

Caerus Oil and Gas

Sample Delivery Group: L1162976
Samples Received: 11/20/2019
Project Number: 17F PRODUCED WATER R
Description: 17F Produced Water Release
Site: 17F
Report To: Jake Janicek
143 Diamond Avenue
Parachute, CO 81635

Entire Report Reviewed By:

Chris Ward

Chris Ward
Project Manager

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



20191118-17F(BOTTOM)@10.5' L1162976-01 Solid

Collected by
Evan Mason

Collected date/time
11/18/19 14:50

Received date/time
11/20/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1385785	1	11/25/19 17:26	11/25/19 17:26	EL	Mt. Juliet, TN
Calculated Results	WG1385283	1	11/22/19 14:50	11/24/19 16:05	ANP	Mt. Juliet, TN
Wet Chemistry by Method 3060A/7196A	WG1384956	1	11/21/19 18:51	11/24/19 16:05	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1384773	1	11/25/19 14:45	11/25/19 21:41	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1386295	1	11/25/19 16:06	11/25/19 17:51	SL	Mt. Juliet, TN
Mercury by Method 7471A	WG1385537	1	11/24/19 12:06	11/25/19 11:16	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1385283	1	11/22/19 14:50	11/23/19 09:13	TRB	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1388372	50	11/21/19 11:33	11/28/19 02:31	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1387292	1	11/21/19 11:33	11/26/19 19:58	JHH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1385506	1	11/22/19 19:31	11/23/19 17:47	KME	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1385124	1	11/22/19 06:01	11/22/19 14:01	AAT	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris Ward
Project Manager

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	1.74		1	11/25/2019 17:26	WG1385785

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Calculated Results

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium, Trivalent	11.4		1.00	1	11/24/2019 16:05	WG1385283

Wet Chemistry by Method 3060A/7196A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	11/24/2019 16:05	WG1384956

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	7.76	T8	1	11/25/2019 21:41	WG1384773

Sample Narrative:

L1162976-01 WG1384773: 7.76 at 20C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	2260		10.0	1	11/25/2019 17:51	WG1386295

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0300	1	11/25/2019 11:16	WG1385537

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	3.38		2.00	1	11/23/2019 09:13	WG1385283
Barium	104		0.500	1	11/23/2019 09:13	WG1385283
Cadmium	ND		0.500	1	11/23/2019 09:13	WG1385283
Chromium	11.4		1.00	1	11/23/2019 09:13	WG1385283
Copper	9.71		2.00	1	11/23/2019 09:13	WG1385283
Lead	7.52		0.500	1	11/23/2019 09:13	WG1385283
Nickel	11.5		2.00	1	11/23/2019 09:13	WG1385283
Selenium	ND		2.00	1	11/23/2019 09:13	WG1385283
Silver	ND		1.00	1	11/23/2019 09:13	WG1385283
Zinc	40.7		5.00	1	11/23/2019 09:13	WG1385283

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	33.4		5.00	50	11/28/2019 02:31	WG1388372
(S) a,a,a-Trifluorotoluene(FID)	96.4		77.0-120		11/28/2019 02:31	WG1388372



Collected date/time: 11/18/19 14:50

L1162976

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.0252	J5	0.00100	1	11/26/2019 19:58	WG1387292
Toluene	0.0779	J5	0.00500	1	11/26/2019 19:58	WG1387292
Ethylbenzene	0.00945		0.00250	1	11/26/2019 19:58	WG1387292
Total Xylenes	0.136	J5	0.00650	1	11/26/2019 19:58	WG1387292
(S) Toluene-d8	103		75.0-131		11/26/2019 19:58	WG1387292
(S) 4-Bromofluorobenzene	103		67.0-138		11/26/2019 19:58	WG1387292
(S) 1,2-Dichloroethane-d4	97.0		70.0-130		11/26/2019 19:58	WG1387292

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	ND		4.00	1	11/23/2019 17:47	WG1385506
(S) o-Terphenyl	89.1		18.0-148		11/23/2019 17:47	WG1385506

