# CRUDE OIL ASSAY

| | | | |
|---|---|---|---|
| PROJECT NO. : | 201403015 | ANALYSIS NO. : | 04 |
| COMPANY NAME : | CARRIZO OIL & GAS | ANALYSIS DATE: | MARCH 6, 2014 |
| ACCOUNT NO. : | | SAMPLE DATE : | MARCH 4, 2014 |
| PRODUCER : | | CYLINDER NO. : | 1L GLASS JAR |
| LEASE NO. : | | SAMPLED BY : | GALE MCENDREE |
| NAME/DESCRIP : | TANK BATTERY @ 14:55 BAILEY 7-26-8-60 | | EMPACT |
| ***FIELD DATA*** | | SAMPLE TEMP. : | 58 |
| SAMPLE PRES. : | | AMBIENT TEMP.: | |
| VAPOR PRES. : | | GRAVITY : | |
| COMMENTS : | SPOT; TK# 52116 | | |

| SPECIFICATION | | TEST METHOD | UNITS | RESULTS |
|---|---|---|---|---|
| API GRAVITY | | | API 60/60 | 36.8 |
| RVP @100 DEG F | | D323 | PSIG | 9.4 |
| TOTAL SULFUR | | D2622 | WT % | N/A |
| TOTAL CHLORIDE | | D4929 | ug/g | N/A |
| ORGANIC CHLORIDE | | D4929 | ug/g | N/A |
| FLASH POINT | | D93 | ° F | N/A |
| HEATING VALUE | | D4809 | BTU/ LB | N/A |
| VISUAL APPEARANCE | | | | RED/BROWN |
| BS&W | | D96 | | |
| Crude Oil | | | VOL % | N/A |
| Water | | | VOL % | N/A |
| Emulsion | | | VOL % | N/A |
| Sediment | | | VOL % | N/A |
| DISTILLATION: | | D86 | | |
| INITIAL POINT | | | DEG F | N/A |
| 50% | | | DEG F | N/A |
| 90% | | | DEG F | N/A |
| END POINT | | | DEG F | N/A |
| DISTILLATION: | @TEMP | D445 | | |
| Average Centipoise | 20°C | | | N/A |
| Average Centipoise | 30°C | | | N/A |
| Average Centipoise | 80°C | | | N/A |
| Kinetic Viscosity | 20°C | | cSt (mm2/s) | N/A |
| Kinetic Viscosity | 30°C | | cSt (mm2/s) | N/A |
| Kinetic Viscosity | 80°C | | cSt (mm2/s) | N/A |

***ND: NOT DETECTED***

***N/A: NO TEST PREFORMED FOR THIS PARAMETER***

EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
BRIGHTON, CO
80601

**303-637-0150**

## EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

### MAIN PAGE

| | | | |
|---|---|---|---|
| PROJECT NO. : | 201403015 | ANALYSIS NO. : | 05 |
| COMPANY NAME : | CARRIZO OIL & GAS | ANALYSIS DATE: | MARCH 6, 2014 |
| ACCOUNT NO. : | | SAMPLE DATE : | MARCH 4, 2014 |
| PRODUCER : | | CYLINDER NO. : | 6843 |
| LEASE NO. : | | SAMPLED BY : | GALE MCENDREE |
| NAME/DESCRIP : | SEPARATOR @ 14:30<br>BAILEY 7-26-8-60 | | EMPACT |
| ***FIELD DATA*** | | SAMPLE TEMP. : | 112 |
| SAMPLE PRES. : | 28 | AMBIENT TEMP.: | |
| VAPOR PRES. : | | GRAVITY : | |
| COMMENTS : | SPOT; NO PROBE | | |

| COMPONENT | MOLE % | MASS % | VOL % |
|---|---|---|---|
| NITROGEN (AIR) | 0.0361 | 0.0095 | 0.0086 |
| CARBON DIOXIDE | 0.0597 | 0.0247 | 0.0222 |
| METHANE | 0.2595 | 0.0391 | 0.0959 |
| ETHANE | 0.7802 | 0.2205 | 0.4554 |
| PROPANE | 2.2072 | 0.9147 | 1.3274 |
| I-BUTANE | 0.5136 | 0.2805 | 0.3666 |
| N-BUTANE | 2.4842 | 1.3568 | 1.7093 |
| I-PENTANE | 1.0747 | 0.7286 | 0.8592 |
| N-PENTANE | 1.7562 | 1.1907 | 1.3880 |
| HEXANES PLUS | 90.8286 | 95.2349 | 93.7674 |
| TOTALS | 100.0000 | 100.0000 | 100.0000 |

| **BTEX COMPONENTS** | **MOLE%** | **MASS%** |
|---|---|---|
| BENZENE | 1.5827 | 1.1617 |
| TOLUENE | 2.3294 | 2.0169 |
| ETHYLBENZENE | 0.6057 | 0.6043 |
| XYLENE | 1.8864 | 1.8821 |
| TOTAL BTEX | 6.4042 | 5.6650 |

(CALC: GPA STD 2145-94 & TP-17 @14.696 & 60 F)

| | **TOTAL SAMPLE** | **C6+ FRACTION** | |
|---|---|---|---|
| Specific Gravity (H2O=1) = | 0.7357 | 0.7476 | 60/60 |
| API Gravity = | 60.83 | 57.77 | 60/60 |
| Molecular Weight = | 106.42 | 112.519 | |
| Absolute Density = | 6.13 | 6.23 | LBS/GAL |
| Heating Value Liq. Idl Gas= | 125300 | 126856 | BTU/GAL |
| Vapor/Liquid = | 21.98 | 21.09 | CUFT/GAL |
| Vapor Pressure = | 27.42 | 2.01 | PSIA @100 F |

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993) ; ASTM D6730*

EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
BRIGHTON, CO
80601

**303-637-0150**

## EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

## E & P TANK / GLYCALC INFORMATION

| | | | |
|---|---|---|---|
| PROJECT NO. : | 201403015 | ANALYSIS NO. : | 05 |
| COMPANY NAME : | CARRIZO OIL & GAS | ANALYSIS DATE: | MARCH 6, 2014 |
| ACCOUNT NO. : | | SAMPLE DATE : | MARCH 4, 2014 |
| PRODUCER : | | CYLINDER NO. : | 6843 |
| LEASE NO. : | | SAMPLED BY : | GALE MCENDREE |
| NAME/DESCRIP : | SEPARATOR @ 14:30 | | EMPACT |
| | BAILEY 7-26-8-60 | | |
| ***FIELD DATA*** | | SAMPLE TEMP. : | 112 |
| SAMPLE PRES. : | 28 | AMBIENT TEMP.: | |
| VAPOR PRES. : | | GRAVITY : | |
| COMMENTS : | SPOT; NO PROBE | | |

