

ANALYTICAL REPORT

August 25, 2020

Revised Report

Caerus Oil and Gas

Sample Delivery Group: L1251848
Samples Received: 08/19/2020
Project Number: UNOCAL 4
Description: UNOCAL 4

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

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

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.



20200818 - UNOCAL 4 - BOT- 40-44.5' L1251848-01 Solid

Collected by
Chance Holder

Collected date/time
08/18/20 09:45

Received date/time
08/19/20 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1526797	1	08/21/20 11:49	08/21/20 11:49	TRB	Mt. Juliet, TN
Calculated Results	WG1528776	1	08/19/20 14:34	08/21/20 12:55	JIC	Mt. Juliet, TN
Wet Chemistry by Method 3060A/7196A	WG1528886	1	08/19/20 19:36	08/21/20 12:55	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1530613	1	08/24/20 13:30	08/24/20 14:30	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1529233	1	08/20/20 22:30	08/21/20 06:31	AKA	Mt. Juliet, TN
Mercury by Method 7471A	WG1528885	1	08/19/20 16:36	08/19/20 23:45	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1528776	1	08/19/20 14:34	08/20/20 05:09	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1530256	5	08/22/20 10:41	08/22/20 14:22	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1530112	500	08/20/20 22:08	08/22/20 11:40	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1530364	40	08/18/20 09:45	08/21/20 23:24	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1530921	40	08/18/20 09:45	08/24/20 01:16	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1528743	10	08/19/20 16:31	08/20/20 07:57	TJD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1529735	1	08/21/20 15:55	08/22/20 11:34	DMG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1529735	10	08/21/20 15:55	08/23/20 12:25	DMG	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

Report Revision History

Level II Report - Version 1: 08/25/20 09:07

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Collected date/time: 08/18/20 09:45

L1251848

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	31.6		1	08/21/2020 11:49	WG1526797

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	20.1		1.00	1	08/21/2020 12:55	WG1528776

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	08/21/2020 12:55	WG1528886

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.55	T8	1	08/24/2020 14:30	WG1530613

Sample Narrative:

L1251848-01 WG1530613: 8.55 at 22.8C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	1750		10.0	1	08/21/2020 06:31	WG1529233

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0400	1	08/19/2020 23:45	WG1528885

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Barium	332		0.500	1	08/20/2020 05:09	WG1528776
Cadmium	ND		0.500	1	08/20/2020 05:09	WG1528776
Chromium	20.1		1.00	1	08/20/2020 05:09	WG1528776
Copper	23.5		2.00	1	08/20/2020 05:09	WG1528776
Lead	18.4		0.500	1	08/20/2020 05:09	WG1528776
Nickel	18.3		2.00	1	08/20/2020 05:09	WG1528776
Selenium	ND		2.00	1	08/20/2020 05:09	WG1528776
Silver	ND		1.00	1	08/20/2020 05:09	WG1528776
Zinc	54.2		5.00	1	08/20/2020 05:09	WG1528776

Metals (ICPMS) by Method 6020

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	16.6		1.00	5	08/22/2020 14:22	WG1530256

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	2960		50.0	500	08/22/2020 11:40	WG1530112



Collected date/time: 08/18/20 09:45

L1251848

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) a,a,a-Trifluorotoluene(FID)	83.7		77.0-120		08/22/2020 11:40	WG1530112

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	8.09		0.0400	40	08/24/2020 01:16	WG1530921
Toluene	30.1		0.200	40	08/21/2020 23:24	WG1530364
Ethylbenzene	6.22		0.100	40	08/21/2020 23:24	WG1530364
Total Xylenes	102		0.260	40	08/21/2020 23:24	WG1530364
(S) Toluene-d8	96.3		75.0-131		08/21/2020 23:24	WG1530364
(S) Toluene-d8	86.9		75.0-131		08/24/2020 01:16	WG1530921
(S) 4-Bromofluorobenzene	108		67.0-138		08/21/2020 23:24	WG1530364
(S) 4-Bromofluorobenzene	102		67.0-138		08/24/2020 01:16	WG1530921
(S) 1,2-Dichloroethane-d4	108		70.0-130		08/21/2020 23:24	WG1530364
(S) 1,2-Dichloroethane-d4	116		70.0-130		08/24/2020 01:16	WG1530921

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	538		40.0	10	08/20/2020 07:57	WG1528743
(S) o-Terphenyl	27.5		18.0-148		08/20/2020 07:57	WG1528743

