



Nicholson GeoSolutions LLC

3433 East Lake Drive
Centennial, CO 80121

November 19, 2015

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

Subject: CD-32 Spoils Sample Results

Dear Derek:

Nicholson GeoSolutions LLC was retained by Linn Energy, LLC (Linn) to conduct soil sampling of the spoils stockpiled on the CD-32 well pad in the Garden Gulch area, Garfield County, Colorado.

Sampling was conducted on October 24, 2015. An eight-point composite sample of the spoils excavated from the pit during closure activities and stockpiled on the well pad in a bermed area was collected. The sample was 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 COGCC Table 910-1 standards and treatment options.

Table 1 provides a summary of the analytical results and the laboratory report is contained in Appendix A. All results for the spoils sample were below the COGCC standards except for arsenic. Arsenic was reported at 8.31 mg/kg, within the range of natural background concentrations for the Garden Gulch area.

Nicholson GeoSolutions LLC

A handwritten signature in blue ink that reads "DK Nicholson".

David K. Nicholson, P.G.
Principal Geologist

Table 1 CD-32 Spoils Sample Results – October 24, 2015

Parameter	Table 910-1 Standards	CD32-LF-Spoils
specific conductance (mmhos/cm)	<4	2.42
pH (standard units)	6-9	8.39
SAR (ratio)	<12	9.51
TVPH – gasoline range	500 ¹	2.58
TEPH – diesel/motor oil range	500 ¹	398
benzene	0.17	<0.0025
toluene	85	<0.025
ethylbenzene	100	0.0072
xylenes	175	0.00872
benzo(a)pyrene	0.022	0.007
arsenic	0.39	8.31

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

APPENDIX A
Laboratory Report



12065 Lebanon Rd.
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1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

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

Report Summary

Thursday November 05, 2015

Report Number: L796886

Samples Received: 10/27/15

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 - 1461-01,1461-02, 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

November 05, 2015

Date Received : October 27, 2015
Description : Pit Reclamation
Sample ID : CD32-LF-SPOILS
Collected By : DK Nicholson
Collection Date : 10/24/15 11:30

ESC Sample # : L796886-11

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium, Hexavalent	BDL	2.00	mg/kg	3060A/7196A	11/02/15	1
ORP	139.		mV	2580 B-2011	10/30/15	1
pH	8.39	0.100	su	9045D	10/29/15	1
Sodium Adsorption Ratio	9.51			Calc	11/02/15	1
Specific Conductance	2420		umhos/cm	9050AMod	11/02/15	1
Mercury	0.0275	0.0200	mg/kg	7471A	10/28/15	1
Arsenic	8.31	2.00	mg/kg	6010B	11/01/15	1
Barium	449.	0.500	mg/kg	6010B	11/01/15	1
Boron	BDL	10.0	mg/kg	6010B	11/01/15	1
Cadmium	BDL	0.500	mg/kg	6010B	11/01/15	1
Chromium	16.3	1.00	mg/kg	6010B	11/01/15	1
Copper	25.1	2.00	mg/kg	6010B	11/01/15	1
Lead	14.6	0.500	mg/kg	6010B	11/01/15	1
Nickel	16.9	2.00	mg/kg	6010B	11/01/15	1
Selenium	BDL	2.00	mg/kg	6010B	11/01/15	1
Silver	BDL	1.00	mg/kg	6010B	11/01/15	1
Zinc	47.9	5.00	mg/kg	6010B	11/01/15	1
Benzene	BDL	0.00250	mg/kg	8021	10/31/15	5
Toluene	BDL	0.0250	mg/kg	8021	10/31/15	5
Ethylbenzene	0.00720	0.00250	mg/kg	8021	10/31/15	5
Total Xylene	0.00872	0.00750	mg/kg	8021	10/31/15	5
TPH (GC/FID) Low Fraction	2.58	0.500	mg/kg	8015	10/31/15	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	92.9		% Rec.	8015	10/31/15	1
a,a,a-Trifluorotoluene(PID)	99.1		% Rec.	8021	10/31/15	1
Diesel and Oil Ranges						
C10-C28 Diesel Range	228.	80.0	mg/kg	8015	11/02/15	20
C28-C40 Oil Range	170.	80.0	mg/kg	8015	11/02/15	20
Surrogate Recovery						
o-Terphenyl	79.1		% Rec.	8015	11/02/15	20
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20
Acenaphthene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20
Acenaphthylene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20
Benzo(a)anthracene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L796886-11 (PH) - 8.39 at 24.2c
L796886-11 (SV8270PAHSIM) - Dilution due to matrix



