EMPACT

## EXTENDED NATURAL GAS ANALYSIS (*DHA)

### MAIN PAGE

| | | | |
|---|---|---|---|
| PRIMARY DB KEY: | **05-045-09070** | NAME/DESCRIP : | **N5A COUEY 5-15A** |
| LEASE #: | **05-045-09070** | | **BRAIDEN HEAD** |
| FIELD/AREA: | | | |

| | | | |
|---|---|---|---|
| PROJECT NO. : | **202107021** | ANALYSIS NO. : | **05** |
| COMPANY NAME : | **CAERUS OIL & GAS LLC** | ANALYSIS DATE: | JULY 08, 2021 12:57 |
| 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. : | 105 | psig | PROBE : | NO |
| FLOW PRES. : | | psig | CYLINDER NO. : | ECA-750 |
| LAB PRES: | | psig | SAMPLED BY : | MIKE KELLEY |
| SAMPLE TEMP. : | 63 | ºf | SAMPLING COMPANY: | COG |
| AMBIENT TEMP.: | | ºf | 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 | GPM @ 14.73 |
|---|---|---|---|---|
| HELIUM | 0.04 | 0.01 | --- | --- |
| HYDROGEN | 0.03 | 0.00 | --- | --- |
| OXYGEN/ARGON | 0.02 | 0.04 | --- | --- |
| NITROGEN | 2.76 | 4.38 | --- | --- |
| CARBON DIOXIDE | 0.01 | 0.02 | --- | --- |
| METHANE | 90.9903 | 82.6637 | --- | --- |
| ETHANE | 4.2085 | 7.1662 | 1.1221 | 1.1282 |
| PROPANE | 1.2107 | 3.0233 | 0.3327 | 0.3345 |
| I-BUTANE | 0.2677 | 0.8811 | 0.0869 | 0.0874 |
| N-BUTANE | 0.2298 | 0.7564 | 0.0719 | 0.0723 |
| I-PENTANE | 0.0844 | 0.3447 | 0.0310 | 0.0311 |
| N-PENTANE | 0.0559 | 0.2284 | 0.0200 | 0.0201 |
| HEXANES PLUS | 0.0927 | 0.4862 | 0.0350 | 0.0350 |
| TOTALS | 100.00000 | 100.00000 | 1.6996 | 1.7086 |

| BTEX COMPONENTS | MOLE% | WT% |
|---|---|---|
| BENZENE | 0.0004 | 0.0018 |
| TOLUENE | 0.0006 | 0.0031 |
| ETHYLBENZENE | 0.0001 | 0.0006 |
| XYLENES | 0.0003 | 0.0018 |
| TOTAL BTEX | 0.0014 | 0.0073 |

**CALCULATED VALUES****

| | BTU @ | 14.65 | 14.73 |
|---|---|---|---|
| LHV | NET DRY REAL : | 946.8 /scf | 952.0 /scf |
| | NET WET REAL : | 930.2 /scf | 935.4 /scf |
| HHV | GROSS DRY REAL : | 1049.1 /scf | 1054.8 /scf |
| | GROSS WET REAL : | 1030.8 /scf | 1036.5 /scf |

| | |
|---|---|
| NET HEATING VALUE (60 °F ideal reaction): | 20375.1 **Btu/lbm** |
| GROSS HEATING VALUE (60°F ideal reaction): | 22575.5 **Btu/lbm** |
| RELATIVE DENSITY (AIR=1): | 0.6093 |
| DENSITY | 0.04653 **lbm/scf** |
| COMPRESSIBILITY FACTOR : | 0.9977 |
| REGULAR WOBBE INDEX | 1345.2 |

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

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

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

**GLYCALC INFORMATION**

| | | | |
|---|---|---|---|
| PROJECT NO. : | 202107021 | ANALYSIS NO. : | 05 |
| COMPANY NAME : | CAERUS OIL & GAS LLC | ANALYSIS DATE: | JULY 08, 2021 12:57 |
| ACCOUNT NO. : | | SAMPLE DATE : | JUNE 30, 2021 |
| PRODUCER : | CAERUS OIL & GAS LLC | CYLINDER NO. : | ECA-750 |
| LEASE NO. : | 05-045-09070 | SAMPLED BY : | MIKE KELLEY |
| NAME/DESCRIP : | N5A COUEY 5-15A<br>BRAIDEN HEAD | | |
| ***FIELD DATA*** | | SAMPLE TEMP. : | 63 |
| SAMPLE PRES. : | 105 | AMBIENT TEMP.: | |
| H2S BY STAIN TUBE: | _ *ppm* | | |
| COMMENTS : | ***SPOT*** ***NO PROBE*** | | |