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	08/22/2020 11:34	WG1529735
Acenaphthene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Acenaphthylene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Benzo(a)anthracene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Benzo(a)pyrene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Benzo(b)fluoranthene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Benzo(g,h,i)perylene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Benzo(k)fluoranthene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Chrysene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Dibenz(a,h)anthracene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Fluoranthene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Fluorene	0.146		0.00600	1	08/22/2020 11:34	WG1529735
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	08/22/2020 11:34	WG1529735
Naphthalene	3.60		0.200	10	08/23/2020 12:25	WG1529735
Phenanthrene	0.103		0.00600	1	08/22/2020 11:34	WG1529735
Pyrene	ND		0.00600	1	08/22/2020 11:34	WG1529735
1-Methylnaphthalene	2.70		0.200	10	08/23/2020 12:25	WG1529735
2-Methylnaphthalene	7.20		0.200	10	08/23/2020 12:25	WG1529735
2-Chloronaphthalene	ND		0.0200	1	08/22/2020 11:34	WG1529735
(S) p-Terphenyl-d14	97.0		23.0-120		08/22/2020 11:34	WG1529735
(S) p-Terphenyl-d14	119		23.0-120		08/23/2020 12:25	WG1529735
(S) Nitrobenzene-d5	0.000	J2	14.0-149		08/22/2020 11:34	WG1529735
(S) Nitrobenzene-d5	1530	J1	14.0-149		08/23/2020 12:25	WG1529735
(S) 2-Fluorobiphenyl	107		34.0-125		08/22/2020 11:34	WG1529735
(S) 2-Fluorobiphenyl	141	J1	34.0-125		08/23/2020 12:25	WG1529735

Sample Narrative:

L1251848-01 WG1529735: Surrogate failure due to matrix interference



Method Blank (MB)

(MB) R3562431-1 08/21/20 11:50

	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

L1250867-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1250867-01 08/21/20 11:52 • (DUP) R3562431-3 08/21/20 11:58

	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

L1251251-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1251251-03 08/21/20 12:50 • (DUP) R3562431-7 08/21/20 12:50

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chromium,Hexavalent	3.28	3.40	1	3.59		20

Laboratory Control Sample (LCS)

(LCS) R3562431-2 08/21/20 11:50

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Chromium,Hexavalent	24.0	24.5	102	80.0-120	

L1251221-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1251221-01 08/21/20 12:08 • (MS) R3562431-8 08/21/20 14:40 • (MSD) R3562431-4 08/21/20 12:11

	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	36.1	52.7	55.1	82.7	95.1	1	75.0-125	E	E	4.58	20

L1251221-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1251221-01 08/21/20 12:08 • (MS) R3562431-5 08/21/20 12:28

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/kg	mg/kg	mg/kg	%		%	
Chromium,Hexavalent	653	36.1	679	98.4	50	75.0-125	



L1251097-55 Original Sample (OS) • Duplicate (DUP)

(OS) L1251097-55 08/24/20 14:30 • (DUP) R3563162-2 08/24/20 14:30

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	7.46	7.41	1	0.672		1

Sample Narrative:

OS: 7.46 at 23.1C

DUP: 7.41 at 22.1C

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L1251848-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1251848-01 08/24/20 14:30 • (DUP) R3563162-3 08/24/20 14:30

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	8.55	8.56	1	0.117		1

Sample Narrative:

OS: 8.55 at 22.8C

DUP: 8.56 at 22.9C

Laboratory Control Sample (LCS)

(LCS) R3563162-1 08/24/20 14:30

	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 23.2C



Method Blank (MB)

(MB) R3562175-1 08/21/20 06:31

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

L1251061-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1251061-04 08/21/20 06:31 • (DUP) R3562175-3 08/21/20 06:31

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	106	106	1	0.188		20

L1252063-13 Original Sample (OS) • Duplicate (DUP)

(OS) L1252063-13 08/21/20 06:31 • (DUP) R3562175-4 08/21/20 06:31

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	276	276	1	0.181		20

Laboratory Control Sample (LCS)

(LCS) R3562175-2 08/21/20 06:31

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	483	480	99.4	85.0-115	



Method Blank (MB)

(MB) R3561698-1 08/19/20 22:36

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

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

Laboratory Control Sample (LCS)

(LCS) R3561698-2 08/19/20 22:39

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Mercury	0.500	0.528	106	80.0-120	

⁷Gl

⁸Al

⁹Sc

L1251868-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1251868-01 08/19/20 23:55 • (MS) R3561698-5 08/19/20 23:58 • (MSD) R3561698-6 08/20/20 00:00

	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	%	%		%			%	%
Mercury	0.250	2.29	2.41	3.81	22.7	303	2	75.0-125	V	E J3 V	45.2	20

Method Blank (MB)

