

Caerus Oil and Gas

Sample Delivery Group: L1029674
Samples Received: 09/28/2018
Project Number:
Description: WF 10 3 Phase Lim

Report To: Brett Middleton
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



20180927-WF10 3 PHASE POND L1029674-01 GW

Collected by
Collected date/time
Received date/time

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8021B	WG1173895	1	10/01/18 19:50	10/01/18 19:50	BMB

¹Cp

²Tc

³Ss

20180927-WF10 POR (10) L1029674-02 Solid

Collected by
Collected date/time
Received date/time

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG1174093	1	10/01/18 16:18	10/02/18 09:19	CCE
Calculated Results	WG1173127	1	09/28/18 15:47	10/02/18 12:14	EEM
Wet Chemistry by Method 3060A/7196A	WG1172991	1	10/02/18 07:10	10/02/18 12:14	EEM
Wet Chemistry by Method 9045D	WG1173134	1	09/29/18 07:30	09/29/18 10:40	AMB
Wet Chemistry by Method 9050AMod	WG1173043	1	10/01/18 18:00	10/01/18 19:45	TH
Mercury by Method 7471A	WG1173686	1	09/30/18 11:45	10/01/18 12:48	EL
Metals (ICP) by Method 6010B	WG1173127	1	09/28/18 15:47	09/29/18 10:49	TRB
Volatile Organic Compounds (GC) by Method 8015/8021	WG1173961	500	09/29/18 09:22	10/01/18 16:51	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1174669	40	10/02/18 10:05	10/02/18 15:41	MTJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1173181	1	09/29/18 18:28	09/30/18 06:06	CJR
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1173181	50	09/29/18 18:28	09/30/18 07:54	CJR

⁴Cn

⁵Sr

⁶Gl

⁷Al

⁸Sc



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 Gl
- ⁷ Al
- ⁸ Sc



Volatile Organic Compounds (GC) by Method 8021B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	10/01/2018 19:50	WG1173895
Toluene	ND		0.00100	1	10/01/2018 19:50	WG1173895
Ethylbenzene	ND		0.000500	1	10/01/2018 19:50	WG1173895
Total Xylene	ND		0.00150	1	10/01/2018 19:50	WG1173895
(S) a,a,a-Trifluorotoluene(PID)	101		79.0-125		10/01/2018 19:50	WG1173895

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



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	48.0		1	10/02/2018 09:19	WG1174093

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Trivalent	20.2		1.00	1	10/02/2018 12:14	WG1173127

Wet Chemistry by Method 3060A/7196A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium, Hexavalent	ND		2.00	1	10/02/2018 12:14	WG1172991

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.63	<u>T8</u>	1	09/29/2018 10:40	WG1173134

Sample Narrative:

L1029674-02 WG1173134: 8.63 at 18.3C

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Specific Conductance	1220		10.0	1	10/01/2018 19:45	WG1173043

Mercury by Method 7471A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	10/01/2018 12:48	WG1173686

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	9.42		2.00	1	09/29/2018 10:49	WG1173127
Barium	541	<u>V</u>	0.500	1	09/29/2018 10:49	WG1173127
Cadmium	ND		0.500	1	09/29/2018 10:49	WG1173127
Chromium	20.2		1.00	1	09/29/2018 10:49	WG1173127
Copper	21.5		2.00	1	09/29/2018 10:49	WG1173127
Lead	14.6		0.500	1	09/29/2018 10:49	WG1173127
Nickel	16.4		2.00	1	09/29/2018 10:49	WG1173127
Selenium	ND	<u>J6</u>	2.00	1	09/29/2018 10:49	WG1173127
Silver	ND		1.00	1	09/29/2018 10:49	WG1173127
Zinc	50.4		5.00	1	09/29/2018 10:49	WG1173127

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	5.09		0.250	500	10/01/2018 16:51	WG1173961
Toluene	51.3		2.50	500	10/01/2018 16:51	WG1173961
Ethylbenzene	ND	<u>J5</u>	0.250	500	10/01/2018 16:51	WG1173961
Total Xylene	226	<u>J6</u>	0.750	500	10/01/2018 16:51	WG1173961
TPH (GC/FID) Low Fraction	4890		50.0	500	10/01/2018 16:51	WG1173961





Collected date/time: 09/27/18 12:00

L1029674

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
(S) a,a,a-Trifluorotoluene(FID)	95.7		77.0-120		10/01/2018 16:51	WG1173961
(S) a,a,a-Trifluorotoluene(PID)	99.0		72.0-128		10/01/2018 16:51	WG1173961

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	11700		160	40	10/02/2018 15:41	WG1174669
(S) o-Terphenyl	47.0	J7	18.0-148		10/02/2018 15:41	WG1174669