| Componet | Mole % | Wt % |
|---|---|---|
| Helium | 0.04 | 0.01 |
| Hydrogen | 0.03 | 0.00 |
| Carbon Dioxide | 0.01 | 0.02 |
| Nitrogen | 2.76 | 4.38 |
| Methane | 90.9903 | 82.6637 |
| Ethane | 4.2085 | 7.1662 |
| Propane | 1.2107 | 3.0233 |
| Isobutane | 0.2677 | 0.8811 |
| n-Butane | 0.2298 | 0.7564 |
| Isopentane | 0.0833 | 0.3403 |
| n-Pentane | 0.0559 | 0.2284 |
| Cyclopentane | 0.0011 | 0.0044 |
| n-Hexane | 0.0174 | 0.0849 |
| Cyclohexane | 0.0053 | 0.0253 |
| Other Hexanes | 0.0335 | 0.1630 |
| Heptanes | 0.0170 | 0.0961 |
| Methylcyclohexane | 0.0096 | 0.0534 |
| 2,2,4 Trimethylpentane | 0.0000 | 0.0000 |
| Benzene | 0.0004 | 0.0018 |
| Toluene | 0.0006 | 0.0031 |
| Ethylbenzene | 0.0001 | 0.0006 |
| Xylenes | 0.0003 | 0.0018 |
| C8+ Heavies | 0.0085 | 0.0562 |
| ***Subtotal*** | 99.98000 | 99.96000 |
| Oxygen/Argon | 0.02 | 0.04 |
| **Total** | 100.00000 | 100.00000 |

| **Calculated Values BTU @** **14.65** | | **Total Sample** | **C6+ Fraction** | **C8+ Fraction** | **C10+ Fraction** | |
|---|---|---|---|---|---|---|
| **LHV** | Net Dry Real: | 946.8 | 4713.9 | 5847.8 | 8209.3 | **Btu/scf** |
| | Net Wet Real: | 930.2 | 4631.5 | 5745.6 | 8065.8 | **Btu/scf** |
| **HHV** | Gross Dry Real: | 1049.1 | 5078.5 | 6296.0 | 8836.2 | **Btu/scf** |
| | Gross Wet Real: | 1030.8 | 4989.7 | 6185.9 | 8681.7 | **Btu/scf** |
| **Other Calculated Values** | | | | | | |
| Regualr Wobbe Index* | | 1345.2 | 2822.2 | 3137.1 | 3732.2 | **Btu/scf** |
| Net Heating Value (60 °F ideal reaction): | | 20375.1 | 19374.1 | 19817.3 | 19132.1 | **Btu/lbm** |
| Gross Heating Value (60°F ideal reaction): | | 22575.5 | 20875.2 | 21337.3 | 20593.0 | **Btu/lbm** |
| Molar Mass (MW): | | 17.6588 | 92.632 | 116.743 | 163.324 | **g/mol** |
| Relative Density (AIR=1): | | 0.6093 | 3.1991 | 4.0308 | 5.6392 | **SG** |
| Density: | | 0.04653 | 0.24411 | 0.30764 | 0.43038 | **lbm/scf** |
| Compressiblity Factor: | | 0.9977 | 0.9908 | 0.9972 | 0.9999 | **Z** |
| Liquid Volume real gas @: | **14.65** | 17.3465 | 0.0349 | 0.002 | 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 uderscore) indicates there was no tube pulled for H2S.***



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# EXTENDED NATURAL GAS ANALYSIS (*DHA)

