

January 03, 2019

## Caerus Oil and Gas

Sample Delivery Group: L1050696  
Samples Received: 12/07/2018  
Project Number:  
Description: NPR water samples Middle Fork

Report To: Jake Janicek  
143 Diamond Avenue  
Parachute, CO 81635

Entire Report Reviewed By:



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 National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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# SAMPLE SUMMARY



20181206-NPR 12ST L1050696-01 GW

Collected by: Blair K. Rollins  
 Collected date/time: 12/06/18 11:45  
 Received date/time: 12/07/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1208850	1	12/13/18 12:40	12/13/18 13:35	AEC
Wet Chemistry by Method 2320 B-2011	WG1209619	1	12/13/18 18:18	12/13/18 18:18	GB
Wet Chemistry by Method 350.1	WG1210515	1	12/14/18 16:03	12/14/18 16:03	JER
Wet Chemistry by Method 4500S2 D-2011	WG1208129	1	12/11/18 15:02	12/11/18 15:02	TH
Wet Chemistry by Method 9040C	WG1208171	1	12/10/18 15:03	12/10/18 15:03	EEM
Wet Chemistry by Method 9050A	WG1218522	1	01/03/19 13:00	01/03/19 13:00	JD
Wet Chemistry by Method 9056A	WG1207223	1	12/07/18 22:17	12/07/18 22:17	ELN
Wet Chemistry by Method 9056A	WG1207223	2	12/08/18 08:57	12/08/18 08:57	ELN
Metals (ICP) by Method 6010B	WG1207254	1	12/07/18 15:22	12/08/18 18:57	ST
Volatile Organic Compounds (GC) by Method 8021	WG1207359	1	12/08/18 23:42	12/08/18 23:42	BMB
Volatile Organic Compounds (GC) by Method RSK175	WG1209729	1	12/13/18 11:39	12/13/18 11:39	MEL

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Gl

7 Al

8 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

- <sup>1</sup> Cp
- <sup>2</sup> Tc
- <sup>3</sup> Ss
- <sup>4</sup> Cn
- <sup>5</sup> Sr
- <sup>6</sup> Gl
- <sup>7</sup> Al
- <sup>8</sup> Sc



## Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	570		10.0	1	12/13/2018 13:35	WG1208850

## Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	306		20.0	1	12/13/2018 18:18	WG1209619
Alkalinity,Bicarbonate	302		20.0	1	12/13/2018 18:18	WG1209619
Alkalinity,Carbonate	ND		20.0	1	12/13/2018 18:18	WG1209619

## Sample Narrative:

L1050696-01 WG1209619: Endpoint pH 4.5 headspace

## Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	12/14/2018 16:03	WG1210515

## Wet Chemistry by Method 4500S2 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Sulfide	ND		0.0500	1	12/11/2018 15:02	WG1208129

## Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.14	T8	1	12/10/2018 15:03	WG1208171

## Sample Narrative:

L1050696-01 WG1208171: 8.14 at 13.2C

## Wet Chemistry by Method 9050A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Specific Conductance	872		10.0	1	01/03/2019 13:00	WG1218522

## Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		2.00	2	12/08/2018 08:57	WG1207223
Chloride	8.39		1.00	1	12/07/2018 22:17	WG1207223
Fluoride	0.718		0.100	1	12/07/2018 22:17	WG1207223
Nitrate as (N)	1.25		0.100	1	12/07/2018 22:17	WG1207223
Nitrite as (N)	ND		0.100	1	12/07/2018 22:17	WG1207223
Sulfate	159		10.0	2	12/08/2018 08:57	WG1207223

## Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.0100	1	12/08/2018 18:57	WG1207254
Barium,Dissolved	0.0596		0.00500	1	12/08/2018 18:57	WG1207254
Cadmium,Dissolved	ND		0.00200	1	12/08/2018 18:57	WG1207254
Calcium,Dissolved	63.7		1.00	1	12/08/2018 18:57	WG1207254





Collected date/time: 12/06/18 11:45

L1050696

## Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chromium,Dissolved	ND		0.0100	1	12/08/2018 18:57	WG1207254
Copper,Dissolved	ND		0.0100	1	12/08/2018 18:57	WG1207254
Iron,Dissolved	ND		0.100	1	12/08/2018 18:57	WG1207254
Lead,Dissolved	ND		0.00500	1	12/08/2018 18:57	WG1207254
Magnesium,Dissolved	50.4		1.00	1	12/08/2018 18:57	WG1207254
Manganese,Dissolved	ND		0.0100	1	12/08/2018 18:57	WG1207254
Potassium,Dissolved	3.46		1.00	1	12/08/2018 18:57	WG1207254
Selenium,Dissolved	ND		0.0100	1	12/08/2018 18:57	WG1207254
Silver,Dissolved	ND		0.00500	1	12/08/2018 18:57	WG1207254
Sodium,Dissolved	66.6		1.00	1	12/08/2018 18:57	WG1207254

