EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-045-10362**	NAME/DESCRIP :	**GARFIELD COUNTY #045**
LEASE #:	**300105016, COC 64157**		**TBI FEDERAL #36-12C (PF36-7)**
FIELD/AREA:	**PARACHUTE - #67350**		**BRAIDEN HEAD**
PROJECT NO. :	**202312092**	ANALYSIS NO. :	**02**
COMPANY NAME :	**CAERUS OIL & GAS LLC**	ANALYSIS DATE:	DECEMBER 27, 2023 03:03
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	DECEMBER 14, 2023 15:40
CUSTOMER REF:		TO:	
PRODUCER :	CAERUS PICEANCE LLC	EFFECTIVE DATE:	

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

SAMPLE CYCLE:			SAMPLE TYPE:	SPOT
SAMPLE PRES. :	97	psig	PROBE :	NO
FLOW PRES. :		psig	CYLINDER NO. :	ECA-734
LAB PRES:		psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	43	ºf	SAMPLING COMPANY:	CAERUS OIL
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
HELIUM	0.00	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.09	0.15	---	---
CARBON DIOXIDE	0.01	0.03	---	---
METHANE	94.0967	86.8584	---	---
ETHANE	3.9348	6.8078	1.0492	1.0549
PROPANE	1.0190	2.5854	0.2798	0.2813
I-BUTANE	0.2182	0.7297	0.0709	0.0713
N-BUTANE	0.2072	0.6929	0.0649	0.0653
I-PENTANE	0.0971	0.4028	0.0350	0.0352
N-PENTANE	0.0661	0.2744	0.0240	0.0241
HEXANES PLUS	0.2609	1.4686	0.1040	0.1042
TOTALS	100.00000	100.00000	1.6278	1.6363

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0030	0.0135
TOLUENE	0.0053	0.0281
ETHYLBENZENE	0.0009	0.0055
XYLENES	0.0041	0.0250
TOTAL BTEX	0.0133	0.0721

CALCULATED VALUES**

	BTU @	14.65	14.73
LHV	NET DRY REAL :	972.6 /scf	977.9 /scf
	NET WET REAL :	955.6 /scf	960.9 /scf
HHV	GROSS DRY REAL :	1077.6 /scf	1083.5 /scf
	GROSS WET REAL :	1058.8 /scf	1064.7 /scf

NET HEATING VALUE (60 °F ideal reaction):	21284.8 **Btu/lbm**
GROSS HEATING VALUE (60°F ideal reaction):	23582.3 **Btu/lbm**
RELATIVE DENSITY (AIR=1):	0.5990
DENSITY	0.04579 **lbm/scf**
COMPRESSIBILITY FACTOR :	0.9977
REGULAR WOBBE INDEX	1393.5

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993)*

Mod ASTM D6730,GPA 2261 & GPA 2286.

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

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202312092	ANALYSIS NO. :	02
COMPANY NAME :	CAERUS OIL & GAS LLC	ANALYSIS DATE:	DECEMBER 27, 2023 03:03
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 14, 2023 15:40
PRODUCER :	CAERUS PICEANCE LLC	CYLINDER NO. :	ECA-734
LEASE NO. :	300105016, COC 64157	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	GARFIELD COUNTY #045 TBI FEDERAL #36-12C (PF36-7) BRAIDEN HEAD		
FIELD DATA		SAMPLE TEMP. :	43
SAMPLE PRES. :	97	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	***SPOT*** ***NO PROBE***		

Componet	Mole %	Wt %
Helium	0.00	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	0.01	0.03
Nitrogen	0.09	0.15
Methane	94.0967	86.8584
Ethane	3.9348	6.8078
Propane	1.0190	2.5854
Isobutane	0.2182	0.7297
n-Butane	0.2072	0.6929
Isopentane	0.0937	0.3891
n-Pentane	0.0661	0.2744
Cyclopentane	0.0034	0.0137
n-Hexane	0.0305	0.1512
Cyclohexane	0.0165	0.0799
Other Hexanes	0.0640	0.3156
Heptanes	0.0477	0.2735
Methylcyclohexane	0.0323	0.1825
2,2,4 Trimethylpentane	0.0001	0.0006
Benzene	0.0030	0.0135
Toluene	0.0053	0.0281
Ethylbenzene	0.0009	0.0055
Xylenes	0.0041	0.0250
C8+ Heavies	0.0565	0.3932
Subtotal	100.00000	100.00000
Oxygen/Argon	0.00	0.00
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	972.6	4940.9	5995.1	7675.3	**Btu/scf**
	Net Wet Real:	955.6	4854.5	5890.3	7541.1	**Btu/scf**
HHV	Gross Dry Real:	1077.6	5315.2	6446.5	8261.0	**Btu/scf**
	Gross Wet Real:	1058.8	5222.3	6333.8	8116.6	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1393.5	2879.7	3168.7	3591.3	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		21284.8	19320.0	19512.1	18856.8	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		23582.3	20783.3	20981.6	20298.0	**Btu/lbm**
Molar Mass (MW):		17.37794	97.931	120.109	154.122	**g/mol**
Relative Density (AIR=1):		0.5990	3.3822	4.1478	5.3213	**SG**
Density:		0.04579	0.25809	0.31650	0.40614	**lbm/scf**
Compressiblity Factor:		0.9977	0.9933	0.9979	0.9997	**Z**
Liquid Volume real gas @:	**14.65**	17.4971	0.1037	0.0229	0.001	**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.