## DHA COMPONENT LIST

| | | | |
|---|---|---|---|
| PRIMARY DB KEY: | **05-045-09070** | NAME/DESCRIP : | **N5A COUEY 5-15A** |
| LEASE #: | **05-045-09070** | | **BRAIDEN HEAD** |
| FIELD/AREA: | | | |
| PROJECT NO. : | **202107021** | ANALYSIS NO. : | **05** |
| COMPANY NAME : | **CAERUS OIL & GAS LLC** | ANALYSIS DATE: | JULY 08, 2021 12:57 |
| 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. : | 105 psig | PROBE : | NO |
| FLOW PRES. : | psig | CYLINDER NO. : | ECA-750 |
| LAB PRES: | psig | SAMPLED BY : | MIKE KELLEY |
| SAMPLE TEMP. : | 63 ºf | SAMPLING COMPANY: | COG |
| AMBIENT TEMP.: | ºf | 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 | --- | 0.04 | 0.01 | --- | --- |
| Hydrogen | --- | 0.03 | 0.00 | --- | --- |
| Oxygen/Argon | --- | 0.02 | 0.04 | --- | --- |
| Nitrogen | --- | 2.76 | 4.38 | --- | --- |
| Carbon Dioxide | --- | 0.01 | 0.02 | --- | --- |
| Methane | P1 | 90.9903 | 82.6637 | --- | --- |
| Ethane | P2 | 4.2085 | 7.1662 | 1.122 | 1.128 |
| Propane | P3 | 1.2107 | 3.0233 | 0.333 | 0.335 |
| i-Butane | I4 | 0.2677 | 0.8811 | 0.087 | 0.087 |
| n-Butane | P4 | 0.2298 | 0.7564 | 0.072 | 0.072 |
| 2,2-Dimethylpropane | I5 | 0.0024 | 0.0098 | 0.001 | 0.001 |
| i-Pentane | I5 | 0.0809 | 0.3305 | 0.030 | 0.030 |
| n-Pentane | P5 | 0.0559 | 0.2284 | 0.020 | 0.020 |
| 2,2-Dimethylbutane | I6 | 0.0019 | 0.0093 | 0.001 | 0.001 |
| Cyclopentane | N5 | 0.0011 | 0.0044 | 0.000 | 0.000 |
| 2,3-Dimethylbutane | I6 | 0.0034 | 0.0166 | 0.001 | 0.001 |
| 2-Methylpentane | I6 | 0.0160 | 0.0781 | 0.007 | 0.007 |
| 3-Methylpentane | I6 | 0.0075 | 0.0366 | 0.003 | 0.003 |
| n-Hexane | P6 | 0.0174 | 0.0849 | 0.007 | 0.007 |
| 2,2-Dimethylpentane | I7 | 0.0002 | 0.0011 | 0.000 | 0.000 |
| Methylcyclopentane | N6 | 0.0047 | 0.0224 | 0.002 | 0.002 |
| 2,4-Dimethylpentane | I7 | 0.0008 | 0.0045 | 0.000 | 0.000 |
| 2,2,3-Trimethylbutane | I7 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| Benzene | A6 | 0.0004 | 0.0018 | 0.000 | 0.000 |
| 3,3-Dimethylpentane | I7 | 0.0002 | 0.0011 | 0.000 | 0.000 |
| Cyclohexane | N6 | 0.0053 | 0.0253 | 0.002 | 0.002 |
| 2-Methylhexane | I7 | 0.0029 | 0.0165 | 0.001 | 0.001 |
| 2,3-Dimethylpentane | I7 | 0.0009 | 0.0051 | 0.000 | 0.000 |
| 1,1-Dimethylcyclopentane | N7 | 0.0005 | 0.0028 | 0.000 | 0.000 |
| 3-Methylhexane | I7 | 0.0025 | 0.0142 | 0.001 | 0.001 |
| 1c,3-Dimethylcyclopentane | N7 | 0.0008 | 0.0045 | 0.000 | 0.000 |
| 1t,3-Dimethylcyclopentane | N7 | 0.0007 | 0.0039 | 0.000 | 0.000 |
| 3-Ethylpentane | I7 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 1t,2-Dimethylcyclopentane | N7 | 0.0012 | 0.0067 | 0.001 | 0.001 |



