

July 24, 2020

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Caerus Oil and Gas

Sample Delivery Group: L1240421

Samples Received: 07/16/2020

Project Number:

Description: Unocal 4 Spill

Report To: Blair Rollins
143 Diamond Avenue
Parachute, CO 81635

Entire Report Reviewed By:

Chris Ward

Chris Ward
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



20200715-UNOCAL 4 POR L1240421-01 Solid

Collected by
Blair K. Rollins

Collected date/time
07/15/20 08:30

Received date/time
07/16/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1510382	1	07/20/20 02:03	07/20/20 02:03	EL	Mt. Juliet, TN
Calculated Results	WG1511048	1	07/18/20 11:28	07/21/20 12:23	KPS	Mt. Juliet, TN
Wet Chemistry by Method 3060A/7196A	WG1511767	1	07/20/20 16:35	07/21/20 12:23	KPS	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1512273	1	07/21/20 11:00	07/21/20 15:51	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1512158	1	07/20/20 22:38	07/21/20 06:17	AKA	Mt. Juliet, TN
Mercury by Method 7471A	WG1511788	1	07/20/20 09:17	07/20/20 17:46	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1511048	1	07/18/20 11:28	07/19/20 19:32	CCE	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1512621	5000	07/17/20 16:55	07/22/20 03:21	DWR	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1511321	40	07/17/20 16:55	07/19/20 10:21	DWR	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1513293	400	07/17/20 16:55	07/23/20 02:39	AV	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1511348	500	07/18/20 17:16	07/19/20 22:22	JN	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1511614	1	07/19/20 23:52	07/20/20 09:43	DMG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1511614	10	07/19/20 23:52	07/20/20 11:09	DMG	Mt. Juliet, TN

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



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 Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	20.0		1	07/20/2020 02:03	WG1510382

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Calculated Results

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium, Trivalent	21.6		1.00	1	07/21/2020 12:23	WG1511048

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	07/21/2020 12:23	WG1511767

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.33	T8	1	07/21/2020 15:51	WG1512273

Sample Narrative:

L1240421-01 WG1512273: 8.33 at 24.1C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	36.4		10.0	1	07/21/2020 06:17	WG1512158

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	0.383		0.0400	1	07/20/2020 17:46	WG1511788

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	11.8		2.00	1	07/19/2020 19:32	WG1511048
Barium	526		0.500	1	07/19/2020 19:32	WG1511048
Cadmium	ND		0.500	1	07/19/2020 19:32	WG1511048
Chromium	21.6		1.00	1	07/19/2020 19:32	WG1511048
Copper	18.0		2.00	1	07/19/2020 19:32	WG1511048
Lead	12.4		0.500	1	07/19/2020 19:32	WG1511048
Nickel	16.9		2.00	1	07/19/2020 19:32	WG1511048
Selenium	ND		2.00	1	07/19/2020 19:32	WG1511048
Silver	ND		1.00	1	07/19/2020 19:32	WG1511048
Zinc	52.1		5.00	1	07/19/2020 19:32	WG1511048

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	16400		500	5000	07/22/2020 03:21	WG1512621
(S) a,a,a-Trifluorotoluene(FID)	96.6		77.0-120		07/22/2020 03:21	WG1512621



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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	2.23		0.0400	40	07/19/2020 10:21	WG1511321
Toluene	75.0	<u>V</u>	0.200	40	07/19/2020 10:21	WG1511321
Ethylbenzene	21.9	<u>V</u>	0.100	40	07/19/2020 10:21	WG1511321
Total Xylenes	870		2.60	400	07/23/2020 02:39	WG1513293
(S) Toluene-d8	96.6		75.0-131		07/19/2020 10:21	WG1511321
(S) Toluene-d8	102		75.0-131		07/23/2020 02:39	WG1513293
(S) 4-Bromofluorobenzene	130		67.0-138		07/19/2020 10:21	WG1511321
(S) 4-Bromofluorobenzene	102		67.0-138		07/23/2020 02:39	WG1513293
(S) 1,2-Dichloroethane-d4	109		70.0-130		07/19/2020 10:21	WG1511321
(S) 1,2-Dichloroethane-d4	112		70.0-130		07/23/2020 02:39	WG1513293

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	5920		2000	500	07/19/2020 22:22	WG1511348
(S) o-Terphenyl	0.000	<u>J7</u>	18.0-148		07/19/2020 22:22	WG1511348

