# SPR CRUDE OIL COMPREHENSIVE ANALYSIS

Sample ID **MLI001** **BRYAN MOUND, SWEET** **Date of Assay** **5/15/1998**

| Crude | | | | | | |
|---|---|---|---|---|---|---|
| Specific Gravity, 60/60° F | 0.8454 | Ni, ppm | 3.41 | RVP, psi @ 100° F | | 5.28 |
| API Gravity | 35.9 | V, ppm | 4.12 | Acid number, mg KOH/g | | 0.10 |
| Sulfur, Wt. % | 0.33 | Fe, ppm | 0.822 | Mercaptan Sulfur, ppm | | 7.26 |
| Nitrogen, Wt. % | 0.111 | Cu, ppm | na | $H_2S$ Sulfur, ppm | | na |
| Micro Car. Res., Wt. % | 2.21 | Org. Cl, ppm | na | Viscosity: 77° F | 6.99 cSt | |
| Pour Point, °F | 25 | UOP "K" | 11.96 | 100° F | 4.666 cSt | |

| Fraction | Gas | 1 | 2 | 3 | 4 | 5 | 6 | Residuum | Residuum |
|---|---|---|---|---|---|---|---|---|---|
| Cut Temp. | $C_2$ - $C_4$ | C5 - 175° F | 175° - 250° F | 250° - 375° F | 375° - 530° F | 530° - 650° F | 650° - 1050° F | 650° F+ | 1050° F+ |
| Vol. % | 1.9 | 7.0 | 8.2 | 14.1 | 16.8 | 12.5 | 28.8 | 39.6 | 10.8 |
| Vol. Sum % | 1.9 | 8.8 | 17.0 | 31.1 | 47.9 | 60.4 | 89.2 | 100.0 | 100.0 |
| Wt. % | 1.3 | 5.5 | 7.2 | 12.9 | 16.5 | 12.7 | 31.1 | 43.9 | 12.8 |
| Wt. Sum % | 1.3 | 6.8 | 14.0 | 26.9 | 43.4 | 56.1 | 87.2 | 100.0 | 100.0 |
| Specific Gravity, 60/60° F | | 0.6747 | 0.7391 | 0.7774 | 0.8275 | 0.8604 | 0.9143 | 0.9371 | 0.998 |
| API Gravity | | 78.2 | 60.0 | 50.5 | 39.5 | 33.0 | 23.3 | 19.5 | 10.4 |
| Sulfur, Wt. % | | 0.0013 | 0.0018 | 0.0113 | 0.07 | 0.25 | 0.51 | 0.65 | 0.98 |
| Molecular Weight | | 96 | 111 | 134 | 185 | 245 | 403 | | |
| Hydrogen, Wt. % | | 15.88 | 14.73 | na | | | | 12.91 | 10.82 |
| Mercaptan Sulfur, ppm | | 3.6 | 8.8 | 27.8 | 19.4 | | | | |
| $H_2S$ Sulfur, ppm | | < 0.1 | < 0.1 | < 0.1 | < 0.1 | | | | |
| Organic Cl, ppm | | 4.1 | 1.0 | 0.1 | < 0.1 | | | | |
| Research Octane Number* | | 69.9 | 62.4 | 46.7 | | | | | |
| Motor Octane Number* | | 67.5 | 60.0 | 44.8 | | | | | |
| Flash Point, ° F | | | | 77 | 172 | 246 | 301 | | |
| Aniline Point, ° F | | | | 123.0 | 143.2 | 163.0 | 194.1 | | |
| Acid Number, mg KOH/g | | | | | 0.04 | 0.10 | | | |
| Cetane Index | | | | | 45.5 | 51.0 | | | |
| Diesel Index | | | | 62.1 | 56.6 | 53.7 | | | |
| Naphthalenes, Vol. % | | | | | 4.83 | 10.24 | | | |
| Smoke point, mm | | | | | 19.9 | 15.6 | | | |
| Nitrogen, Wt. % | | | | | 0.0006 | 0.010 | 0.154 | 0.276 | 0.572 |
| Viscosity, cSt 77° F | | | | | 2.537 | | | | |
| 100° F | | | | | 1.990 | 5.691 | | | |
| 130° F | | | | | | 3.814 | 39.07 | 109.5 | |
| 180° F | | | | | | | 14.77 | 32.12 | 2923 |
| 210° F | | | | | | | | | 920.6 |
| 250° F | | | | | | | | | 143.5 |
| Freezing Point, °F | | | | | -28.1 | | | | |
| Cloud Point, °F | | | | | | 31.1 | 105 | | |
| Pour Point, °F | | | | | | 27.0 | 101 | 85 | |
| Ni, ppm | | | | | | | | 7.66 | 25.8 |
| V, ppm | | | | | | | | 9.29 | 31.4 |
| Fe, ppm | | | | | | | | 6.41 | 21.6 |
| Cu, ppm | | | | | | | | na | na |
| Micro Car. Res., Wt. % | | | | | | | | 5.00 | 17.25 |

## Compositional Analysis Report (MLI001)

| | Gas | 1 | 2 | 3 |
|---|---|---|---|---|
| | IBP 59° F | 59 - 175° F | 175° - 250° F | 250° - 375° F |
| **Paraffins, Wt.%** | 99.85 | 77.86 | 52.61 | 41.48 |
| **Naphthenes, Wt.%** | 0.15 | 20.86 | 40.54 | 36.50 |
| **Aromatics, Wt.%** | 0.00 | 1.28 | 6.86 | 22.02 |
| **Benzene Precursor Index** | 0.03 | 11.14 | 5.14 | 0.02 |