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Anthracene	0.156	J3	0.00600	1	09/30/2018 06:06	WG1173181
Acenaphthene	ND		0.300	50	09/30/2018 07:54	WG1173181
Acenaphthylene	ND		0.300	50	09/30/2018 07:54	WG1173181
Benzo(a)anthracene	ND	J3	0.00600	1	09/30/2018 06:06	WG1173181
Benzo(a)pyrene	ND	J3	0.00600	1	09/30/2018 06:06	WG1173181
Benzo(b)fluoranthene	ND	J3	0.00600	1	09/30/2018 06:06	WG1173181
Benzo(g,h,i)perylene	ND	J3	0.00600	1	09/30/2018 06:06	WG1173181
Benzo(k)fluoranthene	ND	J3	0.00600	1	09/30/2018 06:06	WG1173181
Chrysene	0.00765	J3	0.00600	1	09/30/2018 06:06	WG1173181
Dibenz(a,h)anthracene	0.00733	J3	0.00600	1	09/30/2018 06:06	WG1173181
Fluoranthene	0.0116	J3	0.00600	1	09/30/2018 06:06	WG1173181
Fluorene	1.28		0.300	50	09/30/2018 07:54	WG1173181
Indeno(1,2,3-cd)pyrene	ND	J3	0.00600	1	09/30/2018 06:06	WG1173181
Naphthalene	7.65	J3	1.00	50	09/30/2018 07:54	WG1173181
Phenanthrene	1.09	J3	0.00600	1	09/30/2018 06:06	WG1173181
Pyrene	0.0265		0.00600	1	09/30/2018 06:06	WG1173181
1-Methylnaphthalene	8.18		1.00	50	09/30/2018 07:54	WG1173181
2-Methylnaphthalene	23.3		1.00	50	09/30/2018 07:54	WG1173181
2-Chloronaphthalene	ND	J3	1.00	50	09/30/2018 07:54	WG1173181
(S) p-Terphenyl-d14	98.1	J7	23.0-120		09/30/2018 07:54	WG1173181
(S) p-Terphenyl-d14	96.7		23.0-120		09/30/2018 06:06	WG1173181
(S) Nitrobenzene-d5	5880	J7	14.0-149		09/30/2018 07:54	WG1173181
(S) Nitrobenzene-d5	1620	J1	14.0-149		09/30/2018 06:06	WG1173181
(S) 2-Fluorobiphenyl	121		34.0-125		09/30/2018 06:06	WG1173181
(S) 2-Fluorobiphenyl	112	J7	34.0-125		09/30/2018 07:54	WG1173181

Sample Narrative:

L1029674-02 WG1173181: IS/SURR failed on lower dilution.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Gl

7 Al

8 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.

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.
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
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.



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	T 104704245-17-14
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

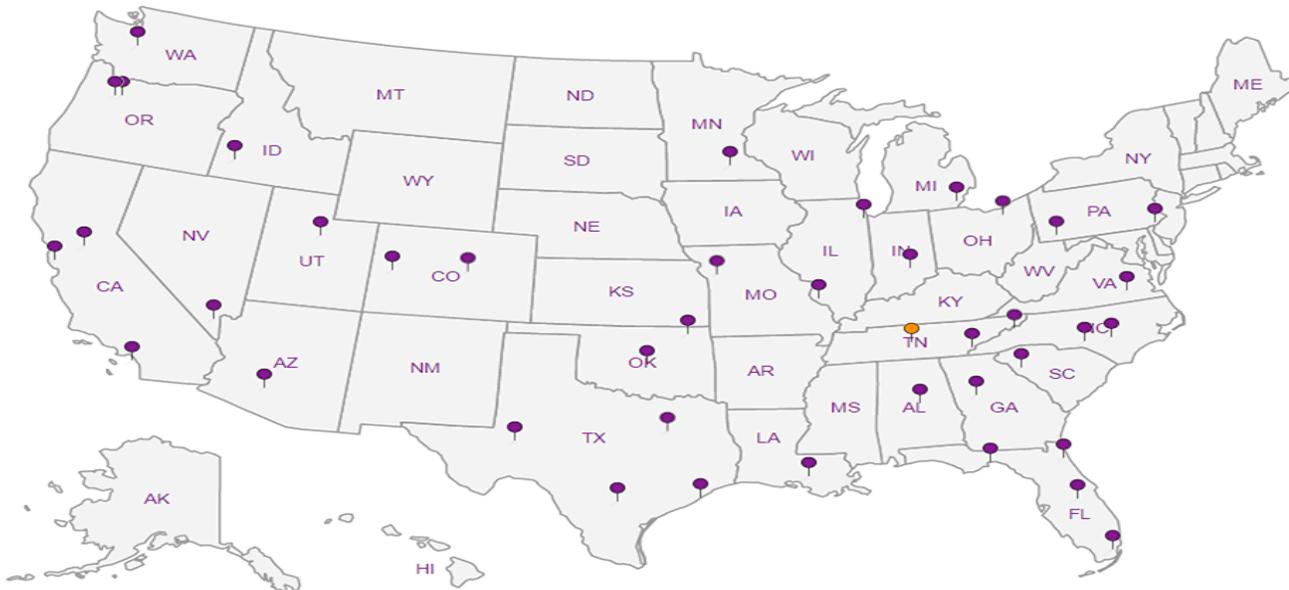
Third Party Federal Accreditations

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 Gl

7 Al

8 Sc

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

Client:	CAERUSPCO	SDG#	L1029674	
Cooler Received/Opened On: 09/18 /18		Temperature:	1.8	
Received By: Chrystan Lyle				
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?				