

November 02, 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: L1277326
Samples Received: 10/23/2020
Project Number:
Description: D27-595 Flowline (5A-27) Release

Report To: Brett Middleton
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



20201022-D27-595-POR01@6' L1277326-01 Solid

Collected by
Collected date/time
Received date/time

10/22/20 11:03
10/23/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1565118	1	10/30/20 02:33	10/30/20 02:33	TRB	Mt. Juliet, TN
Calculated Results	WG1566799	1	10/28/20 11:55	10/28/20 18:08	EL	Mt. Juliet, TN
Wet Chemistry by Method 3060A/7196A	WG1566111	1	10/27/20 13:38	10/28/20 10:35	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1566549	1	10/28/20 17:54	10/28/20 22:47	KPS	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1565369	1	10/27/20 13:00	10/27/20 15:00	SRG	Mt. Juliet, TN
Mercury by Method 7471A	WG1566506	1	10/27/20 17:47	10/28/20 11:08	BMF	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1566799	1	10/28/20 11:55	10/28/20 18:08	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1566802	5	10/28/20 11:57	10/28/20 18:46	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1567710	1	10/29/20 08:47	10/29/20 21:24	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1568113	1	10/28/20 22:26	10/30/20 10:22	JHH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1567732	10	10/29/20 16:06	10/30/20 05:02	DMG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1567046	1	10/29/20 18:14	10/30/20 15:53	LEA	Mt. Juliet, TN

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

20201022-D27-595-POR02@5.5' L1277326-02 Solid

Collected by
Collected date/time
Received date/time

10/22/20 11:12
10/23/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1565118	1	10/30/20 02:35	10/30/20 02:35	TRB	Mt. Juliet, TN
Calculated Results	WG1566799	1	10/28/20 11:55	10/28/20 18:11	EL	Mt. Juliet, TN
Wet Chemistry by Method 3060A/7196A	WG1566111	1	10/27/20 13:38	10/28/20 10:35	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1566549	1	10/28/20 17:54	10/28/20 22:47	KPS	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1565369	1	10/27/20 13:00	10/27/20 15:00	SRG	Mt. Juliet, TN
Mercury by Method 7471A	WG1566506	1	10/27/20 17:47	10/28/20 11:10	BMF	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1566799	1	10/28/20 11:55	10/28/20 18:11	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1566802	5	10/28/20 11:57	10/28/20 18:49	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1567710	1	10/28/20 22:26	10/29/20 21:45	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1568113	1	10/28/20 22:26	10/30/20 10:43	JHH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1567732	10	10/29/20 16:06	10/30/20 05:15	DMG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1567046	1	10/29/20 18:14	10/30/20 16:10	LEA	Mt. Juliet, TN



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



Collected date/time: 10/22/20 11:03

L1277326

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	3.80		1	10/30/2020 02:33	WG1565118

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Trivalent	19.8		1.00	1	10/28/2020 18:08	WG1566799

Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	10/28/2020 10:35	WG1566111

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.25	<u>T8</u>	1	10/28/2020 22:47	WG1566549

Sample Narrative:

L1277326-01 WG1566549: 8.25 at 21.4C

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Specific Conductance	1320		10.0	1	10/27/2020 15:00	WG1565369

Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	0.312		0.0400	1	10/28/2020 11:08	WG1566506

Metals (ICP) by Method 6010B

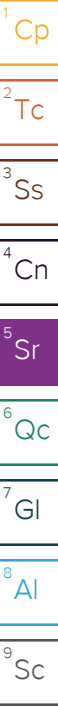
Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	334		0.500	1	10/28/2020 18:08	WG1566799
Cadmium	ND		0.500	1	10/28/2020 18:08	WG1566799
Chromium	19.8		1.00	1	10/28/2020 18:08	WG1566799
Copper	22.3		2.00	1	10/28/2020 18:08	WG1566799
Lead	15.0		0.500	1	10/28/2020 18:08	WG1566799
Nickel	17.5		2.00	1	10/28/2020 18:08	WG1566799
Selenium	ND		2.00	1	10/28/2020 18:08	WG1566799
Silver	ND		1.00	1	10/28/2020 18:08	WG1566799
Zinc	49.1		5.00	1	10/28/2020 18:08	WG1566799

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	13.9		1.00	5	10/28/2020 18:46	WG1566802