### Composition, Wt.%

| | | | | |
|---|---|---|---|---|
| Ethane | 0.21 | - | - | - |
| Propane | 16.33 | 0.00 | 0.00 | 0.00 |
| N-Butane | 54.66 | 1.47 | 0.00 | 0.00 |
| I-Butane | 14.43 | 0.08 | 0.00 | 0.00 |
| N-Pentane | 4.39 | 18.44 | 0.04 | 0.00 |
| I-Pentane | 9.36 | 12.64 | 0.01 | 0.00 |
| Cyclopentane | 0.16 | 4.16 | 0.05 | 0.00 |
| N-Hexane | 0.05 | 15.87 | 2.93 | 0.00 |
| 2-Methylpentane | 0.10 | 10.93 | 0.63 | 0.00 |
| 3-Methylpentane | 0.04 | 6.59 | 0.58 | 0.00 |
| 2,2-Dimethtylbutane | 0.01 | 0.16 | 0.00 | 0.00 |
| 2,3-Dimethlybutane | 0.04 | 3.03 | 0.13 | 0.00 |
| Methylcyclopentane | 0.02 | 10.50 | 2.98 | 0.00 |
| Cyclohexane | 0.01 | 5.16 | 4.99 | 0.01 |
| Benzene | 0.00 | 1.54 | 1.37 | 0.00 |
| N-Heptane | 0.00 | 1.18 | 12.64 | 0.13 |
| 2-Methylhexane | 0.00 | 1.39 | 4.82 | 0.02 |
| 3-Methylhexane | 0.00 | 1.22 | 5.38 | 0.02 |
| 2-2-Dimethylpentane | 0.00 | 0.30 | 0.23 | 0.00 |
| 2,3-Dimethylpentane | 0.00 | 0.85 | 2.85 | 0.01 |
| 2,4-Dimethylpentane | 0.00 | 0.32 | 0.30 | 0.00 |
| 3,3-Dimethylpentane | 0.00 | 0.11 | 0.23 | 0.00 |
| 2,3,3-Trimethylbutane | 0.00 | 0.04 | 0.04 | 0.00 |
| 3-Ethylpentane | 0.00 | 0.05 | 0.28 | 0.00 |
| 1,1-Dimethylcyclopentane | 0.00 | 0.04 | 0.09 | 0.00 |
| 1,Cis-2-DimethylcyC5 | 0.00 | 0.07 | 0.82 | 0.01 |
| 1,Cis-3-DimethylcyC5 | 0.00 | 0.57 | 2.48 | 0.01 |
| 1-Trans-2-DimethcyC5 | 0.00 | 0.92 | 4.08 | 0.02 |
| 1-Trans-3-DimethcyC5 | 0.00 | 0.80 | 3.08 | 0.01 |
| Ethylcyclopentane | 0.00 | 0.11 | 2.18 | 0.04 |
| Methylcyclohexane | 0.00 | 1.14 | 17.08 | 0.24 |
| Toluene (Methylbenzene) | 0.00 | 0.12 | 5.94 | 0.31 |
| N-Octane | 0.00 | 0.02 | 3.77 | 1.54 |
| I-Octane | 0.00 | 0.14 | 14.16 | 2.10 |
| Methyl-Ethylcyclopentane | 0.00 | 0.04 | 4.22 | 0.63 |
| Dimethylcyclohexane | 0.00 | 0.00 | 0.65 | 0.97 |
| P-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| M-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| O-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 | 0.00 |
| N-Nonane | 0.00 | 0.00 | 0.00 | 0.00 |
| C9 isoparaffins | 0.00 | 0.00 | 0.71 | 1.54 |

# SPR CRUDE OIL COMPREHENSIVE ANALYSIS

Sample ID **MLI002** **BRYAN MOUND, SOUR** **Date of Assay** **5/15/1998**

**Crude**

| | | | | | | |
|---|---|---|---|---|---|---|
| Specific Gravity, 60/60° F | 0.8580 | Ni, ppm | 10.9 | RVP, psi @ 100° F | | 4.03 |
| API Gravity | 33.4 | V, ppm | 49.3 | Acid number, mg KOH/g | | 0.10 |
| Sulfur, Wt. % | 1.38 | Fe, ppm | 0.760 | Mercaptan Sulfur, ppm | | 16.0 |
| Nitrogen, Wt. % | 0.147 | Cu, ppm | na | $H_2S$ Sulfur, ppm | | na |
| Micro Car. Res., Wt. % | 4.37 | Org. Cl, ppm | na | Viscosity: 77° F | 8.342 cSt | |
| Pour Point, °F | -5 | UOP "K" | 11.89 | 100° F | 5.991 cSt | |

| Fraction | Gas | 1 | 2 | 3 | 4 | 5 | 6 | Residuum | Residuum |
|---|---|---|---|---|---|---|---|---|---|
| Cut Temp. | $C_2$ - $C_4$ | C5 - 175° F | 175° - 250° F | 250° - 375° F | 375° - 530° F | 530° - 650° F | 650° - 1050° F | 650° F+ | 1050° F+ |
| Vol. % | 1.4 | 6.7 | 7.3 | 15.5 | 15.8 | 9.9 | 28.6 | 43.5 | 14.9 |
| Vol. Sum % | 1.4 | 8.1 | 15.4 | 30.8 | 46.6 | 56.5 | 85.1 | 100.0 | 100.0 |
| Wt. % | 1.0 | 5.2 | 6.2 | 13.9 | 15.1 | 10.0 | 30.8 | 48.7 | 17.9 |
| Wt. Sum % | 1.0 | 6.1 | 12.3 | 26.2 | 41.3 | 51.3 | 82.1 | 100.0 | 100.0 |
| Specific Gravity, 60/60° F | | 0.6652 | 0.7279 | 0.7716 | 0.8205 | 0.8608 | 0.9247 | 0.9616 | 1.033 |
| API Gravity | | 81.2 | 62.9 | 51.9 | 41.0 | 32.9 | 21.5 | 15.7 | 5.5 |
| Sulfur, Wt. % | | 0.0057 | 0.0074 | 0.0457 | 0.40 | 1.10 | 1.93 | 2.46 | 3.38 |
| Molecular Weight | | 97 | 111 | 135 | 184 | 244 | 413 | | |
| Hydrogen, Wt. % | | 16.11 | 14.94 | na | | | | 12.03 | 9.72 |
| Mercaptan Sulfur, ppm | | 25.8 | 30.9 | 56.4 | 19.8 | | | | |
| $H_2S$ Sulfur, ppm | | 3.3 | 6.4 | 4.0 | < 0.1 | | | | |
| Organic Cl, ppm | | 15.0 | 3.8 | < 0.1 | 1.0 | | | | |
| Research Octane Number* | | 64.6 | 53.6 | 46.6 | | | | | |
| Motor Octane Number* | | 63.5 | 52.0 | 43.0 | | | | | |
| Flash Point, ° F | | | | 79 | 172 | 246 | 303 | | |
| Aniline Point, ° F | | | | 125.9 | 146.7 | 160.3 | 180.8 | | |
| Acid Number, mg KOH/g | | | | | 0.02 | 0.04 | | | |
| Cetane Index | | | | | 49.2 | 50.6 | | | |
| Diesel Index | | | | 65.3 | 60.1 | 52.7 | | | |
| Naphthalenes, Vol. % | | | | | 4.06 | 10.40 | | | |
| Smoke point, mm | | | | | 20.1 | 15.1 | | | |
| Nitrogen, Wt. % | | | | | 0.0015 | 0.016 | 0.161 | 0.313 | 0.574 |
| Viscosity, cSt 77° F | | | | | 2.336 | | | | |
| 100° F | | | | | 1.874 | 4.970 | | | |
| 130° F | | | | | | 3.360 | 30.21 | 193.7 | |
| 180° F | | | | | | | 11.96 | 50.97 | 27920 |
| 210° F | | | | | | | | | 5708 |
| 250° F | | | | | | | | | 469.6 |
| Freezing Point, °F | | | | | -26.03 | | | | |
| Cloud Point, °F | | | | | | 26.6 | 97 | | |
| Pour Point, °F | | | | | | 22.0 | 87 | 56 | |
| Ni, ppm | | | | | | | | 22.7 | 61.6 |
| V, ppm | | | | | | | | 102 | 277 |
| Fe, ppm | | | | | | | | 2.792 | 7.87 |
| Cu, ppm | | | | | | | | na | na |
| Micro Car. Res., Wt. % | | | | | | | | 9.03 | 24.41 |