(MB) R3561720-1 08/20/20 03:51

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
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

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R3561720-2 08/20/20 03:54

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Barium	100	102	102	80.0-120	
Cadmium	100	97.1	97.1	80.0-120	
Chromium	100	99.5	99.5	80.0-120	
Copper	100	97.3	97.3	80.0-120	
Lead	100	96.4	96.4	80.0-120	
Nickel	100	98.7	98.7	80.0-120	
Selenium	100	96.9	96.9	80.0-120	
Silver	20.0	17.7	88.4	80.0-120	
Zinc	100	97.0	97.0	80.0-120	

L1251233-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1251233-03 08/20/20 03:56 • (MS) R3561720-5 08/20/20 04:04 • (MSD) R3561720-6 08/20/20 04:06

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 %
Barium	100	66.1	153	171	86.8	105	1	75.0-125			11.2	20
Cadmium	100	ND	86.0	85.3	86.0	85.3	1	75.0-125			0.849	20
Chromium	100	5.04	91.8	92.1	86.7	87.1	1	75.0-125			0.397	20
Copper	100	5.60	92.9	93.3	87.3	87.7	1	75.0-125			0.492	20
Lead	100	13.7	102	106	88.7	92.4	1	75.0-125			3.53	20
Nickel	100	3.04	94.1	94.5	91.0	91.4	1	75.0-125			0.427	20
Selenium	100	ND	85.3	84.1	85.3	84.1	1	75.0-125			1.37	20
Silver	20.0	ND	15.6	15.4	78.1	77.0	1	75.0-125			1.33	20
Zinc	100	22.0	109	110	86.6	88.3	1	75.0-125			1.54	20



Method Blank (MB)

(MB) R3562660-1 08/22/20 14:15

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Arsenic	U		0.422	1.00

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

Laboratory Control Sample (LCS)

(LCS) R3562660-2 08/22/20 14:18

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Arsenic	100	94.7	94.7	80.0-120	

⁷Gl

⁸Al

⁹Sc

L1251848-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1251848-01 08/22/20 14:22 • (MS) R3562660-5 08/22/20 14:31 • (MSD) R3562660-6 08/22/20 14:35

	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	%	%		%			%	%
Arsenic	20.0	16.6	96.4	101	79.8	84.8	5	75.0-125			5.07	20

Method Blank (MB)

(MB) R3562835-2 08/22/20 03:52

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)	99.7			77.0-120

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Laboratory Control Sample (LCS)

(LCS) R3562835-1 08/22/20 03:07

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	5.64	103	72.0-127	
(S) a,a,a-Trifluorotoluene(FID)			99.6	77.0-120	

L1251778-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1251778-06 08/22/20 11:18 • (MS) R3562835-3 08/22/20 12:03 • (MSD) R3562835-4 08/22/20 12:25

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 %
TPH (GC/FID) Low Fraction	106	37.4	110	115	68.5	73.2	25	10.0-151			4.44	28
(S) a,a,a-Trifluorotoluene(FID)					98.6	99.0		77.0-120				



Method Blank (MB)

(MB) R3562735-3 08/21/20 16:32

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Ethylbenzene	U		0.000737	0.00250
Toluene	U		0.00130	0.00500
Xylenes, Total	U		0.000880	0.00650
(S) Toluene-d8	103			75.0-131
(S) 4-Bromofluorobenzene	95.1			67.0-138
(S) 1,2-Dichloroethane-d4	81.8			70.0-130

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

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

(LCS) R3562735-1 08/21/20 15:17 • (LCSD) R3562735-2 08/21/20 15:36

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 %
Ethylbenzene	0.125	0.128	0.116	102	92.8	74.0-126			9.84	20
Toluene	0.125	0.126	0.118	101	94.4	75.0-121			6.56	20
Xylenes, Total	0.375	0.389	0.354	104	94.4	72.0-127			9.42	20
(S) Toluene-d8				99.9	99.1	75.0-131				
(S) 4-Bromofluorobenzene				101	95.8	67.0-138				
(S) 1,2-Dichloroethane-d4				91.5	92.4	70.0-130				

6 Qc

7 Gl

8 Al

9 Sc

L1252601-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1252601-02 08/21/20 22:28 • (MS) R3562735-4 08/21/20 23:43 • (MSD) R3562735-5 08/22/20 00:02

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 %
Ethylbenzene	0.125	0.00793	0.177	0.178	135	136	1	10.0-160			0.563	38
Toluene	0.125	0.0526	0.366	0.377	251	260	1	10.0-156	J5	J5	2.96	38
Xylenes, Total	0.375	0.0379	0.560	0.576	139	143	1	10.0-160			2.82	38
(S) Toluene-d8					98.7	99.7		75.0-131				
(S) 4-Bromofluorobenzene					91.1	94.8		67.0-138				
(S) 1,2-Dichloroethane-d4					108	93.6		70.0-130				