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November 05, 2015

Date Received : October 27, 2015
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Sample ID : CD32-LF-SPOILS
Collected By : DK Nicholson
Collection Date : 10/24/15 11:30

ESC Sample # : L796886-11

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzo(a)pyrene	0.00700	0.0120	mg/kg	8270C-SIM	10/30/15	20
Benzo(b)fluoranthene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20
Benzo(g,h,i)perylene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20
Benzo(k)fluoranthene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20
Chrysene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20
Dibenz(a,h)anthracene	BDL	0.0120	mg/kg	8270C-SIM	10/30/15	20
Fluoranthene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20
Fluorene	0.202	0.120	mg/kg	8270C-SIM	10/30/15	20
Indeno(1,2,3-cd)pyrene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20
Naphthalene	0.422	0.400	mg/kg	8270C-SIM	10/30/15	20
Phenanthrene	0.197	0.120	mg/kg	8270C-SIM	10/30/15	20
Pyrene	BDL	0.120	mg/kg	8270C-SIM	10/30/15	20
1-Methylnaphthalene	0.517	0.400	mg/kg	8270C-SIM	10/30/15	20
2-Methylnaphthalene	1.28	0.400	mg/kg	8270C-SIM	10/30/15	20
2-Chloronaphthalene	BDL	0.400	mg/kg	8270C-SIM	10/30/15	20
Surrogate Recovery						
p-Terphenyl-d14	79.7		% Rec.	8270C-SIM	10/30/15	20
Nitrobenzene-d5	585.		% Rec.	8270C-SIM	10/30/15	20
2-Fluorobiphenyl	104.		% Rec.	8270C-SIM	10/30/15	20

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: 11/04/15 18:18 Revised: 11/05/15 16:19

