

January 24, 2014
Encana Oil and Gas USA Inc.
Charles Jensen
143 Diamond Ave
Parachute, CO 81635

**RE: Site Investigation Summary – Hells Hole #9112
Environmental Consulting Services
HCSI Job Number 10-418**

Dear Mr. Jensen,

This document has been provided per your request for a summary of actions taken during the pit closure site investigation associated with the Hells Hole #9112 (COGCC facility # 335749, COGCC remediation # 5560) by HRL Compliance Solutions, Inc. (HCSI) personnel during the 2011 field season. Please see below for the respective summary.

The site investigation was conducted by a qualified HCSI employee as authorized by Encana personnel. All samples were collected in accordance with the protocol specified within Encana Environmental Compliance Group's Sampling Procedures.

August 31, 2011 – The pit was investigated by an HCSI employee utilizing a photoionization (PID) meter and was excavated using a trackhoe. Field screen readings were collected throughout the excavation process. There were also strong indicators of hydrocarbon impacts to the soil (e.g. soil coloration, field screen readings) throughout the excavation process. The excavation was limited on the north side due to proximity to equipment. Bedrock was encountered at approximately four (4) feet below the ground surface. A grab sample was collected from the soil excavated from the pit with the highest PID reading (i.e., the spoils sample). The excavation was approximately 20' x 20' x 4'. The associated spoils stockpile was roughly 50 cubic yards. The spoils stockpile was treated with a microbial product and mixed to facilitate natural attenuation. The excavation was fenced to promote site safety. The excavated soil was stockpiled on location with a berm surrounding the pile to mitigate stormwater runoff from the pile.

The grab sample collected from the spoils was submitted to a lab for analysis with regards to the COGCC Table 910-1 standards. Five (5) background samples were collected from the area surrounding the excavation from a depth of approximately six (6) inches. These samples were sent to the lab for analysis with respect to arsenic.

The grab sample associated with the spoils (e.g., 9112-SPOILS-083111 3FT) indicated concentrations in exceedance of the Table 910-1 total petroleum hydrocarbon (TPH), benzene and SAR standards. It should be noted that the arsenic concentration for the spoils is within the range of the background samples although all samples indicate concentration exceeding the Table 910-1 standard.

The excavation was left open to facilitate natural attenuation of the hydrocarbons. The stockpile was periodically turned with heavy equipment and watered to facilitate biodegradation of the hydrocarbon species by a third party construction contractor.

Respectfully,

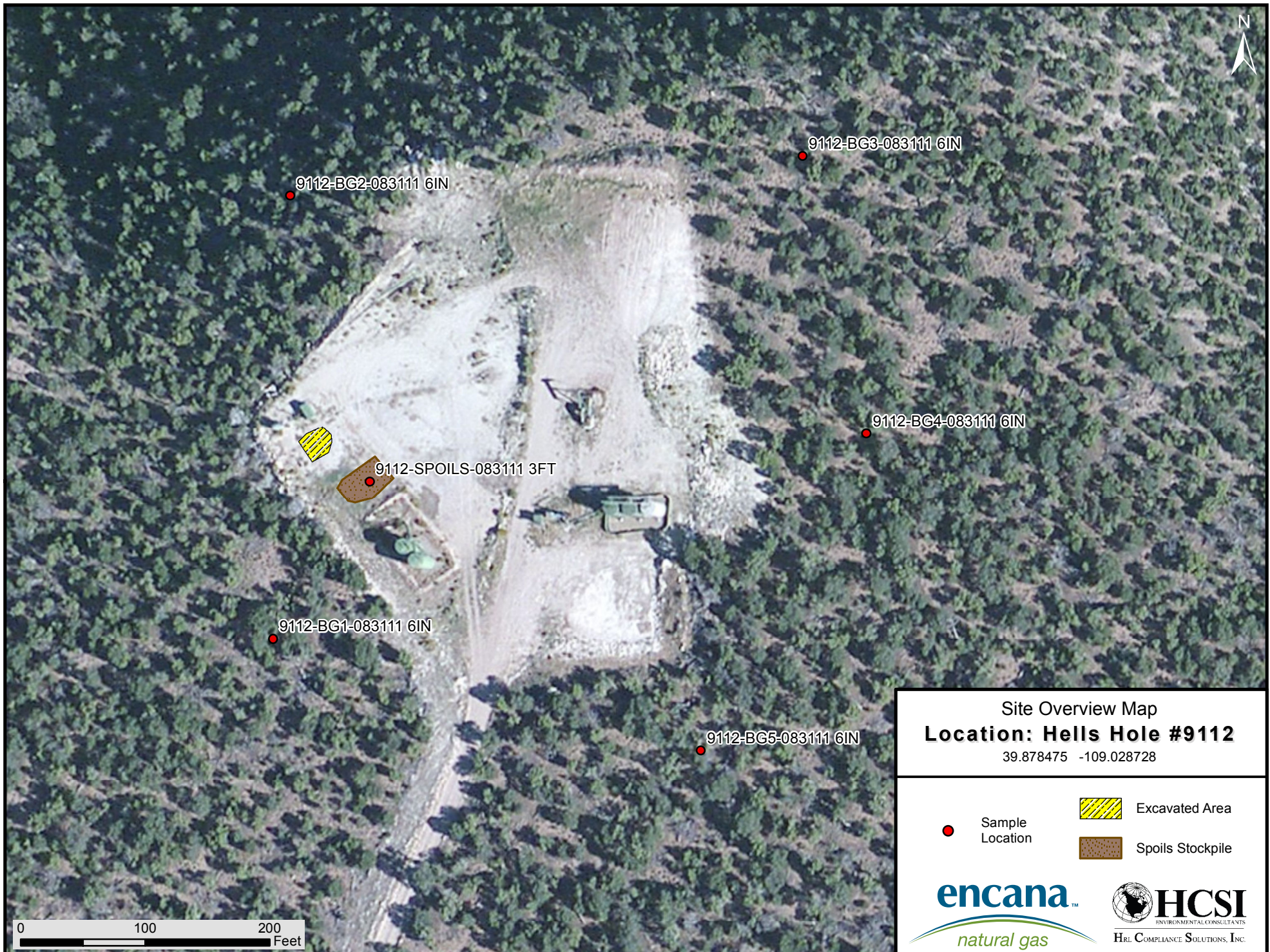
HRL Compliance Solutions, Inc.