## Compositional Analysis Report (MLI002)

| | Gas | 1 | 2 | 3 |
|---|---|---|---|---|
| | IBP 59° F | 59 - 175° F | 175° - 250° F | 250° - 375° F |
| **Paraffins, Wt.%** | 99.90 | 87.22 | 67.40 | 62.27 |
| **Naphthenes, Wt.%** | 0.10 | 11.68 | 25.12 | 13.59 |
| **Aromatics, Wt.%** | 0.00 | 1.11 | 7.49 | 24.14 |
| **Benzene Precursor Index** | 0.03 | 8.45 | 3.53 | 0.01 |

### Composition, Wt.%

| | | | | |
|---|---|---|---|---|
| Ethane | 0.17 | - | - | - |
| Propane | 12.96 | 0.00 | 0.00 | 0.00 |
| N-Butane | 56.18 | 1.24 | 0.00 | 0.00 |
| I-Butane | 12.90 | 0.06 | 0.00 | 0.00 |
| N-Pentane | 6.26 | 21.46 | 0.05 | 0.00 |
| I-Pentane | 10.91 | 12.04 | 0.01 | 0.00 |
| Cyclopentane | 0.11 | 2.30 | 0.03 | 0.00 |
| N-Hexane | 0.08 | 20.89 | 4.07 | 0.00 |
| 2-Methylpentane | 0.14 | 12.82 | 0.78 | 0.00 |
| 3-Methylpentane | 0.06 | 8.04 | 0.74 | 0.00 |
| 2,2-Dimethtylbutane | 0.01 | 0.18 | 0.00 | 0.00 |
| 2,3-Dimethlybutane | 0.03 | 1.77 | 0.08 | 0.00 |
| Methylcyclopentane | 0.02 | 6.22 | 1.86 | 0.00 |
| Cyclohexane | 0.00 | 2.81 | 2.86 | 0.01 |
| Benzene | 0.00 | 1.34 | 1.25 | 0.00 |
| N-Heptane | 0.00 | 1.74 | 19.68 | 0.27 |
| 2-Methylhexane | 0.00 | 1.55 | 5.68 | 0.03 |
| 3-Methylhexane | 0.00 | 1.36 | 6.35 | 0.04 |
| 2-2-Dimethylpentane | 0.00 | 0.33 | 0.27 | 0.00 |
| 2,3-Dimethylpentane | 0.00 | 0.95 | 3.36 | 0.02 |
| 2,4-Dimethylpentane | 0.00 | 0.36 | 0.35 | 0.00 |
| 3,3-Dimethylpentane | 0.00 | 0.13 | 0.27 | 0.00 |
| 2,3,3-Trimethylbutane | 0.00 | 0.04 | 0.05 | 0.00 |
| 3-Ethylpentane | 0.00 | 0.06 | 0.33 | 0.00 |
| 1,1-Dimethylcyclopentane | 0.00 | 0.02 | 0.05 | 0.00 |
| 1,Cis-2-DimethylcyC5 | 0.00 | 0.04 | 0.46 | 0.01 |
| 1,Cis-3-DimethylcyC5 | 0.00 | 0.30 | 1.39 | 0.01 |
| 1-Trans-2-DimethcyC5 | 0.00 | 0.49 | 2.29 | 0.01 |
| 1-Trans-3-DimethcyC5 | 0.00 | 0.43 | 1.73 | 0.01 |
| Ethylcyclopentane | 0.00 | 0.06 | 1.22 | 0.03 |
| Methylcyclohexane | 0.00 | 0.64 | 10.14 | 0.19 |
| Toluene (Methylbenzene) | 0.00 | 0.13 | 6.47 | 0.45 |
| N-Octane | 0.00 | 0.04 | 6.56 | 3.58 |
| I-Octane | 0.00 | 0.14 | 15.08 | 3.00 |
| Methyl-Ethylcyclopentane | 0.00 | 0.04 | 4.46 | 0.89 |
| Dimethylcyclohexane | 0.00 | 0.00 | 0.57 | 1.12 |
| P-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| M-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| O-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 | 0.00 |
| N-Nonane | 0.00 | 0.00 | 0.00 | 0.00 |
| C9 isoparaffins | 0.00 | 0.00 | 1.23 | 3.56 |

# SPR CRUDE OIL ANALYSIS

Sample ID **MLI003 Bryan Mound, Maya** **Date of Assay** **3/13/1998**

**Crude**

| | | | | | | |
|---|---|---|---|---|---|---|
| Specific Gravity, 60/60° F | 0.9176 | Ni, ppm | 51.1 | RVP, psi @ 100° F | | 2.58 |
| API Gravity | 22.7 | V, ppm | 266.0 | Acid number, mg KOH/g | | 0.12 |
| Sulfur, Wt. % | 3.17 | Fe, ppm | 1.100 | Mercaptan Sulfur, ppm | | 16.3 |
| Nitrogen, Wt. % | 0.331 | Cu, ppm | na | $H_2S$ Sulfur, ppm | | na |
| Micro Car. Res., Wt. % | 10.60 | Org. Cl, ppm | na | Viscosity: 77° F | 123.4 cSt | |
| Pour Point, °F | -5 | UOP "K" | 11.65 | 100° F | 55.230 cSt | |

