

January 22, 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: L1179655
Samples Received: 01/15/2020
Project Number:
Description: F23-596 D.L. Release

Report To: Jake Janicek
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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1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

SAMPLE SUMMARY

20200114-F23-596-SOURCE L1179655-01 GW

Collected by: Jake Janicek
 Collected date/time: 01/14/20 12:15
 Received date/time: 01/15/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1411982	1	01/17/20 14:19	01/17/20 16:41	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1411818	1	01/16/20 01:22	01/16/20 01:22	GB	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1411910	1	01/17/20 16:09	01/17/20 16:09	AJC	Mt. Juliet, TN
Wet Chemistry by Method 365.4	WG1414654	1	01/21/20 15:41	01/22/20 14:36	SDL	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1412506	1	01/18/20 12:00	01/18/20 12:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9050A	WG1413057	1	01/17/20 13:10	01/17/20 13:10	EEM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1411828	1	01/16/20 11:00	01/16/20 11:00	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1411828	10	01/16/20 04:56	01/16/20 04:56	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1411828	100	01/16/20 05:09	01/16/20 05:09	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1411993	1	01/16/20 09:02	01/16/20 16:39	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1411993	10	01/16/20 09:02	01/16/20 21:18	EL	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1413735	50	01/21/20 17:15	01/21/20 17:15	DWR	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1411900	500	01/16/20 04:12	01/16/20 04:12	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1414811	500	01/22/20 12:35	01/22/20 12:35	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 3511/8015	WG1411999	1.05	01/16/20 08:28	01/18/20 05:18	SHG	Mt. Juliet, TN

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



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

Chris Ward
Project Manager

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



Collected date/time: 01/14/20 12:15

L1179655

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	13200		400	1	01/17/2020 16:41	WG1411982

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	572		20.0	1	01/16/2020 01:22	WG1411818
Alkalinity,Carbonate	ND		20.0	1	01/16/2020 01:22	WG1411818

3 Ss

4 Cn

Sample Narrative:

L1179655-01 WG1411818: Endpoint pH 4.5

5 Sr

6 Qc

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	ND		0.100	1	01/17/2020 16:09	WG1411910

7 Gl

8 Al

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Phosphorus,Total	0.269		0.100	1	01/22/2020 14:36	WG1414654

9 Sc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	6.64	T8	1	01/18/2020 12:00	WG1412506

Sample Narrative:

L1179655-01 WG1412506: 6.64 at 19.5C

Wet Chemistry by Method 9050A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Specific Conductance	24900		10.0	1	01/17/2020 13:10	WG1413057

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	67.9		1.00	1	01/16/2020 11:00	WG1411828
Chloride	8410		100	100	01/16/2020 05:09	WG1411828
Fluoride	1.16		1.00	10	01/16/2020 04:56	WG1411828
Sulfate	6.33		5.00	1	01/16/2020 11:00	WG1411828

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	46.8		0.00500	1	01/16/2020 16:39	WG1411993
Boron	4.65		0.200	1	01/16/2020 16:39	WG1411993
Calcium	213		1.00	1	01/16/2020 16:39	WG1411993
Iron	48.5		0.100	1	01/16/2020 16:39	WG1411993
Magnesium	16.7		1.00	1	01/16/2020 16:39	WG1411993
Manganese	0.675		0.0100	1	01/16/2020 16:39	WG1411993
Potassium	98.3		1.00	1	01/16/2020 16:39	WG1411993



Collected date/time: 01/14/20 12:15

L1179655

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Selenium	0.0102		0.0100	1	01/16/2020 16:39	WG1411993
Sodium	4980		10.0	10	01/16/2020 21:18	WG1411993
Strontium	28.8		0.100	10	01/16/2020 21:18	WG1411993

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	119		5.00	50	01/21/2020 17:15	WG1413735
(S) <i>o,o</i> -Trifluorotoluene(FID)	99.4		78.0-120		01/21/2020 17:15	WG1413735