A handwritten signature in black ink that reads "Kate Ramsay". The signature is written in a cursive style with a large initial "K" and a stylized "R".




Kate Ramsay
Environmental Consultant

cc: Herman Lucero (HCSI)

Attachment A – Analytical Summary Table
Attachment B – Site Investigation Maps
Attachment C – Analytical Report



Site Overview Map
Location: Hells Hole #9112
 39.878475 -109.028728

-  Sample Location
-  Excavated Area
-  Spoils Stockpile





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Kate Ramsay
HRL Compliance Solutions- CO
744 Horizon Ct., Suite 140
Grand Junction, CO 81506

Report Summary

Thursday September 15, 2011

Report Number: L534276

Samples Received: 09/02/11

Client Project:

Description: Pit Closure Project

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:

Jared Willis , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704, ND - R-140
NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032008A,
TX - T104704245, OK-9915

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

September 15, 2011

Kate Ramsay
 HRL Compliance Solutions- CO
 744 Horizon Ct., Suite 140
 Grand Junction, CO 81506

ESC Sample # : L534276-01

Date Received : September 02, 2011
 Description : Pit Closure Project

Site ID : HELLS HOLE 9112

Sample ID : 9112-SPOILS-083111 3FT

Project # :

Collected By : Kate Ramsay
 Collection Date : 08/31/11 15:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chromium,Hexavalent	BDL	2.0	mg/kg	3060A/7196A	09/08/11	1
Chromium,Trivalent	11.	0.50	mg/kg	Calc.	09/06/11	1
ORP	58.		mV	2580	09/07/11	1
pH	8.0		su	9045D	09/10/11	1
Sodium Adsorption Ratio	43.			Calc.	09/07/11	1
Specific Conductance	1900		umhos/cm	9050AMod	09/11/11	1
Mercury	BDL	0.020	mg/kg	7471	09/07/11	1
Arsenic	4.5	2.0	mg/kg	6010B	09/06/11	2
Barium	410	0.25	mg/kg	6010B	09/06/11	1
Cadmium	0.69	0.25	mg/kg	6010B	09/06/11	1
Chromium	11.	0.50	mg/kg	6010B	09/06/11	1
Copper	16.	1.0	mg/kg	6010B	09/06/11	1
Lead	15.	0.25	mg/kg	6010B	09/06/11	1
Nickel	10.	2.0	mg/kg	6010B	09/06/11	2
Selenium	BDL	2.0	mg/kg	6010B	09/06/11	2
Silver	BDL	0.50	mg/kg	6010B	09/06/11	1
Zinc	41.	1.5	mg/kg	6010B	09/06/11	1
Benzene	2.4	0.025	mg/kg	8021/8015	09/06/11	50
Toluene	7.3	0.25	mg/kg	8021/8015	09/06/11	50
Ethylbenzene	7.1	0.025	mg/kg	8021/8015	09/06/11	50
Total Xylene	110	0.38	mg/kg	8021/8015	09/08/11	250
TPH (GC/FID) Low Fraction	2200	25.	mg/kg	GRO	09/08/11	250
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	88.9		% Rec.	8021/8015	09/08/11	250
a,a,a-Trifluorotoluene(PID)	93.5		% Rec.	8021/8015	09/06/11	50
TPH (GC/FID) High Fraction	7800	200	mg/kg	3546/DRO	09/12/11	50
Surrogate recovery(%)						
o-Terphenyl	0.00		% Rec.	3546/DRO	09/12/11	50
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.030	mg/kg	8270C-SIM	09/12/11	5
Acenaphthene	0.68	0.030	mg/kg	8270C-SIM	09/12/11	5
Acenaphthylene	0.10	0.030	mg/kg	8270C-SIM	09/12/11	5
Benzo(a)anthracene	0.12	0.030	mg/kg	8270C-SIM	09/12/11	5
Benzo(a)pyrene	BDL	0.030	mg/kg	8270C-SIM	09/12/11	5