L796886-11 (PH) - 8.39 at 24.2c

L796886-11 (SV8270PAHSIM) - Dilution due to matrix

Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L796886-01	WG825319	SAMP	Benzo(a)pyrene	R3089113	U
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825319	SAMP	p-Terphenyl-d14	R3089113	J7
	WG825319	SAMP	Nitrobenzene-d5	R3089113	J7
	WG825319	SAMP	2-Fluorobiphenyl	R3089113	J7
	WG825633	SAMP	Barium	R3089448	J6
	WG825569	SAMP	o-Terphenyl	R3089940	J7
L796886-02	WG825319	SAMP	Benzo(a)pyrene	R3089113	U
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825569	SAMP	o-Terphenyl	R3089940	J7
L796886-03	WG825319	SAMP	Benzo(a)pyrene	R3089113	U
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825319	SAMP	p-Terphenyl-d14	R3089113	J7
	WG825319	SAMP	Nitrobenzene-d5	R3089113	J7
	WG825319	SAMP	2-Fluorobiphenyl	R3089113	J7
	WG825569	SAMP	o-Terphenyl	R3089940	J7
	WG825319	SAMP	Benzo(a)pyrene	R3089113	U
L796886-04	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825319	SAMP	p-Terphenyl-d14	R3089113	J7
	WG825319	SAMP	Nitrobenzene-d5	R3089113	J7
	WG825319	SAMP	2-Fluorobiphenyl	R3089113	J7
	WG825569	SAMP	o-Terphenyl	R3089940	J7
	WG825319	SAMP	Benzo(a)pyrene	R3089113	U
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
L796886-05	WG825319	SAMP	p-Terphenyl-d14	R3089113	J7
	WG825319	SAMP	Nitrobenzene-d5	R3089113	J7
	WG825319	SAMP	2-Fluorobiphenyl	R3089113	J7
	WG825569	SAMP	o-Terphenyl	R3089940	J7
	WG825319	SAMP	Benzo(a)pyrene	R3089113	U
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825319	SAMP	p-Terphenyl-d14	R3089113	J7
L796886-06	WG825319	SAMP	Nitrobenzene-d5	R3089113	J7
	WG825319	SAMP	2-Fluorobiphenyl	R3089113	J7
	WG825569	SAMP	o-Terphenyl	R3089940	J7
	WG825319	SAMP	Benzo(a)pyrene	R3089113	U
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825319	SAMP	p-Terphenyl-d14	R3089113	J7
	WG825319	SAMP	Nitrobenzene-d5	R3089113	J7
L796886-07	WG825319	SAMP	2-Fluorobiphenyl	R3089113	J7
	WG825569	SAMP	o-Terphenyl	R3089940	J7
	WG824960	SAMP	Chromium, Hexavalent	R3089396	J6
	WG825319	SAMP	Benzo(a)pyrene	R3089113	U
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825569	SAMP	o-Terphenyl	R3089940	J7
	WG825319	SAMP	Benzo(a)pyrene	R3089113	U
L796886-08	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825319	SAMP	p-Terphenyl-d14	R3089113	J7
	WG825319	SAMP	Nitrobenzene-d5	R3089113	J7
	WG825319	SAMP	2-Fluorobiphenyl	R3089113	J7
	WG825569	SAMP	o-Terphenyl	R3089940	J7
	WG825319	SAMP	Benzo(a)pyrene	R3089113	U
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
L796886-09	WG825319	SAMP	p-Terphenyl-d14	R3089113	J7
	WG825319	SAMP	Nitrobenzene-d5	R3089113	J7
	WG825319	SAMP	2-Fluorobiphenyl	R3089113	J7
	WG825569	SAMP	o-Terphenyl	R3089835	J7
	WG825319	SAMP	Benzo(a)pyrene	R3089113	J
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825569	SAMP	o-Terphenyl	R3089940	J7
L796886-10	WG825319	SAMP	Benzo(a)pyrene	R3089113	J
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825569	SAMP	o-Terphenyl	R3089940	J7
L796886-11	WG825319	SAMP	Benzo(a)pyrene	R3089113	J
	WG825319	SAMP	Dibenz(a,h)anthracene	R3089113	U
	WG825319	SAMP	p-Terphenyl-d14	R3089113	J7
	WG825319	SAMP	Nitrobenzene-d5	R3089113	J7
	WG825319	SAMP	2-Fluorobiphenyl	R3089113	J7
	WG825569	SAMP	o-Terphenyl	R3089835	J7
	WG825569	SAMP	o-Terphenyl	R3089835	J7

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
J	(EPA) - Estimated value below the lowest calibration point. Confidence correlates with concentration.
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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Quality Assurance Report
Level II

