EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-045-11594**	NAME/DESCRIP :	**COLOHAN #3-4 (OH4)**
LEASE #:	**300106029**		**BRAIDEN HEAD**
FIELD/AREA:	**GRAND VALLEY - #31290**		

PROJECT NO. :	**202309082**	ANALYSIS NO. :	**01**
COMPANY NAME :	**CAERUS OIL & GAS LLC**	ANALYSIS DATE:	SEPTEMBER 26, 2023 10:45
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	SEPTEMBER 7, 2023 15:50
CUSTOMER REF:		TO:	
PRODUCER :	CAERUS PICEANCE LLC	EFFECTIVE DATE:	

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

SAMPLE CYCLE:			SAMPLE TYPE:	SPOT
SAMPLE PRES. :	408	psig	PROBE :	NO
FLOW PRES. :		psig	CYLINDER NO. :	ECA-807
LAB PRES:		psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	87	ºf	SAMPLING COMPANY:	CAERUS OIL & GAS
AMBIENT TEMP.:		ºf	H2S BY STAIN TUBE:	ppm mol
H2O BY STAIN TUBE:		#/mmcf	CO2 BY STAIN TUBE:	Mol %

FIELD COMMENTS:

LAB COMMENTS:

COMPONENT	MOLE %	MASS %	GPM @ 14.65	GPM @ 14.73
ALCOHOLS	0.0004	0.0008	0.0000	0.0000
HELIUM	0.01	0.00	---	---
HYDROGEN	0.02	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.11	0.18	---	---
CARBON DIOXIDE	0.02	0.05	---	---
METHANE	94.2795	87.8025	---	---
ETHANE	3.9342	6.8674	1.0481	1.0539
PROPANE	0.9770	2.5010	0.2678	0.2692
I-BUTANE	0.2119	0.7150	0.0689	0.0693
N-BUTANE	0.1867	0.6299	0.0590	0.0593
I-PENTANE	0.0778	0.3256	0.0290	0.0291
N-PENTANE	0.0505	0.2115	0.0180	0.0181
HEXANES PLUS	0.1220	0.7163	0.0510	0.0510
TOTALS	100.00000	100.00000	1.5418	1.5499

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0004	0.0018
TOLUENE	0.0005	0.0027
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0003	0.0018
TOTAL BTEX	0.0012	0.0063

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993)*
Mod ASTM D6730,GPA 2261 & GPA 2286.

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

CALCULATED VALUES**

	BTU @	14.65		14.73	
LHV	NET DRY REAL :	965.6	/scf	970.9	/scf
	NET WET REAL :	948.7	/scf	954.0	/scf
HHV	GROSS DRY REAL :	1069.8	/scf	1075.7	/scf
	GROSS WET REAL :	1051.1	/scf	1057.0	/scf
	NET HEATING VALUE (60 °F ideal reaction):			21294.5	Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):			23600.2	Btu/lbm
	RELATIVE DENSITY (AIR=1):			0.5941	
	DENSITY			0.04539	lbm/scf
	COMPRESSIBILITY FACTOR :			0.9977	
	REGULAR WOBBE INDEX			1389.1	

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202309082	ANALYSIS NO. :	01
COMPANY NAME :	CAERUS OIL & GAS LLC	ANALYSIS DATE:	SEPTEMBER 26, 2023 10:45
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 7, 2023 15:50
PRODUCER :	CAERUS PICEANCE LLC	CYLINDER NO. :	ECA-807
LEASE NO. :	3E+08	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	COLOHAN #3-4 (OH4) BRAIDEN HEAD		
FIELD DATA		SAMPLE TEMP. :	87
SAMPLE PRES. :	408	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	*SPOT* *NO PROBE*		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.02	0.00
Carbon Dioxide	0.02	0.05
Nitrogen	0.11	0.18
Methane	94.2795	87.8025
Ethane	3.9342	6.8674
Propane	0.9770	2.5010
Isobutane	0.2119	0.7150
n-Butane	0.1867	0.6299
Isopentane	0.0760	0.3183
n-Pentane	0.0505	0.2115
Cyclopentane	0.0018	0.0073
n-Hexane	0.0186	0.0931
Cyclohexane	0.0068	0.0332
Other Hexanes	0.0405	0.2016
Heptanes	0.0216	0.1251
Methylcyclohexane	0.0096	0.0547
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0004	0.0018
Toluene	0.0005	0.0027
Ethylbenzene	0.0000	0.0000
Xylenes	0.0003	0.0018
C8+ Heavies	0.0237	0.2023
Subtotal	99.99960	99.99920
Oxygen/Argon	0.00	0.00
Alcohols	0.0004	0.0008
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	965.6	5141.1	7388.6	8656.3	**Btu/scf**
	Net Wet Real:	948.7	5051.2	7259.4	8505.0	**Btu/scf**
HHV	Gross Dry Real:	1069.8	5537.8	7953.5	9311.6	**Btu/scf**
	Gross Wet Real:	1051.1	5441.0	7814.5	9148.8	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1389.1	2951.1	3546.8	3843.6	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		21294.5	19137.8	18673.1	18054.1	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		23600.2	20616.0	20102.5	19420.8	**Btu/lbm**
Molar Mass (MW):		17.22664	101.126	146.344	171.04	**g/mol**
Relative Density (AIR=1):		0.5941	3.4916	5.0527	5.9052	**SG**
Density:		0.04539	0.26648	0.38563	0.45072	**lbm/scf**
Compressiblity Factor:		0.9977	0.9927	0.9993	0.9999	**Z**
Liquid Volume real gas @:	**14.65**	17.4482	0.0508	0.01	0.007	**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 uderscore) indicates there was no tube pulled for H2S.