| COMPONENT | Mole % | | Wt % | | LV % | |
|---|---|---|---|---|---|---|
| CARBON DIOXIDE | 0.0597 | | 0.0247 | | 0.0222 | |
| NITROGEN (AIR) | 0.0361 | | 0.0095 | | 0.0086 | |
| METHANE | 0.2595 | | 0.0391 | | 0.0959 | |
| ETHANE | 0.7802 | | 0.2205 | | 0.4554 | |
| PROPANE | 2.2072 | | 0.9147 | | 1.3274 | |
| I-BUTANE | 0.5136 | | 0.2805 | | 0.3666 | |
| N-BUTANE | 2.4842 | | 1.3568 | | 1.7093 | |
| I-PENTANE | 1.0747 | | 0.7286 | | 0.8592 | |
| N-PENTANE | 1.7562 | | 1.1907 | | 1.3880 | |
| CYCLOPENTANE (N-C5) | 2.0275 | | 1.3362 | | 1.2932 | |
| N-HEXANE | 8.5356 | | 6.9131 | | 7.6628 | |
| CYCLOHEXANE (OTHER C6) | 2.9675 | | 2.3469 | | 2.2039 | |
| OTHER HEXANES | 13.1322 | | 10.5360 | | 11.1509 | |
| OTHER HEPTANES | 12.9195 | | 12.0813 | | 12.5055 | |
| METHYLCYCLOHEXANE (OTHER C7) | 3.8127 | | 3.5180 | | 3.3410 | |
| 2,2,4 TRIMETHYLPENTANE | 0.8121 | | 0.7493 | | 0.7316 | |
| BENZENE | 1.5827 | | 1.1617 | | 0.9681 | |
| TOLUENE | 2.3294 | | 2.0169 | | 1.6973 | |
| ETHYLBENZENE | 0.6057 | | 0.6043 | | 0.5085 | |
| XYLENES | 1.8864 | | 1.8821 | | 1.5861 | |
| OTHER OCTANES | 9.4248 | | 10.1539 | | 10.1411 | |
| OCTANES PLUS | ---- | 43.5215 | ---- | 55.3248 | ---- | 52.9447 |
| NONANES | 9.9108 | | 11.8115 | | 11.4512 | |
| DECANES PLUS | 20.8817 | | 30.1237 | | 28.5262 | |
| SUB TOTAL | 100.0000 | | 100.0000 | | 100.0000 | |
| TOTAL | 100.0000 | | 100.0000 | | 100.0000 | |

| | | |
|---|---|---|
| API Gravity = | **60.83** | 60/60 |
| Vapor Pressure = | **27.42** | PSIA & 100 F |
| Average Molecular Weight of Decanes plus = | **153.51** | |
| Average Specific Gravity of Decanes plus = | **0.7800** | |

EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
BRIGHTON, CO
80601

**303-637-0150**

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

**BY CARBON NUMBER**

| | | | |
|---|---|---|---|
| PROJECT NO. : | 201403015 | ANALYSIS NO. : | 05 |
| COMPANY NAME : | CARRIZO OIL & GAS | ANALYSIS DATE: | MARCH 6, 2014 |
| ACCOUNT NO. : | | SAMPLE DATE : | MARCH 4, 2014 |
| PRODUCER : | | CYLINDER NO. : | 6843 |
| LEASE NO. : | | SAMPLED BY : | GALE MCENDREE |
| NAME/DESCRIP : | SEPARATOR @ 14:30 | | EMPACT |
| | BAILEY 7-26-8-60 | | |
| ***FIELD DATA*** | | SAMPLE TEMP. : | 112 |
| SAMPLE PRES. : | 28 | AMBIENT TEMP.: | |
| VAPOR PRES. : | | GRAVITY : | |
| COMMENTS : | SPOT; NO PROBE | | |

| COMPONENT / CARBON NUMBER | | MOLE% | MASS % | VOLUME % |
|---|---|---|---|---|
| NITROGEN | | 0.0361 | 0.0095 | 0.0086 |
| CARBON DIOXIDE | | 0.0597 | 0.0247 | 0.0222 |
| | C1 | 0.2595 | 0.0391 | 0.0959 |
| | C2 | 0.7802 | 0.2205 | 0.4554 |
| | C3 | 2.2072 | 0.9147 | 1.3274 |
| | C4 | 2.9978 | 1.6373 | 2.0759 |
| | C5 | 4.8584 | 3.2555 | 3.5404 |
| | C6 | 26.2180 | 20.9577 | 21.9857 |
| | C7 | 19.0616 | 17.6162 | 17.5438 |
| | C8 | 12.7290 | 13.3896 | 12.9673 |
| | C9 | 9.9108 | 11.8115 | 11.4512 |
| | C10 | 8.5424 | 11.0277 | 10.4749 |
| | C11 | 5.2610 | 7.3483 | 6.8040 |
| | C12 | 3.5005 | 5.3418 | 5.1062 |
| | C13 | 1.8630 | 3.1451 | 3.0088 |
| | C14 | 1.2303 | 2.2937 | 2.2109 |
| | C15 | 0.4845 | 0.9671 | 0.9214 |
| | C16 | 0.0000 | 0.0000 | 0.0000 |
| | C17 | 0.0000 | 0.0000 | 0.0000 |
| | C18 | 0.0000 | 0.0000 | 0.0000 |
| | C19 | 0.0000 | 0.0000 | 0.0000 |
| | C20 | 0.0000 | 0.0000 | 0.0000 |
| | C21 | 0.0000 | 0.0000 | 0.0000 |
| | C22 | 0.0000 | 0.0000 | 0.0000 |
| | C23 | 0.0000 | 0.0000 | 0.0000 |
| | C24 | 0.0000 | 0.0000 | 0.0000 |
| | C25 | 0.0000 | 0.0000 | 0.0000 |
| | C26 | 0.0000 | 0.0000 | 0.0000 |
| | C27 | 0.0000 | 0.0000 | 0.0000 |
| | C28 | 0.0000 | 0.0000 | 0.0000 |
| | C29 | 0.0000 | 0.0000 | 0.0000 |
| | C30+ | 0.0000 | 0.0000 | 0.0000 |
| | **Total** | 100.0000 | 100.0000 | 100.0000 |

EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
BRIGHTON, CO
80601

**303-637-0150**

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

**DHA COMPONENT LIST**

| | | | |
|---|---|---|---|
| PROJECT NO. : | 201403015 | ANALYSIS NO. : | 05 |
| COMPANY NAME : | CARRIZO OIL & GAS | ANALYSIS DATE: | MARCH 6, 2014 |
| ACCOUNT NO. : | | SAMPLE DATE : | MARCH 4, 2014 |
| PRODUCER : | | CYLINDER NO. : | 6843 |
| LEASE NO. : | | SAMPLED BY : | GALE MCENDREE |
| NAME/DESCRIP : | SEPARATOR @ 14:30 | | EMPACT |
| | BAILEY 7-26-8-60 | | |
| ***FIELD DATA*** | | SAMPLE TEMP. : | 112 |
| SAMPLE PRES. : | 28 | AMBIENT TEMP.: | |
| VAPOR PRES. : | | GRAVITY : | |
| COMMENTS : | SPOT; NO PROBE | | |

