



EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY: **05-045-09067** NAME/DESCRIP : **N5A COUEY 5-10C**
 LEASE #: **05-045-09067** **BRAIDEN HEAD**
 FIELD/AREA:

PROJECT NO. : **202107021** ANALYSIS NO. : **04**
 COMPANY NAME : **CAERUS OIL & GAS LLC** ANALYSIS DATE: **JULY 08, 2021 15:00**
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **JUNE 30, 2021**
 CUSTOMER REF: TO:
 PRODUCER : **CAERUS OIL & GAS LLC** EFFECTIVE DATE:

*****FIELD DATA*****

SAMPLE CYCLE: SAMPLE TYPE: SPOT
 SAMPLE PRES. : 98 psig PROBE : NO
 FLOW PRES. : psig CYLINDER NO. : ECA-726
 LAB PRES: psig SAMPLED BY : MIKE KELLEY
 SAMPLE TEMP. : 63 °f SAMPLING COMPANY: COG
 AMBIENT TEMP.: °f H2S BY STAIN TUBE: - ppm
 H2O BY STAIN TUBE: - #/mmcf CO2 BY STAIN TUBE: - Mol %
 FIELD COMMENTS:
 LAB COMMENTS:

COMPONENT	MOLE %	MASS %	GPM @	
			14.65	14.73
ALCOHOLS	0.0017	0.0030	0.0000	0.0000
HELIUM	0.09	0.02	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.02	0.04	---	---
NITROGEN	3.19	5.01	---	---
CARBON DIOXIDE	0.02	0.05	---	---
METHANE	90.7802	81.7187	---	---
ETHANE	3.7811	6.3796	1.0081	1.0136
PROPANE	1.1380	2.8158	0.3127	0.3144
I-BUTANE	0.2418	0.7886	0.0789	0.0794
N-BUTANE	0.2438	0.7951	0.0769	0.0774
I-PENTANE	0.0990	0.4005	0.0360	0.0362
N-PENTANE	0.0769	0.3113	0.0280	0.0281
HEXANES PLUS	0.3075	1.6674	0.1220	0.1224
TOTALS	100.00000	100.00000	1.6626	1.6715

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0021	0.0092
TOLUENE	0.0074	0.0383
ETHYLBENZENE	0.0006	0.0036
XYLENES	0.0030	0.0179
TOTAL BTEX	0.0131	0.0690

	CALCULATED VALUES**	
	BTU @ 14.65	14.73
LHV NET DRY REAL :	947.5 /scf	952.6 /scf
NET WET REAL :	930.9 /scf	936.0 /scf
HHV GROSS DRY REAL :	1049.6 /scf	1055.3 /scf
GROSS WET REAL :	1031.3 /scf	1037.0 /scf
NET HEATING VALUE (60 °F ideal reaction):		20214.7 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		22391.7 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.6147
DENSITY		0.04696 lbm/scf
COMPRESSIBILITY FACTOR :		0.9977
REGULAR WOBBE INDEX		1339.9

*(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. :	202107021	ANALYSIS NO. :	04
COMPANY NAME :	CAERUS OIL & GAS LLC	ANALYSIS DATE:	JULY 08, 2021 15:00
ACCOUNT NO. :		SAMPLE DATE :	JUNE 30, 2021
PRODUCER :	CAERUS OIL & GAS LLC	CYLINDER NO. :	ECA-726
LEASE NO. :	05-045-09067	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	N5A COUEY 5-10C BRAIDEN HEAD		

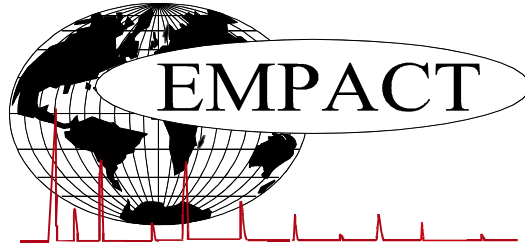
FIELD DATA		SAMPLE TEMP. :	63
SAMPLE PRES. :	98	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	-		
COMMENTS :	<i>SPOT</i> <i>NO PROBE</i>		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.09	0.02
Hydrogen	0.01	0.00
Carbon Dioxide	0.02	0.05
Nitrogen	3.19	5.01
Methane	90.7802	81.7187
Ethane	3.7811	6.3796
Propane	1.1380	2.8158
Isobutane	0.2418	0.7886
n-Butane	0.2438	0.7951
Isopentane	0.0962	0.3895
n-Pentane	0.0769	0.3113
Cyclopentane	0.0028	0.0110
n-Hexane	0.0407	0.1968
Cyclohexane	0.0199	0.0940
Other Hexanes	0.0667	0.3210
Heptanes	0.0650	0.3639
Methylcyclohexane	0.0468	0.2578
2,2,4 Trimethylpentane	0.0001	0.0006
Benzene	0.0021	0.0092
Toluene	0.0074	0.0383
Ethylbenzene	0.0006	0.0036
Xylenes	0.0030	0.0179
C8+ Heavies	0.0552	0.3643
<u>Subtotal</u>	<u>99.97830</u>	<u>99.95700</u>
Oxygen/Argon	0.02	0.04
Alcohols	0.0017	0.0030
<u>Total</u>	<u>100.00000</u>	<u>100.00000</u>