| Fraction | Gas | 1 | 2 | 3 | 4 | 5 | 6 | Residuum | Residuum |
|---|---|---|---|---|---|---|---|---|---|
| Cut Temp. | $C_2$ - $C_4$ | C5 - 175° F | 175° - 250° F | 250° - 375° F | 375° - 530° F | 530° - 650° F | 650° - 1050° F | 650° F+ | 1050° F+ |
| Vol. % | 2.1 | 5.2 | 4.2 | 10.1 | 12.1 | 8.9 | 29.1 | 57.5 | 28.4 |
| Vol. Sum % | 2.1 | 7.2 | 11.4 | 21.5 | 33.6 | 42.5 | 71.6 | 100.0 | 100.0 |
| Wt. % | 1.3 | 3.8 | 3.3 | 8.5 | 11.0 | 8.5 | 30.1 | 63.7 | 33.6 |
| Wt. Sum % | 1.3 | 5.0 | 8.3 | 16.8 | 27.8 | 36.3 | 66.4 | 100.0 | 100.0 |
| Specific Gravity, 60/60° F | | 0.6616 | 0.7226 | 0.7693 | 0.8241 | 0.8692 | 0.9420 | 1.0090 | 1.078 |
| API Gravity | | 82.4 | 64.3 | 52.5 | 40.2 | 31.3 | 18.7 | 8.7 | -0.2 |
| Sulfur, Wt. % | | 0.0054 | 0.0292 | 0.2344 | 1.01 | 1.90 | 3.08 | 4.52 | 5.80 |
| Molecular Weight | | 97 | 111 | 137 | 184 | 245 | 371 | | |
| Hydrogen, Wt. % | | 16.18 | 15.11 | na | | | | 10.45 | 8.41 |
| Mercaptan Sulfur, ppm | | 63.6 | 109.9 | 103.6 | 10.9 | | | | |
| $H_2S$ Sulfur, ppm | | 2.0 | 2.0 | 1.1 | < 0.1 | | | | |
| Organic Cl, ppm | | na | 10.3 | 5.4 | 0.1 | | | | |
| Research Octane Number | | 65.9 | 52.4 | 28.8 | | | | | |
| Motor Octane Number | | 64.7 | 50.9 | 26.6 | | | | | |
| Flash Point, ° F | | | | 82 | 171 | 247 | 300 | | |
| Aniline Point, ° F | | | | 124.4 | 137.9 | 148.8 | 166.3 | | |
| Acid Number, mg KOH/g | | | | | 0.02 | 0.03 | | | |
| Cetane Index | | | | | 47.3 | 48.1 | | | |
| Diesel Index | | | | 65.3 | 55.4 | 46.6 | | | |
| Naphthalenes, Vol. % | | | | | 3.82 | 10.62 | | | |
| Smoke point, mm | | | | | 19.0 | 14.3 | | | |
| Nitrogen, Wt. % | | | | | 0.0027 | 0.028 | 0.231 | 0.524 | 0.787 |
| Viscosity, cSt 77° F | | | | | 2.266 | | | | |
| 100° F | | | | | 1.717 | 5.038 | | | |
| 130° F | | | | | | 3.326 | 41.82 | 9416 | |
| 180° F | | | | | | | 14.42 | 922.0 | |
| 210° F | | | | | | | | | 770300 |
| 250° F | | | | | | | | | 24700 |
| Freezing Point, °F | | | | | -32.3 | | | | |
| Cloud Point, °F | | | | | | 25.2 | 91 | | |
| Pour Point, °F | | | | | | 21.2 | 87 | 100 | |
| Ni, ppm | | | | | | | | 79.7 | 151 |
| V, ppm | | | | | | | | 418 | 792 |
| Fe, ppm | | | | | | | | 10.8 | 20.4 |
| Cu, ppm | | | | | | | | na | na |
| Micro Car. Res., Wt. % | | | | | | | | 17.99 | 32.70 |

## Compositional Analysis Report (MLI003)

| | Gas | 1 | 2 | 3 |
|---|---|---|---|---|
| | IBP 59° F | 59 - 175° F | 175° - 250° F | 250° - 375° F |
| **Paraffins, Wt.%** | 99.94 | 88.40 | 69.40 | 65.80 |
| **Naphthenes, Wt.%** | 0.06 | 10.76 | 25.10 | 16.28 |
| **Aromatics, Wt.%** | 0.00 | 0.84 | 5.50 | 17.93 |
| **Benzene Precursor Index** | 0.02 | 7.82 | 4.12 | 0.01 |

### Composition - wt%

| | | | | |
|---|---|---|---|---|
| Ethane | 3.10 | - | - | - |
| Propane | 27.90 | 0.00 | 0.00 | 0.00 |
| N-Butane | 45.04 | 1.77 | 0.00 | 0.00 |
| I-Butane | 12.96 | 0.11 | 0.00 | 0.00 |
| N-Pentane | 3.77 | 23.05 | 0.07 | 0.00 |
| I-Pentane | 6.98 | 13.73 | 0.01 | 0.00 |
| Cyclopentane | 0.06 | 2.43 | 0.04 | 0.00 |
| N-Hexane | 0.04 | 19.19 | 4.93 | 0.01 |
| 2-Methylpentane | 0.08 | 12.83 | 1.03 | 0.00 |
| 3-Methylpentane | 0.04 | 8.62 | 1.04 | 0.00 |
| 2,2-Dimethtylbutane | 0.00 | 0.00 | 0.00 | 0.00 |
| 2,3-Dimethlybutane | 0.02 | 1.84 | 0.11 | 0.00 |
| Methylcyclopentane | 0.01 | 6.00 | 2.37 | 0.00 |
| Cyclohexane | 0.00 | 2.30 | 3.09 | 0.01 |
| Benzene | 0.00 | 1.05 | 1.30 | 0.00 |
| N-Heptane | 0.00 | 1.37 | 20.44 | 0.37 |
| 2-Methylhexane | 0.00 | 1.26 | 6.10 | 0.04 |
| 3-Methylhexane | 0.00 | 1.11 | 6.81 | 0.05 |
| 2-2-Dimethylpentane | 0.00 | 0.27 | 0.29 | 0.00 |
| 2,3-Dimethylpentane | 0.00 | 0.78 | 3.60 | 0.02 |
| 2,4-Dimethylpentane | 0.00 | 0.29 | 0.38 | 0.00 |
| 3,3-Dimethylpentane | 0.00 | 0.10 | 0.29 | 0.00 |
| 2,3,3-Trimethylbutane | 0.00 | 0.04 | 0.05 | 0.00 |
| 3-Ethylpentane | 0.00 | 0.05 | 0.35 | 0.00 |
| 1,1-Dimethylcyclopentane | 0.00 | 0.02 | 0.06 | 0.00 |
| 1,Cis-2-DimethylcycloC5 | 0.00 | 0.03 | 0.53 | 0.01 |
| 1,Cis-3-DimethylcycloC5 | 0.00 | 0.26 | 1.59 | 0.01 |
| 1-Trans-2-DimethcycloC5 | 0.00 | 0.42 | 2.62 | 0.02 |
| 1-Trans-3-DimethcycloC5 | 0.00 | 0.37 | 1.98 | 0.01 |
| Ethylcyclopentane | 0.00 | 0.05 | 1.40 | 0.05 |
| Methylcyclohexane | 0.00 | 0.44 | 9.10 | 0.23 |
| Toluene (Methylbenzene) | 0.00 | 0.07 | 4.64 | 0.43 |
| N-Octane | 0.00 | 0.02 | 5.54 | 4.07 |
| I-Octane | 0.00 | 0.10 | 13.77 | 3.68 |
| Methyl-Ethylcyclopentane | 0.00 | 0.02 | 3.24 | 0.87 |
| Dimethylcyclohexane | 0.00 | 0.00 | 0.67 | 1.77 |
| P-Xylene | 0.00 | 0.00 | 0.32 | 1.36 |
| M-Xylene | 0.00 | 0.00 | 0.12 | 0.57 |
| O-Xylene | 0.00 | 0.00 | 0.08 | 0.81 |
| Ethylbenzene | 0.00 | 0.00 | 0.19 | 0.58 |
| N-Nonane | 0.00 | 0.00 | 0.18 | 4.12 |
| C9 Isoparaffins | 0.00 | 0.00 | 1.54 | 6.02 |
| Isobutylcyclopentane | 0.00 | 0.00 | 0.03 | 0.13 |
| Isopropylcyclohexane | 0.00 | 0.00 | 0.11 | 1.35 |
| C9 Aromatics | 0.00 | 0.00 | 0.00 | 0.09 |