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	0.507		0.100	1	10/29/2020 21:24	WG1567710





Collected date/time: 10/22/20 11:03

L1277326

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) <i>a,a,a</i> -Trifluorotoluene(FID)	92.9		77.0-120		10/29/2020 21:24	WG1567710

1 Cp

2 Tc

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.0126		0.00100	1	10/30/2020 10:22	WG1568113
Toluene	0.0931		0.00500	1	10/30/2020 10:22	WG1568113
Ethylbenzene	0.0174		0.00250	1	10/30/2020 10:22	WG1568113
Total Xylenes	0.274		0.00650	1	10/30/2020 10:22	WG1568113
(S) Toluene-d8	113		75.0-131		10/30/2020 10:22	WG1568113
(S) 4-Bromofluorobenzene	95.6		67.0-138		10/30/2020 10:22	WG1568113
(S) 1,2-Dichloroethane-d4	79.1		70.0-130		10/30/2020 10:22	WG1568113

3 Ss

4 Cn

5 Sr

6 Qc

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	102		40.0	10	10/30/2020 05:02	WG1567732
(S) <i>o</i> -Terphenyl	50.2		18.0-148		10/30/2020 05:02	WG1567732

7 Gl

8 Al

9 Sc

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	10/30/2020 15:53	WG1567046
Acenaphthene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Acenaphthylene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Benzo(a)anthracene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Benzo(a)pyrene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Benzo(b)fluoranthene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Benzo(g,h,i)perylene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Benzo(k)fluoranthene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Chrysene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Dibenz(a,h)anthracene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Fluoranthene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Fluorene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Naphthalene	0.0692		0.0200	1	10/30/2020 15:53	WG1567046
Phenanthrene	ND		0.00600	1	10/30/2020 15:53	WG1567046
Pyrene	ND		0.00600	1	10/30/2020 15:53	WG1567046
1-Methylnaphthalene	0.0326		0.0200	1	10/30/2020 15:53	WG1567046
2-Methylnaphthalene	0.0972		0.0200	1	10/30/2020 15:53	WG1567046
2-Chloronaphthalene	ND		0.0200	1	10/30/2020 15:53	WG1567046
(S) <i>p</i> -Terphenyl-d14	107		23.0-120		10/30/2020 15:53	WG1567046
(S) Nitrobenzene-d5	141		14.0-149		10/30/2020 15:53	WG1567046
(S) 2-Fluorobiphenyl	113		34.0-125		10/30/2020 15:53	WG1567046



Collected date/time: 10/22/20 11:12

L1277326

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	1.33		1	10/30/2020 02:35	WG1565118

1 Cp

2 Tc

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Trivalent	22.4		1.00	1	10/28/2020 18:11	WG1566799

3 Ss

4 Cn

Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	10/28/2020 10:35	WG1566111

5 Sr

6 Qc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.34	T8	1	10/28/2020 22:47	WG1566549

7 Gl

8 Al

Sample Narrative:

L1277326-02 WG1566549: 8.34 at 21.4C

9 Sc

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Specific Conductance	731		10.0	1	10/27/2020 15:00	WG1565369

Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	0.193		0.0400	1	10/28/2020 11:10	WG1566506

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	312		0.500	1	10/28/2020 18:11	WG1566799
Cadmium	ND		0.500	1	10/28/2020 18:11	WG1566799
Chromium	22.4		1.00	1	10/28/2020 18:11	WG1566799
Copper	23.1		2.00	1	10/28/2020 18:11	WG1566799
Lead	13.9		0.500	1	10/28/2020 18:11	WG1566799
Nickel	19.0		2.00	1	10/28/2020 18:11	WG1566799
Selenium	ND		2.00	1	10/28/2020 18:11	WG1566799
Silver	ND		1.00	1	10/28/2020 18:11	WG1566799
Zinc	55.6		5.00	1	10/28/2020 18:11	WG1566799

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	13.3		1.00	5	10/28/2020 18:49	WG1566802

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	0.415		0.100	1	10/29/2020 21:45	WG1567710



Collected date/time: 10/22/20 11:12

L1277326

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
(S) <i>a,a,a</i> -Trifluorotoluene(FID)	97.0		77.0-120		10/29/2020 21:45	WG1567710

