref Samp	Batch
		MS Res	Ref Res	TV	% Rec			
Benzene	mg/kg	0.233	0.0	.05	93.0	49.7-127	L676583-01	WG700312
Ethylbenzene	mg/kg	0.222	0.0	.05	89.0	40.8-141	L676583-01	WG700312
Toluene	mg/kg	0.227	0.00136	.05	90.0	49.8-132	L676583-01	WG700312
Total Xylene	mg/kg	0.668	0.00215	.15	89.0	41.2-140	L676583-01	WG700312
a,a,a-Trifluorotoluene(PID)					103.0	54-144		WG700312
TPH (GC/FID) Low Fraction	mg/kg	21.2	0.0	5.5	77.0	28.5-138	L676583-01	WG700312
a,a,a-Trifluorotoluene(FID)					102.0	59-128		WG700312
Arsenic	mg/kg	55.1	4.44	50	100.	75-125	L676586-01	WG700288
Barium	mg/kg	461.	365.	50	190.*	75-125	L676586-01	WG700288
Boron	mg/kg	66.3	15.7	50	100.	75-125	L676586-01	WG700288
Cadmium	mg/kg	50.5	0.478	50	100.	75-125	L676586-01	WG700288
Chromium	mg/kg	64.5	14.2	50	100.	75-125	L676586-01	WG700288
Copper	mg/kg	62.8	11.8	50	100.	75-125	L676586-01	WG700288
Iron	mg/kg	13000	12300	50	1300*	75-125	L676586-01	WG700288
Lead	mg/kg	56.4	7.21	50	98.0	75-125	L676586-01	WG700288
Nickel	mg/kg	60.0	14.2	50	92.0	75-125	L676586-01	WG700288
Selenium	mg/kg	51.4	0.876	50	100.	75-125	L676586-01	WG700288
Silver	mg/kg	50.5	0.172	50	100.	75-125	L676586-01	WG700288
Zinc	mg/kg	108.	55.9	50	100.	75-125	L676586-01	WG700288
TPH (GC/FID) High Fraction	mg/kg	46.5	0.141	60	77.0	50-150	L676433-01	WG700287
o-Terphenyl					124.0	50-150		WG700287
1-Methylnaphthalene	mg/kg	0.0713	0.0000505	.08	89.0	58.9-123	L676612-18	WG700297
2-Chloronaphthalene	mg/kg	0.0744	0.0000132	.08	93.0	61.6-120	L676612-18	WG700297

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Analyte	Units	MS Res	Matrix Spike Ref Res	TV	% Rec	Limit	Ref Samp	Batch
2-Methylnaphthalene	mg/kg	0.0706	0.000114	.08	88.2	50.7-129	L676612-18	WG700297
Acenaphthene	mg/kg	0.0678	0.000185	.08	84.7	51.6-124	L676612-18	WG700297
Acenaphthylene	mg/kg	0.0652	0.000119	.08	81.3	58.3-126	L676612-18	WG700297
Anthracene	mg/kg	0.0806	0.000189	.08	101.	47.9-137	L676612-18	WG700297
Benzo (a) anthracene	mg/kg	0.0618	0.000381	.08	76.8	34.2-138	L676612-18	WG700297
Benzo (a) pyrene	mg/kg	0.0693	0.000257	.08	86.3	34.6-133	L676612-18	WG700297
Benzo (b) fluoranthene	mg/kg	0.0675	0.000467	.08	83.8	19.8-142	L676612-18	WG700297
Benzo (g, h, i) perylene	mg/kg	0.0631	0.0000026	.08	78.8	20-149	L676612-18	WG700297
Benzo (k) fluoranthene	mg/kg	0.0679	0.000405	.08	84.4	32.1-137	L676612-18	WG700297
Chrysene	mg/kg	0.0692	0.000226	.08	86.2	36.6-137	L676612-18	WG700297
Dibenz (a, h) anthracene	mg/kg	0.0635	0.0000084	.08	79.4	27.1-145	L676612-18	WG700297
Fluoranthene	mg/kg	0.0831	0.000406	.08	103.	39.8-141	L676612-18	WG700297
Fluorene	mg/kg	0.0695	0.0000341	.08	86.8	42.5-130	L676612-18	WG700297
Indeno (1, 2, 3-cd) pyrene	mg/kg	0.0634	0.000159	.08	79.1	19-151	L676612-18	WG700297
Naphthalene	mg/kg	0.0631	0.000698	.08	78.0	40.6-135	L676612-18	WG700297
Phenanthrene	mg/kg	0.0645	0.000214	.08	80.4	39.7-129	L676612-18	WG700297
Pyrene	mg/kg	0.0650	0.000345	.08	80.8	31.5-141	L676612-18	WG700297
2-Fluorobiphenyl					90.20	51.1-131		WG700297
Nitrobenzene-d5					85.70	40.9-147		WG700297
p-Terphenyl-d14					72.80	45.3-138		WG700297
Chromium, Hexavalent	mg/kg	18.6	0.0	20	93.0	75-125	L676418-01	WG700232
Mercury	mg/kg	0.311	0.0549	.25	100.	80-120	L676548-01	WG700347