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Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Mercury	< .02	mg/kg			WG825013	10/28/15 15:54
1-Methylnaphthalene	< .02	mg/kg			WG825319	10/30/15 02:26
2-Chloronaphthalene	< .02	mg/kg			WG825319	10/30/15 02:26
2-Methylnaphthalene	< .02	mg/kg			WG825319	10/30/15 02:26
Acenaphthene	< .006	mg/kg			WG825319	10/30/15 02:26
Acenaphthylene	< .006	mg/kg			WG825319	10/30/15 02:26
Anthracene	< .006	mg/kg			WG825319	10/30/15 02:26
Benzo(a)anthracene	< .006	mg/kg			WG825319	10/30/15 02:26
Benzo(a)pyrene	< .006	mg/kg			WG825319	10/30/15 02:26
Benzo(b)fluoranthene	< .006	mg/kg			WG825319	10/30/15 02:26
Benzo(g,h,i)perylene	< .006	mg/kg			WG825319	10/30/15 02:26
Benzo(k)fluoranthene	< .006	mg/kg			WG825319	10/30/15 02:26
Chrysene	< .006	mg/kg			WG825319	10/30/15 02:26
Dibenz(a,h)anthracene	< .006	mg/kg			WG825319	10/30/15 02:26
Fluoranthene	< .006	mg/kg			WG825319	10/30/15 02:26
Fluorene	< .006	mg/kg			WG825319	10/30/15 02:26
Indeno(1,2,3-cd)pyrene	< .006	mg/kg			WG825319	10/30/15 02:26
Naphthalene	< .02	mg/kg			WG825319	10/30/15 02:26
Phenanthrene	< .006	mg/kg			WG825319	10/30/15 02:26
Pyrene	< .006	mg/kg			WG825319	10/30/15 02:26
2-Fluorobiphenyl		% Rec.	86.50	40.6-122	WG825319	10/30/15 02:26
Nitrobenzene-d5		% Rec.	104.0	22.1-146	WG825319	10/30/15 02:26
p-Terphenyl-d14		% Rec.	75.90	32.2-131	WG825319	10/30/15 02:26
Chromium,Hexavalent	< 2	mg/kg			WG824960	10/31/15 11:47
Arsenic	< 2	mg/kg			WG825633	11/01/15 15:49
Barium	< .5	mg/kg			WG825633	11/01/15 15:49
Boron	< 10	mg/kg			WG825633	11/01/15 15:49
Cadmium	< .5	mg/kg			WG825633	11/01/15 15:49
Chromium	< 1	mg/kg			WG825633	11/01/15 15:49
Copper	< 2	mg/kg			WG825633	11/01/15 15:49
Lead	< .5	mg/kg			WG825633	11/01/15 15:49
Nickel	< 2	mg/kg			WG825633	11/01/15 15:49
Selenium	< 2	mg/kg			WG825633	11/01/15 15:49
Silver	< 1	mg/kg			WG825633	11/01/15 15:49
Zinc	< 5	mg/kg			WG825633	11/01/15 15:49
Chromium,Hexavalent	< 2	mg/kg			WG825653	11/02/15 10:40
Benzene	< .0005	mg/kg			WG825211	10/31/15 01:55
Ethylbenzene	< .0005	mg/kg			WG825211	10/31/15 01:55
Toluene	< .005	mg/kg			WG825211	10/31/15 01:55
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG825211	10/31/15 01:55
Total Xylene	< .0015	mg/kg			WG825211	10/31/15 01:55
a,a,a-Trifluorotoluene(FID)		% Rec.	93.50	59-128	WG825211	10/31/15 01:55
a,a,a-Trifluorotoluene(PID)		% Rec.	99.30	54-144	WG825211	10/31/15 01:55
Specific Conductance	0.920	umhos/cm			WG825887	11/02/15 12:05
C10-C28 Diesel Range	< 4	mg/kg			WG825569	11/02/15 12:10

* 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			
C28-C40 Oil Range	< 4	mg/kg			WG825569	11/02/15 12:10
o-Terphenyl		% Rec.	93.20	50-150	WG825569	11/02/15 12:10

Analyte	Units	Result	Duplicate		Limit	Ref Samp	Batch
			Duplicate	RPD			
pH	su	7.01	7.01	0.00	1	L796726-01	WG825063
pH	su	8.29	8.29	0.00	1	L796973-04	WG825063
ORP	mV	96.0	98.0	2.06	20	L796726-01	WG825165
ORP	mV	105.	105.	0.00	20	L797041-01	WG825165
ORP	mV	144.	143.	0.697	20	L796886-08	WG825478
ORP	mV	115.	115.	0.00	20	L797147-03	WG825478
Chromium,Hexavalent	mg/kg	0.00	0.00	0.00	20	L796886-07	WG824960
Chromium,Hexavalent	mg/kg	0.00	0.00	0.00	20	L797147-01	WG825653
Chromium,Hexavalent	mg/kg	0.00	0.00	0.00	20	L797166-01	WG825653
Specific Conductance	umhos/cm	714.	708.	0.844	20	L796886-01	WG825887
Specific Conductance	umhos/cm	2490	2800	11.7	20	L797155-01	WG825887
pH	su	8.20	8.20	0.00	1	L796886-04	WG825064
pH	su	8.16	8.16	0.00	1	L796971-08	WG825064