1 Cp

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## Volatile Organic Compounds (GC) by Method 8021

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	12/08/2018 23:42	WG1207359
Toluene	ND		0.00100	1	12/08/2018 23:42	WG1207359
Ethylbenzene	ND		0.000500	1	12/08/2018 23:42	WG1207359
Total Xylene	ND		0.00150	1	12/08/2018 23:42	WG1207359
Methyl tert-butyl ether	ND		0.00100	1	12/08/2018 23:42	WG1207359
(S) <i>a,a,a</i> -Trifluorotoluene(PID)	105		79.0-125		12/08/2018 23:42	WG1207359

## Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Methane	ND		0.0100	1	12/13/2018 11:39	WG1209729
Ethane	ND		0.0130	1	12/13/2018 11:39	WG1209729
Ethene	ND		0.0130	1	12/13/2018 11:39	WG1209729
Propane	ND		0.0190	1	12/13/2018 11:39	WG1209729



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.

Abbreviations and Definitions

ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
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.
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.
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.
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 Gl
- 7 A
- 8 Sc

Qualifier Description

T8	Sample(s) received past/too close to holding time expiration.
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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 <sup>1</sup>	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina <sup>1</sup>	DW21704
Georgia	NELAP	North Carolina <sup>3</sup>	41
Georgia <sup>1</sup>	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 <sup>1,6</sup>	90010	South Carolina	84004
Kentucky <sup>2</sup>	16	South Dakota	n/a
Louisiana	AI30792	Tennessee <sup>1,4</sup>	2006
Louisiana <sup>1</sup>	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas <sup>5</sup>	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

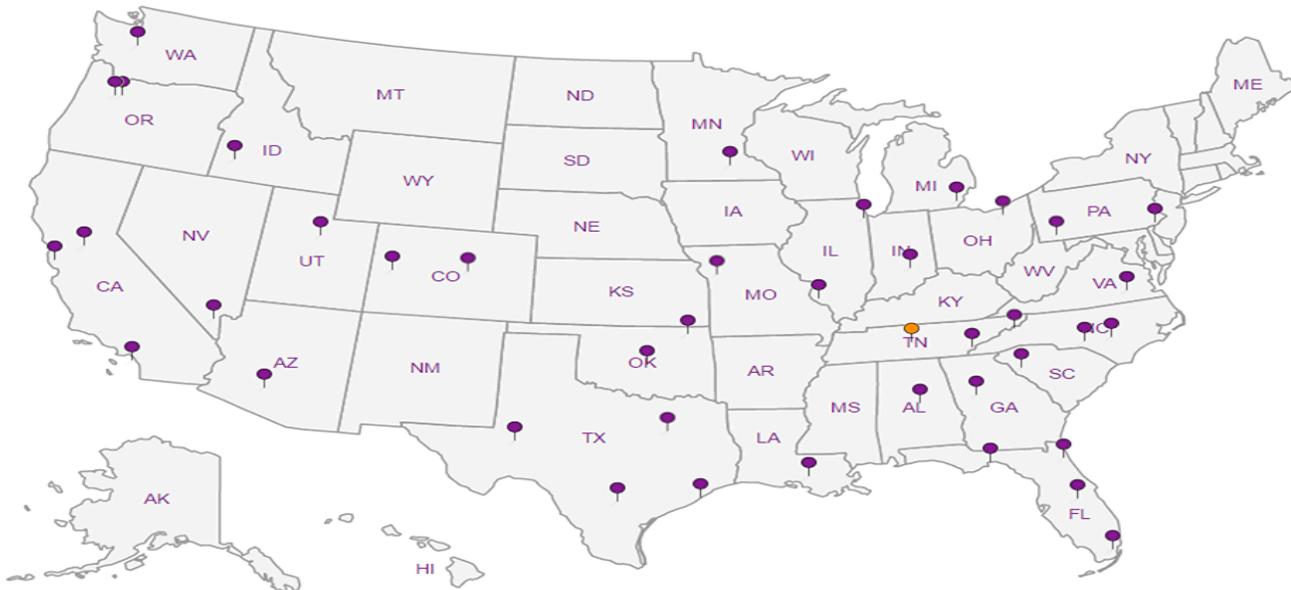
## Third Party Federal Accreditations

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

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>6</sup> 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

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