Analyte	Units	MSD	Matrix Spike Ref	Duplicate %Rec	Limit	RPD	Limit	Ref Samp	Batch
Benzene	mg/kg	0.239	0.233	95.7	49.7-127	2.79	23.5	L676583-01	WG700312
Ethylbenzene	mg/kg	0.223	0.222	89.0	40.8-141	0.0600	23.8	L676583-01	WG700312
Toluene	mg/kg	0.226	0.227	90.0	49.8-132	0.460	23.5	L676583-01	WG700312
Total Xylene	mg/kg	0.664	0.668	88.2	41.2-140	0.560	23.7	L676583-01	WG700312
a, a, a-Trifluorotoluene (PID)				102.0	54-144				WG700312
TPH (GC/FID) Low Fraction	mg/kg	20.3	21.2	73.7	28.5-138	4.36	23.6	L676583-01	WG700312
a, a, a-Trifluorotoluene (FID)				102.0	59-128				WG700312
Arsenic	mg/kg	53.0	55.1	97.1	75-125	4.00	20	L676586-01	WG700288
Barium	mg/kg	313.	461.	0*	75-125	38.0*	20	L676586-01	WG700288
Boron	mg/kg	63.8	66.3	96.2	75-125	4.00	20	L676586-01	WG700288
Cadmium	mg/kg	49.2	50.5	97.4	75-125	3.00	20	L676586-01	WG700288
Chromium	mg/kg	62.9	64.5	97.5	75-125	3.00	20	L676586-01	WG700288
Copper	mg/kg	61.9	62.8	100.	75-125	1.00	20	L676586-01	WG700288
Iron	mg/kg	13000	13000	1300*	75-125	0.0	20	L676586-01	WG700288
Lead	mg/kg	55.2	56.4	96.0	75-125	2.00	20	L676586-01	WG700288
Nickel	mg/kg	59.0	60.0	89.7	75-125	2.00	20	L676586-01	WG700288
Selenium	mg/kg	50.1	51.4	98.5	75-125	2.00	20	L676586-01	WG700288
Silver	mg/kg	49.1	50.5	97.9	75-125	3.00	20	L676586-01	WG700288
Zinc	mg/kg	108.	108.	103.	75-125	0.0	20	L676586-01	WG700288
TPH (GC/FID) High Fraction	mg/kg	55.8	46.5	92.7	50-150	18.2	20	L676433-01	WG700287
o-Terphenyl				130.0	50-150				WG700287
1-Methylnaphthalene	mg/kg	0.0709	0.0713	88.6	58.9-123	0.450	20	L676612-18	WG700297
2-Chloronaphthalene	mg/kg	0.0739	0.0744	92.4	61.6-120	0.670	20	L676612-18	WG700297

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Analyte	Units	MSD	Matrix Spike		Duplicate %Rec	Limit	RPD	Limit	Ref Samp	Batch
			Ref							
2-Methylnaphthalene	mg/kg	0.0705	0.0706	87.9	50.7-129	0.250	20	L676612-18	WG700297	
Acenaphthene	mg/kg	0.0673	0.0678	84.1	51.6-124	0.690	20	L676612-18	WG700297	
Acenaphthylene	mg/kg	0.0648	0.0652	80.8	58.3-126	0.650	20	L676612-18	WG700297	
Anthracene	mg/kg	0.0789	0.0806	98.4	47.9-137	2.15	20	L676612-18	WG700297	
Benzo (a) anthracene	mg/kg	0.0612	0.0618	76.0	34.2-138	0.960	22.8	L676612-18	WG700297	
Benzo (a) pyrene	mg/kg	0.0687	0.0693	85.6	34.6-133	0.820	26.3	L676612-18	WG700297	
Benzo (b) fluoranthene	mg/kg	0.0653	0.0675	81.0	19.8-142	3.31	30.3	L676612-18	WG700297	
Benzo (g, h, i) perylene	mg/kg	0.0628	0.0631	78.5	20-149	0.370	27.1	L676612-18	WG700297	
Benzo (k) fluoranthene	mg/kg	0.0689	0.0679	85.6	32.1-137	1.42	24.6	L676612-18	WG700297	
Chrysene	mg/kg	0.0685	0.0692	85.3	36.6-137	1.03	22.7	L676612-18	WG700297	
Dibenz (a, h) anthracene	mg/kg	0.0632	0.0635	78.9	27.1-145	0.600	21.9	L676612-18	WG700297	
Fluoranthene	mg/kg	0.0819	0.0831	102.	39.8-141	1.47	22.2	L676612-18	WG700297	
Fluorene	mg/kg	0.0685	0.0695	85.5	42.5-130	1.45	20	L676612-18	WG700297	
Indeno (1, 2, 3-cd) pyrene	mg/kg	0.0633	0.0634	78.9	19-151	0.220	25	L676612-18	WG700297	
Naphthalene	mg/kg	0.0631	0.0631	78.0	40.6-135	0.0500	20	L676612-18	WG700297	
Phenanthrene	mg/kg	0.0648	0.0645	80.7	39.7-129	0.380	20	L676612-18	WG700297	
Pyrene	mg/kg	0.0644	0.0650	80.1	31.5-141	0.860	23.5	L676612-18	WG700297	
2-Fluorobiphenyl				91.00	51.1-131				WG700297	
Nitrobenzene-d5				75.40	40.9-147				WG700297	
p-Terphenyl-d14				73.40	45.3-138				WG700297	
Chromium, Hexavalent	mg/kg	18.1	18.6	90.5	75-125	2.72	20	L676418-01	WG700232	
Mercury	mg/kg	0.310	0.311	102.	80-120	0.0	20	L676548-01	WG700347	

Post Spike

Serial Dilution

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Serial Dilution

Batch number / Run number / Sample number cross reference

WG700312: R2873923: L676583-01 02 03 04 05
WG700288: R2873941: L676583-05
WG700290: R2873943: L676583-01 02 03 04
WG700287: R2874160: L676583-01 02 03 04 05
WG700335: R2874225: L676583-05
WG700297: R2874284: L676583-05
WG700232: R2874326: L676583-05
WG700347: R2874370: L676583-05
WG700427: R2874480: L676583-01 02 03 04 05
WG700450: R2874500: L676583-05
WG700517: R2874861: L676583-01 02 03 04 05

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

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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.