BDL - Below Detection Limit
 Det. Limit - Practical Quantitation Limit(PQL)
 L534276-01 (SV8270PAHSIM) - Dilution due to matrix
 L534276-01 (PH) - 7.98@20.4c



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September 15, 2011

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744 Horizon Ct., Suite 140
Grand Junction, CO 81506

ESC Sample # : L534276-01

Date Received : September 02, 2011
Description : Pit Closure Project

Site ID : HELLS HOLE 9112

Sample ID : 9112-SPOILS-083111 3FT

Project # :

Collected By : Kate Ramsay
Collection Date : 08/31/11 15:00

Table with 7 columns: Parameter, Result, Det. Limit, Units, Method, Date, Dil. Rows include various PAHs like Benzo(b)fluoranthene, Benzo(g,h,i)perylene, etc., and Surrogate Recovery results.

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: 09/15/11 13:48 Printed: 09/15/11 13:49
L534276-01 (SV8270PAHSIM) - Dilution due to matrix
L534276-01 (PH) - 7.98@20.4c



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September 15, 2011

Kate Ramsay
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744 Horizon Ct., Suite 140
Grand Junction, CO 81506

Date Received : September 02, 2011
Description : Pit Closure Project
Sample ID : 9112-BG1-083111 6IN
Collected By : Kate Ramsay
Collection Date : 08/31/11 12:40

ESC Sample # : L534276-02
Site ID : HELLS HOLE 9112
Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	4.4	1.0	mg/kg	6010B	09/08/11	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Date Received : September 02, 2011
Description : Pit Closure Project
Sample ID : 9112-BG2-083111 6IN
Collected By : Kate Ramsay
Collection Date : 08/31/11 12:50

ESC Sample # : L534276-03
Site ID : HELLS HOLE 9112
Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	3.2	1.0	mg/kg	6010B	09/08/11	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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September 15, 2011

Date Received : September 02, 2011
Description : Pit Closure Project
Sample ID : 9112-BG3-083111 6IN
Collected By : Kate Ramsay
Collection Date : 08/31/11 13:00

ESC Sample # : L534276-04
Site ID : HELLS HOLE 9112
Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	4.1	1.0	mg/kg	6010B	09/08/11	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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September 15, 2011

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744 Horizon Ct., Suite 140
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Date Received : September 02, 2011
Description : Pit Closure Project
Sample ID : 9112-BG4-083111 6IN
Collected By : Kate Ramsay
Collection Date : 08/31/11 13:10

ESC Sample # : L534276-05
Site ID : HELLS HOLE 9112
Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	3.7	1.0	mg/kg	6010B	09/08/11	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Date Received : September 02, 2011
Description : Pit Closure Project
Sample ID : 9112-BG5-083111 6IN
Collected By : Kate Ramsay
Collection Date : 08/31/11 13:20

ESC Sample # : L534276-06
Site ID : HELLS HOLE 9112
Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	4.5	1.0	mg/kg	6010B	09/08/11	1

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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Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L534276-01	WG553618	SAMP	Selenium	R1846232	O
	WG554477	SAMP	1-Methylnaphthalene	R1852932	E
	WG554477	SAMP	2-Methylnaphthalene	R1852932	E
	WG554477	SAMP	Nitrobenzene-d5	R1852932	J7
	WG554075	SAMP	o-Terphenyl	R1853860	J7

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
E	GTL (EPA) - Greater than upper calibration limit: Actual value is known to be greater than the upper calibration range.
J7	Surrogate recovery limits cannot be evaluated; surrogates were diluted out
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.

Summary of Remarks For Samples Printed
09/15/11 at 13:49:26

TSR Signing Reports: 358
R5 - Desired TAT

Accounting - pending credit application. TSR - pending info release authorization.

Sample: L534276-01 Account: HRLCSCO Received: 09/02/11 09:00 Due Date: 09/12/11 00:00 RPT Date: 09/15/11 13:48

Sample: L534276-02 Account: HRLCSCO Received: 09/02/11 09:00 Due Date: 09/12/11 00:00 RPT Date: 09/15/11 13:48

Sample: L534276-03 Account: HRLCSCO Received: 09/02/11 09:00 Due Date: 09/12/11 00:00 RPT Date: 09/15/11 13:48

Sample: L534276-04 Account: HRLCSCO Received: 09/02/11 09:00 Due Date: 09/12/11 00:00 RPT Date: 09/15/11 13:48

Sample: L534276-05 Account: HRLCSCO Received: 09/02/11 09:00 Due Date: 09/12/11 00:00 RPT Date: 09/15/11 13:48

Sample: L534276-06 Account: HRLCSCO Received: 09/02/11 09:00 Due Date: 09/12/11 00:00 RPT Date: 09/15/11 13:48