# SPR CRUDE OIL COMPREHENSIVE ANALYSIS

Sample ID **MLI004** **WEST HACKBERRY, SWEET** **Date of Assay** **5/15/1998**

**Crude**

| | | | | | | |
|---|---|---|---|---|---|---|
| Specific Gravity, 60/60° F | 0.8397 | Ni, ppm | 2.61 | RVP, psi @ 100° F | | 5.27 |
| API Gravity | 37.0 | V, ppm | 4.07 | Acid number, mg KOH/g | | 0.09 |
| Sulfur, Wt. % | 0.29 | Fe, ppm | 1.50 | Mercaptan Sulfur, ppm | | 3.8 |
| Nitrogen, Wt. % | 0.102 | Cu, ppm | na | $H_2S$ Sulfur, ppm | | na |
| Micro Car. Res., Wt. % | 1.89 | Org. Cl, ppm | na | Viscosity: 77° F | 5.714 cSt | |
| Pour Point, °F | 28 | UOP "K" | 11.95 | 100° F | 3.913 cSt | |

| Fraction | Gas | 1 | 2 | 3 | 4 | 5 | 6 | Residuum | Residuum |
|---|---|---|---|---|---|---|---|---|---|
| Cut Temp. | $C_2$ - $C_4$ | C5 - 175° F | 175° - 250° F | 250° - 375° F | 375° - 530° F | 530° - 650° F | 650° - 1050° F | 650° F+ | 1050° F+ |
| Vol. % | 2.5 | 8.8 | 8.7 | 13.9 | 17.6 | 10.4 | 28.2 | 38.0 | 9.8 |
| Vol. Sum % | 2.5 | 11.4 | 20.1 | 34.0 | 51.6 | 62.1 | 90.3 | 100.0 | 100.0 |
| Wt. % | 1.7 | 7.1 | 7.7 | 12.9 | 17.4 | 10.7 | 30.7 | 42.3 | 11.6 |
| Wt. Sum % | 1.7 | 8.8 | 16.5 | 29.4 | 46.9 | 57.5 | 88.3 | 99.8 | 99.8 |
| Specific Gravity, 60/60° F | | 0.6710 | 0.7422 | 0.7794 | 0.8306 | 0.8593 | 0.9148 | 0.9351 | 0.995 |
| API Gravity | | 79.4 | 59.2 | 50.1 | 38.9 | 33.2 | 23.2 | 19.8 | 10.8 |
| Sulfur, Wt. % | | 0.0012 | 0.0010 | 0.0064 | 0.07 | 0.20 | 0.47 | 0.60 | 0.95 |
| Molecular Weight | | 96 | 111 | 133 | 184 | 244 | 415 | | |
| Hydrogen, Wt. % | | 15.91 | 14.55 | na | | | | 12.99 | 10.91 |
| Mercaptan Sulfur, ppm | | 2.5 | 5.4 | 10.9 | 8.9 | | | | |
| $H_2S$ Sulfur, ppm | | 0.0 | 0.0 | 0.1 | 0.0 | | | | |
| Organic Cl, ppm | | 14.5 | 4.3 | 0.1 | 0.7 | | | | |
| Research Octane Number* | | 69.2 | 62.1 | 52.0 | | | | | |
| Motor Octane Number* | | 67.3 | 59.5 | 48.6 | | | | | |
| Flash Point, ° F | | | | 77 | 173 | 245 | 302 | | |
| Aniline Point, ° F | | | | 120.5 | 144.2 | 163.4 | 192.5 | | |
| Acid Number, mg KOH/g | | | | | 0.04 | 0.11 | | | |
| Cetane Index | | | | | 45.5 | 51.1 | | | |
| Diesel Index | | | | 60.3 | 56.0 | 54.2 | | | |
| Naphthalenes, Vol. % | | | | | 5.29 | 9.73 | | | |
| Smoke point, mm | | | | | 19.0 | 15.4 | | | |
| Nitrogen, Wt. % | | | | | 0.0007 | 0.009 | 0.166 | 0.271 | 0.551 |
| Viscosity, cSt 77° F | | | | | 2.693 | | | | |
| 100° F | | | | | 2.108 | 5.357 | | | |
| 130° F | | | | | | 3.607 | 36.99 | 92.87 | |
| 180° F | | | | | | | 14.22 | 27.84 | 2527 |
| 210° F | | | | | | | | | 834.2 |
| 250° F | | | | | | | | | 139.5 |
| Freezing Point, °F | | | | | -23.9 | | | | |
| Cloud Point, °F | | | | | | 29.3 | 106 | | |
| Pour Point, °F | | | | | | 22.5 | 102 | 92 | |
| Ni, ppm | | | | | | | | 6.40 | 23.3 |
| V, ppm | | | | | | | | 9.73 | 35.4 |
| Fe, ppm | | | | | | | | 6.48 | 22.9 |
| Cu, ppm | | | | | | | | na | na |
| Micro Car. Res., Wt. % | | | | | | | | 4.52 | 16.20 |