1 Cp

2 Tc

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.00570		0.00100	1	10/30/2020 10:43	WG1568113
Toluene	0.0280		0.00500	1	10/30/2020 10:43	WG1568113
Ethylbenzene	0.0104		0.00250	1	10/30/2020 10:43	WG1568113
Total Xylenes	0.101		0.00650	1	10/30/2020 10:43	WG1568113
(S) Toluene-d8	109		75.0-131		10/30/2020 10:43	WG1568113
(S) 4-Bromofluorobenzene	96.7		67.0-138		10/30/2020 10:43	WG1568113
(S) 1,2-Dichloroethane-d4	72.3		70.0-130		10/30/2020 10:43	WG1568113

3 Ss

4 Cn

5 Sr

6 Qc

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
TPH (GC/FID) High Fraction	50.5		40.0	10	10/30/2020 05:15	WG1567732
(S) <i>o</i> -Terphenyl	53.0		18.0-148		10/30/2020 05:15	WG1567732

7 Gl

8 Al

9 Sc

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Anthracene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Acenaphthene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Acenaphthylene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Benzo(a)anthracene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Benzo(a)pyrene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Benzo(b)fluoranthene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Benzo(g,h,i)perylene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Benzo(k)fluoranthene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Chrysene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Dibenz(a,h)anthracene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Fluoranthene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Fluorene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Naphthalene	ND		0.0200	1	10/30/2020 16:10	WG1567046
Phenanthrene	ND		0.00600	1	10/30/2020 16:10	WG1567046
Pyrene	ND		0.00600	1	10/30/2020 16:10	WG1567046
1-Methylnaphthalene	ND		0.0200	1	10/30/2020 16:10	WG1567046
2-Methylnaphthalene	ND		0.0200	1	10/30/2020 16:10	WG1567046
2-Chloronaphthalene	ND		0.0200	1	10/30/2020 16:10	WG1567046
(S) <i>p</i> -Terphenyl-d14	98.4		23.0-120		10/30/2020 16:10	WG1567046
(S) Nitrobenzene-d5	118		14.0-149		10/30/2020 16:10	WG1567046
(S) 2-Fluorobiphenyl	101		34.0-125		10/30/2020 16:10	WG1567046



Method Blank (MB)

(MB) R3586424-1 10/28/20 10:14

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
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

L1276076-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1276076-02 10/28/20 10:16 • (DUP) R3586424-3 10/28/20 10:17

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Chromium,Hexavalent	ND	ND	1	0.000		20

L1277326-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1277326-02 10/28/20 10:35 • (DUP) R3586424-4 10/28/20 10:36

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Chromium,Hexavalent	ND	ND	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3586424-2 10/28/20 10:15

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Chromium,Hexavalent	24.0	21.4	89.3	80.0-120	

L1277677-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1277677-01 10/28/20 10:37 • (MS) R3586424-5 10/28/20 10:38 • (MSD) R3586424-6 10/28/20 10:38

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Chromium,Hexavalent	20.0	ND	9.68	9.64	48.4	48.2	1	75.0-125	<u>J6</u>	<u>J6</u>	0.396	20

Sample Narrative:

OS: Sample is a reducer.



L1277677-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1277677-01 10/28/20 10:37 • (MS) R3586424-7 10/28/20 10:39

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MS Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>
Chromium,Hexavalent	664	ND	622	93.7	50	75.0-125	

Sample Narrative:

OS: Sample is a reducer.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Laboratory Control Sample (LCS)

(LCS) R3586822-1 10/28/20 22:47

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	<u>LCS Qualifier</u>
	su	su	%	%	
pH	10.0	9.95	99.5	99.0-101	

Sample Narrative:

LCS: 9.95 at 20.4C

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3586649-1 10/27/20 15:00

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

Laboratory Control Sample (LCS)

(LCS) R3586649-2 10/27/20 15:00

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Specific Conductance	326	315	96.6	85.0-115	

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3586613-1 10/28/20 10:16

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Mercury	U		0.0180	0.0400

¹ Cp

² Tc

³ Ss

Laboratory Control Sample (LCS)

(LCS) R3586613-2 10/28/20 10:19

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Mercury	0.500	0.576	115	80.0-120	

⁴ Cn

⁵ Sr

⁶ Qc

L1276799-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1276799-01 10/28/20 10:22 • (MS) R3586613-3 10/28/20 10:24 • (MSD) R3586613-4 10/28/20 10:27