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Quality Assurance Report
 Level II

L534276

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Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Arsenic	< 1	mg/kg			WG553618	09/06/11 14:44
Barium	< .25	mg/kg			WG553618	09/06/11 14:44
Cadmium	< .25	mg/kg			WG553618	09/06/11 14:44
Chromium	< .5	mg/kg			WG553618	09/06/11 14:44
Copper	< 1	mg/kg			WG553618	09/06/11 14:44
Lead	< .25	mg/kg			WG553618	09/06/11 14:44
Nickel	< 1	mg/kg			WG553618	09/06/11 14:44
Selenium	< 1	mg/kg			WG553618	09/06/11 14:44
Silver	< .5	mg/kg			WG553618	09/06/11 14:44
Zinc	< 1.5	mg/kg			WG553618	09/06/11 14:44
Benzene	< .0005	mg/kg			WG553729	09/06/11 06:28
Ethylbenzene	< .0005	mg/kg			WG553729	09/06/11 06:28
Toluene	< .005	mg/kg			WG553729	09/06/11 06:28
a,a,a-Trifluorotoluene(FID)		% Rec.	95.61	59-128	WG553729	09/06/11 06:28
a,a,a-Trifluorotoluene(PID)		% Rec.	100.2	54-144	WG553729	09/06/11 06:28
Mercury	< .02	mg/kg			WG553778	09/07/11 08:17
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG553911	09/07/11 17:56
Total Xylene	< .0015	mg/kg			WG553911	09/07/11 17:56
a,a,a-Trifluorotoluene(FID)		% Rec.	95.69	59-128	WG553911	09/07/11 17:56
a,a,a-Trifluorotoluene(PID)		% Rec.	100.5	54-144	WG553911	09/07/11 17:56
Chromium,Hexavalent	< 2	mg/kg			WG553536	09/08/11 15:27
Arsenic	< 1	mg/kg			WG553924	09/08/11 17:05
Arsenic	< 1	mg/kg			WG553917	09/08/11 17:28
1-Methylnaphthalene	< .006	mg/kg			WG554477	09/11/11 22:41
2-Chloronaphthalene	< .006	mg/kg			WG554477	09/11/11 22:41
2-Methylnaphthalene	< .006	mg/kg			WG554477	09/11/11 22:41
Acenaphthene	< .006	mg/kg			WG554477	09/11/11 22:41
Acenaphthylene	< .006	mg/kg			WG554477	09/11/11 22:41
Anthracene	< .006	mg/kg			WG554477	09/11/11 22:41
Benzo(a)anthracene	< .006	mg/kg			WG554477	09/11/11 22:41
Benzo(a)pyrene	< .006	mg/kg			WG554477	09/11/11 22:41
Benzo(b)fluoranthene	< .006	mg/kg			WG554477	09/11/11 22:41
Benzo(g,h,i)perylene	< .006	mg/kg			WG554477	09/11/11 22:41
Benzo(k)fluoranthene	< .006	mg/kg			WG554477	09/11/11 22:41
Chrysene	< .006	mg/kg			WG554477	09/11/11 22:41
Dibenz(a,h)anthracene	< .006	mg/kg			WG554477	09/11/11 22:41
Fluoranthene	< .006	mg/kg			WG554477	09/11/11 22:41
Fluorene	< .006	mg/kg			WG554477	09/11/11 22:41
Indeno(1,2,3-cd)pyrene	< .006	mg/kg			WG554477	09/11/11 22:41
Naphthalene	< .006	mg/kg			WG554477	09/11/11 22:41
Phenanthrene	< .006	mg/kg			WG554477	09/11/11 22:41
Pyrene	< .006	mg/kg			WG554477	09/11/11 22:41
2-Fluorobiphenyl		% Rec.	84.51	34-129	WG554477	09/11/11 22:41
Nitrobenzene-d5		% Rec.	77.44	14-141	WG554477	09/11/11 22:41
p-Terphenyl-d14		% Rec.	76.13	25-139	WG554477	09/11/11 22:41

* 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
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September 15, 2011

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
pH	5.20	su			WG553639	09/10/11 11:08
Specific Conductance	1.20	umhos/cm			WG554532	09/11/11 11:55
TPH (GC/FID) High Fraction o-Terphenyl	< 4	ppm % Rec.	77.45	50-150	WG554075 WG554075	09/09/11 21:55 09/09/11 21:55

