



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

**MAIN PAGE**

PRIMARY DB KEY:	<b>05-045-13000</b>	NAME/DESCRIP :	<b>Unocal 13D-9D</b>
LEASE #:	<b>05-045-13000</b>		<b>U2 Pad</b>
FIELD/AREA:			<b>Casing</b>
PROJECT NO. :	<b>202103019</b>	ANALYSIS NO. :	<b>01</b>
COMPANY NAME :	<b>CAERUS OIL &amp; GAS LLC</b>	ANALYSIS DATE:	<b>MARCH 03, 2021 14:39</b>
OFFICE / BRANCH:	<b>PARACHUTE, CO</b>	SAMPLE DATE :	<b>MARCH 1, 2021 08:00</b>
CUSTOMER REF:		TO:	
PRODUCER :		EFFECTIVE DATE:	

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

SAMPLE CYCLE:		SAMPLE TYPE:	SPOT
SAMPLE PRES. :	446 psig	PROBE :	NO
FLOW PRES. :	psig	CYLINDER NO. :	ECA-751
LAB PRES:	psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	23 °f	SAMPLING COMPANY:	CAERUS OIL & GAS LLC
AMBIENT TEMP.:	°f	H2S BY STAIN TUBE:	- ppm
H2O BY STAIN TUBE:	- #/mmcf	CO2 BY STAIN TUBE:	- Mol %
FIELD COMMENTS:			
LAB COMMENTS:	<i>Possible Ethylene in sample</i>		

<u>COMPONENT</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @ 14.65</u>	<u>GPM @ 14.73</u>
ALCOHOLS	0.0289	0.0523	0.0040	0.0040
HELIUM	0.01	0.00	---	---
HYDROGEN	0.16	0.02	---	---
OXYGEN/ARGON	0.01	0.02	---	---
NITROGEN	0.17	0.27	---	---
CARBON DIOXIDE	0.51	1.27	---	---
METHANE	90.9850	82.4687	---	---
ETHANE	6.1199	10.3970	1.6309	1.6398
PROPANE	1.4794	3.6858	0.4067	0.4089
I-BUTANE	0.2466	0.8098	0.0799	0.0804
N-BUTANE	0.2023	0.6643	0.0640	0.0643
I-PENTANE	0.0474	0.1932	0.0170	0.0171
N-PENTANE	0.0191	0.0779	0.0070	0.0070
HEXANES PLUS	0.0114	0.0710	0.0030	0.0030
<b>TOTALS</b>	<b>100.00000</b>	<b>100.00000</b>	<b>2.2125</b>	<b>2.2245</b>

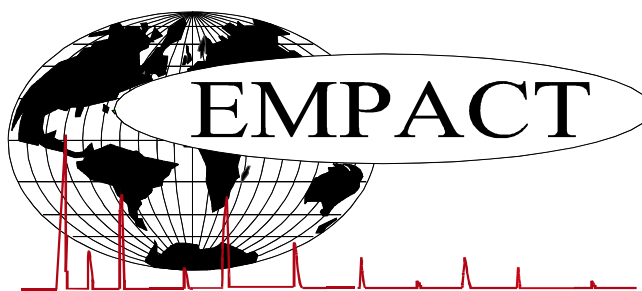
<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>	<u>BTU @ 14.65</u>	<u>14.73</u>
BENZENE	0.0000	0.0000	<b>LHV NET DRY REAL :</b>	976.8 /scf
TOLUENE	0.0000	0.0000	NET WET REAL :	959.7 /scf
ETHYLBENZENE	0.0000	0.0000	<b>HHV GROSS DRY REAL :</b>	1082.1 /scf
XYLENES	0.0002	0.0012	GROSS WET REAL :	1063.2 /scf
<b>TOTAL BTEX</b>	<b>0.0002</b>	<b>0.0012</b>	NET HEATING VALUE (60 °F ideal reaction):	20968.2 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):	23224.8 Btu/lbm
			RELATIVE DENSITY (AIR=1):	0.6108
			DENSITY	0.04663 lbm/scf
			COMPRESSIBILITY FACTOR :	0.9976
			REGULAR WOBBE INDEX	1385.5

