

**EXTENDED NATURAL GAS ANALYSIS (\*DHA)**

**MAIN PAGE**

PRIMARY DB KEY:	<b>05-045-16304</b>	NAME/DESCRIP :	<b>NP D09A MF04D-9 696</b>
LEASE #:	<b>110166074</b>		<b>BRADENHEAD</b>
FIELD/AREA:			
PROJECT NO. :	<b>202007041</b>	ANALYSIS NO. :	<b>02</b>
COMPANY NAME :	<b>CAERUS OIL &amp; GAS LLC</b>	ANALYSIS DATE:	<b>JULY 10, 2020 16:31</b>
OFFICE / BRANCH:	<b>PARACHUTE, CO</b>	SAMPLE DATE :	<b>JULY 8, 2020</b>
CUSTOMER REF:		TO:	
PRODUCER :	<b>CAERUS OIL &amp; GAS LLC</b>	EFFECTIVE DATE:	

**\*\*\*FIELD DATA\*\*\***

SAMPLE CYCLE:		SAMPLE TYPE:	<b>SPOT</b>
SAMPLE PRES. :	<b>220</b> psig	PROBE :	<b>NO</b>
FLOW PRES. :	psig	CYLINDER NO. :	<b>ECA-739</b>
LAB PRES:	psig	SAMPLED BY :	<b>MIKE KELLEY</b>
SAMPLE TEMP. : :	<b>62</b> °f	SAMPLING COMPANY:	<b>CAERUS</b>
AMBIENT TEMP.:	°f	H2S BY STAIN TUBE:	<b>-      ppm</b>
H2O BY STAIN TUBE:	<b>-      #/mmcf</b>	CO2 BY STAIN TUBE:	<b>-      Mol %</b>
FIELD COMMENTS:			
LAB COMMENTS:			

<u>COMPONENT</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @ 14.65</u>	<u>GPM @ 14.73</u>
HELIUM	0.01	0.00	---	---
HYDROGEN	0.03	0.00	---	---
OXYGEN/ARGON	0.01	0.02	---	---
NITROGEN	0.28000	0.45000	---	---
CARBON DIOXIDE	0.02000	0.05000	---	---
METHANE	94.26160	87.43720	---	---
ETHANE	3.5012	6.0874	0.9332	0.9383
PROPANE	1.0584	2.6986	0.2908	0.2924
I-BUTANE	0.2151	0.7229	0.0699	0.0703
N-BUTANE	0.2611	0.8775	0.0819	0.0824
I-PENTANE	0.1087	0.4531	0.0390	0.0392
N-PENTANE	0.0810	0.3379	0.0290	0.0291
HEXANES PLUS	0.1629	0.8654	0.0640	0.0642
<b>TOTALS</b>	<b>100.00000</b>	<b>100.00000</b>	<b>1.5078</b>	<b>1.5159</b>

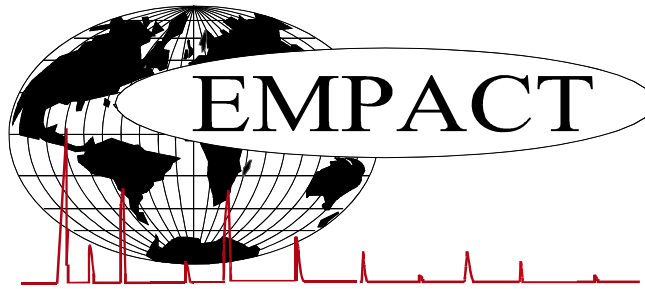
<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>	<u>BTU @ 14.65</u>	<u>14.73</u>
BENZENE	0.0011	0.0050	<b>LHV NET DRY REAL :</b>	<b>965.9 /scf</b>
TOLUENE	0.0002	0.0010		<b>971.2 /scf</b>
ETHYLBENZENE	0.0001	0.0006	<b>NET WET REAL :</b>	<b>949.0 /scf</b>
XYLENES	0.0001	0.0006		<b>954.3 /scf</b>
<b>TOTAL BTEX</b>	<b>0.0015</b>	<b>0.0072</b>	<b>HHV GROSS DRY REAL :</b>	<b>1070.6 /scf</b>
				<b>1076.5 /scf</b>
			<b>GROSS WET REAL :</b>	<b>1051.9 /scf</b>
				<b>1057.8 /scf</b>
			<b>NET HEATING VALUE (60 °F ideal reaction):</b>	<b>21225.6 Btu/lbm</b>
			<b>GROSS HEATING VALUE (60°F ideal reaction):</b>	<b>23521.8 Btu/lbm</b>
			<b>RELATIVE DENSITY (AIR=1):</b>	<b>0.5964</b>
			<b>DENSITY</b>	<b>0.04557 lbm/scf</b>
			<b>COMPRESSIBILITY FACTOR :</b>	<b>0.9977</b>
			<b>REGULAR WOBBE INDEX</b>	<b>1387.5</b>