Method Blank (MB)

(MB) R3563023-3 08/23/20 21:19

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000467	0.00100
(S) Toluene-d8	97.8			75.0-131
(S) 4-Bromofluorobenzene	98.4			67.0-138
(S) 1,2-Dichloroethane-d4	113			70.0-130

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

(LCS) R3563023-1 08/23/20 20:05 • (LCSD) R3563023-2 08/23/20 20:24

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	0.141	0.142	113	114	70.0-123			0.707	20
(S) Toluene-d8				97.4	99.2	75.0-131				
(S) 4-Bromofluorobenzene				99.5	99.7	67.0-138				
(S) 1,2-Dichloroethane-d4				122	119	70.0-130				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3561785-1 08/20/20 01:45

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	67.1			18.0-148

Laboratory Control Sample (LCS)

(LCS) R3561785-2 08/20/20 01:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) High Fraction	50.0	39.1	78.2	50.0-150	
(S) o-Terphenyl			99.2	18.0-148	

L1250697-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1250697-07 08/20/20 12:00 • (MS) R3561785-3 08/20/20 12:13 • (MSD) R3561785-4 08/20/20 12:27

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 %
TPH (GC/FID) High Fraction	49.2	ND	43.8	44.5	83.0	84.5	1	50.0-150			1.59	20
(S) o-Terphenyl					99.8	99.5		18.0-148				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3562624-2 08/22/20 07:20

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	77.8			14.0-149
(S) 2-Fluorobiphenyl	79.6			34.0-125
(S) p-Terphenyl-d14	80.2			23.0-120

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS)

(LCS) R3562624-1 08/22/20 06:59

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	0.0800	0.0763	95.4	50.0-126	
Acenaphthene	0.0800	0.0745	93.1	50.0-120	
Acenaphthylene	0.0800	0.0775	96.9	50.0-120	
Benzo(a)anthracene	0.0800	0.0779	97.4	45.0-120	
Benzo(a)pyrene	0.0800	0.0715	89.4	42.0-120	
Benzo(b)fluoranthene	0.0800	0.0785	98.1	42.0-121	
Benzo(g,h,i)perylene	0.0800	0.0786	98.3	45.0-125	
Benzo(k)fluoranthene	0.0800	0.0769	96.1	49.0-125	
Chrysene	0.0800	0.0779	97.4	49.0-122	
Dibenz(a,h)anthracene	0.0800	0.0770	96.3	47.0-125	
Fluoranthene	0.0800	0.0777	97.1	49.0-129	

Laboratory Control Sample (LCS)

(LCS) R3562624-1 08/22/20 06:59

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Fluorene	0.0800	0.0764	95.5	49.0-120	
Indeno(1,2,3-cd)pyrene	0.0800	0.0797	99.6	46.0-125	
Naphthalene	0.0800	0.0729	91.1	50.0-120	
Phenanthrene	0.0800	0.0781	97.6	47.0-120	
Pyrene	0.0800	0.0754	94.3	43.0-123	
1-Methylnaphthalene	0.0800	0.0719	89.9	51.0-121	
2-Methylnaphthalene	0.0800	0.0690	86.3	50.0-120	
2-Chloronaphthalene	0.0800	0.0740	92.5	50.0-120	
(S) Nitrobenzene-d5			92.0	14.0-149	
(S) 2-Fluorobiphenyl			90.3	34.0-125	
(S) p-Terphenyl-d14			88.6	23.0-120	

L1252081-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1252081-01 08/22/20 11:55 • (MS) R3562624-3 08/22/20 12:16 • (MSD) R3562624-4 08/22/20 12:38