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| | | | | | |
|---|---|---|---|---|---|
| n-Heptane | P7 | 0.0057 | 0.0323 | 0.003 | 0.003 |
| 1c,2-Dimethylcyclopentane | N7 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| Methylcyclohexane | N7 | 0.0096 | 0.0534 | 0.004 | 0.004 |
| 2,2-Dimethylhexane | I8 | 0.0003 | 0.0019 | 0.000 | 0.000 |
| Ethylcyclopentane | N7 | 0.0003 | 0.0016 | 0.000 | 0.000 |
| 2,5-Dimethylhexane | I8 | 0.0002 | 0.0013 | 0.000 | 0.000 |
| 2,4-Dimethylhexane | I8 | 0.0002 | 0.0013 | 0.000 | 0.000 |
| 1c,2t,4-Trimethylcyclopentane | N8 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 3,3-Dimethylhexane | I8 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 1t,2c,4-Trimethylcyclopentane | N8 | 0.0002 | 0.0013 | 0.000 | 0.000 |
| Toluene | A7 | 0.0006 | 0.0031 | 0.000 | 0.000 |
| 2,3-Dimethylhexane | I8 | 0.0002 | 0.0013 | 0.000 | 0.000 |
| 2-Methylheptane | I8 | 0.0009 | 0.0058 | 0.000 | 0.000 |
| 4-Methylheptane | I8 | 0.0002 | 0.0013 | 0.000 | 0.000 |
| 3-Methylheptane | I8 | 0.0005 | 0.0032 | 0.000 | 0.000 |
| 1c,2t,3-Trimethylcyclopentane | N8 | 0.0012 | 0.0076 | 0.001 | 0.001 |
| 3-Ethylhexane | I8 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 1t,4-Dimethylcyclohexane | N8 | 0.0005 | 0.0032 | 0.000 | 0.000 |
| 1,1-Dimethylcyclohexane | N8 | 0.0002 | 0.0013 | 0.000 | 0.000 |
| 1,1-Methylethylcyclopentane | N8 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 1t,2-Dimethylcyclohexane | N8 | 0.0003 | 0.0019 | 0.000 | 0.000 |
| n-Octane | P8 | 0.0014 | 0.0091 | 0.001 | 0.001 |
| 1c,4-Dimethylcyclohexane | N8 | 0.0002 | 0.0013 | 0.000 | 0.000 |
| 1c,2-Dimethylcyclohexane | N8 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 1,1,4-Trimethylcyclohexane | N9 | 0.0002 | 0.0014 | 0.000 | 0.000 |
| 2,2,3-Trimethylhexane | I9 | 0.0002 | 0.0015 | 0.000 | 0.000 |
| Ethylcyclohexane | N8 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| n-Propylcyclopentane | N8 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| Ethylbenzene | I8 | 0.0001 | 0.0006 | 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 | 0.0007 | 0.000 | 0.000 |
| 2-Methyloctane | I9 | 0.0001 | 0.0007 | 0.000 | 0.000 |
| 3-Methyloctane | I9 | 0.0001 | 0.0007 | 0.000 | 0.000 |
| n-Nonane | P9 | 0.0002 | 0.0015 | 0.000 | 0.000 |
| n-Decane | P10 | 0.0001 | 0.0008 | 0.000 | 0.000 |
| n-Undecane | P11 | 0.0001 | 0.0009 | 0.000 | 0.000 |
| n-Dodecane | P12 | 0.0001 | 0.0010 | 0.000 | 0.000 |
| n-Tridecane | P13 | 0.0001 | 0.0010 | 0.000 | 0.000 |
| TOTAL | | 100.00000 | 100.00000 | 1.6996 | 1.7086 |

| BTEX COMPONENTS | MOLE% | WT% |
|---|---|---|
| BENZENE | 0.0004 | 0.0018 |
| TOLUENE | 0.0006 | 0.0031 |
| ETHYLBENZENE | 0.0001 | 0.0006 |
| XYLENES | 0.0003 | 0.0018 |
| TOTAL BTEX | 0.0014 | 0.0073 |

**(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 : | 946.8 /scf | 952.0 /scf | |
| | NET WET REAL : | 930.2 /scf | 935.4 /scf | |
| HHV | GROSS DRY REAL : | 1049.1 /scf | 1054.8 /scf | |
| | GROSS WET REAL : | 1030.8 /scf | 1036.5 /scf | |
| | NET HEATING VALUE (60 °F ideal reaction): | | 20375.1 | Btu/lbm |
| | GROSS HEATING VALUE (60°F ideal reaction): | | 22575.5 | Btu/lbm |
| | RELATIVE DENSITY (AIR=1): | | 0.6093 | |
| | DENSITY | | 0.04653 | lb/scf |
| | COMPRESSIBILITY FACTOR : | | 0.9977 | |
| | REGULAR WOBBE INDEX | | 1345.2 | |

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

| | | | | | |
|---|---|---|---|---|---|
| Net Dry Ideal BTU | 4685.4 /scf | Relative Density - SG (Air=1) | 3.1991 | | ***C6+factors*** |
| Gross Dry Ideal BTU | 5047.8 /scf | **Z** Compressiblity Factor | 0.99084 | | 0.99018 |
| Net Dry Ideal BTU | 19374.1 /lb | Density Factor | 244.112 | lbm/1000 ft3 | |
| Gross Dry Ideal BTU | 20875.2 /lb | Molar Mass or MW | 92.632 | g/mol | |
| | | Volume Liquid Ideal gas | 0.035 | scf/gal | 23.5 |

***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.***