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EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PRIMARY DB KEY:	**05-045-11594**	NAME/DESCRIP :	**COLOHAN #3-4 (OH4)**
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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	---	0.02	0.00	---	---
Oxygen/Argon	---	0.00	0.00	---	---
Nitrogen	---	0.11	0.18	---	---
Carbon Dioxide	---	0.02	0.05	---	---
Methane	P1	94.2795	87.8025	---	---
Ethane	P2	3.9342	6.8674	1.048	1.054
Propane	P3	0.9770	2.5010	0.268	0.269
i-Butane	I4	0.2119	0.7150	0.069	0.069
Methanol	X1	0.0004	0.0008	0.000	0.000
n-Butane	P4	0.1867	0.6299	0.059	0.059
2,2-Dimethylpropane	I5	0.0033	0.0138	0.001	0.001
i-Pentane	I5	0.0727	0.3045	0.027	0.027
n-Pentane	P5	0.0505	0.2115	0.018	0.018
2,2-Dimethylbutane	I6	0.0028	0.0140	0.001	0.001
Cyclopentane	N5	0.0018	0.0073	0.001	0.001
2,3-Dimethylbutane	I6	0.0040	0.0200	0.002	0.002
2-Methylpentane	I6	0.0167	0.0835	0.007	0.007
3-Methylpentane	I6	0.0088	0.0440	0.004	0.004
n-Hexane	P6	0.0186	0.0931	0.008	0.008
2,2-Dimethylpentane	I7	0.0001	0.0006	0.000	0.000
Methylcyclopentane	N6	0.0082	0.0401	0.003	0.003
2,4-Dimethylpentane	I7	0.0010	0.0058	0.000	0.000
2,2,3-Trimethylbutane	I7	0.0002	0.0012	0.000	0.000
Benzene	A6	0.0004	0.0018	0.000	0.000
3,3-Dimethylpentane	I7	0.0003	0.0017	0.000	0.000
Cyclohexane	N6	0.0068	0.0332	0.002	0.002
2-Methylhexane	I7	0.0033	0.0192	0.002	0.002
2,3-Dimethylpentane	I7	0.0015	0.0087	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0007	0.0040	0.000	0.000