Analyte	Units	Duplicate		RPD	Limit	Ref Samp	Batch
		Result	Duplicate				
Selenium	mg/kg	0	0	0	20	L534310-02	WG553618
Arsenic	mg/kg	2.80	2.50	13.1	20	L534310-02	WG553618
Barium	mg/kg	2000	240.	158.*	20	L534310-02	WG553618
Cadmium	mg/kg	0.510	0.600	16.0	20	L534310-02	WG553618
Chromium	mg/kg	8.80	8.60	1.96	20	L534310-02	WG553618
Copper	mg/kg	11.0	9.80	9.71	20	L534310-02	WG553618
Lead	mg/kg	7.60	8.70	13.8	20	L534310-02	WG553618
Nickel	mg/kg	7.20	8.20	13.1	20	L534310-02	WG553618
Silver	mg/kg	0	0	0	20	L534310-02	WG553618
Zinc	mg/kg	34.0	33.0	4.15	20	L534310-02	WG553618
Mercury	mg/kg	0	0	0	20	L534136-10	WG553778
ORP	mV	75.0	66.0	12.8	20	L533650-04	WG553916
ORP	mV	62.0	63.0	1.60	20	L533974-10	WG553916
Chromium,Hexavalent	mg/kg	0	0	0	20	L533944-11	WG553536
Chromium,Hexavalent	mg/kg	0	0	0	20	L534302-06	WG553536
Arsenic	mg/kg	3.00	3.46	15.6	20	L534378-08	WG553924
Arsenic	mg/kg	4.70	4.40	6.81	20	L534276-02	WG553917
pH	su	8.50	8.50	0.352	1	L534278-01	WG553639
Specific Conductance	umhos/cm	3000	3000	0	20	L534133-51	WG554532
Specific Conductance	umhos/cm	2000	1900	5.13	20	L534276-01	WG554532

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Arsenic	mg/kg	92.6	91.6	98.9	82.9-117	WG553618
Barium	mg/kg	169	165.	97.6	82.8-117	WG553618
Cadmium	mg/kg	61.8	60.9	98.5	83.3-117	WG553618
Chromium	mg/kg	71.3	72.5	102.	81.8-118	WG553618
Copper	mg/kg	81.2	91.0	112.	83.9-116	WG553618
Lead	mg/kg	92.4	95.2	103.	83.3-117	WG553618
Nickel	mg/kg	59.1	62.1	105.	83.8-116	WG553618
Selenium	mg/kg	89.5	90.6	101.	79-121	WG553618
Silver	mg/kg	34.4	35.1	102.	66.3-134	WG553618

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Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Zinc	mg/kg	141	136.	96.5	80.9-119	WG553618
Benzene	mg/kg	.05	0.0493	98.5	76-113	WG553729
Ethylbenzene	mg/kg	.05	0.0508	102.	78-115	WG553729
Toluene	mg/kg	.05	0.0516	103.	76-114	WG553729
a,a,a-Trifluorotoluene(PID)				96.71	54-144	WG553729
Mercury	mg/kg	3.77	4.46	118.	71.6-128	WG553778
Total Xylene	mg/kg	.15	0.161	108.	81-118	WG553911
a,a,a-Trifluorotoluene(PID)				98.49	54-144	WG553911
TPH (GC/FID) Low Fraction	mg/kg	5.5	6.25	114.	67-135	WG553911
a,a,a-Trifluorotoluene(FID)				95.73	59-128	WG553911
ORP	mV	229	220.	96.1	95.6-104.37	WG553916
Chromium, Hexavalent	mg/kg	132	94.4	71.5	50-150	WG553536
Arsenic	mg/kg	92.6	90.0	97.2	82.9-117	WG553924
Arsenic	mg/kg	92.6	92.7	100.	82.9-117	WG553917
1-Methylnaphthalene	mg/kg	.033	0.0277	84.1	48-113	WG554477
2-Chloronaphthalene	mg/kg	.033	0.0280	84.8	51-114	WG554477
2-Methylnaphthalene	mg/kg	.033	0.0286	86.7	44-109	WG554477
Acenaphthene	mg/kg	.033	0.0288	87.2	52-108	WG554477
Acenaphthylene	mg/kg	.033	0.0289	87.6	51-110	WG554477
Anthracene	mg/kg	.033	0.0302	91.7	58-120	WG554477
Benzo(a)anthracene	mg/kg	.033	0.0303	91.9	54-110	WG554477
Benzo(a)pyrene	mg/kg	.033	0.0305	92.3	56-118	WG554477
Benzo(b)fluoranthene	mg/kg	.033	0.0303	91.8	55-114	WG554477
Benzo(g,h,i)perylene	mg/kg	.033	0.0296	89.6	48-130	WG554477
Benzo(k)fluoranthene	mg/kg	.033	0.0311	94.4	55-122	WG554477
Chrysene	mg/kg	.033	0.0304	92.2	57-118	WG554477
Dibenz(a,h)anthracene	mg/kg	.033	0.0289	87.6	53-122	WG554477
Fluoranthene	mg/kg	.033	0.0312	94.5	58-118	WG554477
Fluorene	mg/kg	.033	0.0305	92.4	54-109	WG554477
Indeno(1,2,3-cd)pyrene	mg/kg	.033	0.0295	89.4	51-125	WG554477
Naphthalene	mg/kg	.033	0.0274	83.0	45-105	WG554477
Phenanthrene	mg/kg	.033	0.0312	94.5	53-114	WG554477
Pyrene	mg/kg	.033	0.0295	89.5	53-121	WG554477
2-Fluorobiphenyl				84.06	34-129	WG554477
Nitrobenzene-d5				76.82	14-141	WG554477
p-Terphenyl-d14				81.57	25-139	WG554477
pH	su	9.04	9.00	99.6	98-101	WG553639
Specific Conductance	umhos/cm	427	430.	101.	85-115	WG554532