*\*(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. :	202103019	ANALYSIS NO. :	01
COMPANY NAME :	CAERUS OIL & GAS LLC	ANALYSIS DATE:	MARCH 03, 2021 14:39
ACCOUNT NO. :		SAMPLE DATE :	MARCH 1, 2021 08:00
PRODUCER :		CYLINDER NO. :	ECA-751
LEASE NO. :	05-045-13000	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	Unocal 13D-9D U2 Pad Casing		

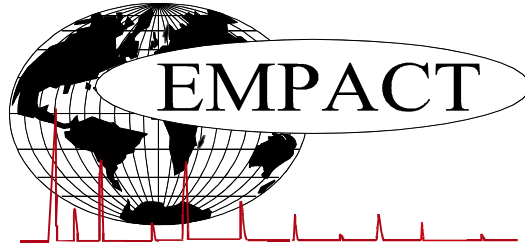
\*\*\*FIELD DATA\*\*\*

SAMPLE PRES. :	446	SAMPLE TEMP. :	23
H2S BY STAIN TUBE:	- ppm	AMBIENT TEMP.:	
COMMENTS :	<i>SPOT NO PROBE</i> <i>Possible Ethylene in sample</i>		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.01	0.00
Hydrogen	0.16	0.02
Carbon Dioxide	0.51	1.27
Nitrogen	0.17	0.27
Methane	90.9850	82.4687
Ethane	6.1199	10.3970
Propane	1.4794	3.6858
Isobutane	0.2466	0.8098
n-Butane	0.2023	0.6643
Isopentane	0.0473	0.1928
n-Pentane	0.0191	0.0779
Cyclopentane	0.0001	0.0004
n-Hexane	0.0009	0.0044
Cyclohexane	0.0000	0.0000
Other Hexanes	0.0039	0.0189
Heptanes	0.0001	0.0006
Methylcyclohexane	0.0000	0.0000
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0000	0.0000
Toluene	0.0000	0.0000
Ethylbenzene	0.0000	0.0000
Xylenes	0.0002	0.0012
C8+ Heavies	0.0063	0.0459
<u>Subtotal</u>	<u>99.96110</u>	<u>99.92770</u>
Oxygen/Argon	0.01	0.02
<u>Alcohols</u>	<u>0.0289</u>	<u>0.0523</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: **05-045-13000** NAME/DESCRIP : **Unocal 13D-9D**  
 LEASE #: **05-045-13000** **U2 Pad**  
 FIELD/AREA: **Casing**

PROJECT NO. : **202103019** ANALYSIS NO. : **01**  
 COMPANY NAME : **CAERUS OIL & GAS LLC** ANALYSIS DATE: **MARCH 03, 2021 14:39**  
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **MARCH 1, 2021 08:00**  
 CUSTOMER REF:  TO:  
 PRODUCER :  EFFECTIVE DATE:  
**\*\*\*FIELD DATA\*\*\***

SAMPLE CYCLE:  SAMPLE TYPE: **SPOT**  
 SAMPLE PRES. : **446** psig PROBE : **NO**  
 FLOW PRES. :  psig CYLINDER NO. : **ECA-751**  
 LAB PRES:  psig SAMPLED BY : **MIKE KELLEY**  
 SAMPLE TEMP. : **23** °f SAMPLING COMPANY: **CAERUS OIL & GAS LLC**  
 AMBIENT TEMP.:  °f H2S BY STAIN TUBE: **-** ppm  
 H2O BY STAIN TUBE: **-** #/mmcf CO2 BY STAIN TUBE: **-** Mol %  
 FIELD COMMENTS:  
 LAB COMMENTS: **Possible Ethylene in sample**