| COMPONENT | PIANO # | MOLE % | MASS % | VOL % |
|---|---|---|---|---|
| Nitrogen | NHC | 0.0361 | 0.0095 | 0.0086 |
| Carbon Dioxide | NHC | 0.0597 | 0.0247 | 0.0222 |
| Methane | P1 | 0.2595 | 0.0391 | 0.0959 |
| Ethane | P2 | 0.7802 | 0.2205 | 0.4554 |
| Propane | P3 | 2.2072 | 0.9147 | 1.3274 |
| i-Butane | I4 | 0.5136 | 0.2805 | 0.3666 |
| n-Butane | P4 | 2.4842 | 1.3568 | 1.7093 |
| 2,2-Dimethylpropane | I5 | 0.0288 | 0.0195 | 0.0240 |
| i-Pentane | I5 | 1.0459 | 0.7091 | 0.8352 |
| n-Pentane | P5 | 1.7562 | 1.1907 | 1.3880 |
| 2,2-Dimethylbutane | I6 | 0.0438 | 0.0355 | 0.0399 |
| Cyclopentane | N5 | 2.0275 | 1.3362 | 1.2932 |
| 2,3-Dimethylbutane | I6 | 0.4517 | 0.3658 | 0.4035 |
| 2-Methylpentane | I6 | 4.7813 | 3.8721 | 4.3311 |
| 3-Methylpentane | I6 | 2.6399 | 2.1379 | 2.3514 |
| n-Hexane | P6 | 8.5356 | 6.9131 | 7.6628 |
| 2,2-Dimethylpentane | I7 | 0.0225 | 0.0212 | 0.0229 |
| Methylcyclopentane | N6 | 5.2155 | 4.1247 | 4.0250 |
| 2,4-Dimethylpentane | I7 | 0.2524 | 0.2377 | 0.2586 |
| Benzene | A6 | 1.5827 | 1.1617 | 0.9681 |
| 3,3-Dimethylpentane | I7 | 0.0247 | 0.0233 | 0.0246 |
| Cyclohexane | N6 | 2.9675 | 2.3469 | 2.2039 |
| 2-Methylhexane | I7 | 1.2785 | 1.2038 | 1.2980 |
| 2,3-Dimethylpentane | I7 | 0.7137 | 0.6720 | 0.7039 |
| 1,1-Dimethylcyclopentane | N7 | 0.3772 | 0.3480 | 0.3372 |
| 3-Methylhexane | I7 | 1.7127 | 1.6127 | 1.7127 |
| 1c,3-Dimethylcyclopentane | N7 | 0.9015 | 0.8318 | 0.8165 |
| 1t,3-Dimethylcyclopentane | N7 | 0.8121 | 0.7493 | 0.7316 |
| 3-Ethylpentane | I7 | 0.1334 | 0.1256 | 0.1312 |
| 1t,2-Dimethylcyclopentane | N7 | 1.6695 | 1.5404 | 1.4989 |
| 2,2,4-Trimethylpentane | I8 | 0.0512 | 0.0550 | 0.0579 |
| n-Heptane | P7 | 4.3561 | 4.1017 | 4.3848 |
| 1c,2-Dimethylcyclopentane | N7 | 0.1466 | 0.1353 | 0.1281 |
| Methylcyclohexane | N7 | 3.8127 | 3.5180 | 3.3410 |
| 2,2-Dimethylhexane | I8 | 0.3738 | 0.4012 | 0.4216 |
| Ethylcyclopentane | N7 | 0.5186 | 0.4785 | 0.4565 |
| 2,5-Dimethylhexane | I8 | 0.1018 | 0.1093 | 0.1152 |
| 2,2,3-Trimethylpentane | I8 | 0.0273 | 0.0293 | 0.0299 |
| 2,4-Dimethylhexane | I8 | 0.2096 | 0.2250 | 0.2359 |
| 1c,2t,4-Trimethylcyclopentane | N8 | 0.3606 | 0.3802 | 0.3642 |
| 3,3-Dimethylhexane | I8 | 0.0400 | 0.0429 | 0.0442 |
| 2,3,4-Trimethylpentane | I8 | 0.0837 | 0.0898 | 0.0913 |