6 Qc

7 Gl

8 Al

9 Sc

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	18.5		0.500	500	01/16/2020 04:12	WG1411900
Toluene	26.6		0.500	500	01/16/2020 04:12	WG1411900
Ethylbenzene	0.847		0.500	500	01/22/2020 12:35	WG1414811
Total Xylenes	10.7		1.50	500	01/22/2020 12:35	WG1414811
(S) Toluene-d8	87.1		80.0-120		01/16/2020 04:12	WG1411900
(S) Toluene-d8	104		80.0-120		01/22/2020 12:35	WG1414811
(S) 4-Bromofluorobenzene	93.0		77.0-126		01/16/2020 04:12	WG1411900
(S) 4-Bromofluorobenzene	93.7		77.0-126		01/22/2020 12:35	WG1414811
(S) 1,2-Dichloroethane-d4	109		70.0-130		01/16/2020 04:12	WG1411900
(S) 1,2-Dichloroethane-d4	106		70.0-130		01/22/2020 12:35	WG1414811

Semi-Volatile Organic Compounds (GC) by Method 3511/8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	9.17		0.105	1.05	01/18/2020 05:18	WG1411999
(S) <i>o</i> -Terphenyl	96.2		31.0-160		01/18/2020 05:18	WG1411999



Method Blank (MB)

(MB) R3492465-1 01/17/20 16:41

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Dissolved Solids	U		2.82	10.0

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

L1179338-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1179338-01 01/17/20 16:41 • (DUP) R3492465-3 01/17/20 16:41

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	492	513	1	4.18		5

6 Qc

Laboratory Control Sample (LCS)

(LCS) R3492465-2 01/17/20 16:41

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Dissolved Solids	8800	8580	97.5	85.0-115	

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3491160-1 01/15/20 23:19

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Alkalinity,Bicarbonate	U		2.71	20.0
Alkalinity,Carbonate	U		2.71	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1179354-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1179354-01 01/15/20 23:27 • (DUP) R3491160-2 01/15/20 23:34

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Alkalinity,Bicarbonate	60.3	59.8	1	0.784		20
Alkalinity,Carbonate	ND	0.000	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 headspace

DUP: Endpoint pH 4.5

L1179778-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1179778-03 01/16/20 02:00 • (DUP) R3491160-4 01/16/20 02:08

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Alkalinity,Bicarbonate	36.7	36.3	1	1.19		20
Alkalinity,Carbonate	U	0.000	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5

DUP: Endpoint pH 4.5

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3491817-1 01/17/20 15:27

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Nitrate-Nitrite	U		0.0197	0.100

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1179379-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1179379-01 01/17/20 15:33 • (DUP) R3491817-3 01/17/20 15:34

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Nitrate-Nitrite	0.397	0.401	1	1.00		20

L1179617-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1179617-01 01/17/20 15:55 • (DUP) R3491817-6 01/17/20 15:57

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Nitrate-Nitrite	0.146	0.144	1	1.38		20

Laboratory Control Sample (LCS)

(LCS) R3491817-2 01/17/20 15:28

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Nitrate-Nitrite	5.00	3.98	99.5	90.0-110	

L1179384-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1179384-01 01/17/20 15:36 • (MS) R3491817-4 01/17/20 15:37 • (MSD) R3491817-5 01/17/20 15:39

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Nitrate-Nitrite	2.50	0.472	3.13	3.23	106	110	1	90.0-110			3.30	20

L1179619-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1179619-01 01/17/20 15:58 • (MS) R3491817-7 01/17/20 16:00

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Nitrate-Nitrite	2.50	0.868	3.34	98.8	1	90.0-110	



Method Blank (MB)

(MB) R3493081-1 01/22/20 14:00

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Phosphorus,Total	U		0.0350	0.100

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1179380-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1179380-01 01/22/20 14:03 • (DUP) R3493081-3 01/22/20 14:04

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Phosphorus,Total	0.204	0.169	1	18.8		20

L1179572-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1179572-01 01/22/20 14:12 • (DUP) R3493081-6 01/22/20 14:16

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Phosphorus,Total	0.821	0.799	1	2.72		20

Laboratory Control Sample (LCS)

(LCS) R3493081-2 01/22/20 14:02

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Phosphorus,Total	1.97	1.68	85.5	82.4-117	

L1179511-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1179511-01 01/22/20 14:06 • (MS) R3493081-4 01/22/20 14:07 • (MSD) R3493081-5 01/22/20 14:08