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Acenaphthene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Acenaphthylene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Benzo(a)anthracene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Benzo(a)pyrene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Benzo(b)fluoranthene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Benzo(g,h,i)perylene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Benzo(k)fluoranthene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Chrysene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Dibenz(a,h)anthracene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Fluoranthene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Fluorene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Naphthalene	ND		0.0200	1	11/22/2019 14:01	WG1385124
Phenanthrene	ND		0.00600	1	11/22/2019 14:01	WG1385124
Pyrene	ND		0.00600	1	11/22/2019 14:01	WG1385124
1-Methylnaphthalene	ND		0.0200	1	11/22/2019 14:01	WG1385124
2-Methylnaphthalene	ND		0.0200	1	11/22/2019 14:01	WG1385124
2-Chloronaphthalene	ND		0.0200	1	11/22/2019 14:01	WG1385124
(S) p-Terphenyl-d14	112		23.0-120		11/22/2019 14:01	WG1385124
(S) Nitrobenzene-d5	110		14.0-149		11/22/2019 14:01	WG1385124
(S) 2-Fluorobiphenyl	110		34.0-125		11/22/2019 14:01	WG1385124



Method Blank (MB)

(MB) R3475646-1 11/24/19 16:02

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Chromium,Hexavalent	U		0.640	2.00

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L1162976-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1162976-01 11/24/19 16:05 • (DUP) R3475646-3 11/24/19 16:06

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chromium,Hexavalent	ND	0.000	1	0.000		20

L1163543-13 Original Sample (OS) • Duplicate (DUP)

(OS) L1163543-13 11/24/19 16:25 • (DUP) R3475646-8 11/24/19 16:25

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chromium,Hexavalent	ND	0.000	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3475646-2 11/24/19 16:04

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Chromium,Hexavalent	24.0	23.5	97.8	80.0-120	

L1163076-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1163076-01 11/24/19 16:07 • (MS) R3475646-4 11/24/19 16:13 • (MSD) R3475646-5 11/24/19 16:13

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chromium,Hexavalent	138	ND	12.0	13.0	3.95	4.65	1	75.0-125	J6	J6	0.000	20

L1163076-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1163076-01 11/24/19 16:07 • (MS) R3475646-6 11/24/19 16:14

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chromium,Hexavalent	4870	ND	3240	66.5	50	75.0-125	J6

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

L1162976-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1162976-01 11/25/19 21:41 • (DUP) R3476167-2 11/25/19 21:41

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	7.76	7.76	1	0.000		1

Sample Narrative:
OS: 7.76 at 20C
DUP: 7.76 at 20.1C

Laboratory Control Sample (LCS)

(LCS) R3476167-1 11/25/19 21:41

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	su	su	%	%	
pH	10.0	9.92	99.2	99.0-101	

Sample Narrative:
LCS: 9.92 at 18.3C

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3476112-1 11/25/19 17:51

Analyte	MB Result umhos/cm	MB Qualifier	MB MDL umhos/cm	MB RDL umhos/cm
Specific Conductance	U		10.0	10.0

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1162461-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1162461-01 11/25/19 17:51 • (DUP) R3476112-3 11/25/19 17:51

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	170	161	1	5.13		20

L1162976-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1162976-01 11/25/19 17:51 • (DUP) R3476112-4 11/25/19 17:51

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	2260	2200	1	2.87		20

Laboratory Control Sample (LCS)

(LCS) R3476112-2 11/25/19 17:51

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	475	474	99.8	85.0-115	



Method Blank (MB)

(MB) R3475915-1 11/25/19 10:58

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Mercury	U		0.00280	0.0300

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3475915-2 11/25/19 11:00 • (LCSD) R3475915-3 11/25/19 11:03

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.500	0.507	0.510	101	102	80.0-120			0.656	20

L1163078-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1163078-01 11/25/19 11:05 • (MS) R3475915-4 11/25/19 11:07 • (MSD) R3475915-5 11/25/19 11:14

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.623	0.0174	0.681	0.619	107	96.6	1	75.0-125			9.56	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3475354-1 11/23/19 08:38