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Mercury	0.500	ND	0.612	0.474	122	94.9	1	75.0-125		<u>J3</u>	25.4	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3586817-1 10/28/20 17:48

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Barium	U		0.0852	0.500
Cadmium	U		0.0471	0.500
Chromium	U		0.133	1.00
Copper	U		0.400	2.00
Lead	U		0.208	0.500
Nickel	U		0.132	2.00
Selenium	U		0.764	2.00
Silver	U		0.127	1.00
Zinc	U		0.832	5.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

Laboratory Control Sample (LCS)

(LCS) R3586817-2 10/28/20 17:51

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/kg	mg/kg	%	%	
Barium	100	101	101	80.0-120	
Cadmium	100	95.7	95.7	80.0-120	
Chromium	100	94.1	94.1	80.0-120	
Copper	100	95.3	95.3	80.0-120	
Lead	100	91.8	91.8	80.0-120	
Nickel	100	95.1	95.1	80.0-120	
Selenium	100	92.8	92.8	80.0-120	
Silver	20.0	18.2	91.1	80.0-120	
Zinc	100	95.9	95.9	80.0-120	

⁷ Gl

⁸ Al

⁹ Sc

L1277327-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1277327-01 10/28/20 17:54 • (MS) R3586817-5 10/28/20 18:02 • (MSD) R3586817-6 10/28/20 18:05

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Barium	100	1180	1010	1070	0.000	0.000	1	75.0-125	V	V	6.06	20
Cadmium	100	0.555	97.0	94.9	96.5	94.3	1	75.0-125			2.22	20
Chromium	100	22.3	112	109	89.6	86.5	1	75.0-125			2.88	20
Copper	100	28.2	122	117	93.5	88.5	1	75.0-125			4.21	20
Lead	100	18.1	108	106	89.8	87.7	1	75.0-125			1.94	20
Nickel	100	18.9	115	114	96.5	95.2	1	75.0-125			1.13	20
Selenium	100	ND	95.2	94.4	94.1	93.3	1	75.0-125			0.871	20
Silver	20.0	ND	18.8	18.3	93.9	91.6	1	75.0-125			2.52	20
Zinc	100	62.4	145	146	83.0	83.8	1	75.0-125			0.539	20



Method Blank (MB)

(MB) R3586746-1 10/28/20 18:21

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.100	1.00

¹ Cp

² Tc

³ Ss

Laboratory Control Sample (LCS)

(LCS) R3586746-2 10/28/20 18:25

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	100	95.4	95.4	80.0-120	

⁴ Cn

⁵ Sr

L1277327-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1277327-01 10/28/20 18:28 • (MS) R3586746-5 10/28/20 18:39 • (MSD) R3586746-6 10/28/20 18:42

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	20.0	17.9	102	103	84.3	85.4	5	75.0-125			1.08	20

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3588429-3 10/29/20 16:49

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)	111			77.0-120

1 Cp

2 Tc

3 Ss

4 Cn

Laboratory Control Sample (LCS)

(LCS) R3588429-2 10/29/20 16:08

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	5.53	101	72.0-127	
^(S) a,a,a-Trifluorotoluene(FID)			102	77.0-120	

5 Sr

6 Qc

7 Gl

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

(OS) • (MS) R3588429-6 10/30/20 01:13 • (MSD) R3588429-7 10/30/20 01:34

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	550		587	602	92.8	95.6	100	10.0-151			2.52	28
^(S) a,a,a-Trifluorotoluene(FID)					104	102		77.0-120				

8 Al

9 Sc



Method Blank (MB)

(MB) R3588098-3 10/30/20 04:38

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
Xylenes, Total	U		0.000880	0.00650
(S) Toluene-d8	109			75.0-131
(S) 4-Bromofluorobenzene	95.3			67.0-138
(S) 1,2-Dichloroethane-d4	77.4			70.0-130

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

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

(LCS) R3588098-1 10/30/20 03:17 • (LCSD) R3588098-2 10/30/20 03:37

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	0.130	0.134	104	107	70.0-123			3.03	20
Ethylbenzene	0.125	0.121	0.135	96.8	108	74.0-126			10.9	20
Toluene	0.125	0.133	0.143	106	114	75.0-121			7.25	20
Xylenes, Total	0.375	0.356	0.404	94.9	108	72.0-127			12.6	20
(S) Toluene-d8				111	112	75.0-131				
(S) 4-Bromofluorobenzene				91.1	100	67.0-138				
(S) 1,2-Dichloroethane-d4				83.8	84.3	70.0-130				