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Phosphorus,Total	2.50	0.167	2.13	2.28	78.5	84.5	1	90.0-110	<u>J6</u>	<u>J6</u>	6.80	20

L1179572-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1179572-02 01/22/20 14:17 • (MS) R3493081-7 01/22/20 14:18

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Phosphorus,Total	2.50	0.317	2.54	88.9	1	90.0-110	<u>J6</u>



L1179085-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1179085-01 01/18/20 12:00 • (DUP) R3492544-2 01/18/20 12:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
	su	su		%		%
pH	6.70	6.73	1	0.447		1

Sample Narrative:

OS: 6.7 at 19.8C

DUP: 6.73 at 19.7C

L1179380-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1179380-01 01/18/20 12:00 • (DUP) R3492544-3 01/18/20 12:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
	su	su		%		%
pH	6.62	6.66	1	0.602		1

Sample Narrative:

OS: 6.62 at 19.2C

DUP: 6.66 at 19.6C

Laboratory Control Sample (LCS)

(LCS) R3492544-1 01/18/20 12:00

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 18.5C

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3491733-1 01/17/20 13:10

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

L1178738-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1178738-01 01/17/20 13:10 • (DUP) R3491733-3 01/17/20 13:10

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	273	275	1	0.694		20

⁴Cn

⁵Sr

L1180383-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1180383-01 01/17/20 13:10 • (DUP) R3491733-4 01/17/20 13:10

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	177	178	1	0.225		20

⁶Qc

⁷Gl

⁸Al

Laboratory Control Sample (LCS)

(LCS) R3491733-2 01/17/20 13:10

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	475	473	99.6	85.0-115	

⁹Sc



Method Blank (MB)

(MB) R3491434-1 01/16/20 01:42

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Bromide	0.169	↓	0.0790	1.00
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	U		0.0774	5.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

L1179577-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1179577-02 01/16/20 03:14 • (DUP) R3491434-3 01/16/20 03:27

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	ND	0.172	1	0.000		15
Chloride	4.28	4.23	1	1.29		15
Fluoride	0.116	0.115	1	0.260		15
Sulfate	8.45	8.34	1	1.39		15

⁶ Qc

⁷ Gl

⁸ Al

L1179691-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1179691-02 01/16/20 08:33 • (DUP) R3491434-6 01/16/20 08:46

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	ND	0.185	1	0.000		15
Chloride	5.69	5.57	1	2.12		15
Fluoride	2.17	2.18	1	0.170		15
Sulfate	64.2	63.8	1	0.747		15

⁹ Sc

Laboratory Control Sample (LCS)

(LCS) R3491434-2 01/16/20 01:54

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Bromide	40.0	40.0	99.9	80.0-120	
Chloride	40.0	39.5	98.7	80.0-120	
Fluoride	8.00	7.90	98.7	80.0-120	
Sulfate	40.0	39.8	99.6	80.0-120	



L1179577-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1179577-02 01/16/20 03:14 • (MS) R3491434-4 01/16/20 03:40 • (MSD) R3491434-5 01/16/20 03:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	ND	51.5	51.9	103	103	1	80.0-120			0.779	15
Chloride	50.0	4.28	55.9	56.5	103	104	1	80.0-120			1.04	15
Fluoride	5.00	0.116	5.31	5.37	104	105	1	80.0-120			1.16	15
Sulfate	50.0	8.45	59.5	60.1	102	103	1	80.0-120			1.06	15

L1179691-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1179691-02 01/16/20 08:33 • (MS) R3491434-7 01/16/20 08:59

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	ND	49.5	98.6	1	80.0-120	
Chloride	50.0	5.69	54.9	98.5	1	80.0-120	
Fluoride	5.00	2.17	6.91	94.7	1	80.0-120	
Sulfate	50.0	64.2	109	89.3	1	80.0-120	E

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3491550-1 01/16/20 15:47

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Barium	U		0.00170	0.00500
Boron	U		0.0126	0.200
Calcium	U		0.0463	1.00
Iron	U		0.0141	0.100
Magnesium	U		0.0111	1.00
Manganese	U		0.00120	0.0100
Potassium	U		0.102	1.00
Selenium	U		0.00740	0.0100
Sodium	U		0.0985	1.00
Strontium	U		0.00170	0.0100