	Total	C6+	C8+	C10+
Calculated Values BTU @ 14.65	Sample	Fraction	Fraction	Fraction
LHV Net Dry Real:	947.5	4877.5	5835.7	7285.7 Btu/scf
Net Wet Real:	930.9	4792.2	5733.7	7158.3 Btu/scf
HHV Gross Dry Real:	1049.6	5247.6	6281.0	7858.3 Btu/scf
Gross Wet Real:	1031.3	5155.9	6171.2	7720.9 Btu/scf
Other Calculated Values				
Regualr Wobbe Index*	1339.9	2861.7	3127.3	3497.9 Btu/scf
Net Heating Value (60 °F ideal reaction):	20214.7	19327.9	19646.3	19036.1 Btu/lbm
Gross Heating Value (60°F ideal reaction):	22391.7	20797.7	21144.4	20524.4 Btu/lbm
Molar Mass (MW):	17.8215	96.638	116.985	146.979 g/mol
Relative Density (AIR=1):	0.6147	3.3368	4.0389	5.0748 SG
Density:	0.04696	0.25468	0.30827	0.38731 lbm/scf
Compressibility Factor:	0.9977	0.9931	0.9975	0.9996 Z
Liquid Volume real gas @:	14.65	17.3256	0.1216	0.0209 0 gal/1000 scf

* The Wobbe pressure base in the number considered is based upon the given Pb of the HHV above.
 #DIV/0 or 0 (zero) will appear in the Calculated Value Section when there is no C6+, C8+ or C10+ in the sample to calculate these factors.
 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: **05-045-09067**
 LEASE #: **05-045-09067**
 FIELD/AREA:

NAME/DESCRIP : **N5A COUEY 5-10C**
BRAIDEN HEAD

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 OFFICE / BRANCH: **PARACHUTE, CO**
 CUSTOMER REF:
 PRODUCER : **CAERUS OIL & GAS LLC**

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*****FIELD DATA*****

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 SAMPLE PRES. : **98** psig
 FLOW PRES. : psig
 LAB PRES: psig
 SAMPLE TEMP. : **63** °f
 AMBIENT TEMP.: °f
 H2O BY STAIN TUBE: **-** #/mmcf
 FIELD COMMENTS:
 LAB COMMENTS:

SAMPLE TYPE: **SPOT**
 PROBE : **NO**
 CYLINDER NO. : **ECA-726**
 SAMPLED BY : **MIKE KELLEY**
 SAMPLING COMPANY: **COG**
 H2S BY STAIN TUBE: **-** ppm
 CO2 BY STAIN TUBE: **-** Mol %

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.65	GPM @ 14.73
Helium	---	0.09	0.02	---	---
Hydrogen	---	0.01	0.00	---	---
Oxygen/Argon	---	0.02	0.04	---	---
Nitrogen	---	3.19	5.01	---	---
Carbon Dioxide	---	0.02	0.05	---	---
Methane	P1	90.7802	81.7187	---	---
Ethane	P2	3.7811	6.3796	1.008	1.014
Propane	P3	1.1380	2.8158	0.313	0.314
i-Butane	I4	0.2418	0.7886	0.079	0.079
Methanol	X1	0.0017	0.0030	0.000	0.000
n-Butane	P4	0.2438	0.7951	0.077	0.077
2,2-Dimethylpropane	I5	0.0031	0.0126	0.001	0.001
i-Pentane	I5	0.0931	0.3769	0.034	0.034
n-Pentane	P5	0.0769	0.3113	0.028	0.028
2,2-Dimethylbutane	I6	0.0032	0.0155	0.001	0.001
Cyclopentane	N5	0.0028	0.0110	0.001	0.001
2,3-Dimethylbutane	I6	0.0056	0.0271	0.002	0.002
2-Methylpentane	I6	0.0286	0.1383	0.012	0.012
3-Methylpentane	I6	0.0149	0.0721	0.006	0.006
n-Hexane	P6	0.0407	0.1968	0.017	0.017
2,2-Dimethylpentane	I7	0.0006	0.0034	0.000	0.000
Methylcyclopentane	N6	0.0144	0.0680	0.005	0.005
2,4-Dimethylpentane	I7	0.0020	0.0112	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0005	0.0028	0.000	0.000
Benzene	A6	0.0021	0.0092	0.001	0.001
3,3-Dimethylpentane	I7	0.0007	0.0039	0.000	0.000
Cyclohexane	N6	0.0199	0.0940	0.007	0.007
2-Methylhexane	I7	0.0101	0.0568	0.005	0.005
2,3-Dimethylpentane	I7	0.0028	0.0158	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0020	0.0110	0.001	0.001