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
pH	su	6.72	6.72	100.	98.2-101.8	WG825063
Mercury	mg/kg	.3	0.279	93.0	80-120	WG825013
ORP	mV	100	96.0	96.0	90-110	WG825165
1-Methylnaphthalene	mg/kg	.08	0.0697	87.1	50.6-122	WG825319
2-Chloronaphthalene	mg/kg	.08	0.0614	76.8	53.9-121	WG825319
2-Methylnaphthalene	mg/kg	.08	0.0689	86.1	50.4-120	WG825319
Acenaphthene	mg/kg	.08	0.0644	80.5	52.4-120	WG825319
Acenaphthylene	mg/kg	.08	0.0585	73.2	49.6-120	WG825319
Anthracene	mg/kg	.08	0.0589	73.7	50.3-130	WG825319
Benzo(a)anthracene	mg/kg	.08	0.0593	74.1	46.7-125	WG825319
Benzo(a)pyrene	mg/kg	.08	0.0513	64.2	42.3-119	WG825319
Benzo(b)fluoranthene	mg/kg	.08	0.0503	62.9	43.6-124	WG825319
Benzo(g,h,i)perylene	mg/kg	.08	0.0575	71.8	45.1-132	WG825319
Benzo(k)fluoranthene	mg/kg	.08	0.0521	65.2	46.1-131	WG825319
Chrysene	mg/kg	.08	0.0656	81.9	49.5-131	WG825319
Dibenz(a,h)anthracene	mg/kg	.08	0.0494	61.7	44.8-133	WG825319
Fluoranthene	mg/kg	.08	0.0686	85.8	49.3-128	WG825319
Fluorene	mg/kg	.08	0.0663	82.8	50.6-121	WG825319

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November 05, 2015

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Indeno(1,2,3-cd)pyrene	mg/kg	.08	0.0531	66.4	46.1-135	WG825319
Naphthalene	mg/kg	.08	0.0614	76.7	49.6-115	WG825319
Phenanthrene	mg/kg	.08	0.0556	69.5	48.8-121	WG825319
Pyrene	mg/kg	.08	0.0596	74.5	44.7-130	WG825319
2-Fluorobiphenyl				82.90	40.6-122	WG825319
Nitrobenzene-d5				106.0	22.1-146	WG825319
p-Terphenyl-d14				68.20	32.2-131	WG825319
ORP	mV	100	100.	100.	90-110	WG825478
Chromium, Hexavalent	mg/kg	59.8	55.8	93.3	80-120	WG824960
Arsenic	mg/kg	100	91.2	91.0	80-120	WG825633
Barium	mg/kg	100	92.1	92.0	80-120	WG825633
Boron	mg/kg	100	95.6	96.0	80-120	WG825633
Cadmium	mg/kg	100	92.6	93.0	80-120	WG825633
Chromium	mg/kg	100	95.9	96.0	80-120	WG825633
Copper	mg/kg	100	97.8	98.0	80-120	WG825633
Lead	mg/kg	100	93.2	93.0	80-120	WG825633
Nickel	mg/kg	100	92.0	92.0	80-120	WG825633
Selenium	mg/kg	100	94.1	94.0	80-120	WG825633
Silver	mg/kg	100	98.0	98.0	80-120	WG825633
Zinc	mg/kg	100	89.6	90.0	80-120	WG825633
Chromium, Hexavalent	mg/kg	59.8	61.2	102.	80-120	WG825653
Benzene	mg/kg	.05	0.0479	95.8	70-130	WG825211
Ethylbenzene	mg/kg	.05	0.0472	94.4	70-130	WG825211
Toluene	mg/kg	.05	0.0474	94.7	70-130	WG825211
Total Xylene	mg/kg	.15	0.143	95.3	70-130	WG825211
a,a,a-Trifluorotoluene(FID)				92.60	59-128	WG825211
a,a,a-Trifluorotoluene(PID)				98.10	54-144	WG825211
TPH (GC/FID) Low Fraction	mg/kg	5.5	5.50	100.	63.5-137	WG825211
a,a,a-Trifluorotoluene(FID)				102.0	59-128	WG825211
a,a,a-Trifluorotoluene(PID)				111.0	54-144	WG825211
Specific Conductance	umhos/cm	915	949.	104.	90-110	WG825887
C10-C28 Diesel Range	mg/kg	60	47.7	79.5	50-100	WG825569
o-Terphenyl				104.0	50-150	WG825569
pH	su	6.72	6.70	99.7	98.5-101.5	WG825064