*\*(DETAILED HYDROCARBON ANALYSIS/NJ 1993)*

*Mod ASTM D6730,GPA 2261 & GPA 2286.*

*(CALC: GPA 2172, GPA 2145 & TP-17 @14.696 & 60 F)*

*The data presented herein has been acquired by means of current analytical techniques and represents the judicious conclusion EMPACT Analytical Systems, Inc. Results of the analysis can be affected by the sampling conditions, therefore, are only warranted through proper lab protocol. EMPACT assumes no responsibility for interpretation or any consequences from application of the reported information and is the sole liability of the user. The reproduction in any media of this reported information may not be made, in portion or as a whole, without the written permission of EMPACT Analytical Systems, Inc.*



**EXTENDED NATURAL GAS ANALYSIS (\*DHA)**

**GLYCALC INFORMATION**

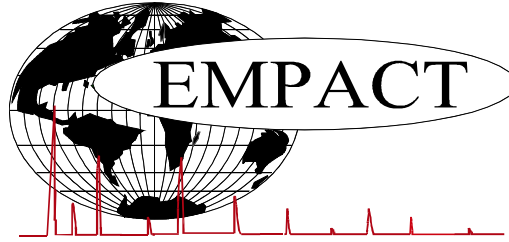
PROJECT NO. :	202007041	ANALYSIS NO. :	02
COMPANY NAME :	CAERUS OIL & GAS LLC	ANALYSIS DATE:	JULY 10, 2020 16:31
ACCOUNT NO. :		SAMPLE DATE :	JULY 8, 2020
PRODUCER :	CAERUS OIL & GAS LLC	CYLINDER NO. :	ECA-739
LEASE NO. :	110166074	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	NP D09A MF04D-9 696 BRADENHEAD		

***FIELD DATA***		SAMPLE TEMP. :	62
SAMPLE PRES. :	220	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	- ppm		
COMMENTS :	<i>SPOT NO PROBE</i>		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.01	0.00
Hydrogen	0.03	0.00
Carbon Dioxide	0.02000	0.05000
Nitrogen	0.28000	0.45000
Methane	94.26160	87.43720
Ethane	3.5012	6.0874
Propane	1.0584	2.6986
Isobutane	0.2151	0.7229
n-Butane	0.2611	0.8775
Isopentane	0.1046	0.4364
n-Pentane	0.0810	0.3379
Cyclopentane	0.0041	0.0167
n-Hexane	0.0281	0.1400
Cyclohexane	0.0124	0.0604
Other Hexanes	0.0628	0.3114
Heptanes	0.0303	0.1750
Methylcyclohexane	0.0150	0.0852
2,2,4 Trimethylpentane	0.0002	0.0013
Benzene	0.0011	0.0050
Toluene	0.0002	0.0010
Ethylbenzene	0.0001	0.0006
Xylenes	0.0001	0.0006
C8+ Heavies	0.0126	0.0849
<u>Subtotal</u>	<u>99.99000</u>	<u>99.98000</u>
<u>Oxygen/Argon</u>	<u>0.01</u>	<u>0.02</u>
<b>Total</b>	<b>100.00000</b>	<b>100.00000</b>