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	07/20/2020 09:43	WG1511614
Acenaphthene	ND		0.0600	10	07/20/2020 11:09	WG1511614
Acenaphthylene	ND		0.0600	10	07/20/2020 11:09	WG1511614
Benzo(a)anthracene	ND		0.0600	10	07/20/2020 11:09	WG1511614
Benzo(a)pyrene	ND		0.0600	10	07/20/2020 11:09	WG1511614
Benzo(b)fluoranthene	ND		0.0600	10	07/20/2020 11:09	WG1511614
Benzo(g,h,i)perylene	ND		0.0600	10	07/20/2020 11:09	WG1511614
Benzo(k)fluoranthene	ND		0.0600	10	07/20/2020 11:09	WG1511614
Chrysene	ND		0.0600	10	07/20/2020 11:09	WG1511614
Dibenz(a,h)anthracene	ND		0.0600	10	07/20/2020 11:09	WG1511614
Fluoranthene	ND		0.00600	1	07/20/2020 09:43	WG1511614
Fluorene	0.608		0.0600	10	07/20/2020 11:09	WG1511614
Indeno(1,2,3-cd)pyrene	ND		0.0600	10	07/20/2020 11:09	WG1511614
Naphthalene	8.45		0.200	10	07/20/2020 11:09	WG1511614
Phenanthrene	0.371		0.00600	1	07/20/2020 09:43	WG1511614
Pyrene	ND		0.0600	10	07/20/2020 11:09	WG1511614
1-Methylnaphthalene	5.11		0.200	10	07/20/2020 11:09	WG1511614
2-Methylnaphthalene	14.3		0.200	10	07/20/2020 11:09	WG1511614
2-Chloronaphthalene	ND		0.200	10	07/20/2020 11:09	WG1511614
(S) p-Terphenyl-d14	58.1		23.0-120		07/20/2020 09:43	WG1511614
(S) p-Terphenyl-d14	84.8		23.0-120		07/20/2020 11:09	WG1511614
(S) Nitrobenzene-d5	0.000	<u>J2</u>	14.0-149		07/20/2020 09:43	WG1511614
(S) Nitrobenzene-d5	11300	<u>J1</u>	14.0-149		07/20/2020 11:09	WG1511614
(S) 2-Fluorobiphenyl	0.000	<u>J2</u>	34.0-125		07/20/2020 09:43	WG1511614
(S) 2-Fluorobiphenyl	105		34.0-125		07/20/2020 11:09	WG1511614

Sample Narrative:

L1240421-01 WG1511614: Surrogate failure due to matrix interference

L1240421-01 WG1511614: Dilution due to matrix impact on instrumentation at lower dilution

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3551542-1 07/21/20 12:06

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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1239966-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1239966-02 07/21/20 12:11 • (DUP) R3551542-7 07/21/20 12:12

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

L1240414-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1240414-03 07/21/20 12:22 • (DUP) R3551542-8 07/21/20 12:23

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

Laboratory Control Sample (LCS)

(LCS) R3551542-2 07/21/20 12:06

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Chromium,Hexavalent	24.0	25.7	107	80.0-120	

L1238355-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1238355-01 07/21/20 12:07 • (MS) R3551542-3 07/21/20 12:08 • (MSD) R3551542-4 07/21/20 12:09

	Spike Amount	Original Result	MS Result	MSD Result	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	20.0	ND	2.51	2.31	12.5	11.6	1	75.0-125	J6	J6	8.26	20

Sample Narrative:

OS: Sample is a reducer

L1238355-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1238355-01 07/21/20 12:07 • (MS) R3551542-5 07/21/20 12:10

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chromium,Hexavalent	677	ND	671	99.1	50	75.0-125	

Sample Narrative:
OS: Sample is a reducer

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

L1240402-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1240402-08 07/21/20 15:51 • (DUP) R3551638-2 07/21/20 15:51

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	6.95	6.92	1	0.433		1

Sample Narrative:
OS: 6.95 at 24.5C
DUP: 6.92 at 24.3C

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L1240414-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1240414-01 07/21/20 15:51 • (DUP) R3551638-3 07/21/20 15:51

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	8.72	8.77	1	0.572		1

Sample Narrative:
OS: 8.72 at 24.1C
DUP: 8.77 at 24C

Laboratory Control Sample (LCS)

(LCS) R3551638-1 07/21/20 15:51

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	su	su	%	%	
pH	10.0	10.0	100	99.0-101	

Sample Narrative:
LCS: 10.04 at 24C



Method Blank (MB)

(MB) R3551382-1 07/21/20 06:17

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

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

L1239097-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1239097-06 07/21/20 06:17 • (DUP) R3551382-3 07/21/20 06:17