| | | | | |
|---|---|---|---|---|
| 2,3,3-Trimethylpentane | I8 | 0.0077 | 0.0083 | 0.0084 |
| Toluene | A7 | 2.3294 | 2.0169 | 1.6973 |
| 2,3-Dimethylhexane | I8 | 0.1879 | 0.2017 | 0.2072 |
| 2-Methyl-3-ethylpentane | I8 | 0.0975 | 0.1047 | 0.1064 |
| 1,1,2-Trimethylcyclopentane | N8 | 0.0119 | 0.0125 | 0.0118 |
| 2-Methylheptane | I8 | 1.1391 | 1.2227 | 1.2786 |
| 4-Methylheptane | I8 | 0.3266 | 0.3506 | 0.3578 |
| 3-Methyl-3-ethylpentane | I8 | 0.0952 | 0.1022 | 0.1028 |
| 3,4-Dimethylhexane | I8 | 0.0764 | 0.0820 | 0.0833 |
| 1c,2c,4-Trimethylcyclopentane | N8 | 0.0324 | 0.0342 | 0.0324 |
| 1c,3-Dimethylcyclohexane | N8 | 0.0223 | 0.0235 | 0.0224 |
| 3-Methylheptane | I8 | 0.5078 | 0.5451 | 0.5651 |
| 1c,2t,3-Trimethylcyclopentane | N8 | 0.8212 | 0.8659 | 0.8221 |
| 3-Ethylhexane | I8 | 0.1922 | 0.2063 | 0.2116 |
| 1t,4-Dimethylcyclohexane | N8 | 0.3900 | 0.4112 | 0.3944 |
| 1,1-Dimethylcyclohexane | N8 | 0.1014 | 0.1069 | 0.1001 |
| 3t-Ethylmethylcyclopentane | N8 | 0.1735 | 0.1829 | 0.1745 |
| 2t-Ethylmethylcyclopentane | N8 | 0.1438 | 0.1516 | 0.1442 |
| 1,1-Methylethylcyclopentane | N8 | 0.4955 | 0.5225 | 0.4895 |
| 2,2,4-Trimethylhexane | I9 | 0.0422 | 0.0509 | 0.0520 |
| 1t,2-Dimethylcyclohexane | N8 | 0.5157 | 0.5438 | 0.5128 |
| 1t,3-Dimethylcyclohexane | N8 | 0.0124 | 0.0131 | 0.0122 |
| n-Octane | P8 | 2.1806 | 2.3407 | 2.4360 |
| 1c,4-Dimethylcyclohexane | N8 | 0.4556 | 0.4804 | 0.4489 |
| i-Propylcyclopentane | I8 | 0.0601 | 0.0634 | 0.0597 |
| 2,4,4-Trimethylhexane | I9 | 0.0161 | 0.0194 | 0.0197 |
| 2,2,3,4-Tetramethylpentane | I9 | 0.0166 | 0.0200 | 0.0203 |
| 2,3,4-Trimethylhexane | I9 | 0.0193 | 0.0233 | 0.0236 |
| 1c,2-Dimethylcyclohexane | N8 | 0.2174 | 0.2292 | 0.2106 |
| 2,3,5-Trimethylhexane | I9 | 0.0599 | 0.0722 | 0.0732 |
| 2,2-Dimethylheptane | I9 | 0.0146 | 0.0176 | 0.0181 |
| 1,1,4-Trimethylcyclohexane | N9 | 0.8495 | 1.0078 | 0.9552 |
| 2,2,3-Trimethylhexane | I9 | 0.3598 | 0.4337 | 0.4350 |
| 2,4-Dimethylheptane | I9 | 0.0807 | 0.0973 | 0.0995 |
| 4,4-Dimethylheptane | I9 | 0.0426 | 0.0513 | 0.0524 |
| Ethylcyclohexane | N8 | 0.4800 | 0.5061 | 0.4701 |
| n-Propylcyclopentane | N8 | 0.1919 | 0.2023 | 0.1906 |
| 1c,3c,5-Trimethylcyclohexane | N9 | 0.0425 | 0.0504 | 0.0478 |
| 2,5-Dimethylheptane | I9 | 0.0700 | 0.0844 | 0.0861 |
| 3,3-Dimethylheptane | I9 | 0.0769 | 0.0927 | 0.0946 |
| 3,5-Dimethylheptane | I9 | 0.0521 | 0.0628 | 0.0641 |
| 2,6-Dimethylheptane | I9 | 0.0478 | 0.0576 | 0.0594 |
| 1,1,3-Trimethylcyclohexane | N9 | 0.0874 | 0.1037 | 0.0983 |
| Ethylbenzene | A8 | 0.6057 | 0.6043 | 0.5085 |
| 1c,2t,4t-Trimethylcyclohexane | N9 | 0.2191 | 0.2599 | 0.2416 |
| 2,3-Dimethylheptane | I9 | 0.0082 | 0.0099 | 0.0100 |
| 1,3-Dimethylbenzene (m-Xylene) | A8 | 0.6110 | 0.6096 | 0.5159 |
| 1,4-Dimethylbenzene (p-Xylene) | A8 | 0.6936 | 0.6920 | 0.5875 |
| 3,4-Dimethylheptane | I9 | 0.0469 | 0.0565 | 0.0565 |
| 3,4-Dimethylheptane (2) | I9 | 0.1459 | 0.1758 | 0.1758 |
| 4-Ethylheptane | I9 | 0.0356 | 0.0429 | 0.0439 |
| 4-Methyloctane | I9 | 0.2661 | 0.3207 | 0.3255 |
| 2-Methyloctane | I9 | 0.2966 | 0.3575 | 0.3665 |
| 1c,2t,4c-Trimethylcyclohexane | I9 | 0.0481 | 0.0580 | 0.0585 |
| 3-Ethylheptane | I9 | 0.0823 | 0.0992 | 0.0999 |
| 3-Methyloctane | I9 | 0.3265 | 0.3935 | 0.3994 |
| 3,3-Diethylpentane | I9 | 0.0528 | 0.0636 | 0.0617 |
| 1c,2t,3-Trimethylcyclohexane | N9 | 0.0728 | 0.0864 | 0.0803 |
| 1,1,2-Trimethylcyclohexane | N9 | 0.0310 | 0.0368 | 0.0342 |
| 1,2-Dimethylbenzene (o-Xylene) | A8 | 0.5818 | 0.5805 | 0.4827 |
| i-Butylcyclopentane | N9 | 0.2154 | 0.2555 | 0.2394 |
| UnknownC8s | U8 | 0.0528 | 0.0567 | 0.0590 |
| n-Nonane | P9 | 1.6874 | 2.0338 | 2.0730 |
| 1,1-Methylethylcyclohexane | N9 | 0.2946 | 0.3551 | 0.3630 |
| i-Propylbenzene | A9 | 0.2628 | 0.2968 | 0.2515 |
| i-Propylcyclohexane | N9 | 0.0951 | 0.1128 | 0.1029 |
| 2,2-Dimethyloctane | I10 | 0.0698 | 0.0933 | 0.0923 |
| 2,4-Dimethyloctane | I10 | 0.0780 | 0.1043 | 0.1032 |
| 2,6-Dimethyloctane | I10 | 0.0140 | 0.0187 | 0.0191 |
| 2,5-Dimethyloctane | I10 | 0.0389 | 0.0520 | 0.0514 |
| n-Butylcyclopentane | N9 | 0.3315 | 0.4370 | 0.4002 |
| 3,3-Dimethyloctane | I10 | 0.0204 | 0.0273 | 0.0270 |
| n-Propylbenzene | A9 | 0.2537 | 0.2865 | 0.2428 |
| 3,6-Dimethyloctane | I10 | 0.2167 | 0.2897 | 0.2866 |