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3-Methylhexane	I7	0.0034	0.0198	0.002	0.002
1c,3-Dimethylcyclopentane	N7	0.0011	0.0063	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0009	0.0051	0.000	0.000
3-Ethylpentane	I7	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0015	0.0085	0.001	0.001
n-Heptane	P7	0.0069	0.0401	0.003	0.003
1c,2-Dimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Methylcyclohexane	N7	0.0096	0.0547	0.004	0.004
2,2-Dimethylhexane	I8	0.0002	0.0013	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Ethylcyclopentane	N7	0.0004	0.0023	0.000	0.000
2,5-Dimethylhexane	I8	0.0004	0.0027	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0003	0.0020	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
Toluene	A7	0.0005	0.0027	0.000	0.000
2,3-Dimethylhexane	I8	0.0002	0.0013	0.000	0.000
2-Methylheptane	I8	0.0012	0.0080	0.001	0.001
4-Methylheptane	I8	0.0003	0.0020	0.000	0.000
3-Methylheptane	I8	0.0006	0.0040	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0013	0.0085	0.001	0.001
3-Ethylhexane	I8	0.0002	0.0013	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0005	0.0033	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0003	0.0020	0.000	0.000
n-Octane	P8	0.0021	0.0139	0.001	0.001
1,1,4-Trimethylcyclohexane	N9	0.0002	0.0015	0.000	0.000
Ethylcyclohexane	N8	0.0002	0.0013	0.000	0.000
n-Propylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2,5-Dimethylheptane	I9	0.0002	0.0015	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0002	0.0012	0.000	0.000
1,4-Dimethylbenzene (p-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
1c,2t,4c-Trimethylcyclohexane	I9	0.0002	0.0015	0.000	0.000
n-Nonane	P9	0.0008	0.0060	0.000	0.000
n-Propylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
5-Methylnonane	I10	0.0001	0.0008	0.000	0.000
2-Methylnonane	I10	0.0001	0.0008	0.000	0.000
3-Methylnonane	I10	0.0001	0.0008	0.000	0.000
n-Decane	P10	0.0005	0.0041	0.000	0.000
1,4-Methyl-i-propylbenzene	A10	0.0001	0.0008	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0008	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0009	0.000	0.000
1,3-Dimethyl-4-ethylbenzene	A10	0.0001	0.0008	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0001	0.0008	0.000	0.000
UnknownC10s	U10	0.0001	0.0008	0.000	0.000
n-Undecane	P11	0.0012	0.0109	0.001	0.001
1,2,4,5-Tetramethylbenzene	A11	0.0001	0.0008	0.000	0.000
1,3-Di-i-propylbenzene	A11	0.0001	0.0009	0.000	0.000
sec-Pentylbenzene	A11	0.0001	0.0009	0.000	0.000
1,2-Di-n-propylbenzene	A11	0.0002	0.0019	0.000	0.000
Tetrahydronaphthalene	A10	0.0001	0.0008	0.000	0.000
1-t-Butyl-3,5-dimethylbenzene	A12	0.0001	0.0009	0.000	0.000
1,3-Di-n-propylbenzene	A12	0.0001	0.0009	0.000	0.000
n-Dodecane	P12	0.0024	0.0237	0.002	0.002
1,3,5-Triethylbenzene	A12	0.0005	0.0047	0.000	0.000
1,2,4-Triethylbenzene	A12	0.0001	0.0009	0.000	0.000
1,4-Methyl-n-pentylbenzene	A12	0.0002	0.0019	0.000	0.000
n-Hexylbenzene	A12	0.0004	0.0038	0.000	0.000
1,2,3,4,5-Pentamethylbenzene	A13	0.0006	0.0052	0.000	0.000

2-Methylnaphthalene	A11	0.0001	0.0008	0.000	0.000
1-Methylnaphthalene	A11	0.0001	0.0008	0.000	0.000
UnknownC12s	U12	0.0004	0.0037	0.000	0.000
n-Tridecane	P13	0.0018	0.0193	0.001	0.001
UnknownC13s	U13	0.0013	0.0139	0.001	0.001
n-Tetradecane	P14	0.0004	0.0046	0.000	0.000
UnknownC14s	U14	0.0007	0.0081	0.001	0.001
n-Pentadecane	P15	0.0001	0.0012	0.000	0.000
UnknownC15s	U15	0.0007	0.0087	0.001	0.001
UnknownC16s	U16	0.0001	0.0013	0.000	0.000
TOTAL		100.00000	100.00000	1.5418	1.5499

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0004	0.0018
TOLUENE	0.0005	0.0027
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0003	0.0018
TOTAL BTEX	0.0012	0.0063

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993)*
Mod ASTM D6730,GPA 2261 & GPA 2286.

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

CALCULATED VALUES**

	BTU @	14.65	14.73
LHV	NET DRY REAL :	965.6 /scf	970.9 /scf
	NET WET REAL :	948.7 /scf	954.0 /scf
HHV	GROSS DRY REAL :	1069.8 /scf	1075.7 /scf
	GROSS WET REAL :	1051.1 /scf	1057.0 /scf
	NET HEATING VALUE (60 °F ideal reaction):		21294.5 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		23600.2 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.5941
	DENSITY		0.04539 lb/scf
	COMPRESSIBILITY FACTOR :		0.9977
	REGULAR WOBBE INDEX		1389.1

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

Net Dry Ideal BTU	5119.3 /scf	Relative Density - SG (Air=1)	3.4916	***C6+factors***
Gross Dry Ideal BTU	5514.4 /scf	**Z** Compressiblity Factor	0.99265	0.99138
Net Dry Ideal BTU	19137.8 /lb	Density Factor	266.479 lbm/1000 ft3	
Gross Dry Ideal BTU	20616 /lb	Molar Mass or MW	101.126 g/mol	
		Volume Liquid Ideal gas	0.051 scf/gal	22.3

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.