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
pH	su	6.72	6.72	100.	98.2-101.8	0.00	1	WG825063
Mercury	mg/kg	0.250	0.279	83.0	80-120	11.0	20	WG825013

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		Result	Ref	%Rec				
ORP	mV	95.0	96.0	95.0	90-110	1.05	20	WG825165
1-Methylnaphthalene	mg/kg	0.0738	0.0697	92.0	50.6-122	5.75	20	WG825319
2-Chloronaphthalene	mg/kg	0.0637	0.0614	80.0	53.9-121	3.57	20	WG825319
2-Methylnaphthalene	mg/kg	0.0729	0.0689	91.0	50.4-120	5.72	20	WG825319
Acenaphthene	mg/kg	0.0651	0.0644	81.0	52.4-120	1.01	20	WG825319
Acenaphthylene	mg/kg	0.0624	0.0585	78.0	49.6-120	6.41	20	WG825319
Anthracene	mg/kg	0.0664	0.0589	83.0	50.3-130	11.8	20	WG825319
Benzo(a)anthracene	mg/kg	0.0644	0.0593	80.0	46.7-125	8.39	20	WG825319
Benzo(a)pyrene	mg/kg	0.0596	0.0513	74.0	42.3-119	14.9	20	WG825319
Benzo(b)fluoranthene	mg/kg	0.0546	0.0503	68.0	43.6-124	8.16	20	WG825319
Benzo(g,h,i)perylene	mg/kg	0.0579	0.0575	72.0	45.1-132	0.760	20	WG825319
Benzo(k)fluoranthene	mg/kg	0.0575	0.0521	72.0	46.1-131	9.73	20	WG825319
Chrysene	mg/kg	0.0711	0.0656	89.0	49.5-131	8.14	20	WG825319
Dibenz(a,h)anthracene	mg/kg	0.0482	0.0494	60.0	44.8-133	2.51	20	WG825319
Fluoranthene	mg/kg	0.0787	0.0686	98.0	49.3-128	13.7	20	WG825319
Fluorene	mg/kg	0.0678	0.0663	85.0	50.6-121	2.33	20	WG825319
Indeno(1,2,3-cd)pyrene	mg/kg	0.0508	0.0531	64.0	46.1-135	4.48	20	WG825319
Naphthalene	mg/kg	0.0650	0.0614	81.0	49.6-115	5.75	20	WG825319
Phenanthrene	mg/kg	0.0602	0.0556	75.0	48.8-121	8.03	20	WG825319
Pyrene	mg/kg	0.0683	0.0596	85.0	44.7-130	13.6	20	WG825319
2-Fluorobiphenyl				91.00	40.6-122			WG825319
Nitrobenzene-d5				116.0	22.1-146			WG825319
p-Terphenyl-d14				81.00	32.2-131			WG825319
ORP	mV	101.	100.	101.	90-110	0.995	20	WG825478
Chromium,Hexavalent	mg/kg	55.8	55.8	93.0	80-120	0.00	20	WG824960
Arsenic	mg/kg	100.	91.2	100.	80-120	10.0	20	WG825633
Barium	mg/kg	101.	92.1	101.	80-120	9.00	20	WG825633
Boron	mg/kg	106.	95.6	106.	80-120	11.0	20	WG825633
Cadmium	mg/kg	101.	92.6	101.	80-120	9.00	20	WG825633
Chromium	mg/kg	105.	95.9	105.	80-120	9.00	20	WG825633
Copper	mg/kg	109.	97.8	109.	80-120	11.0	20	WG825633
Lead	mg/kg	102.	93.2	102.	80-120	9.00	20	WG825633
Nickel	mg/kg	100.	92.0	100.	80-120	9.00	20	WG825633
Selenium	mg/kg	104.	94.1	104.	80-120	10.0	20	WG825633
Silver	mg/kg	107.	98.0	107.	80-120	9.00	20	WG825633
Zinc	mg/kg	98.0	89.6	98.0	80-120	9.00	20	WG825633
Chromium,Hexavalent	mg/kg	61.2	61.2	102.	80-120	0.00	20	WG825653
Benzene	mg/kg	0.0429	0.0479	86.0	70-130	11.0	20	WG825211
Ethylbenzene	mg/kg	0.0425	0.0472	85.0	70-130	10.5	20	WG825211
Toluene	mg/kg	0.0421	0.0474	84.0	70-130	11.8	20	WG825211
Total Xylene	mg/kg	0.132	0.143	88.0	70-130	7.66	20	WG825211
a,a,a-Trifluorotoluene(FID)				92.90	59-128			WG825211
a,a,a-Trifluorotoluene(PID)				97.80	54-144			WG825211
TPH (GC/FID) Low Fraction	mg/kg	5.34	5.50	97.0	63.5-137	2.90	20	WG825211
a,a,a-Trifluorotoluene(FID)				103.0	59-128			WG825211
a,a,a-Trifluorotoluene(PID)				111.0	54-144			WG825211