| | | | | |
|---|---|---|---|---|
| 3-Methyl-5-ethylheptane | I10 | 0.3887 | 0.4685 | 0.4723 |
| 1,3-Methylethylbenzene | A9 | 0.3372 | 0.3809 | 0.3201 |
| 1,4-Methylethylbenzene | A9 | 0.1371 | 0.1549 | 0.1302 |
| 1,3,5-Trimethylbenzene | A9 | 0.1631 | 0.1842 | 0.1559 |
| 2,3-Dimethyloctane | I10 | 0.0648 | 0.0866 | 0.0857 |
| 5-Methylnonane | I10 | 0.2304 | 0.3080 | 0.3076 |
| 1,2-Methylethylbenzene | A9 | 0.4746 | 0.5361 | 0.4481 |
| 2-Methylnonane | I10 | 0.0738 | 0.0987 | 0.0994 |
| 3-Ethyloctane | I10 | 0.0726 | 0.0971 | 0.0961 |
| 3-Methylnonane | I10 | 0.1474 | 0.1971 | 0.1966 |
| 1,2,4-Trimethylbenzene | A9 | 0.0327 | 0.0369 | 0.0308 |
| t-Butylbenzene | A10 | 0.2636 | 0.3325 | 0.2810 |
| i-Butylcyclohexane | N10 | 0.1994 | 0.2628 | 0.2369 |
| 1t-Methyl-2-n-propylcyclohexane | I10 | 0.0344 | 0.0415 | 0.0418 |
| i-Butylbenzene | A10 | 0.0651 | 0.0821 | 0.0704 |
| sec-Butylbenzene | A10 | 0.0272 | 0.0343 | 0.0291 |
| UnknownC9s | U9 | 1.9215 | 2.3159 | 2.3606 |
| n-Decane | P10 | 1.1453 | 1.5313 | 1.5346 |
| 1,2,3-Trimethylbenzene | A9 | 0.1942 | 0.2193 | 0.1796 |
| 1,3-Methyl-i-propylbenzene | A10 | 0.0994 | 0.1123 | 0.0939 |
| 1,4-Methyl-i-propylbenzene | A10 | 0.0437 | 0.0494 | 0.0413 |
| Sec-Butylcyclohexane | N10 | 0.3212 | 0.4234 | 0.3812 |
| 1,2-Methyl-i-propylbenzene | A10 | 0.1396 | 0.1761 | 0.1471 |
| 3-Ethylnonane | I10 | 0.0446 | 0.0596 | 0.0600 |
| 1,3-Diethylbenzene | A10 | 0.1343 | 0.1694 | 0.1435 |
| 1,3-Methyl-n-propylbenzene | A10 | 0.0258 | 0.0325 | 0.0276 |
| 1,4-Diethylbenzene | A10 | 0.1435 | 0.1810 | 0.1537 |
| 1,4-Methyl-n-propylbenzene | A10 | 0.0318 | 0.0401 | 0.0342 |
| n-Butylbenzene | A10 | 0.0806 | 0.1017 | 0.0864 |
| 1,3-Dimethyl-5-ethylbenzene | A10 | 0.0595 | 0.0750 | 0.0635 |
| 1,2-Diethylbenzene | A10 | 0.0925 | 0.1167 | 0.0971 |
| 1,2-Methyl-n-propylbenzene | A10 | 0.0886 | 0.1118 | 0.0937 |
| 1,4-Dimethyl-2-ethylbenzene | A10 | 0.1182 | 0.1491 | 0.1244 |
| 1,3-Dimethyl-4-ethylbenzene | A10 | 0.0424 | 0.0535 | 0.0447 |
| 1,2-Dimethyl-4-ethylbenzene | A10 | 0.1938 | 0.2444 | 0.2046 |
| 1,3-Dimethyl-2-ethylbenzene | A10 | 0.1447 | 0.1825 | 0.1501 |
| 1t,2c,4-Trimethylcyclopentane | A10 | 0.4305 | 0.4539 | 0.4442 |
| 1,2-Dimethyl-3-ethylbenzene | A10 | 0.1133 | 0.1429 | 0.1173 |
| 1,2-Ethyl-i-propylbenzene | A10 | 0.1116 | 0.1408 | 0.1176 |
| 1,4-Methyl-t-butylbenzene | A11 | 0.1724 | 0.2174 | 0.1815 |
| UnknownC10s | U10 | 2.5644 | 3.4287 | 3.4360 |
| n-Undecane | P11 | 0.9511 | 1.3970 | 1.3806 |
| 1,4-Ethyl-i-propylbenzene | A11 | 0.0690 | 0.0870 | 0.0727 |
| 1,2,4,5-Tetramethylbenzene | A11 | 0.2065 | 0.2605 | 0.2153 |
| 1,2-Methyl-n-butylbenzene | A11 | 0.1099 | 0.1386 | 0.1157 |
| 1,2,3,5-Tetramethylbenzene | A11 | 0.1525 | 0.1923 | 0.1582 |
| 1,2-Methyl-t-butylbenzene | A11 | 0.1505 | 0.1898 | 0.1585 |
| 5-Methylindan | A11 | 0.0317 | 0.0507 | 0.0496 |
| 4-Methylindan | A11 | 0.0261 | 0.0418 | 0.0409 |
| 1,2-Ethyl-n-propylbenzene | A11 | 0.1657 | 0.2090 | 0.1745 |
| 2-Methylindan | A11 | 0.0949 | 0.1519 | 0.1485 |
| 1,3-Methyl-n-butylbenzene | A11 | 0.0859 | 0.1083 | 0.0904 |
| sec-Pentylbenzene | A11 | 0.0972 | 0.1226 | 0.1024 |
| n-Pentylbenzene | A11 | 0.0730 | 0.1017 | 0.0867 |
| 1t-M-2-(4MP)cyclopentane | P12 | 0.0597 | 0.0956 | 0.0935 |
| 1,2-Di-n-propylbenzene | A11 | 0.1361 | 0.1717 | 0.1434 |
| 1,4-Di-i-propylbenzene | A11 | 0.1639 | 0.2067 | 0.1726 |
| Tetrahydronaphthalene | A10 | 0.1212 | 0.1529 | 0.1277 |
| t-Decahydronaphthalene | A10 | 0.1238 | 0.1562 | 0.1304 |
| Naphthalene | A10 | 0.1229 | 0.1480 | 0.1236 |
| 1-t-Butyl-3,5-dimethylbenzene | A12 | 0.0793 | 0.1000 | 0.0835 |
| 1,4-Ethyl-t-butylbenzene | A11 | 0.1113 | 0.1404 | 0.1172 |
| UnknownC11s | U11 | 2.0300 | 2.9818 | 2.9467 |
| n-Dodecane | P12 | 0.7512 | 1.2024 | 1.1752 |
| 1,3-Di-n-propylbenzene | A12 | 0.0782 | 0.0986 | 0.0823 |
| 1,3,5-Triethylbenzene | A12 | 0.0719 | 0.0812 | 0.0687 |
| 1,2,4-Triethylbenzene | A12 | 0.2979 | 0.3365 | 0.2811 |
| 1,4-Methyl-n-pentylbenzene | A12 | 0.0836 | 0.1054 | 0.0880 |
| n-Hexylbenzene | A12 | 0.0696 | 0.1061 | 0.0906 |
| 1,2,3,4,5-Pentamethylbenzene | A13 | 0.1750 | 0.2207 | 0.1843 |
| 2-Methylnaphthalene | A11 | 0.2098 | 0.2804 | 0.2342 |
| 1-Methylnaphthalene | A11 | 0.2235 | 0.2987 | 0.2144 |
| UnknownC12s | U12 | 2.0091 | 3.2160 | 3.1433 |
| n-Tridecane | P13 | 0.5611 | 0.9721 | 0.9389 |

| | | | | |
|---|---|---|---|---|
| UnknownC13s | U13 | 1.1269 | 1.9523 | 1.8856 |
| n-Tetradecane | P14 | 0.3701 | 0.6900 | 0.6651 |
| UnknownC14s | U14 | 0.8602 | 1.6037 | 1.5458 |
| UnknownC15s | U15 | 0.4845 | 0.9671 | 0.9214 |
| TOTAL | | 100.0000 | 100.0000 | 100.0000 |

EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
BRIGHTON, CO
80601

303-637-0150

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

**MAIN PAGE**

| | | | |
|---|---|---|---|
| PROJECT NO. : | 201403015 | ANALYSIS NO. : | 06 |
| COMPANY NAME : | CARRIZO OIL & GAS | ANALYSIS DATE: | MARCH 12, 2014 |
| ACCOUNT NO. : | | SAMPLE DATE : | MARCH 11, 2014 |
| PRODUCER : | | CYLINDER NO. : | 0958 |
| LEASE NO. : | | SAMPLED BY : | GALE MCENDREE-EMPACT |
| NAME/DESCRIP : | SALES GAS @ 10:15<br>BAILEY 7-26-8-60 | | |
| ***FIELD DATA*** | | SAMPLE TEMP. : | 77 |
| SAMPLE PRES. : | 118 | AMBIENT TEMP.: | |
| VAPOR PRES. : | | GRAVITY : | |
| COMMENTS : | SPOT; PROBE; LENGTH OF H2S STAIN @ 1-7=5 PPM @ 14:45<br>RESAMPLE-EMPACT | | |