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) R3491550-2 01/16/20 15:50 • (LCSD) R3491550-3 01/16/20 15:52

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Barium	1.00	0.988	0.989	98.8	98.9	80.0-120			0.143	20
Boron	1.00	0.923	0.924	92.3	92.4	80.0-120			0.123	20
Calcium	10.0	9.50	9.46	95.0	94.6	80.0-120			0.400	20
Iron	10.0	9.51	9.46	95.1	94.6	80.0-120			0.565	20
Magnesium	10.0	9.60	9.59	96.0	95.9	80.0-120			0.0944	20
Manganese	1.00	0.903	0.911	90.3	91.1	80.0-120			0.888	20
Potassium	10.0	9.29	9.27	92.9	92.7	80.0-120			0.185	20
Selenium	1.00	0.927	0.927	92.7	92.7	80.0-120			0.0323	20
Sodium	10.0	9.49	9.45	94.9	94.5	80.0-120			0.398	20
Strontium	1.00	0.930	0.925	93.0	92.5	80.0-120			0.507	20

L1179721-15 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1179721-15 01/16/20 15:55 • (MS) R3491550-5 01/16/20 16:00 • (MSD) R3491550-6 01/16/20 16:03

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Barium	1.00	0.456	1.43	1.43	97.7	97.4	1	75.0-125			0.147	20
Boron	1.00	U	0.949	0.935	94.9	93.5	1	75.0-125			1.51	20
Calcium	10.0	1.59	11.0	11.0	94.4	94.5	1	75.0-125			0.0159	20
Iron	10.0	0.0485	9.50	9.49	94.5	94.4	1	75.0-125			0.135	20
Magnesium	10.0	16.4	25.8	25.6	93.5	91.7	1	75.0-125			0.718	20
Manganese	1.00	12.9	13.6	13.5	65.2	59.9	1	75.0-125	V	V	0.392	20
Potassium	10.0	4.46	13.6	13.7	91.6	92.1	1	75.0-125			0.403	20



L1179721-15 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1179721-15 01/16/20 15:55 • (MS) R3491550-5 01/16/20 16:00 • (MSD) R3491550-6 01/16/20 16:03

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Selenium	1.00	U	0.940	0.949	94.0	94.9	1	75.0-125			1.03	20
Sodium	10.0	51.9	60.6	60.7	86.6	87.8	1	75.0-125			0.194	20
Strontium	1.00	0.0278	0.955	0.957	92.7	92.9	1	75.0-125			0.204	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3492833-3 01/21/20 14:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) Low Fraction	0.0672	↓	0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID)	102			78.0-120

1 Cp

2 Tc

3 Ss

4 Cn

Laboratory Control Sample (LCS)

(LCS) R3492833-2 01/21/20 13:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	5.49	99.8	72.0-127	
(S) a,a,a-Trifluorotoluene(FID)			102	78.0-120	

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3492640-2 01/15/20 22:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Toluene	U		0.000412	0.00100
<i>(S) Toluene-d8</i>	82.3			80.0-120
<i>(S) 4-Bromofluorobenzene</i>	90.6			77.0-126
<i>(S) 1,2-Dichloroethane-d4</i>	108			70.0-130

1 Cp

2 Tc

3 Ss

4 Cn

Laboratory Control Sample (LCS)

(LCS) R3492640-1 01/15/20 21:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00581	116	70.0-123	
Toluene	0.00500	0.00491	98.2	79.0-120	
<i>(S) Toluene-d8</i>			86.9	80.0-120	
<i>(S) 4-Bromofluorobenzene</i>			92.0	77.0-126	
<i>(S) 1,2-Dichloroethane-d4</i>			108	70.0-130	

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3493066-2 01/22/20 08:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ethylbenzene	U		0.000384	0.00100
Xylenes, Total	U		0.00106	0.00300
<i>(S) Toluene-d8</i>	108			80.0-120
<i>(S) 4-Bromofluorobenzene</i>	90.7			77.0-126
<i>(S) 1,2-Dichloroethane-d4</i>	104			70.0-130

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

Laboratory Control Sample (LCS)