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.460	2.00
Barium	U		0.170	0.500
Cadmium	U		0.0700	0.500
Chromium	U		0.140	1.00
Copper	U		0.530	2.00
Lead	U		0.190	0.500
Nickel	U		0.490	2.00
Selenium	U		0.620	2.00
Silver	U		0.120	1.00
Zinc	U		0.590	5.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3475354-2 11/23/19 08:40 • (LCSD) R3475354-3 11/23/19 08:43

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	93.4	93.6	93.4	93.6	80.0-120			0.168	20
Barium	100	99.8	99.6	99.8	99.6	80.0-120			0.162	20
Cadmium	100	94.4	93.9	94.4	93.9	80.0-120			0.482	20
Chromium	100	95.8	95.1	95.8	95.1	80.0-120			0.714	20
Copper	100	94.8	94.0	94.8	94.0	80.0-120			0.868	20
Lead	100	94.4	94.5	94.4	94.5	80.0-120			0.0553	20
Nickel	100	95.4	94.9	95.4	94.9	80.0-120			0.519	20
Selenium	100	92.8	92.8	92.8	92.8	80.0-120			0.0495	20
Silver	20.0	17.5	17.3	87.6	86.4	80.0-120			1.34	20
Zinc	100	94.9	94.4	94.9	94.4	80.0-120			0.457	20

L1163460-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1163460-01 11/23/19 08:45 • (MS) R3475354-6 11/23/19 08:53 • (MSD) R3475354-7 11/23/19 08:55

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	100	2.34	89.0	91.8	86.7	89.4	1	75.0-125			3.02	20
Barium	100	13.9	107	110	93.5	96.6	1	75.0-125			2.84	20
Cadmium	100	U	88.5	91.5	88.5	91.5	1	75.0-125			3.38	20
Chromium	100	12.0	102	106	89.8	94.2	1	75.0-125			4.29	20
Copper	100	4.10	95.3	98.4	91.2	94.3	1	75.0-125			3.18	20
Lead	100	3.67	94.6	98.0	90.9	94.4	1	75.0-125			3.54	20
Nickel	100	6.73	98.7	102	91.9	95.3	1	75.0-125			3.33	20



L1163460-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1163460-01 11/23/19 08:45 • (MS) R3475354-6 11/23/19 08:53 • (MSD) R3475354-7 11/23/19 08:55

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Selenium	100	U	87.0	89.7	87.0	89.7	1	75.0-125			3.09	20
Silver	20.0	U	16.2	16.7	81.1	83.3	1	75.0-125			2.73	20
Zinc	100	9.36	98.9	102	89.5	92.8	1	75.0-125			3.24	20

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3477208-2 11/27/19 22:11

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	0.0280	⬇	0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	96.7			77.0-120

- 1Cp
- 2Tc
- 3Ss
- 4Cn
- 5Sr
- 6Qc
- 7Gl
- 8Al
- 9Sc

Laboratory Control Sample (LCS)

(LCS) R3477208-1 11/27/19 21:18

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	6.21	113	72.0-127	
(S) a,a,a-Trifluorotoluene(FID)			111	77.0-120	



Method Blank (MB)

(MB) R3476617-2 11/26/19 10:46

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000400	0.00100
Ethylbenzene	U		0.000530	0.00250
Toluene	U		0.00125	0.00500
Xylenes, Total	U		0.00478	0.00650
(S) Toluene-d8	102			75.0-131
(S) 4-Bromofluorobenzene	97.1			67.0-138
(S) 1,2-Dichloroethane-d4	97.2			70.0-130

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3476617-1 11/26/19 09:24 • (LCSD) R3476617-3 11/26/19 11:53

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.125	0.129	0.141	103	113	70.0-123			8.89	20
Ethylbenzene	0.125	0.119	0.125	95.2	100	74.0-126			4.92	20
Toluene	0.125	0.109	0.120	87.2	96.0	75.0-121			9.61	20
Xylenes, Total	0.375	0.304	0.316	81.1	84.3	72.0-127			3.87	20
(S) Toluene-d8				101	99.4	75.0-131				
(S) 4-Bromofluorobenzene				103	99.6	67.0-138				
(S) 1,2-Dichloroethane-d4				113	111	70.0-130				