| COMPONENT | MOLE % | MASS % | GPM @ 14.650 | GPM @ 14.730 |
|---|---|---|---|---|
| ALCOHOLS | 0.0002 | 0.0005 | | |
| HELIUM | 0.01 | 0.00 | --- | --- |
| HYDROGEN | 0.00 | 0.00 | --- | --- |
| OXYGEN/ARGON | 0.01 | 0.01 | --- | --- |
| NITROGEN | 0.90 | 1.10 | --- | --- |
| CARBON DIOXIDE | 2.60 | 4.98 | --- | --- |
| METHANE | 71.95970 | 50.20510 | --- | --- |
| ETHANE | 12.0172 | 15.7146 | 3.2089 | 3.2264 |
| PROPANE | 7.9896 | 15.3215 | 2.1970 | 2.2090 |
| I-BUTANE | 0.7396 | 1.8695 | 0.2412 | 0.2425 |
| N-BUTANE | 2.3553 | 5.9535 | 0.7417 | 0.7457 |
| I-PENTANE | 0.4429 | 1.3861 | 0.1591 | 0.1600 |
| N-PENTANE | 0.5027 | 1.5773 | 0.1822 | 0.1832 |
| HEXANES PLUS | 0.4728 | 1.8819 | 0.1880 | 0.1890 |
| TOTALS | 100.00000 | 100.00000 | 6.9181 | 6.9558 |

| BTEX COMPONENTS | MOLE% | WT% |
|---|---|---|
| BENZENE | 0.0162 | 0.0550 |
| TOLUENE | 0.0095 | 0.0380 |
| ETHYLBENZENE | 0.0009 | 0.0042 |
| XYLENES | 0.0022 | 0.0101 |
| TOTAL BTEX | 0.0288 | 0.1073 |

| | BTU @ | 14.650 | 14.730 |
|---|---|---|---|
| **LOW** | NET DRY REAL : | 1184.0 **/scf** | 1190.4 **/scf** |
| | NET WET REAL : | 1163.3 **/scf** | 1169.7 **/scf** |
| **HIGH** | GROSS DRY REAL : | 1302.7 **/scf** | 1309.8 **/scf** |
| | GROSS WET REAL : | 1279.9 **/scf** | 1287.0 **/scf** |
| | NET DRY REAL : | 19557.4 **/lb** | 19664.2 **/lb** |
| | GROSS DRY REAL : | 21520.9 **/lb** | 21638.4 **/lb** |
| | RELATIVE DENSITY (AIR=1): | | 0.7931 |
| | COMPRESSIBILITY FACTOR : | | 0.99598 |

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

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993) ; ASTM D6730*

EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
BRIGHTON, CO
80601

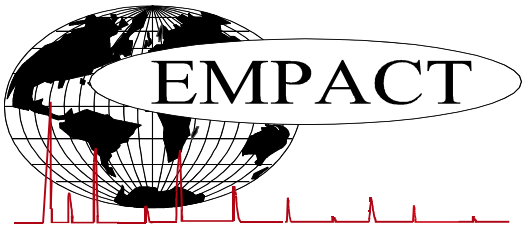
**303-637-0150**

## EXTENDED NATURAL GAS ANALYSIS (*DHA)

## GLYCALC INFORMATION

| | | | |
|---|---|---|---|
| PROJECT NO. : | 201403015 | ANALYSIS NO. : | 06 |
| COMPANY NAME : | CARRIZO OIL & GAS | ANALYSIS DATE: | MARCH 12, 2014 |
| ACCOUNT NO. : | | SAMPLE DATE : | MARCH 11, 2014 |
| PRODUCER : | | CYLINDER NO. : | 0958 |
| LEASE NO. : | | SAMPLED BY : | GALE MCENDREE-EMPACT |
| NAME/DESCRIP : | SALES GAS @ 10:15<br>BAILEY 7-26-8-60 | | |
| ***FIELD DATA*** | | SAMPLE TEMP. : | 77 |
| SAMPLE PRES. : | 118 | AMBIENT TEMP.: | |
| VAPOR PRES. : | | GRAVITY : | |
| COMMENTS : | SPOT; PROBE; LENGTH OF H2S STAIN @ 1-7=5 PPM @ 14:45<br>RESAMPLE-EMPACT | | |

| Componet | Mole % | Wt % |
|---|---|---|
| Helium | 0.01 | 0.00 |
| Carbon Dioxide | 2.60 | 4.98 |
| Carbon Monoxide | 0.00 | 0.00 |
| Nitrogen | 0.90 | 1.10 |
| Methane | 71.95970 | 50.20510 |
| Ethane | 12.0172 | 15.7146 |
| Propane | 7.9896 | 15.3215 |
| Isobutane | 0.7396 | 1.8695 |
| n-Butane | 2.3553 | 5.9535 |
| Isopentane | 0.4021 | 1.2617 |
| n-Pentane | 0.5027 | 1.5773 |
| Cyclopentane | 0.0408 | 0.1244 |
| n-Hexane | 0.0992 | 0.3718 |
| Cyclohexane | 0.0252 | 0.0922 |
| Other Hexanes | 0.1763 | 0.6558 |
| Heptanes | 0.0825 | 0.3578 |
| Methycyclohexane | 0.0192 | 0.0820 |
| 2,2,4 Trimethylpentane | 0.0002 | 0.0010 |
| Benzene | 0.0162 | 0.0550 |
| Toluene | 0.0095 | 0.0380 |
| Ethylbenzene | 0.0009 | 0.0042 |
| Xylenes | 0.0022 | 0.0101 |
| C8+ Heavies | 0.0414 | 0.2140 |
| ***Subtotal*** | 99.98980 | 99.98950 |
| Oxygen/Argon | 0.01 | 0.01 |
| Alcohols | 0.0002 | 0.0005 |
| **Total** | 100.00000 | 100.00000 |




## EXTENDED NATURAL GAS ANALYSIS (*DHA)

## DHA COMPONENT LIST

| | | | |
|---|---|---|---|
| PROJECT NO. : | 201403015 | ANALYSIS NO. : | 06 |
| COMPANY NAME : | CARRIZO OIL & GAS | ANALYSIS DATE: | MARCH 12, 2014 |
| ACCOUNT NO. : | | SAMPLE DATE : | MARCH 11, 2014 |
| PRODUCER : | | CYLINDER NO. : | 0958 |
| LEASE NO. : | | SAMPLED BY : | GALE MCENDREE-EMPACT |
| NAME/DESCRIP : | SALES GAS @ 10:15<br>BAILEY 7-26-8-60 | | |
| ***FIELD DATA*** | | SAMPLE TEMP. : | 77 |
| SAMPLE PRES. : | 118 | AMBIENT TEMP.: | |
| VAPOR PRES. : | | GRAVITY : | |
| COMMENTS : | SPOT; PROBE; LENGTH OF H2S STAIN @ 1-7=5 PPM @ 14:45<br>RESAMPLE-EMPACT | | |