(LCS) R3493066-1 01/22/20 07:03

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Ethylbenzene	0.00500	0.00461	92.2	79.0-123	
Xylenes, Total	0.0150	0.0138	92.0	79.0-123	
<i>(S) Toluene-d8</i>			105	80.0-120	
<i>(S) 4-Bromofluorobenzene</i>			92.6	77.0-126	
<i>(S) 1,2-Dichloroethane-d4</i>			108	70.0-130	

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3491705-1 01/17/20 05:01

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) High Fraction	U		0.0247	0.100
(S) o-Terphenyl	68.5			31.0-160

1 Cp

2 Tc

3 Ss

4 Cn

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

(LCS) R3491705-2 01/17/20 05:27 • (LCSD) R3491705-3 01/17/20 05:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) High Fraction	1.50	1.45	1.41	96.7	94.0	50.0-150			2.80	20
(S) o-Terphenyl				80.0	79.5	31.0-160				

5 Sr

6 Qc

7 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.

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

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
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

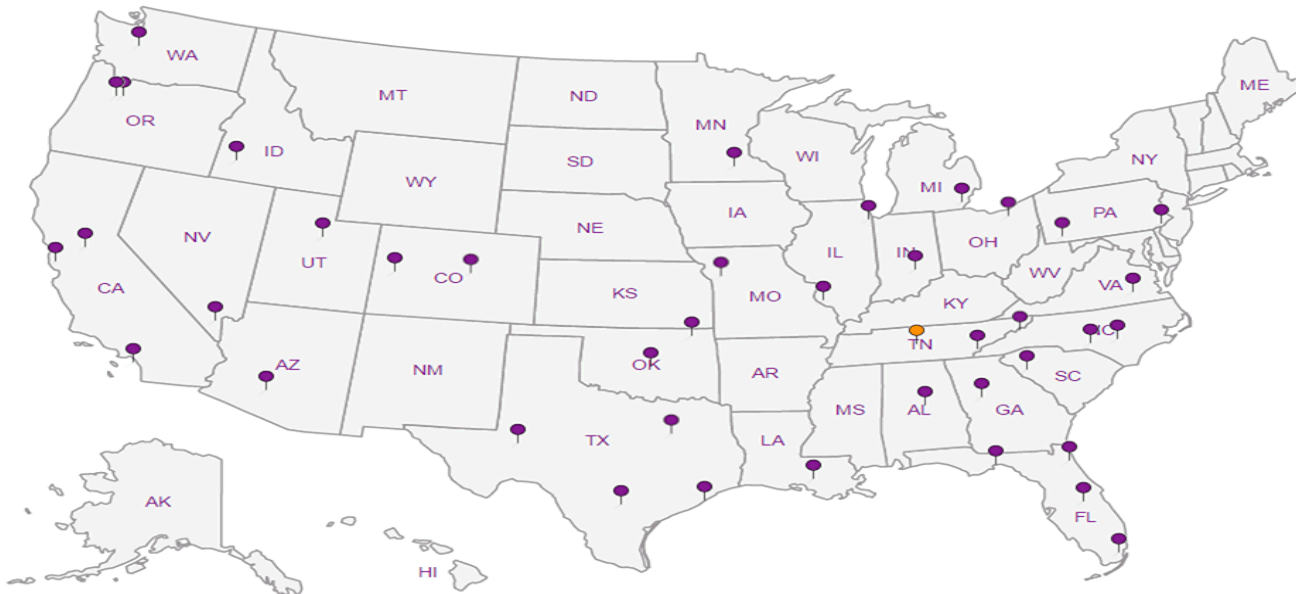
Third Party Federal Accreditations

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

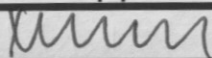
6 Qc

7 Gl

8 Al

9 Sc

**Pace Analytical National Center for Testing & Innovation
Cooler Receipt Form**

Client:	CAerusco	1179655
Cooler Received/Opened On:	1/15/20	Temperature: 3.1
Received By:	Michael Pappas	
Signature:		
Receipt Check List		
	NP	Yes No
COC Seal Present / Intact?	/	
COC Signed / Accurate?		/
Bottles arrive intact?		/
Correct bottles used?		/
Sufficient volume sent?		/
If Applicable		
VOA Zero headspace?		/
Preservation Correct / Checked?		/