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3587620-1 10/30/20 02:16

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
<i>(S) o-Terphenyl</i>	54.5			18.0-148

Laboratory Control Sample (LCS)

(LCS) R3587620-2 10/30/20 02:29

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) High Fraction	50.0	35.0	70.0	50.0-150	
<i>(S) o-Terphenyl</i>			80.6	18.0-148	

L1277325-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1277325-01 10/30/20 03:58 • (MS) R3587620-3 10/30/20 04:11 • (MSD) R3587620-4 10/30/20 04:24

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	48.5	163	137	189	0.000	53.8	1	50.0-150	J6	J3	31.9	20
<i>(S) o-Terphenyl</i>					70.7	74.4		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) R3587768-2 10/30/20 07:14

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	108			14.0-149
(S) 2-Fluorobiphenyl	105			34.0-125
(S) p-Terphenyl-d14	107			23.0-120

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS)

(LCS) R3587768-1 10/30/20 06:57

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	0.0800	0.0744	93.0	50.0-126	
Acenaphthene	0.0800	0.0771	96.4	50.0-120	
Acenaphthylene	0.0800	0.0845	106	50.0-120	
Benzo(a)anthracene	0.0800	0.0728	91.0	45.0-120	
Benzo(a)pyrene	0.0800	0.0587	73.4	42.0-120	
Benzo(b)fluoranthene	0.0800	0.0735	91.9	42.0-121	
Benzo(g,h,i)perylene	0.0800	0.0726	90.8	45.0-125	
Benzo(k)fluoranthene	0.0800	0.0758	94.8	49.0-125	
Chrysene	0.0800	0.0778	97.3	49.0-122	
Dibenz(a,h)anthracene	0.0800	0.0725	90.6	47.0-125	
Fluoranthene	0.0800	0.0766	95.8	49.0-129	



Laboratory Control Sample (LCS)

(LCS) R3587768-1 10/30/20 06:57

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Fluorene	0.0800	0.0797	99.6	49.0-120	
Indeno(1,2,3-cd)pyrene	0.0800	0.0720	90.0	46.0-125	
Naphthalene	0.0800	0.0759	94.9	50.0-120	
Phenanthrene	0.0800	0.0743	92.9	47.0-120	
Pyrene	0.0800	0.0752	94.0	43.0-123	
1-Methylnaphthalene	0.0800	0.0744	93.0	51.0-121	
2-Methylnaphthalene	0.0800	0.0698	87.3	50.0-120	
2-Chloronaphthalene	0.0800	0.0815	102	50.0-120	
(S) Nitrobenzene-d5			112	14.0-149	
(S) 2-Fluorobiphenyl			107	34.0-125	
(S) p-Terphenyl-d14			102	23.0-120	

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

L1277309-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1277309-09 10/30/20 13:52 • (MS) R3587768-3 10/30/20 14:09 • (MSD) R3587768-4 10/30/20 14:27