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Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
TPH (GC/FID) High Fraction	ppm	60	50.4	84.0	50-150	WG554075
o-Terphenyl				83.39	50-150	WG554075

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Benzene	mg/kg	0.0512	0.0493	102.	76-113	3.96	20	WG553729
Ethylbenzene	mg/kg	0.0516	0.0508	103.	78-115	1.70	20	WG553729
Toluene	mg/kg	0.0526	0.0516	105.	76-114	1.96	20	WG553729
a,a,a-Trifluorotoluene(PID)				97.44	54-144			WG553729
TPH (GC/FID) Low Fraction	mg/kg	6.61	6.25	120.	67-135	5.57	20	WG553911
a,a,a-Trifluorotoluene(FID)				96.10	59-128			WG553911
Total Xylene	mg/kg	0.147	0.161	98.0	81-118	8.98	20	WG553911
a,a,a-Trifluorotoluene(PID)				98.00	54-144			WG553911
ORP	mV	220.	220.	96.0	95.6-104.37	0	20	WG553916
Chromium,Hexavalent	mg/kg	87.8	94.4	66.0	50-150	7.24	20	WG553536
1-Methylnaphthalene	mg/kg	0.0295	0.0277	89.0	48-113	6.07	24	WG554477
2-Chloronaphthalene	mg/kg	0.0299	0.0280	91.0	51-114	6.56	24	WG554477
2-Methylnaphthalene	mg/kg	0.0297	0.0286	90.0	44-109	3.74	24	WG554477
Acenaphthene	mg/kg	0.0298	0.0288	90.0	52-108	3.48	22	WG554477
Acenaphthylene	mg/kg	0.0301	0.0289	91.0	51-110	3.93	21	WG554477
Anthracene	mg/kg	0.0309	0.0302	94.0	58-120	2.01	20	WG554477
Benzo(a)anthracene	mg/kg	0.0314	0.0303	95.0	54-110	3.59	22	WG554477
Benzo(a)pyrene	mg/kg	0.0308	0.0305	93.0	56-118	1.28	21	WG554477
Benzo(b)fluoranthene	mg/kg	0.0312	0.0303	94.0	55-114	2.92	20	WG554477
Benzo(g,h,i)perylene	mg/kg	0.0293	0.0296	89.0	48-130	0.785	20	WG554477
Benzo(k)fluoranthene	mg/kg	0.0305	0.0311	92.0	55-122	1.92	25	WG554477
Chrysene	mg/kg	0.0310	0.0304	94.0	57-118	2.04	20	WG554477
Dibenz(a,h)anthracene	mg/kg	0.0287	0.0289	87.0	53-122	0.605	20	WG554477
Fluoranthene	mg/kg	0.0313	0.0312	95.0	58-118	0.245	20	WG554477
Fluorene	mg/kg	0.0312	0.0305	94.0	54-109	2.28	20	WG554477
Indeno(1,2,3-cd)pyrene	mg/kg	0.0295	0.0295	89.0	51-125	0.0208	21	WG554477
Naphthalene	mg/kg	0.0270	0.0274	82.0	45-105	1.45	24	WG554477
Phenanthrene	mg/kg	0.0302	0.0312	92.0	53-114	3.06	20	WG554477
Pyrene	mg/kg	0.0307	0.0295	93.0	53-121	3.92	20	WG554477
2-Fluorobiphenyl				91.75	34-129			WG554477
Nitrobenzene-d5				78.84	14-141			WG554477
p-Terphenyl-d14				82.77	25-139			WG554477
pH	su	9.00	9.00	100.	98-101	0	20	WG553639
Specific Conductance	umhos/	430.	430.	101.	85-115	0	20	WG554532
TPH (GC/FID) High Fraction	ppm	49.2	50.4	82.0	50-150	2.36	20	WG554075
o-Terphenyl				84.72	50-150			WG554075