| COMPONENT | PIANO # | MOLE % | MASS % | GPM @ 14.650 | GPM @ 14.730 |
|---|---|---|---|---|---|
| Helium | --- | 0.01 | 0.00 | --- | --- |
| Hydrogen | --- | 0.00 | 0.00 | --- | --- |
| Oxygen/Argon | --- | 0.01 | 0.01 | --- | --- |
| Nitrogen | --- | 0.90 | 1.10 | --- | --- |
| Carbon Dioxide | --- | 2.60 | 4.98 | --- | --- |
| Methane | P1 | 71.95970 | 50.20510 | --- | --- |
| Ethane | P2 | 12.0172 | 15.7146 | 3.209 | 3.226 |
| Propane | P3 | 7.9896 | 15.3215 | 2.197 | 2.209 |
| i-Butane | I4 | 0.7396 | 1.8695 | 0.241 | 0.243 |
| n-Butane | P4 | 2.3553 | 5.9535 | 0.742 | 0.746 |
| 2,2-Dimethylpropane | I5 | 0.0019 | 0.0060 | 0.001 | 0.001 |
| Ethanol | X2 | 0.0001 | 0.0002 | 0.000 | 0.000 |
| i-Pentane | I5 | 0.4002 | 1.2557 | 0.146 | 0.147 |
| n-Pentane | P5 | 0.5027 | 1.5773 | 0.182 | 0.183 |
| t-Butanol | X4 | 0.0001 | 0.0003 | 0.000 | 0.000 |
| 2,2-Dimethylbutane | I6 | 0.0012 | 0.0045 | 0.000 | 0.000 |
| Cyclopentane | N5 | 0.0408 | 0.1244 | 0.012 | 0.012 |
| 2,3-Dimethylbutane | I6 | 0.0067 | 0.0251 | 0.003 | 0.003 |
| 2-Methylpentane | I6 | 0.0748 | 0.2803 | 0.031 | 0.031 |
| 3-Methylpentane | I6 | 0.0379 | 0.1420 | 0.015 | 0.015 |
| n-Hexane | P6 | 0.0992 | 0.3718 | 0.041 | 0.041 |
| 2,2-Dimethylpentane | I7 | 0.0004 | 0.0017 | 0.000 | 0.000 |
| Methylcyclopentane | N6 | 0.0557 | 0.2039 | 0.020 | 0.020 |
| 2,4-Dimethylpentane | I7 | 0.0024 | 0.0104 | 0.001 | 0.001 |
| 2,2,3-Trimethylbutane | I7 | 0.0001 | 0.0004 | 0.000 | 0.000 |
| Benzene | A6 | 0.0162 | 0.0550 | 0.005 | 0.005 |
| 3,3-Dimethylpentane | I7 | 0.0002 | 0.0009 | 0.000 | 0.000 |
| Cyclohexane | N6 | 0.0252 | 0.0922 | 0.009 | 0.009 |
| 2-Methylhexane | I7 | 0.0098 | 0.0427 | 0.005 | 0.005 |
| 2,3-Dimethylpentane | I7 | 0.0046 | 0.0200 | 0.002 | 0.002 |
| 1,1-Dimethylcyclopentane | N7 | 0.0027 | 0.0115 | 0.001 | 0.001 |
| 3-Methylhexane | I7 | 0.0112 | 0.0488 | 0.005 | 0.005 |
| 1c,3-Dimethylcyclopentane | N7 | 0.0062 | 0.0265 | 0.003 | 0.003 |
| 1t,3-Dimethylcyclopentane | N7 | 0.0055 | 0.0235 | 0.003 | 0.003 |
| 3-Ethylpentane | I7 | 0.0008 | 0.0035 | 0.000 | 0.000 |
| 1t,2-Dimethylcyclopentane | N7 | 0.0107 | 0.0457 | 0.005 | 0.005 |



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

| | | | | | |
|---|---|---|---|---|---|
| 2,2,4-Trimethylpentane | I8 | 0.0002 | 0.0010 | 0.000 | 0.000 |
| n-Heptane | P7 | 0.0231 | 0.1007 | 0.011 | 0.011 |
| 1c,2-Dimethylcyclopentane | N7 | 0.0008 | 0.0034 | 0.000 | 0.000 |
| Methylcyclohexane | N7 | 0.0192 | 0.0820 | 0.008 | 0.008 |
| 1,1,3-Trimethylcyclopentane | N7 | 0.0016 | 0.0078 | 0.001 | 0.001 |
| Ethylcyclopentane | N7 | 0.0024 | 0.0103 | 0.001 | 0.001 |
| 2,5-Dimethylhexane | I8 | 0.0004 | 0.0020 | 0.000 | 0.000 |
| 2,2,3-Trimethylpentane | I8 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| 2,4-Dimethylhexane | I8 | 0.0008 | 0.0040 | 0.000 | 0.000 |
| 1c,2t,4-Trimethylcyclopentane | N8 | 0.0016 | 0.0078 | 0.001 | 0.001 |
| 3,3-Dimethylhexane | I8 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| 1t,2c,4-Trimethylcyclopentane | N8 | 0.0017 | 0.0083 | 0.001 | 0.001 |
| 2,3,4-Trimethylpentane | I8 | 0.0003 | 0.0015 | 0.000 | 0.000 |
| 2,3,3-Trimethylpentane | I8 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| Toluene | A7 | 0.0095 | 0.0380 | 0.003 | 0.003 |
| 2,3-Dimethylhexane | I8 | 0.0006 | 0.0030 | 0.000 | 0.000 |
| 2-Methyl-3-ethylpentane | I8 | 0.0005 | 0.0025 | 0.000 | 0.000 |
| 2-Methylheptane | I8 | 0.0037 | 0.0184 | 0.002 | 0.002 |
| 4-Methylheptane | I8 | 0.0010 | 0.0050 | 0.001 | 0.001 |
| 3-Methyl-3-ethylpentane | I8 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| 3,4-Dimethylhexane | I8 | 0.0002 | 0.0010 | 0.000 | 0.000 |
| 1c,2c,4-Trimethylcyclopentane | N8 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| 1c,3-Dimethylcyclohexane | N8 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| 3-Methylheptane | I8 | 0.0018 | 0.0090 | 0.001 | 0.001 |
| 1c,2t,3-Trimethylcyclopentane | N8 | 0.0025 | 0.0122 | 0.001 | 0.001 |
| 3-Ethylhexane | I8 | 0.0002 | 0.0010 | 0.000 | 0.000 |
| 1t,4-Dimethylcyclohexane | N8 | 0.0009 | 0.0044 | 0.000 | 0.000 |
| 1,1-Dimethylcyclohexane | N8 | 0.0003 | 0.0015 | 0.000 | 0.000 |
| 3t-Ethylmethylcyclopentane | N8 | 0.0005 | 0.0024 | 0.000 | 0.000 |
| 2t-Ethylmethylcyclopentane | N8 | 0.0004 | 0.0020 | 0.000 | 0.000 |
| 1,1-Methylethylcyclopentane | N8 | 0.0013 | 0.0063 | 0.001 | 0.001 |
| 2,2,4-Trimethylhexane | I9 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 1t,2-Dimethylcyclohexane | N8 | 0.0013 | 0.0063 | 0.001 | 0.001 |
| n-Octane | P8 | 0.0054 | 0.0268 | 0.003 | 0.003 |
| 1c,4-Dimethylcyclohexane | N8 | 0.0005 | 0.0024 | 0.000 | 0.000 |
| i-Propylcyclopentane | I8 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| 2,3,5-Trimethylhexane | I9 | 0.0003 | 0.0016 | 0.000 | 0.000 |
| 1c,2-Dimethylcyclohexane | N8 | 0.0003 | 0.0015 | 0.000 | 0.000 |
| 1,1,4-Trimethylcyclohexane | N9 | 0.0014 | 0.0077 | 0.001 | 0.001 |
| 2,2,3-Trimethylhexane | I9 | 0.0006 | 0.0033 | 0.000 | 0.000 |
| 2,4-Dimethylheptane | I9 | 0.0002 | 0.0011 | 0.000 | 0.000 |
| Ethylcyclohexane | N8 | 0.0008 | 0.0039 | 0.000 | 0.000 |
| n-Propylcyclopentane | N8 | 0.0003 | 0.0015 | 0.000 | 0.000 |
| 2,5-Dimethylheptane | I9 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 3,3-Dimethylheptane | I9 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 3,5-Dimethylheptane | I9 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 2,6-Dimethylheptane | I9 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 1,1,3-Trimethylcyclohexane | N9 | 0.0003 | 0.0016 | 0.000 | 0.000 |
| Ethylbenzene | I8 | 0.0009 | 0.0042 | 0.000 | 0.000 |
| 1c,2t,4t-Trimethylcyclohexane | N9 | 0.0003 | 0.0016 | 0.000 | 0.000 |
| 2,3-Dimethylheptane | I9 | 0.0007 | 0.0039 | 0.000 | 0.000 |
| 1,3-Dimethylbenzene (m-Xylene) | A8 | 0.0012 | 0.0055 | 0.000 | 0.000 |
| 1,4-Dimethylbenzene (p-Xylene) | A8 | 0.0003 | 0.0014 | 0.000 | 0.000 |
| 3,4-Dimethylheptane (2) | I9 | 0.0002 | 0.0011 | 0.000 | 0.000 |
| 4-Methyloctane | I9 | 0.0003 | 0.0016 | 0.000 | 0.000 |
| 2-Methyloctane | I9 | 0.0004 | 0.0022 | 0.000 | 0.000 |
| 1c,2t,3-Trimethylcyclohexane | N9 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 3-Ethylheptane | I9 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 3-Methyloctane | I9 | 0.0004 | 0.0022 | 0.000 | 0.000 |
| 1,2-Dimethylbenzene (o-Xylene) | A8 | 0.0007 | 0.0032 | 0.000 | 0.000 |