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	155	155	1	0.322		20

L1240414-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1240414-02 07/21/20 06:17 • (DUP) R3551382-4 07/21/20 06:17

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	147	148	1	0.474		20

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R3551382-2 07/21/20 06:17

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	268	268	100	85.0-115	

Method Blank (MB)

(MB) R3551353-1 07/20/20 17:13

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Mercury	U		0.0180	0.0400

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Laboratory Control Sample (LCS)

(LCS) R3551353-2 07/20/20 17:15

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Mercury	0.500	0.465	93.0	80.0-120	



Method Blank (MB)

(MB) R3550964-1 07/19/20 18:03

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.460	2.00
Barium	U		0.240	0.500
Cadmium	U		0.0810	0.500
Chromium	U		0.250	1.00
Copper	U		0.506	2.00
Lead	U		0.208	0.500
Nickel	U		0.490	2.00
Selenium	U		0.617	2.00
Silver	U		0.228	1.00
Zinc	U		0.939	5.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS)

(LCS) R3550964-2 07/19/20 18:05

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	100	91.0	91.0	80.0-120	
Barium	100	96.6	96.6	80.0-120	
Cadmium	100	92.5	92.5	80.0-120	
Chromium	100	95.0	95.0	80.0-120	
Copper	100	93.9	93.9	80.0-120	
Lead	100	94.0	94.0	80.0-120	
Nickel	100	96.5	96.5	80.0-120	
Selenium	100	91.0	91.0	80.0-120	
Silver	20.0	17.6	88.0	80.0-120	
Zinc	100	92.6	92.6	80.0-120	

L1239884-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1239884-09 07/19/20 18:09 • (MS) R3550964-5 07/19/20 18:18 • (MSD) R3550964-6 07/19/20 18:21

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	9.60	99.3	102	89.7	92.5	1	75.0-125			2.78	20
Barium	100	75.1	213	188	137	113	1	75.0-125	J5		12.1	20
Cadmium	100	34.4	113	109	78.8	74.6	1	75.0-125		J6	3.79	20
Chromium	100	ND	93.2	95.2	93.2	95.2	1	75.0-125			2.15	20
Copper	100	833	795	886	0.000	53.2	1	75.0-125	V	V	10.8	20
Lead	100	26600	34600	31300	8050	4680	1	75.0-125	E V	E V	10.2	20
Nickel	100	ND	96.9	99.8	96.9	99.8	1	75.0-125			2.94	20

L1239884-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1239884-09 07/19/20 18:09 • (MS) R3550964-5 07/19/20 18:18 • (MSD) R3550964-6 07/19/20 18:21

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 %
Selenium	100	10.9	105	108	93.9	97.6	1	75.0-125			3.49	20
Silver	20.0	33.0	53.5	52.2	103	96.1	1	75.0-125			2.49	20
Zinc	100	7600	5330	3940	0.000	0.000	1	75.0-125	E V	E J3 V	30.0	20

L1239886-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1239886-09 07/19/20 18:24 • (MS) R3550964-8 07/19/20 18:29 • (MSD) R3550964-9 07/19/20 18:38

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	29.1	118	115	89.4	85.8	1	75.0-125			3.07	20
Barium	100	195	271	242	76.2	47.2	1	75.0-125		J6	11.3	20
Cadmium	100	ND	96.9	91.0	96.8	90.9	1	75.0-125			6.30	20
Chromium	100	5.39	105	96.9	99.3	91.6	1	75.0-125			7.71	20
Copper	100	15.9	111	105	94.9	89.6	1	75.0-125			4.87	20
Lead	100	159	823	240	664	81.0	1	75.0-125	J5	J3	110	20
Nickel	100	ND	103	98.2	102	96.8	1	75.0-125			5.27	20
Selenium	100	3.31	98.9	92.3	95.6	89.0	1	75.0-125			6.85	20
Silver	20.0	ND	19.2	17.6	95.9	87.8	1	75.0-125			8.89	20
Zinc	100	51.8	123	137	70.8	85.5	1	75.0-125	J6		11.3	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3551818-2 07/21/20 17:07

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	106			77.0-120

Laboratory Control Sample (LCS)

(LCS) R3551818-1 07/21/20 16:26

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	6.31	115	72.0-127	
(S) a,a,a-Trifluorotoluene(FID)			95.8	77.0-120	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3551975-3 07/19/20 03:31

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000467	0.00100
Ethylbenzene	U		0.000737	0.00250
Toluene	U		0.00130	0.00500
(S) Toluene-d8	92.9			75.0-131
(S) 4-Bromofluorobenzene	99.9			67.0-138
(S) 1,2-Dichloroethane-d4	116			70.0-130