EMPACT Analytical Systems Inc. 365 S Main St Brighton, CO 80601 303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PRIMARY DB KEY:	**05-045-10362**	NAME/DESCRIP :	**GARFIELD COUNTY #045**
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PRODUCER :	CAERUS PICEANCE LLC	EFFECTIVE DATE:	
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SAMPLE TEMP. :	43 ºf	SAMPLING COMPANY:	CAERUS OIL
AMBIENT TEMP.:	ºf	H2S BY STAIN TUBE:	_ ppm mol
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	---	0.00	0.00	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.00	0.00	---	---
Nitrogen	---	0.09	0.15	---	---
Carbon Dioxide	---	0.01	0.03	---	---
Methane	P1	94.0967	86.8584	---	---
Ethane	P2	3.9348	6.8078	1.049	1.055
Propane	P3	1.0190	2.5854	0.280	0.281
i-Butane	I4	0.2182	0.7297	0.071	0.071
n-Butane	P4	0.2072	0.6929	0.065	0.065
2,2-Dimethylpropane	I5	0.0036	0.0150	0.001	0.001
i-Pentane	I5	0.0901	0.3741	0.033	0.033
n-Pentane	P5	0.0661	0.2744	0.024	0.024
2,2-Dimethylbutane	I6	0.0038	0.0188	0.002	0.002
Cyclopentane	N5	0.0034	0.0137	0.001	0.001
2,3-Dimethylbutane	I6	0.0061	0.0303	0.002	0.002
2-Methylpentane	I6	0.0249	0.1235	0.010	0.010
3-Methylpentane	I6	0.0138	0.0684	0.006	0.006
n-Hexane	P6	0.0305	0.1512	0.013	0.013
2,2-Dimethylpentane	I7	0.0009	0.0052	0.000	0.000
Methylcyclopentane	N6	0.0154	0.0746	0.005	0.005
2,4-Dimethylpentane	I7	0.0017	0.0098	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0004	0.0023	0.000	0.000
Benzene	A6	0.0030	0.0135	0.001	0.001
3,3-Dimethylpentane	I7	0.0006	0.0034	0.000	0.000
Cyclohexane	N6	0.0165	0.0799	0.006	0.006
2-Methylhexane	I7	0.0077	0.0444	0.004	0.004
2,3-Dimethylpentane	I7	0.0019	0.0109	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0015	0.0085	0.001	0.001
3-Methylhexane	I7	0.0068	0.0392	0.003	0.003
1c,3-Dimethylcyclopentane	N7	0.0025	0.0141	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0022	0.0124	0.001	0.001

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3-Ethylpentane	I7	0.0003	0.0017	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0035	0.0198	0.002	0.002
2,2,4-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
n-Heptane	P7	0.0161	0.0928	0.007	0.007
1c,2-Dimethylcyclopentane	N7	0.0004	0.0022	0.000	0.000
Methylcyclohexane	N7	0.0323	0.1825	0.013	0.013
2,2-Dimethylhexane	I8	0.0008	0.0052	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Ethylcyclopentane	N7	0.0011	0.0062	0.000	0.000
2,5-Dimethylhexane	I8	0.0008	0.0052	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0008	0.0052	0.000	0.000
2,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0007	0.0045	0.000	0.000
3,3-Dimethylhexane	I8	0.0003	0.0020	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0053	0.0281	0.002	0.002
2,3-Dimethylhexane	I8	0.0006	0.0040	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0038	0.0250	0.002	0.002
4-Methylheptane	I8	0.0011	0.0072	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0001	0.0006	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	0.0171	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0054	0.0349	0.003	0.003
3-Ethylhexane	I8	0.0003	0.0020	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0023	0.0148	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0008	0.0052	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0002	0.0013	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0002	0.0013	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0002	0.0013	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0016	0.0104	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0085	0.0559	0.004	0.004
1c,4-Dimethylcyclohexane	N8	0.0013	0.0084	0.001	0.001
i-Propylcyclopentane	I8	0.0001	0.0006	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0003	0.0022	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0007	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
2,2-Dimethylheptane	I9	0.0006	0.0044	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0017	0.0124	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0002	0.0015	0.000	0.000
2,4-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
Ethylcyclohexane	N8	0.0011	0.0071	0.000	0.000
n-Propylcyclopentane	N8	0.0006	0.0039	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0003	0.0022	0.000	0.000
2,5-Dimethylheptane	I9	0.0009	0.0066	0.001	0.001
3,3-Dimethylheptane	I9	0.0002	0.0015	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
Ethylbenzene	I8	0.0009	0.0055	0.000	0.000
2,3-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0027	0.0165	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0009	0.0055	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-Ethylheptane	I9	0.0001	0.0007	0.000	0.000