## Compositional Analysis Report (MLI004)

| | Gas | 1 | 2 | 3 |
|---|---|---|---|---|
| | IBP 59° F | 59 - 175° F | 175° - 250° F | 250° - 375° F |
| **Paraffins, Wt.%** | 99.88 | 80.11 | 50.92 | 28.89 |
| **Naphthenes, Wt.%** | 0.11 | 18.14 | 39.93 | 45.85 |
| **Aromatics, Wt.%** | 0.00 | 1.75 | 9.15 | 25.26 |
| **Benzene Precursor Index** | 0.03 | 10.61 | 6.18 | 0.02 |

### Composition, Wt.%

| | | | | |
|---|---|---|---|---|
| Ethane | 0.17 | - | - | - |
| Propane | 14.12 | 0.00 | 0.00 | 0.00 |
| N-Butane | 57.43 | 1.66 | 0.00 | 0.00 |
| I-Butane | 13.41 | 0.08 | 0.00 | 0.00 |
| N-Pentane | 4.94 | 22.27 | 0.06 | 0.00 |
| I-Pentane | 9.50 | 13.76 | 0.01 | 0.00 |
| Cyclopentane | 0.12 | 3.39 | 0.05 | 0.00 |
| N-Hexane | 0.05 | 15.59 | 3.33 | 0.01 |
| 2-Methylpentane | 0.09 | 11.22 | 0.75 | 0.00 |
| 3-Methylpentane | 0.04 | 6.73 | 0.68 | 0.00 |
| 2,2-Dimethtylbutane | 0.01 | 0.20 | 0.00 | 0.00 |
| 2,3-Dimethlybutane | 0.01 | 1.12 | 0.05 | 0.00 |
| Methylcyclopentane | 0.02 | 9.18 | 3.02 | 0.01 |
| Cyclohexane | 0.01 | 5.18 | 5.79 | 0.02 |
| Benzene | 0.00 | 2.16 | 2.22 | 0.01 |
| N-Heptane | 0.00 | 1.10 | 13.68 | 0.34 |
| 2-Methylhexane | 0.00 | 1.06 | 4.27 | 0.04 |
| 3-Methylhexane | 0.00 | 0.93 | 4.77 | 0.05 |
| 2-2-Dimethylpentane | 0.00 | 0.23 | 0.21 | 0.00 |
| 2,3-Dimethylpentane | 0.00 | 0.65 | 2.52 | 0.02 |
| 2,4-Dimethylpentane | 0.00 | 0.24 | 0.26 | 0.00 |
| 3,3-Dimethylpentane | 0.00 | 0.09 | 0.20 | 0.00 |
| 2,3,3-Trimethylbutane | 0.00 | 0.03 | 0.03 | 0.00 |
| 3-Ethylpentane | 0.00 | 0.04 | 0.25 | 0.00 |
| 1,1-Dimethylcyclopentane | 0.00 | 0.03 | 0.08 | 0.00 |
| 1,Cis-2-DimethylcyC5 | 0.00 | 0.05 | 0.68 | 0.02 |
| 1,Cis-3-DimethylcyC5 | 0.00 | 0.40 | 2.04 | 0.02 |
| 1-Trans-2-DimethcyC5 | 0.00 | 0.65 | 3.35 | 0.04 |
| 1-Trans-3-DimethcyC5 | 0.00 | 0.57 | 2.53 | 0.02 |
| Ethylcyclopentane | 0.00 | 0.07 | 1.79 | 0.09 |
| Methylcyclohexane | 0.00 | 1.03 | 17.81 | 0.61 |
| Toluene (Methylbenzene) | 0.00 | 0.13 | 7.60 | 0.96 |
| N-Octane | 0.00 | 0.02 | 4.36 | 4.35 |
| I-Octane | 0.00 | 0.09 | 11.37 | 4.13 |
| Methyl-Ethylcyclopentane | 0.00 | 0.04 | 4.47 | 1.62 |
| Dimethylcyclohexane | 0.00 | 0.00 | 0.63 | 2.27 |
| P-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| M-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| O-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 | 0.00 |
| N-Nonane | 0.00 | 0.00 | 0.00 | 0.00 |
| C9 isoparaffins | 0.00 | 0.00 | 0.94 | 4.97 |

# SPR CRUDE OIL COMPREHENSIVE ANALYSIS

Sample ID **MLI005** **WEST HACKBERRY, SOUR** **Date of Assay** **5/12/1998**

**Crude**

| | | | | | | |
|---|---|---|---|---|---|---|
| Specific Gravity, 60/60° F | 0.8575 | Ni, ppm | 7.74 | RVP, psi @ 100° F | | 4.48 |
| API Gravity | 33.5 | V, ppm | 33.6 | Acid number, mg KOH/g | | 0.11 |
| Sulfur, Wt. % | 1.41 | Fe, ppm | 0.325 | Mercaptan Sulfur, ppm | | 26.2 |
| Nitrogen, Wt. % | 0.137 | Cu, ppm | na | $H_2S$ Sulfur, ppm | | na |
| Micro Car. Res., Wt. % | 4.11 | Org. Cl, ppm | na | Viscosity: 77° F | 8.278 cSt | |
| Pour Point, °F | -5 | UOP "K" | 11.86 | 100° F | 5.632 cSt | |