3-Methylhexane	I7	0.0090	0.0506	0.004	0.004
1c,3-Dimethylcyclopentane	N7	0.0027	0.0149	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0025	0.0138	0.001	0.001
3-Ethylpentane	I7	0.0003	0.0017	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0044	0.0242	0.002	0.002
2,2,4-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
n-Heptane	P7	0.0256	0.1439	0.012	0.012
1c,2-Dimethylcyclopentane	N7	0.0004	0.0022	0.000	0.000
Methylcyclohexane	N7	0.0468	0.2578	0.019	0.019
2,2-Dimethylhexane	I8	0.0015	0.0096	0.001	0.001
Ethylcyclopentane	N7	0.0014	0.0077	0.001	0.001
2,5-Dimethylhexane	I8	0.0009	0.0058	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
2,4-Dimethylhexane	I8	0.0010	0.0064	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0006	0.0038	0.000	0.000
3,3-Dimethylhexane	I8	0.0003	0.0019	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0009	0.0057	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0074	0.0383	0.002	0.002
2,3-Dimethylhexane	I8	0.0009	0.0058	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0048	0.0308	0.002	0.002
4-Methylheptane	I8	0.0013	0.0084	0.001	0.001
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,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0026	0.0167	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0064	0.0403	0.003	0.003
3-Ethylhexane	I8	0.0004	0.0026	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0026	0.0164	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0008	0.0051	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0002	0.0012	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0002	0.0012	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0003	0.0019	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0020	0.0126	0.001	0.001
n-Octane	P8	0.0091	0.0583	0.005	0.005
1c,4-Dimethylcyclohexane	N8	0.0018	0.0113	0.001	0.001
i-Propylcyclopentane	I8	0.0001	0.0006	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0006	0.0038	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0020	0.0141	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0015	0.0108	0.001	0.001
2,4-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
Ethylcyclohexane	N8	0.0005	0.0031	0.000	0.000
n-Propylcyclopentane	N8	0.0010	0.0063	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
Ethylbenzene	I8	0.0006	0.0036	0.000	0.000
2,3-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0021	0.0125	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0006	0.0036	0.000	0.000
3,4-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0001	0.0007	0.000	0.000
4-Methyloctane	I9	0.0004	0.0029	0.000	0.000
2-Methyloctane	I9	0.0007	0.0051	0.000	0.000
3-Ethylheptane	I9	0.0002	0.0015	0.000	0.000
3-Methyloctane	I9	0.0007	0.0051	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0003	0.0018	0.000	0.000
i-Butylcyclopentane	N9	0.0003	0.0021	0.000	0.000
n-Nonane	P9	0.0023	0.0166	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0002	0.0014	0.000	0.000

i-Propylbenzene	A9	0.0001	0.0007	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0007	0.000	0.000
2,2-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
2,4-Dimethyloctane	I10	0.0002	0.0016	0.000	0.000
n-Butylcyclopentane	N9	0.0002	0.0014	0.000	0.000
n-Propylbenzene	A9	0.0003	0.0020	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0001	0.0008	0.000	0.000
1,3-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0003	0.0020	0.000	0.000
1,2-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
2-Methylnonane	I10	0.0002	0.0016	0.000	0.000
3-Methylnonane	I10	0.0001	0.0008	0.000	0.000
t-Butylbenzene	A10	0.0003	0.0022	0.000	0.000
UnknownC9s	U9	0.0005	0.0036	0.000	0.000
n-Decane	P10	0.0006	0.0048	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0001	0.0007	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0008	0.000	0.000
UnknownC10s	U10	0.0002	0.0016	0.000	0.000
n-Undecane	P11	0.0004	0.0035	0.000	0.000
n-Dodecane	P12	0.0002	0.0019	0.000	0.000
n-Tridecane	P13	0.0001	0.0010	0.000	0.000
TOTAL		100.0000	100.0000	1.6626	1.6715

CALCULATED VALUES**

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.65	14.73
BENZENE	0.0021	0.0092	LHV NET DRY REAL :	947.5 /scf	952.6 /scf
TOLUENE	0.0074	0.0383	NET WET REAL :	930.9 /scf	936.0 /scf
ETHYLBENZENE	0.0006	0.0036	HHV GROSS DRY REAL :	1049.6 /scf	1055.3 /scf
XYLENES	0.0030	0.0179	GROSS WET REAL :	1031.3 /scf	1037.0 /scf
TOTAL BTEX	0.0131	0.0690	NET HEATING VALUE (60 °F ideal reaction):		20214.7 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		22391.7 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.6147
			DENSITY		0.04696 lb/scf
			COMPRESSIBILITY FACTOR :		0.9977
			REGULAR WOBBE INDEX		1339.9

*(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>4858.8</u> /scf	Relative Density - SG (Air=1)	<u>3.3368</u>	C6+ factors
Gross Dry Ideal BTU	<u>5227.5</u> /scf	Z Compressibility Factor	<u>0.99305</u>	<u>0.99218</u>
Net Dry Ideal BTU	<u>19327.9</u> /lb	Density Factor	<u>254.677</u> lbm/1000 ft3	
Gross Dry Ideal BTU	<u>20797.7</u> /lb	Molar Mass or MW	<u>96.638</u> g/mol	
		Volume Liquid Ideal gas	<u>0.122</u> scf/gal	<u>23</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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