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Analyte	Units	MS Res	Matrix Spike		% Rec	Limit	Ref Samp	Batch
			Ref Res	TV				
Selenium	mg/kg	52.6	0	10	105.	75-125	L534310-02	WG553618
Arsenic	mg/kg	49.6	2.50	50	94.2	75-125	L534310-02	WG553618
Barium	mg/kg	822.	240.	50	1160*	75-125	L534310-02	WG553618
Cadmium	mg/kg	44.1	0.600	50	87.0	75-125	L534310-02	WG553618
Chromium	mg/kg	57.5	8.60	50	97.8	75-125	L534310-02	WG553618
Copper	mg/kg	63.5	9.80	50	107.	75-125	L534310-02	WG553618
Lead	mg/kg	55.2	8.70	50	93.0	75-125	L534310-02	WG553618
Nickel	mg/kg	55.7	8.20	50	95.0	75-125	L534310-02	WG553618
Silver	mg/kg	50.5	0	50	101.	75-125	L534310-02	WG553618
Zinc	mg/kg	78.4	33.0	50	90.8	75-125	L534310-02	WG553618
Benzene	mg/kg	0.0254	0.00200	.05	46.9	32-137	L534150-06	WG553729
Ethylbenzene	mg/kg	0.0267	0.000560	.05	52.2	10-150	L534150-06	WG553729
Toluene	mg/kg	0.0282	0.00270	.05	51.1	20-142	L534150-06	WG553729
a,a,a-Trifluorotoluene(PID)					96.97	54-144		WG553729
Mercury	mg/kg	0.242	0	.25	96.8	70-130	L534136-10	WG553778
Total Xylene	mg/kg	0.718	0.0150	.15	93.8	16-141	L534118-09	WG553911
a,a,a-Trifluorotoluene(PID)					97.51	54-144		WG553911
TPH (GC/FID) Low Fraction	mg/kg	28.7	2.41	5.5	95.7	55-109	L534118-09	WG553911
a,a,a-Trifluorotoluene(FID)					102.2	59-128		WG553911
Chromium, Hexavalent	mg/kg	4.72	0	20	23.6*	50-150	L534302-03	WG553536
Arsenic	mg/kg	43.3	3.46	50	79.7	75-125	L534378-08	WG553924
Arsenic	mg/kg	45.3	4.40	50	81.8	75-125	L534276-02	WG553917
TPH (GC/FID) High Fraction	ppm	43.8	0	60	73.0	50-150	L534150-05	WG554075
o-Terphenyl					70.98	50-150		WG554075
1-Methylnaphthalene	mg/kg	0.0255	0	.033	77.3	25-155	L534221-06	WG554477
2-Chloronaphthalene	mg/kg	0.0260	0	.033	78.6	31-153	L534221-06	WG554477
2-Methylnaphthalene	mg/kg	0.0280	0	.033	84.7	22-172	L534221-06	WG554477
Acenaphthene	mg/kg	0.0255	0	.033	77.3	43-133	L534221-06	WG554477
Acenaphthylene	mg/kg	0.0266	0	.033	80.6	42-146	L534221-06	WG554477
Anthracene	mg/kg	0.0265	0	.033	80.4	38-153	L534221-06	WG554477
Benzo(a)anthracene	mg/kg	0.0257	0	.033	77.9	31-142	L534221-06	WG554477
Benzo(a)pyrene	mg/kg	0.0243	0	.033	73.6	26-152	L534221-06	WG554477
Benzo(b)fluoranthene	mg/kg	0.0242	0	.033	73.2	10-188	L534221-06	WG554477
Benzo(g,h,i)perylene	mg/kg	0.0270	0	.033	81.8	10-176	L534221-06	WG554477
Benzo(k)fluoranthene	mg/kg	0.0218	0	.033	65.9	22-163	L534221-06	WG554477
Chrysene	mg/kg	0.0228	0	.033	69.1	26-146	L534221-06	WG554477
Dibenz(a,h)anthracene	mg/kg	0.0220	0	.033	66.6	10-160	L534221-06	WG554477
Fluoranthene	mg/kg	0.0272	0	.033	82.4	23-160	L534221-06	WG554477
Fluorene	mg/kg	0.0275	0	.033	83.4	44-143	L534221-06	WG554477
Indeno(1,2,3-cd)pyrene	mg/kg	0.0248	0	.033	75.3	10-157	L534221-06	WG554477
Naphthalene	mg/kg	0.0242	0	.033	73.3	22-156	L534221-06	WG554477
Phenanthrene	mg/kg	0.0286	0	.033	86.5	23-164	L534221-06	WG554477
Pyrene	mg/kg	0.0252	0	.033	76.4	12-170	L534221-06	WG554477
2-Fluorobiphenyl					71.94	34-129		WG554477

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Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit Ref	Samp	Batch
			Ref	%Rec					
Nitrobenzene-d5					73.89	14-141			
p-Terphenyl-d14					72.38	25-139			