| Fraction | Gas | 1 | 2 | 3 | 4 | 5 | 6 | Residuum | Residuum |
|---|---|---|---|---|---|---|---|---|---|
| Cut Temp. | $C_2$ - $C_4$ | C5 - 175° F | 175° - 250° F | 250° - 375° F | 375° - 530° F | 530° - 650° F | 650° - 1050° F | 650° F+ | 1050° F+ |
| Vol. % | 1.4 | 6.2 | 7.0 | 16.4 | 15.8 | 10.2 | 29.1 | 43.1 | 14.0 |
| Vol. Sum % | 1.4 | 7.6 | 14.6 | 31.0 | 46.7 | 56.9 | 86.0 | 100.0 | 100.0 |
| Wt. % | 0.9 | 4.8 | 5.9 | 14.8 | 15.1 | 10.2 | 31.4 | 48.2 | 16.8 |
| Wt. Sum % | 0.9 | 5.7 | 11.7 | 26.4 | 41.5 | 51.7 | 83.1 | 99.9 | 99.9 |
| Specific Gravity, 60/60° F | | 0.6654 | 0.7281 | 0.7717 | 0.8194 | 0.8610 | 0.9263 | 0.9583 | 1.025 |
| API Gravity | | 81.2 | 62.8 | 51.9 | 41.2 | 32.8 | 21.3 | 16.2 | 6.6 |
| Sulfur, Wt. % | | 0.0061 | 0.0119 | 0.0523 | 0.39 | 1.09 | 2.03 | 2.55 | 3.53 |
| Molecular Weight | | 97 | 111 | 135 | 184 | 245 | 411 | | |
| Hydrogen, Wt. % | | 16.11 | 14.96 | na | | | | 12.15 | 9.97 |
| Mercaptan Sulfur, ppm | | 28.7 | 56.6 | 110.6 | 45.2 | | | | |
| $H_2S$ Sulfur, ppm | | 4.8 | 9.2 | 7.9 | 0.5 | | | | |
| Organic Cl, ppm | | 41.9 | 16.0 | 3.7 | 1.0 | | | | |
| Research Octane Number* | | 64.6 | 53.6 | 34.4 | | | | | |
| Motor Octane Number* | | 63.4 | 51.9 | 34.2 | | | | | |
| Flash Point, ° F | | | | 77 | 170 | 246 | 302 | | |
| Aniline Point, ° F | | | | 124.3 | 144.9 | 159.1 | 180.8 | | |
| Acid Number, mg KOH/g | | | | | 0.02 | 0.05 | | | |
| Cetane Index | | | | | 49.2 | 50.6 | | | |
| Diesel Index | | | | 64.5 | 59.7 | 52.3 | | | |
| Naphthalenes, Vol. % | | | | | 3.83 | 10.82 | | | |
| Smoke point, mm | | | | | 20.2 | 14.8 | | | |
| Nitrogen, Wt. % | | | | | 0.0009 | 0.013 | 0.173 | 0.295 | 0.525 |
| Viscosity, cSt 77° F | | | | | 2.372 | | | | |
| 100° F | | | | | 1.900 | 4.934 | | | |
| 130° F | | | | | | 3.365 | 36.47 | 173.9 | |
| 180° F | | | | | | | 14.07 | 46.73 | 12560 |
| 210° F | | | | | | | | | 3128 |
| 250° F | | | | | | | | | 340.4 |
| Freezing Point, °F | | | | | -25.7 | | | | |
| Cloud Point, °F | | | | | | 24.1 | 99 | | |
| Pour Point, °F | | | | | | 20.7 | 95 | 47 | |
| Ni, ppm | | | | | | | | 16.5 | 47.1 |
| V, ppm | | | | | | | | 69.3 | 198 |
| Fe, ppm | | | | | | | | 2.82 | 8.20 |
| Cu, ppm | | | | | | | | na | na |
| Micro Car. Res., Wt. % | | | | | | | | 8.50 | 23.44 |

## Compositional Analysis Report (MLI005)

| | Gas | 1 | 2 | 3 |
|---|---|---|---|---|
| | IBP 59° F | 59 - 175° F | 175° - 250° F | 250° - 375° F |
| **Paraffins, Wt.%** | 99.90 | 87.18 | 66.75 | 44.59 |
| **Naphthenes, Wt.%** | 0.10 | 11.74 | 26.30 | 37.35 |
| **Aromatics, Wt.%** | 0.00 | 1.08 | 6.94 | 18.05 |
| **Benzene Precursor Index** | 0.03 | 8.47 | 3.48 | 0.01 |

### Composition, Wt.%

| | | | | |
|---|---|---|---|---|
| Ethane | 0.22 | - | - | - |
| Propane | 13.03 | 0.00 | 0.00 | 0.00 |
| N-Butane | 56.08 | 1.24 | 0.00 | 0.00 |
| I-Butane | 12.98 | 0.06 | 0.00 | 0.00 |
| N-Pentane | 6.21 | 21.31 | 0.05 | 0.00 |
| I-Pentane | 10.78 | 11.90 | 0.01 | 0.00 |
| Cyclopentane | 0.10 | 2.21 | 0.03 | 0.00 |
| N-Hexane | 0.08 | 20.77 | 3.88 | 0.00 |
| 2-Methylpentane | 0.14 | 12.60 | 0.73 | 0.00 |
| 3-Methylpentane | 0.06 | 8.55 | 0.75 | 0.00 |
| 2,2-Dimethtylbutane | 0.01 | 0.23 | 0.00 | 0.00 |
| 2,3-Dimethlybutane | 0.02 | 1.69 | 0.07 | 0.00 |
| Methylcyclopentane | 0.02 | 6.14 | 1.76 | 0.00 |
| Cyclohexane | 0.00 | 2.90 | 2.83 | 0.00 |
| Benzene | 0.00 | 1.31 | 1.18 | 0.00 |
| N-Heptane | 0.00 | 1.78 | 19.29 | 0.19 |
| 2-Methylhexane | 0.00 | 1.57 | 5.52 | 0.02 |
| 3-Methylhexane | 0.00 | 1.38 | 6.17 | 0.03 |
| 2-2-Dimethylpentane | 0.00 | 0.33 | 0.27 | 0.00 |
| 2,3-Dimethylpentane | 0.00 | 0.96 | 3.26 | 0.01 |
| 2,4-Dimethylpentane | 0.00 | 0.36 | 0.34 | 0.00 |
| 3,3-Dimethylpentane | 0.00 | 0.13 | 0.26 | 0.00 |
| 2,3,3-Trimethylbutane | 0.00 | 0.05 | 0.05 | 0.00 |
| 3-Ethylpentane | 0.00 | 0.06 | 0.32 | 0.00 |
| 1,1-Dimethylcyclopentane | 0.00 | 0.02 | 0.06 | 0.00 |
| 1,Cis-2-DimethylcyC5 | 0.00 | 0.04 | 0.50 | 0.01 |
| 1,Cis-3-DimethylcyC5 | 0.00 | 0.35 | 1.52 | 0.01 |
| 1-Trans-2-DimethcyC5 | 0.00 | 0.56 | 2.51 | 0.01 |
| 1-Trans-3-DimethcyC5 | 0.00 | 0.49 | 1.89 | 0.01 |
| Ethylcyclopentane | 0.00 | 0.06 | 1.34 | 0.03 |
| Methylcyclohexane | 0.00 | 0.59 | 8.87 | 0.12 |
| Toluene (Methylbenzene) | 0.00 | 0.12 | 5.73 | 0.29 |
| N-Octane | 0.00 | 0.04 | 6.69 | 2.69 |
| I-Octane | 0.00 | 0.14 | 14.47 | 2.12 |
| Methyl-Ethylcyclopentane | 0.00 | 0.06 | 6.12 | 0.90 |
| Dimethylcyclohexane | 0.00 | 0.00 | 0.67 | 0.98 |
| P-Xylene | 0.00 | 0.00 | 0.39 | 0.91 |
| M-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| O-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.42 | 0.73 |
| N-Nonane | 0.00 | 0.00 | 0.00 | 0.00 |
| C9 isoparaffins | 0.00 | 0.01 | 1.90 | 4.05 |