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Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Specific Conductance	umhos/	949.	949.	104.	90-110	0.00	20	WG825887
C10-C28 Diesel Range	mg/kg	53.8	47.7	90.0	50-100	12.2	20	WG825569
o-Terphenyl				112.0	50-150			WG825569
pH	su	6.70	6.70	100.	98.5-101.5	0.00	1	WG825064

Analyte	Units	MS Res	Matrix Spike		TV	% Rec	Limit	Ref Samp	Batch
			Ref	Res					
Mercury	mg/kg	0.333	0.0251	.3	103.	75-125	L796886-01	WG825013	
Chromium,Hexavalent	mg/kg	4.92	0.00	20	24.6*	75-125	L796886-07	WG824960	
Arsenic	mg/kg	107.	6.42	100	100.	75-125	L796886-01	WG825633	
Barium	mg/kg	406.	345.	100	61.0*	75-125	L796886-01	WG825633	
Boron	mg/kg	103.	3.70	100	99.0	75-125	L796886-01	WG825633	
Cadmium	mg/kg	102.	0.428	100	102.	75-125	L796886-01	WG825633	
Chromium	mg/kg	111.	14.1	100	97.0	75-125	L796886-01	WG825633	
Copper	mg/kg	125.	21.2	100	104.	75-125	L796886-01	WG825633	
Lead	mg/kg	118.	15.0	100	103.	75-125	L796886-01	WG825633	
Nickel	mg/kg	119.	16.4	100	102.	75-125	L796886-01	WG825633	
Selenium	mg/kg	104.	1.68	100	102.	75-125	L796886-01	WG825633	
Silver	mg/kg	110.	-0.0670	100	110.	75-125	L796886-01	WG825633	
Zinc	mg/kg	130.	41.6	100	88.0	75-125	L796886-01	WG825633	
Chromium,Hexavalent	mg/kg	18.9	0.00	20	94.5	75-125	L797147-01	WG825653	
Benzene	mg/kg	0.226	0.000310	.05	90.3	49.7-127	L797241-03	WG825211	
Ethylbenzene	mg/kg	0.219	0.000503	.05	87.5	40.8-141	L797241-03	WG825211	
Toluene	mg/kg	0.221	0.00124	.05	87.7	49.8-132	L797241-03	WG825211	
Total Xylene	mg/kg	0.661	0.00247	.15	87.9	41.2-140	L797241-03	WG825211	
a,a,a-Trifluorotoluene(FID)					92.60	59-128		WG825211	
a,a,a-Trifluorotoluene(PID)					98.40	54-144		WG825211	
TPH (GC/FID) Low Fraction	mg/kg	21.0	0.0677	5.5	76.3	28.5-138	L797241-03	WG825211	
a,a,a-Trifluorotoluene(FID)					99.70	59-128		WG825211	
a,a,a-Trifluorotoluene(PID)					107.0	54-144		WG825211	