*BDL - Below Detection Limit. The H2S LOS has a detection limit of 0.25 ppm. A \_ (an underscore) indicates there was no tube pulled for H2S.*

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**EXTENDED NATURAL GAS ANALYSIS (\*DHA)**

**DHA COMPONENT LIST**

PRIMARY DB KEY: **05-045-16304** NAME/DESCRIP : **NP D09A MF04D-9 696**  
 LEASE #: **110166074** **BRADENHEAD**  
 FIELD/AREA:  
 PROJECT NO. : **202007041** ANALYSIS NO. : **02**  
 COMPANY NAME : **CAERUS OIL & GAS LLC** ANALYSIS DATE: **JULY 10, 2020 16:31**  
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **JULY 8, 2020**  
 CUSTOMER REF: **TO:**  
 PRODUCER : **CAERUS OIL & GAS LLC** EFFECTIVE DATE:

**\*\*\*FIELD DATA\*\*\***

SAMPLE CYCLE: SAMPLE TYPE: SPOT  
 SAMPLE PRES.: 220 psig PROBE : NO  
 FLOW PRES.: psig CYLINDER NO. : ECA-739  
 LAB PRES: psig SAMPLED BY : MIKE KELLEY  
 SAMPLE TEMP. : 62 °f SAMPLING COMPANY: CAERUS  
 AMBIENT TEMP.: °f H2S BY STAIN TUBE: - ppm  
 H2O BY STAIN TUBE: - #/mmcf CO2 BY STAIN TUBE: - Mol %  
 FIELD COMMENTS:  
 LAB COMMENTS:

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.65	GPM @ 14.73
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.03	0.00	---	---
Oxygen/Argon	---	0.01	0.02	---	---
Nitrogen	---	0.28	0.45	---	---
Carbon Dioxide	---	0.02	0.05	---	---
Methane	P1	94.2616	87.4372	---	---
Ethane	P2	3.5012	6.0874	0.933	0.938
Propane	P3	1.0584	2.6986	0.291	0.292
i-Butane	I4	0.2151	0.7229	0.070	0.070
n-Butane	P4	0.2611	0.8775	0.082	0.082
2,2-Dimethylpropane	I5	0.0026	0.0109	0.001	0.001
i-Pentane	I5	0.1020	0.4255	0.037	0.037
n-Pentane	P5	0.0810	0.3379	0.029	0.029
2,2-Dimethylbutane	I6	0.0030	0.0150	0.001	0.001
Cyclopentane	N5	0.0041	0.0167	0.001	0.001
2,3-Dimethylbutane	I6	0.0053	0.0264	0.002	0.002
2-Methylpentane	I6	0.0270	0.1346	0.011	0.011
3-Methylpentane	I6	0.0143	0.0712	0.006	0.006
n-Hexane	P6	0.0281	0.1400	0.012	0.012
Methylcyclopentane	N6	0.0132	0.0642	0.005	0.005
2,4-Dimethylpentane	I7	0.0013	0.0075	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0004	0.0023	0.000	0.000
Benzene	A6	0.0011	0.0050	0.000	0.000
3,3-Dimethylpentane	I7	0.0001	0.0006	0.000	0.000
Cyclohexane	N6	0.0124	0.0604	0.004	0.004
2-Methylhexane	I7	0.0056	0.0324	0.003	0.003
2,3-Dimethylpentane	I7	0.0028	0.0163	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0008	0.0046	0.000	0.000