L1162976-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1162976-01 11/26/19 19:58 • (MS) R3476617-4 11/26/19 20:19 • (MSD) R3476617-5 11/26/19 20:39

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.125	0.0252	0.285	0.245	208	176	1	10.0-149	J5	J5	15.1	37
Ethylbenzene	0.125	0.00945	0.186	0.147	141	110	1	10.0-160			23.4	38
Toluene	0.125	0.0779	0.619	0.586	433	406	1	10.0-156	J5	J5	5.48	38
Xylenes, Total	0.375	0.136	1.29	1.20	308	284	1	10.0-160	J5	J5	7.23	38
(S) Toluene-d8					103	102		75.0-131				
(S) 4-Bromofluorobenzene					106	107		67.0-138				
(S) 1,2-Dichloroethane-d4					101	103		70.0-130				

Method Blank (MB)

(MB) R3475557-1 11/23/19 16:48

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) High Fraction	U		0.769	4.00
(S) o-Terphenyl	91.6			18.0-148

Laboratory Control Sample (LCS)

(LCS) R3475557-2 11/23/19 17:01

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
TPH (GC/FID) High Fraction	50.0	43.3	86.6	50.0-150	
(S) o-Terphenyl			71.8	18.0-148	

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Method Blank (MB)

(MB) R3475377-2 11/22/19 10:01

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Anthracene	U		0.000600	0.00600
Acenaphthene	U		0.000600	0.00600
Acenaphthylene	U		0.000600	0.00600
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(g,h,i)perylene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Fluoranthene	U		0.000600	0.00600
Fluorene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
Naphthalene	U		0.00200	0.0200
Phenanthrene	U		0.000600	0.00600
Pyrene	U		0.000600	0.00600
1-Methylnaphthalene	U		0.00200	0.0200
2-Methylnaphthalene	U		0.00200	0.0200
2-Chloronaphthalene	U		0.00200	0.0200
(S) Nitrobenzene-d5	114			14.0-149
(S) 2-Fluorobiphenyl	119			34.0-125
(S) p-Terphenyl-d14	131	J1		23.0-120

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS)

(LCS) R3475377-1 11/22/19 09:39

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	0.0800	0.0842	105	50.0-126	
Acenaphthene	0.0800	0.0802	100	50.0-120	
Acenaphthylene	0.0800	0.0860	108	50.0-120	
Benzo(a)anthracene	0.0800	0.0752	94.0	45.0-120	
Benzo(a)pyrene	0.0800	0.0757	94.6	42.0-120	
Benzo(b)fluoranthene	0.0800	0.0733	91.6	42.0-121	
Benzo(g,h,i)perylene	0.0800	0.0769	96.1	45.0-125	
Benzo(k)fluoranthene	0.0800	0.0851	106	49.0-125	
Chrysene	0.0800	0.0799	99.9	49.0-122	
Dibenz(a,h)anthracene	0.0800	0.0763	95.4	47.0-125	
Fluoranthene	0.0800	0.0722	90.3	49.0-129	

Laboratory Control Sample (LCS)

(LCS) R3475377-1 11/22/19 09:39

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Fluorene	0.0800	0.0794	99.3	49.0-120	
Indeno(1,2,3-cd)pyrene	0.0800	0.0796	99.5	46.0-125	
Naphthalene	0.0800	0.0771	96.4	50.0-120	
Phenanthrene	0.0800	0.0746	93.3	47.0-120	
Pyrene	0.0800	0.0792	99.0	43.0-123	
1-Methylnaphthalene	0.0800	0.0779	97.4	51.0-121	
2-Methylnaphthalene	0.0800	0.0766	95.8	50.0-120	
2-Chloronaphthalene	0.0800	0.0724	90.5	50.0-120	
(S) Nitrobenzene-d5			107	14.0-149	
(S) 2-Fluorobiphenyl			110	34.0-125	
(S) p-Terphenyl-d14			119	23.0-120	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
T8	Sample(s) received past/too close to holding time expiration.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1 6}	90010	South Carolina	84004
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1 4}	2006
Louisiana ¹	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP, LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Condition:
NCF / OK