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Anthracene	0.0800	ND	0.0734	0.0762	91.8	95.3	1	10.0-145			3.74	30
Acenaphthene	0.0800	ND	0.0694	0.0755	86.8	94.4	1	14.0-127			8.42	27
Acenaphthylene	0.0800	ND	0.0788	0.0826	98.5	103	1	21.0-124			4.71	25
Benzo(a)anthracene	0.0800	ND	0.0701	0.0724	87.6	90.5	1	10.0-139			3.23	30
Benzo(a)pyrene	0.0800	ND	0.0686	0.0722	85.8	90.3	1	10.0-141			5.11	31
Benzo(b)fluoranthene	0.0800	ND	0.0643	0.0690	80.4	86.3	1	10.0-140			7.05	36
Benzo(g,h,i)perylene	0.0800	ND	0.0660	0.0692	82.5	86.5	1	10.0-140			4.73	33
Benzo(k)fluoranthene	0.0800	ND	0.0712	0.0730	89.0	91.3	1	10.0-137			2.50	31
Chrysene	0.0800	ND	0.0763	0.0801	95.4	100	1	10.0-145			4.86	30
Dibenz(a,h)anthracene	0.0800	ND	0.0681	0.0703	85.1	87.9	1	10.0-132			3.18	31
Fluoranthene	0.0800	ND	0.0734	0.0790	91.8	98.8	1	10.0-153			7.35	33
Fluorene	0.0800	ND	0.0730	0.0832	91.3	104	1	11.0-130			13.1	29
Indeno(1,2,3-cd)pyrene	0.0800	ND	0.0645	0.0682	80.6	85.3	1	10.0-137			5.58	32
Naphthalene	0.0800	ND	0.0805	0.0833	85.4	88.9	1	10.0-135			3.42	27
Phenanthrene	0.0800	ND	0.0709	0.0749	84.5	89.5	1	10.0-144			5.49	31
Pyrene	0.0800	ND	0.0692	0.0729	84.0	88.6	1	10.0-148			5.21	35
1-Methylnaphthalene	0.0800	0.0319	0.0988	0.100	83.6	85.1	1	10.0-142			1.21	28
2-Methylnaphthalene	0.0800	0.0466	0.105	0.108	73.0	76.8	1	10.0-137			2.82	28
2-Chloronaphthalene	0.0800	ND	0.0740	0.0785	92.5	98.1	1	29.0-120			5.90	24
(S) Nitrobenzene-d5					104	112		14.0-149				
(S) 2-Fluorobiphenyl					98.9	104		34.0-125				
(S) p-Terphenyl-d14					95.1	97.8		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.

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

Qualifier	Description
J3	The associated batch QC was outside the established quality control range for precision.
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.
V	The sample concentration is too high to evaluate accurate spike recoveries.



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

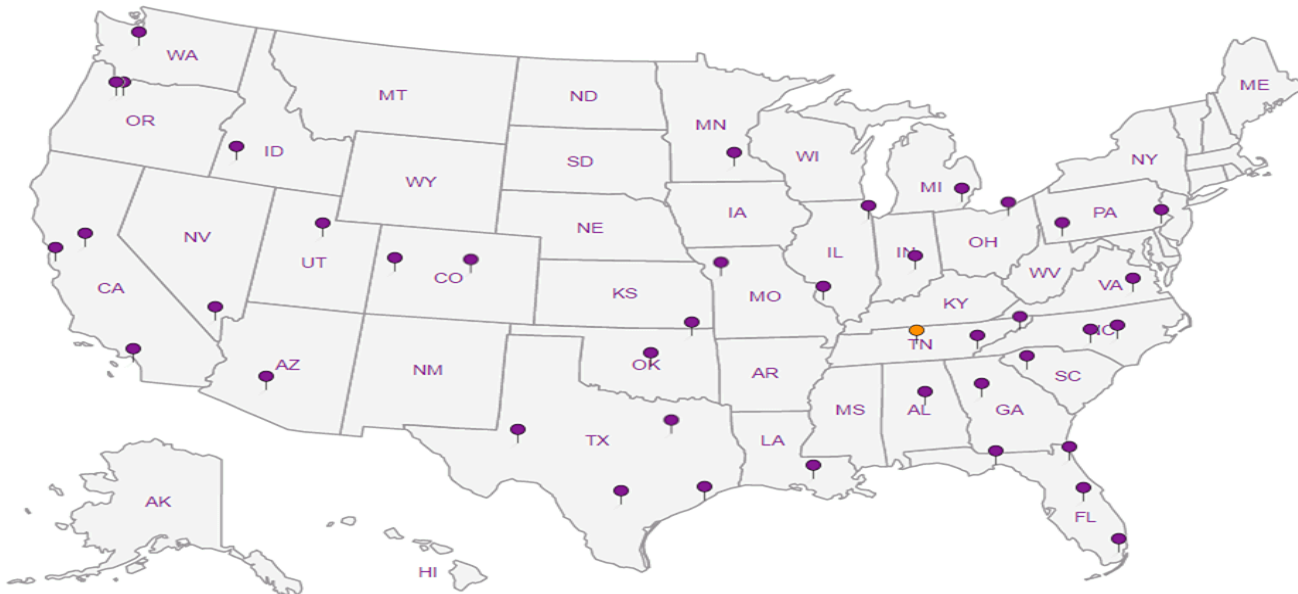
Third Party Federal Accreditations

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.



1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