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.65	GPM @ 14.73
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.16	0.02	---	---
Oxygen/Argon	---	0.01	0.02	---	---
Nitrogen	---	0.17	0.27	---	---
Carbon Dioxide	---	0.51	1.27	---	---
Methane	P1	90.9850	82.4687	---	---
Ethane	P2	6.1076	10.3761	1.628	1.637
UnknownC2s	U2	0.0123	0.0209	0.003	0.003
Propane	P3	1.4794	3.6858	0.407	0.409
i-Butane	I4	0.2466	0.8098	0.080	0.080
Methanol	X1	0.0289	0.0523	0.004	0.004
n-Butane	P4	0.2023	0.6643	0.064	0.064
2,2-Dimethylpropane	I5	0.0030	0.0122	0.001	0.001
i-Pentane	I5	0.0443	0.1806	0.016	0.016
n-Pentane	P5	0.0191	0.0779	0.007	0.007
2,2-Dimethylbutane	I6	0.0007	0.0034	0.000	0.000
Cyclopentane	N5	0.0001	0.0004	0.000	0.000
2,3-Dimethylbutane	I6	0.0005	0.0024	0.000	0.000
2-Methylpentane	I6	0.0019	0.0093	0.001	0.001
3-Methylpentane	I6	0.0007	0.0034	0.000	0.000
n-Hexane	P6	0.0009	0.0044	0.000	0.000
Methylcyclopentane	N6	0.0001	0.0004	0.000	0.000
2,4-Dimethylpentane	I7	0.0001	0.0006	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0002	0.0012	0.000	0.000
i-Propylbenzene	A9	0.0001	0.0007	0.000	0.000
3,6-Dimethyloctane	I10	0.0005	0.0040	0.000	0.000
1,3-Methylethylbenzene	A9	0.0016	0.0108	0.001	0.001
1,4-Methylethylbenzene	A9	0.0007	0.0047	0.000	0.000
2-Methylnonane	I10	0.0005	0.0040	0.000	0.000

t-Butylbenzene	A10	0.0019	0.0144	0.001	0.001
1,2,3-Trimethylbenzene	A9	0.0003	0.0020	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0006	0.0046	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0007	0.000	0.000
<b>TOTAL</b>		<b>100.00000</b>	<b>100.00000</b>	<b>2.2125</b>	<b>2.2245</b>

<b>BTEX COMPONENTS</b>	<b>MOLE%</b>	<b>WT%</b>
BENZENE	0.0000	0.0000
TOLUENE	0.0000	0.0000
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0002	0.0012
<b>TOTAL BTEX</b>	<b>0.0002</b>	<b>0.0012</b>

<b>BTU @</b>	<b>14.65</b>	<b>14.73</b>
<b>LHV NET DRY REAL :</b>	976.8 /scf	982.2 /scf
<b>NET WET REAL :</b>	959.7 /scf	965.1 /scf
<b>HHV GROSS DRY REAL :</b>	1082.1 /scf	1088.0 /scf
<b>GROSS WET REAL :</b>	1063.2 /scf	1069.1 /scf
<b>NET HEATING VALUE (60 °F ideal reaction):</b>		20968.2 <b>Btu/lbm</b>
<b>GROSS HEATING VALUE (60°F ideal reaction):</b>		23224.8 <b>Btu/lbm</b>
<b>RELATIVE DENSITY (AIR=1):</b>		0.6108
<b>DENSITY</b>		0.04663 <b>lb/scf</b>
<b>COMPRESSIBILITY FACTOR :</b>		0.9976
<b>REGULAR WOBBE INDEX</b>		1385.5

\*(DETAILED HYDROCARBON ANALYSIS/NJ 1993)  
 Mod ASTM D6730, GPA 2261 & GPA 2286.  
 (CALC: GPA 2172, GPA 2145 & TP-17 @14.696 & 60 F)

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

Net Dry Ideal BTU	<u>5260.8</u> /scf	Relative Density - SG (Air=1)	<u>3.8177</u>	<b>C6+ factors</b>
Gross Dry Ideal BTU	<u>5645.4</u> /scf	Z Compressibility Factor	<u>0.99543</u>	<u>0.99308</u>
Net Dry Ideal BTU	<u>17681.7</u> /lb	Density Factor	<u>291.369</u> <b>lbm/1000 ft3</b>	
Gross Dry Ideal BTU	<u>18973.3</u> /lb	Molar Mass or MW	<u>110.569</u> <b>g/mol</b>	
		Volume Liquid Ideal gas	<u>0.003</u> <b>scf/gal</b>	<u>21.1</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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