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) R3551975-1 07/19/20 01:33 • (LCSD) R3551975-2 07/19/20 01:52

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	0.118	0.120	94.4	96.0	70.0-123			1.68	20
Ethylbenzene	0.125	0.111	0.112	88.8	89.6	74.0-126			0.897	20
Toluene	0.125	0.114	0.113	91.2	90.4	75.0-121			0.881	20
(S) Toluene-d8				96.7	97.2	75.0-131				
(S) 4-Bromofluorobenzene				100	99.7	67.0-138				
(S) 1,2-Dichloroethane-d4				108	113	70.0-130				

L1240421-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1240421-01 07/19/20 10:21 • (MS) R3551975-4 07/19/20 10:39 • (MSD) R3551975-5 07/19/20 10:58

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	5.00	2.23	9.39	9.67	143	149	40	10.0-149			2.94	37
Ethylbenzene	5.00	21.9	45.4	46.2	470	486	40	10.0-160	V	V	1.75	38
Toluene	5.00	75.0	146	153	1420	1560	40	10.0-156	E V	E V	4.68	38
(S) Toluene-d8					91.4	87.6		75.0-131				
(S) 4-Bromofluorobenzene					162	139		67.0-138	J1	J1		
(S) 1,2-Dichloroethane-d4					113	109		70.0-130				



Method Blank (MB)

(MB) R3552496-2 07/22/20 19:47

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Xylenes, Total	U		0.000880	0.00650
(S) Toluene-d8	105			75.0-131
(S) 4-Bromofluorobenzene	107			67.0-138
(S) 1,2-Dichloroethane-d4	119			70.0-130

1
Cp

2
Tc

3
Ss

4
Cn

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Sr

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Qc

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Gl

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Al

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Sc

Laboratory Control Sample (LCS)

(LCS) R3552496-1 07/22/20 18:28

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Xylenes, Total	0.375	0.367	97.9	72.0-127	
(S) Toluene-d8			103	75.0-131	
(S) 4-Bromofluorobenzene			109	67.0-138	
(S) 1,2-Dichloroethane-d4			118	70.0-130	



Method Blank (MB)

(MB) R3551042-1 07/19/20 16:46

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) High Fraction	U		0.769	4.00
(S) o-Terphenyl	66.1			18.0-148

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS)

(LCS) R3551042-2 07/19/20 16:59

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) High Fraction	50.0	33.3	66.6	50.0-150	
(S) o-Terphenyl			74.9	18.0-148	

Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) • (MS) R3551601-1 07/20/20 12:56 • (MSD) R3551601-2 07/20/20 13:09

Analyte	Spike Amount mg/kg	Original Result	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) High Fraction	49.0		139	165	2.04	54.9	5	50.0-150	J6		17.1	20
(S) o-Terphenyl					46.3	51.5		18.0-148				



Method Blank (MB)

(MB) R3551011-2 07/20/20 02:42

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Anthracene	U		0.00230	0.00600
Acenaphthene	U		0.00209	0.00600
Acenaphthylene	U		0.00216	0.00600
Benzo(a)anthracene	U		0.00173	0.00600
Benzo(a)pyrene	U		0.00179	0.00600
Benzo(b)fluoranthene	U		0.00153	0.00600
Benzo(g,h,i)perylene	U		0.00177	0.00600
Benzo(k)fluoranthene	U		0.00215	0.00600
Chrysene	U		0.00232	0.00600
Dibenz(a,h)anthracene	U		0.00172	0.00600
Fluoranthene	U		0.00227	0.00600
Fluorene	U		0.00205	0.00600
Indeno(1,2,3-cd)pyrene	U		0.00181	0.00600
Naphthalene	U		0.00408	0.0200
Phenanthrene	U		0.00231	0.00600
Pyrene	U		0.00200	0.00600
1-Methylnaphthalene	U		0.00449	0.0200
2-Methylnaphthalene	U		0.00427	0.0200
2-Chloronaphthalene	U		0.00466	0.0200
(S) Nitrobenzene-d5	75.4			14.0-149
(S) 2-Fluorobiphenyl	88.1			34.0-125
(S) p-Terphenyl-d14	103			23.0-120