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit Ref	Samp	Batch
			Ref	%Rec					
Arsenic	mg/kg	48.2	49.6	91.4	75-125	2.86	20	L534310-02	WG553618
Barium	mg/kg	1310	822.	2140*	75-125	45.8*	20	L534310-02	WG553618
Cadmium	mg/kg	42.7	44.1	84.2	75-125	3.23	20	L534310-02	WG553618
Chromium	mg/kg	56.6	57.5	96.0	75-125	1.58	20	L534310-02	WG553618
Copper	mg/kg	62.5	63.5	105.	75-125	1.59	20	L534310-02	WG553618
Lead	mg/kg	54.0	55.2	90.6	75-125	2.20	20	L534310-02	WG553618
Nickel	mg/kg	54.6	55.7	92.8	75-125	1.99	20	L534310-02	WG553618
Silver	mg/kg	49.0	50.5	98.0	75-125	3.02	20	L534310-02	WG553618
Zinc	mg/kg	77.5	78.4	89.0	75-125	1.15	20	L534310-02	WG553618
Selenium	mg/kg	47.0	52.6	94.0	75-125	11.2	20	L534310-02	WG553618
Benzene	mg/kg	0.0401	0.0254	76.2	32-137	44.8*	39	L534150-06	WG553729
Ethylbenzene	mg/kg	0.0409	0.0267	80.7	10-150	42.1	44	L534150-06	WG553729
Toluene	mg/kg	0.0422	0.0282	79.0	20-142	39.6	42	L534150-06	WG553729
a,a,a-Trifluorotoluene(PID)				97.47	54-144				WG553729
Mercury	mg/kg	0.253	0.242	101.	70-130	4.44	20	L534136-10	WG553778
Total Xylene	mg/kg	0.689	0.718	89.9	16-141	4.15	46	L534118-09	WG553911
a,a,a-Trifluorotoluene(PID)				98.66	54-144				WG553911
TPH (GC/FID) Low Fraction	mg/kg	24.5	28.7	80.2	55-109	16.1	20	L534118-09	WG553911
a,a,a-Trifluorotoluene(FID)				100.2	59-128				WG553911
Chromium,Hexavalent	mg/kg	7.36	4.72	36.8*	50-150	43.7*	20	L534302-03	WG553536
Arsenic	mg/kg	47.3	43.3	87.7	75-125	8.83	20	L534378-08	WG553924
Arsenic	mg/kg	43.0	45.3	77.2	75-125	5.21	20	L534276-02	WG553917
TPH (GC/FID) High Fraction	ppm	44.2	43.8	73.6	50-150	0.844	20	L534150-05	WG554075
o-Terphenyl				73.11	50-150				WG554075
1-Methylnaphthalene	mg/kg	0.0297	0.0255	90.0	25-155	15.1	27	L534221-06	WG554477
2-Chloronaphthalene	mg/kg	0.0304	0.0260	92.2	31-153	15.9	22	L534221-06	WG554477
2-Methylnaphthalene	mg/kg	0.0317	0.0280	96.0	22-172	12.5	29	L534221-06	WG554477
Acenaphthene	mg/kg	0.0284	0.0255	86.2	43-133	10.9	26	L534221-06	WG554477
Acenaphthylene	mg/kg	0.0296	0.0266	89.6	42-146	10.6	22	L534221-06	WG554477
Anthracene	mg/kg	0.0290	0.0265	87.8	38-153	8.83	27	L534221-06	WG554477
Benzo(a)anthracene	mg/kg	0.0285	0.0257	86.4	31-142	10.3	31	L534221-06	WG554477
Benzo(a)pyrene	mg/kg	0.0258	0.0243	78.2	26-152	6.04	32	L534221-06	WG554477
Benzo(b)fluoranthene	mg/kg	0.0285	0.0242	86.2	10-188	16.3	33	L534221-06	WG554477
Benzo(g,h,i)perylene	mg/kg	0.0281	0.0270	85.2	10-176	4.07	30	L534221-06	WG554477
Benzo(k)fluoranthene	mg/kg	0.0244	0.0218	74.0	22-163	11.5	29	L534221-06	WG554477
Chrysene	mg/kg	0.0257	0.0228	77.8	26-146	11.9	30	L534221-06	WG554477
Dibenz(a,h)anthracene	mg/kg	0.0234	0.0220	70.8	10-160	6.08	39	L534221-06	WG554477

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Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit Ref	Samp	Batch
			Ref	%Rec					
Fluoranthene	mg/kg	0.0306	0.0272	92.6	23-160	11.7	22	L534221-06	WG554477
Fluorene	mg/kg	0.0294	0.0275	89.0	44-143	6.58	23	L534221-06	WG554477
Indeno(1,2,3-cd)pyrene	mg/kg	0.0257	0.0248	77.9	10-157	3.38	40	L534221-06	WG554477
Naphthalene	mg/kg	0.0280	0.0242	84.9	22-156	14.7	27	L534221-06	WG554477
Phenanthrene	mg/kg	0.0310	0.0286	94.0	23-164	8.29	25	L534221-06	WG554477
Pyrene	mg/kg	0.0294	0.0252	89.2	12-170	15.6	24	L534221-06	WG554477
2-Fluorobiphenyl				80.98	34-129				WG554477
Nitrobenzene-d5				84.58	14-141				WG554477
p-Terphenyl-d14				83.24	25-139				WG554477

Batch number / Run number / Sample number cross reference

WG553618: R1846232: L534276-01
 WG553729: R1847452: L534276-01
 WG553724: R1848212: L534276-01
 WG553778: R1848272: L534276-01
 WG553911: R1849132: L534276-01
 WG553916: R1849497: L534276-01
 WG553536: R1850152: L534276-01
 WG553924: R1850854: L534276-06
 WG553917: R1851281: L534276-02 03 04 05
 WG554477: R1852932: L534276-01
 WG553639: R1853232: L534276-01
 WG554532: R1853655: L534276-01
 WG554075: R1853860: L534276-01

* * 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.