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Mercury	mg/kg	0.336	0.333	104.	75-125	1.00	20	L796886-01	WG825013
Chromium,Hexavalent	mg/kg	4.80	4.92	24.0*	75-125	2.47	20	L796886-07	WG824960
Arsenic	mg/kg	107.	107.	101.	75-125	1.00	20	L796886-01	WG825633
Barium	mg/kg	425.	406.	79.2	75-125	4.00	20	L796886-01	WG825633
Boron	mg/kg	105.	103.	101.	75-125	2.00	20	L796886-01	WG825633
Cadmium	mg/kg	104.	102.	103.	75-125	2.00	20	L796886-01	WG825633
Chromium	mg/kg	114.	111.	99.4	75-125	2.00	20	L796886-01	WG825633
Copper	mg/kg	128.	125.	106.	75-125	2.00	20	L796886-01	WG825633

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Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Lead	mg/kg	121.	118.	106.	75-125	2.00	20	L796886-01	WG825633
Nickel	mg/kg	123.	119.	107.	75-125	4.00	20	L796886-01	WG825633
Selenium	mg/kg	106.	104.	104.	75-125	2.00	20	L796886-01	WG825633
Silver	mg/kg	110.	110.	110.	75-125	1.00	20	L796886-01	WG825633
Zinc	mg/kg	134.	130.	92.3	75-125	3.00	20	L796886-01	WG825633
Chromium,Hexavalent	mg/kg	18.9	18.9	94.5	75-125	0.00	20	L797147-01	WG825653
Benzene	mg/kg	0.227	0.226	90.7	49.7-127	0.520	23.5	L797241-03	WG825211
Ethylbenzene	mg/kg	0.215	0.219	85.7	40.8-141	2.07	23.8	L797241-03	WG825211
Toluene	mg/kg	0.219	0.221	87.0	49.8-132	0.860	23.5	L797241-03	WG825211
Total Xylene	mg/kg	0.649	0.661	86.2	41.2-140	1.95	23.7	L797241-03	WG825211
a,a,a-Trifluorotoluene(FID)				92.40	59-128				WG825211
a,a,a-Trifluorotoluene(PID)				98.40	54-144				WG825211
TPH (GC/FID) Low Fraction	mg/kg	22.1	21.0	80.0	28.5-138	4.77	23.6	L797241-03	WG825211
a,a,a-Trifluorotoluene(FID)				99.90	59-128				WG825211
a,a,a-Trifluorotoluene(PID)				107.0	54-144				WG825211

Post Spike

Serial Dilution

Batch number /Run number / Sample number cross reference

WG825063: R3088638: L796886-01 02 03
WG825013: R3088658: L796886-01 02 03 04 05 06 07 08 09 10 11
WG825165: R3088887: L796886-01 02 03 04 05 06 07
WG825319: R3089113 R3089830: L796886-01 02 03 04 05 06 07 08 09 10 11
WG825478: R3089241: L796886-08 09 10 11
WG824960: R3089396: L796886-01 02 03 04 05 06 07 08

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WG825633: R3089448 R3089454: L796886-01 02 03 04 05 06 07 08 09 10 11
WG825561: R3089472: L796886-01 02 03 04 05 06 07 08 09 10 11
WG825211: R3089540: L796886-01 02 03 04 05 06 07 08 09 10 11
WG825653: R3089607: L796886-09 10 11
WG825887: R3089767: L796886-01 02 03 04 05 06 07 08 09 10 11
WG825569: R3089835 R3089940: L796886-01 02 03 04 05 06 07 08 09 10 11
WG825064: R3090047: L796886-04 05 06 07 08 09 10 11

* * 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.