3-Methylhexane	I7	0.0055	0.0319	0.003	0.003
1c,3-Dimethylcyclopentane	N7	0.0018	0.0102	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0014	0.0079	0.001	0.001
3-Ethylpentane	I7	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0029	0.0165	0.001	0.001
2,2,4-Trimethylpentane	I8	0.0002	0.0013	0.000	0.000
n-Heptane	P7	0.0067	0.0388	0.003	0.003
1c,2-Dimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Methylcyclohexane	N7	0.0150	0.0852	0.006	0.006
2,2-Dimethylhexane	I8	0.0004	0.0027	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0003	0.0020	0.000	0.000
Ethylcyclopentane	N7	0.0005	0.0028	0.000	0.000
2,5-Dimethylhexane	I8	0.0004	0.0027	0.000	0.000
2,4-Dimethylhexane	I8	0.0005	0.0033	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0003	0.0020	0.000	0.000
3,3-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0003	0.0020	0.000	0.000
Toluene	A7	0.0002	0.0010	0.000	0.000
2,3-Dimethylhexane	I8	0.0003	0.0020	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0012	0.0079	0.001	0.001
4-Methylheptane	I8	0.0004	0.0027	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0002	0.0013	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0005	0.0033	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0012	0.0078	0.001	0.001
3-Ethylhexane	I8	0.0004	0.0027	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0008	0.0052	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0002	0.0013	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0005	0.0032	0.000	0.000
n-Octane	P8	0.0014	0.0093	0.001	0.001
1c,2-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0004	0.0029	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0003	0.0022	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
Ethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Propylcyclopentane	N8	0.0002	0.0013	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
Ethylbenzene	I8	0.0001	0.0006	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0001	0.0006	0.000	0.000
4-Methyloctane	I9	0.0001	0.0008	0.000	0.000
2-Methyloctane	I9	0.0002	0.0015	0.000	0.000
3-Methyloctane	I9	0.0002	0.0015	0.000	0.000
i-Butylcyclopentane	N9	0.0001	0.0008	0.000	0.000
UnknownC8s	U8	0.0003	0.0020	0.000	0.000
n-Nonane	P9	0.0002	0.0015	0.000	0.000
n-Propylbenzene	A9	0.0001	0.0007	0.000	0.000
UnknownC9s	U9	0.0002	0.0015	0.000	0.000
<u>1t-M-2-(4MP)cyclopentane</u>	<u>P12</u>	<u>0.0001</u>	<u>0.0010</u>	<u>0.000</u>	<u>0.000</u>
<u>TOTAL</u>		<u>100.00000</u>	<u>100.00000</u>	<u>1.5078</u>	<u>1.5159</u>

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0011	0.0050
TOLUENE	0.0002	0.0010
ETHYLBENZENE	0.0001	0.0006
XYLENES	0.0001	0.0006
TOTAL BTEX	0.0015	0.0072

\*(DETAILED HYDROCARBON ANALYSIS/NJ 1993)

Mod ASTM D6730,GPA 2261 & GPA 2286.

(CALC: GPA 2172, GPA 2145 & TP-17 @14.696 & 60 F)

BTU @	14.65	14.73
LHV NET DRY REAL :	965.9 /scf	971.2 /scf
NET WET REAL :	949.0 /scf	954.3 /scf
HHV GROSS DRY REAL :	1070.6 /scf	1076.5 /scf
GROSS WET REAL :	1051.9 /scf	1057.8 /scf
NET HEATING VALUE (60 °F ideal reaction):		21225.6 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		23521.8 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.5964
DENSITY		0.04557 lb/scf
COMPRESSIBILITY FACTOR :		0.9977
REGULAR WOBBE INDEX		1387.5

**C6+ Fraction of DHA Gas Analysis @60°F, 14.696 psia**

Net Dry Ideal BTU	<u>4642.9</u> /scf	Relative Density - SG (Air=1)	<u>3.171</u>	<u>C6+ factors</u>
Gross Dry Ideal BTU	<u>5001.3</u> /scf	Z Compressibility Factor	<u>0.99074</u>	<u>0.99009</u>
Net Dry Ideal BTU	<u>19396</u> /lb	Density Factor	<u>242.008</u> lbm/1000 ft3	
Gross Dry Ideal BTU	<u>20897.1</u> /lb	Molar Mass or MW	<u>91.837</u> g/mol	
		Volume Liquid Ideal gas	<u>0.064</u> scf/gal	<u>23.5</u>

**This hexanes plus fraction may be applied in place of published C6+ factors. The Z & GPM need additional calc for C6+ factors. #DIV/0 or 0 (zero) will appear in this section when there is no hexanes plus in the sample to calculate C6+ factors.**

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