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R3551011-1 07/20/20 02:21

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	0.0800	0.0804	101	50.0-126	
Acenaphthene	0.0800	0.0794	99.3	50.0-120	
Acenaphthylene	0.0800	0.0802	100	50.0-120	
Benzo(a)anthracene	0.0800	0.0774	96.8	45.0-120	
Benzo(a)pyrene	0.0800	0.0828	104	42.0-120	
Benzo(b)fluoranthene	0.0800	0.0834	104	42.0-121	
Benzo(g,h,i)perylene	0.0800	0.0815	102	45.0-125	
Benzo(k)fluoranthene	0.0800	0.0887	111	49.0-125	
Chrysene	0.0800	0.0826	103	49.0-122	
Dibenz(a,h)anthracene	0.0800	0.0830	104	47.0-125	
Fluoranthene	0.0800	0.0863	108	49.0-129	

Laboratory Control Sample (LCS)

(LCS) R3551011-1 07/20/20 02:21

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Fluorene	0.0800	0.0813	102	49.0-120	
Indeno(1,2,3-cd)pyrene	0.0800	0.0832	104	46.0-125	
Naphthalene	0.0800	0.0754	94.3	50.0-120	
Phenanthrene	0.0800	0.0811	101	47.0-120	
Pyrene	0.0800	0.0804	101	43.0-123	
1-Methylnaphthalene	0.0800	0.0775	96.9	51.0-121	
2-Methylnaphthalene	0.0800	0.0743	92.9	50.0-120	
2-Chloronaphthalene	0.0800	0.0779	97.4	50.0-120	
(S) Nitrobenzene-d5			100	14.0-149	
(S) 2-Fluorobiphenyl			102	34.0-125	
(S) p-Terphenyl-d14			105	23.0-120	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

L1240363-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1240363-13 07/20/20 04:27 • (MS) R3551011-3 07/20/20 04:48 • (MSD) R3551011-4 07/20/20 05:09

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 %
Anthracene	0.0800	ND	0.0697	0.0636	87.1	79.5	1	10.0-145			9.15	30
Acenaphthene	0.0800	ND	0.0645	0.0595	80.6	74.4	1	14.0-127			8.06	27
Acenaphthylene	0.0800	ND	0.0710	0.0662	88.8	82.8	1	21.0-124			7.00	25
Benzo(a)anthracene	0.0800	ND	0.0772	0.0665	92.0	78.6	1	10.0-139			14.9	30
Benzo(a)pyrene	0.0800	ND	0.0741	0.0638	89.1	76.2	1	10.0-141			14.9	31
Benzo(b)fluoranthene	0.0800	ND	0.0739	0.0579	88.0	68.0	1	10.0-140			24.3	36
Benzo(g,h,i)perylene	0.0800	ND	0.0630	0.0534	78.8	66.8	1	10.0-140			16.5	33
Benzo(k)fluoranthene	0.0800	ND	0.0661	0.0612	82.6	76.5	1	10.0-137			7.70	31
Chrysene	0.0800	ND	0.0689	0.0632	82.0	74.9	1	10.0-145			8.63	30
Dibenz(a,h)anthracene	0.0800	ND	0.0620	0.0579	77.5	72.4	1	10.0-132			6.84	31
Fluoranthene	0.0800	0.00604	0.0719	0.0607	82.3	68.3	1	10.0-153			16.9	33
Fluorene	0.0800	ND	0.0695	0.0625	86.9	78.1	1	11.0-130			10.6	29
Indeno(1,2,3-cd)pyrene	0.0800	ND	0.0624	0.0548	78.0	68.5	1	10.0-137			13.0	32
Naphthalene	0.0800	ND	0.0752	0.0721	80.7	76.9	1	10.0-135			4.21	27
Phenanthrene	0.0800	0.0121	0.0728	0.0646	75.9	65.6	1	10.0-144			11.9	31
Pyrene	0.0800	0.00649	0.0644	0.0553	72.4	61.0	1	10.0-148			15.2	35
1-Methylnaphthalene	0.0800	ND	0.0858	0.0790	83.8	75.3	1	10.0-142			8.25	28
2-Methylnaphthalene	0.0800	0.0268	0.0925	0.0846	82.1	72.3	1	10.0-137			8.92	28
2-Chloronaphthalene	0.0800	ND	0.0664	0.0615	83.0	76.9	1	29.0-120			7.66	24
(S) Nitrobenzene-d5					86.6	90.0		14.0-149				
(S) 2-Fluorobiphenyl					90.8	81.4		34.0-125				
(S) p-Terphenyl-d14					87.4	85.0		23.0-120				



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

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
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J3	The associated batch QC was outside the established quality control range for precision.
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.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.

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

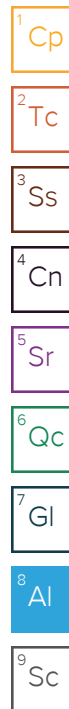
Third Party Federal Accreditations

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.



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