| | | | | | |
|---|---|---|---|---|---|
| i-Butylcyclopentane | N9 | 0.0003 | 0.0016 | 0.000 | 0.000 |
| UnknownC8s | U8 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| n-Nonane | P9 | 0.0013 | 0.0073 | 0.001 | 0.001 |
| 1,1-Methylethylcyclohexane | N9 | 0.0002 | 0.0011 | 0.000 | 0.000 |
| i-Propylbenzene | A9 | 0.0002 | 0.0010 | 0.000 | 0.000 |
| i-Propylcyclohexane | N9 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 2,2-Dimethyloctane | I10 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 2,4-Dimethyloctane | I10 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| n-Butylcyclopentane | N9 | 0.0003 | 0.0016 | 0.000 | 0.000 |
| 3,3-Dimethyloctane | I10 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| n-Propylbenzene | A9 | 0.0002 | 0.0010 | 0.000 | 0.000 |
| 3,6-Dimethyloctane | I10 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 3-Methyl-5-ethylheptane | I10 | 0.0004 | 0.0025 | 0.000 | 0.000 |
| 1,3-Methylethylbenzene | A9 | 0.0002 | 0.0010 | 0.000 | 0.000 |
| 1,4-Methylethylbenzene | A9 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| 1,3,5-Trimethylbenzene | A9 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| 5-Methylnonane | I10 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 1,2-Methylethylbenzene | A9 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| 2-Methylnonane | I10 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 3-Ethyloctane | I10 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 3-Methylnonane | I10 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| 1,2,4-Trimethylbenzene | A9 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| t-Butylbenzene | A10 | 0.0002 | 0.0012 | 0.000 | 0.000 |
| i-Butylcyclohexane | N10 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| UnknownC9s | U9 | 0.0010 | 0.0056 | 0.001 | 0.001 |
| n-Decane | P10 | 0.0004 | 0.0025 | 0.000 | 0.000 |
| 1,2,3-Trimethylbenzene | A9 | 0.0001 | 0.0005 | 0.000 | 0.000 |
| Sec-Butylcyclohexane | A10 | 0.0001 | 0.0006 | 0.000 | 0.000 |
| UnknownC10s | U10 | 0.0008 | 0.0050 | 0.000 | 0.000 |
| n-Undecane | P11 | 0.0002 | 0.0013 | 0.000 | 0.000 |
| UnknownC11s | U11 | 0.0001 | 0.0007 | 0.000 | 0.000 |
| n-Dodecane | P12 | 0.0001 | 0.0007 | 0.000 | 0.000 |
| TOTAL | | 100.00000 | 100.00000 | 6.9181 | 6.9558 |

| **BTEX COMPONENTS** | **MOLE%** | **WT%** |
|---|---|---|
| BENZENE | 0.0162 | 0.0550 |
| TOLUENE | 0.0095 | 0.0380 |
| ETHYLBENZENE | 0.0009 | 0.0042 |
| XYLENES | 0.0022 | 0.0101 |
| TOTAL BTEX | 0.0288 | 0.1073 |

| | | | |
|---|---|---|---|
| | **BTU @** | 14.650 | 14.730 |
| **LOW** | NET DRY REAL : | 1184.0 **/scf** | 1190.4 **/scf** |
| | NET WET REAL : | 1163.3 **/scf** | 1169.7 **/scf** |
| **HIGH** | GROSS DRY REAL : | 1302.7 **/scf** | 1309.8 **/scf** |
| | GROSS WET REAL : | 1279.9 **/scf** | 1287.0 **/scf** |
| | NET DRY REAL : | 19557.4 **/lb** | 19664.2 **/lb** |
| | GROSS DRY REAL : | 21520.9 **/lb** | 21638.4 **/lb** |
| | RELATIVE DENSITY (AIR=1): | | 0.7931 |
| | COMPRESSIBILITY FACTOR : | | 0.99598 |

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

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993) ; ASTM D6730*

*THIS DATA HAS BEEN ACQUIRED THROUGH APPLICATION OF CURRENT STATE-OF-THE-ART ANALYTICAL TECHNIQUES. THE USE OF THIS INFORMATION IS THE RESPONSIBLITY OF THE USER. EMPACT ANALYTICAL SYSTEMS, ASSUMES NO RESPONSIBLITY FOR ACCURACY OF THE REPORTED INFORMATION NOR ANY CONSEQUENCES OF IT'S APPLICATION.*



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