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 %
Anthracene	0.0780	ND	0.0788	0.0816	101	105	1	10.0-145			3.49	30
Acenaphthene	0.0780	ND	0.0737	0.0764	94.5	97.9	1	14.0-127			3.60	27
Acenaphthylene	0.0780	ND	0.0805	0.0833	103	107	1	21.0-124			3.42	25
Benzo(a)anthracene	0.0780	ND	0.0846	0.0866	108	111	1	10.0-139			2.34	30
Benzo(a)pyrene	0.0780	ND	0.0800	0.0832	103	107	1	10.0-141			3.92	31
Benzo(b)fluoranthene	0.0780	ND	0.0795	0.0831	102	107	1	10.0-140			4.43	36
Benzo(g,h,i)perylene	0.0780	ND	0.0772	0.0798	99.0	102	1	10.0-140			3.31	33
Benzo(k)fluoranthene	0.0780	ND	0.0775	0.0789	99.4	101	1	10.0-137			1.79	31
Chrysene	0.0780	ND	0.0747	0.0784	95.8	101	1	10.0-145			4.83	30
Dibenz(a,h)anthracene	0.0780	ND	0.0747	0.0767	95.8	98.3	1	10.0-132			2.64	31
Fluoranthene	0.0780	ND	0.0805	0.0838	103	107	1	10.0-153			4.02	33
Fluorene	0.0780	ND	0.0771	0.0794	98.8	102	1	11.0-130			2.94	29
Indeno(1,2,3-cd)pyrene	0.0780	ND	0.0772	0.0804	99.0	103	1	10.0-137			4.06	32
Naphthalene	0.0780	ND	0.0722	0.0749	92.6	96.0	1	10.0-135			3.67	27
Phenanthrene	0.0780	ND	0.0754	0.0784	96.7	101	1	10.0-144			3.90	31
Pyrene	0.0780	ND	0.0800	0.0807	103	103	1	10.0-148			0.871	35
1-Methylnaphthalene	0.0780	ND	0.0725	0.0754	92.9	96.7	1	10.0-142			3.92	28
2-Methylnaphthalene	0.0780	ND	0.0695	0.0721	89.1	92.4	1	10.0-137			3.67	28
2-Chloronaphthalene	0.0780	ND	0.0731	0.0756	93.7	96.9	1	29.0-120			3.36	24
(S) Nitrobenzene-d5					98.0	99.8		14.0-149				
(S) 2-Fluorobiphenyl					94.3	95.4		34.0-125				
(S) p-Terphenyl-d14					96.6	95.1		23.0-120				

1

Cp

2

Tc

3

Ss

4

Cn

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Sr

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Qc

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Gl

8

Al

9

Sc



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.
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

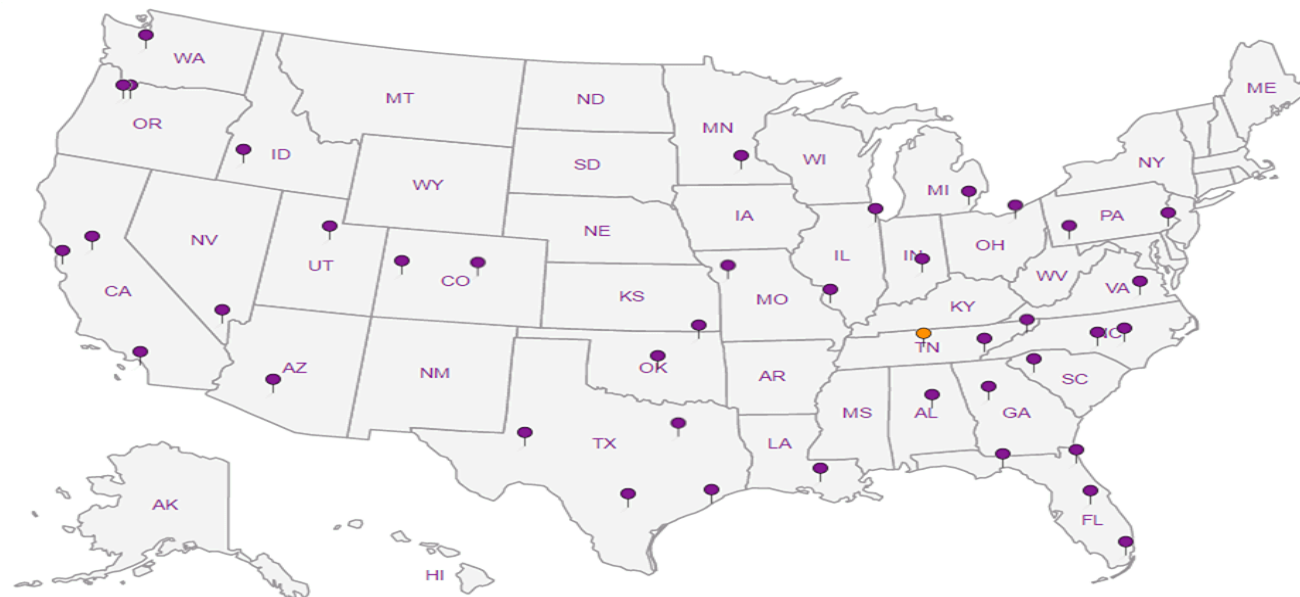
Third Party Federal Accreditations

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.



Condition:
NCE / OK