4-Methyloctane	I9	0.0006	0.0044	0.000	0.000
2-Methyloctane	I9	0.0010	0.0074	0.001	0.001
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0007	0.000	0.000
3-Methyloctane	I9	0.0001	0.0007	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0009	0.0066	0.001	0.001
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0007	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0005	0.0030	0.000	0.000
i-Butylcyclopentane	N9	0.0006	0.0044	0.000	0.000
n-Nonane	P9	0.0037	0.0273	0.002	0.002
1,1-Methylethylcyclohexane	N9	0.0003	0.0022	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	0.0001	0.0008	0.000	0.000
2,6-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
2,5-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
n-Butylcyclopentane	N9	0.0004	0.0029	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0016	0.000	0.000
n-Propylbenzene	A9	0.0004	0.0028	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0001	0.0008	0.000	0.000
1,3-Methylethylbenzene	A9	0.0003	0.0021	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0004	0.0028	0.000	0.000
5-Methylnonane	I10	0.0002	0.0016	0.000	0.000
2-Methylnonane	I10	0.0003	0.0025	0.000	0.000
3-Ethyloctane	I10	0.0001	0.0008	0.000	0.000
3-Methylnonane	I10	0.0002	0.0016	0.000	0.000
t-Butylbenzene	A10	0.0004	0.0031	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0008	0.000	0.000
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0008	0.000	0.000
UnknownC9s	U9	0.0009	0.0066	0.001	0.001
n-Decane	P10	0.0010	0.0082	0.001	0.001
1,2,3-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,4-Methyl-i-propylbenzene	A10	0.0001	0.0007	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0007	0.000	0.000
UnknownC10s	U10	0.0008	0.0066	0.000	0.000
1,2,4,5-Tetramethylbenzene	A11	0.0001	0.0007	0.000	0.000
1,3-Methyl-n-butylbenzene	A11	0.0001	0.0009	0.000	0.000
UnknownC11s	U11	0.0001	0.0009	0.000	0.000
1,2,4-Triethylbenzene	A12	0.0001	0.0009	0.000	0.000
1,4-Methyl-n-pentylbenzene	A12	0.0001	0.0009	0.000	0.000
n-Tridecane	P13	0.0001	0.0010	0.000	0.000
UnknownC13s	U13	0.0002	0.0021	0.000	0.000
n-Tetradecane	P14	0.0002	0.0023	0.000	0.000
n-Pentadecane	P15	0.0002	0.0024	0.000	0.000
UnknownC15s	U15	0.0002	0.0024	0.000	0.000
n-Hexadecane	P16	0.0001	0.0013	0.000	0.000
UnknownC16s	U16	0.0001	0.0013	0.000	0.000
TOTAL		100.00000	100.00000	1.6278	1.6363

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0030	0.0135
TOLUENE	0.0053	0.0281
ETHYLBENZENE	0.0009	0.0055
XYLENES	0.0041	0.0250
TOTAL BTEX	0.0133	0.0721

**(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
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HHV	GROSS DRY REAL :	1077.6 /scf	1083.5 /scf
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	NET HEATING VALUE (60 °F ideal reaction):		21284.8 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		23582.3 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.5990
	DENSITY		0.04579 lb/scf
	COMPRESSIBILITY FACTOR :		0.9977
	REGULAR WOBBE INDEX		1393.5

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

Net Dry Ideal BTU	4923 /scf	Relative Density - SG (Air=1)	3.3822	***C6+factors***
Gross Dry Ideal BTU	5296 /scf	**Z** Compressiblity Factor	0.99326	0.99232
Net Dry Ideal BTU	19320 /lb	Density Factor	258.087 lbm/1000 ft3	
Gross Dry Ideal BTU	20783.3 /lb	Molar Mass or MW	97.931 g/mol	
		Volume Liquid Ideal gas	0.104 scf/gal	23.3

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.