# SPR CRUDE OIL COMPREHENSIVE ANALYSIS

Sample ID **MLI007** **BAYOU CHOCTAW, SWEET** **Date of Assay** **4/30/1998**

**Crude**

| | | | | | | |
|---|---|---|---|---|---|---|
| Specific Gravity, 60/60° F | 0.8447 | Ni, ppm | 3.50 | RVP, psi @ 100° F | | 4.62 |
| API Gravity | 36.0 | V, ppm | 5.49 | Acid number, mg KOH/g | | 0.084 |
| Sulfur, Wt. % | 0.36 | Fe, ppm | 0.844 | Mercaptan Sulfur, ppm | | 7.021 |
| Nitrogen, Wt. % | 0.114 | Cu, ppm | na | $H_2S$ Sulfur, ppm | | na |
| Micro Car. Res., Wt. % | 2.22 | Org. Cl, ppm | 0.2 | Viscosity: 77° F | 6.874 cSt | |
| Pour Point, °F | 31 | UOP "K" | 11.94 | 100° F | 4.623 cSt | |

| Fraction | Gas | 1 | 2 | 3 | 4 | 5 | 6 | Residuum | Residuum |
|---|---|---|---|---|---|---|---|---|---|
| Cut Temp. | $C_2$ - $C_4$ | C5 - 175° F | 175° - 250° F | 250° - 375° F | 375° - 530° F | 530° - 650° F | 650° - 1050° F | 650° F+ | 1050° F+ |
| Vol. % | 1.7 | 7.3 | 8.1 | 14.2 | 16.3 | 10.0 | 31.8 | 42.4 | 10.7 |
| Vol. Sum % | 1.7 | 9.0 | 17.1 | 31.3 | 47.6 | 57.6 | 89.3 | 100.0 | 100.0 |
| Wt. % | 1.2 | 5.8 | 7.1 | 13.1 | 15.9 | 10.1 | 34.3 | 47.0 | 12.7 |
| Wt. Sum % | 1.2 | 7.0 | 14.1 | 27.1 | 43.0 | 53.1 | 87.4 | 100.0 | 100.0 |
| Specific Gravity, 60/60° F | | 0.6730 | 0.7396 | 0.7763 | 0.8240 | 0.8526 | 0.9116 | 0.9349 | 1.004 |
| API Gravity | | 78.8 | 59.8 | 50.8 | 40.2 | 34.5 | 23.7 | 19.9 | 9.4 |
| Sulfur, Wt. % | | 0.0043 | 0.0040 | 0.0123 | 0.07 | 0.21 | 0.57 | 0.69 | 1.04 |
| Molecular Weight | | 97 | 111 | 136 | 184 | 246 | 425 | | |
| Hydrogen, Wt. % | | 15.89 | 14.65 | na | | | | 12.99 | 10.61 |
| Mercaptan Sulfur, ppm | | 14.6 | 10.1 | 22.5 | 17.4 | | | | |
| $H_2S$ Sulfur, ppm | | 0.03 | 0.8 | 0.7 | 0.02 | | | | |
| Organic Cl, ppm | | 2.1 | 0.5 | 0.5 | 0.6 | | | | |
| Research Octane Number* | | 68.4 | 61.1 | 42.3 | | | | | |
| Motor Octane Number* | | 66.5 | 58.6 | 40.0 | | | | | |
| Flash Point, ° F | | | | 77 | 171 | 246 | 303 | | |
| Aniline Point, ° F | | | | 122.4 | 144.1 | 164.3 | 193.3 | | |
| Acid Number, mg KOH/g | | | | | 0.03 | 0.10 | | | |
| Cetane Index | | | | | 47.1 | 53.2 | | | |
| Diesel Index | | | | 62.2 | 58.0 | 56.6 | | | |
| Naphthalenes, Vol. % | | | | | 4.42 | 8.20 | | | |
| Smoke point, mm | | | | | 20.3 | 16.8 | | | |
| Nitrogen, Wt. % | | | | | 0.0015 | 0.006 | 0.108 | 0.240 | 0.603 |
| Viscosity, cSt 77° F | | | | | 2.473 | | | | |
| 100° F | | | | | 1.951 | 4.795 | | | |
| 130° F | | | | | | 3.312 | 37.03 | 95.3 | |
| 180° F | | | | | | | 14.22 | 28.28 | 5671 |
| 210° F | | | | | | | | | 1722 |
| 250° F | | | | | | | | | 249.3 |
| Freezing Point, °F | | | | | -28.54 | | | | |
| Cloud Point, °F | | | | | | 24.0 | 106 | | |
| Pour Point, °F | | | | | | 19.9 | 102 | 75 | |
| Ni, ppm | | | | | | | | 7.539 | 26.2 |
| V, ppm | | | | | | | | 11.81 | 41.0 |
| Fe, ppm | | | | | | | | 3.856 | 13.87 |
| Cu, ppm | | | | | | | | na | na |
| Micro Car. Res., Wt. % | | | | | | | | 5.07 | 18.17 |

## Compositional Analysis Report (MLI007)

| | Gas | 1 | 2 | 3 |
|---|---|---|---|---|
| | IBP 59° F | 59 - 175° F | 175° - 250° F | 250° - 375° F |
| **Paraffins, Wt.%** | 99.86 | 79.54 | 53.27 | 21.05 |
| **Naphthenes, Wt.%** | 0.14 | 18.79 | 38.53 | 45.28 |
| **Aromatics, Wt.%** | 0.00 | 1.67 | 8.19 | 33.67 |
| **Benzene Precursor Index** | 0.03 | 11.04 | 5.71 | 0.02 |
| **Composition, Wt.%** | | | | |
| Ethane | 0.00 | - | - | - |
| Propane | 9.25 | 0.00 | 0.00 | 0.00 |
| N-Butane | 61.31 | 1.45 | 0.00 | 0.00 |
| I-Butane | 12.86 | 0.06 | 0.00 | 0.00 |
| N-Pentane | 5.60 | 20.62 | 0.04 | 0.00 |
| I-Pentane | 10.56 | 12.51 | 0.01 | 0.00 |
| Cyclopentane | 0.14 | 3.20 | 0.04 | 0.00 |
| N-Hexane | 0.06 | 16.63 | 3.12 | 0.01 |
| 2-Methylpentane | 0.12 | 11.68 | 0.68 | 0.00 |
| 3-Methylpentane | 0.05 | 7.18 | 0.64 | 0.00 |
| 2,2-Dimethtylbutane | 0.00 | 0.00 | 0.00 | 0.00 |
| 2,3-Dimethlybutane | 0.02 | 1.26 | 0.05 | 0.00 |
| Methylcyclopentane | 0.02 | 9.49 | 2.73 | 0.01 |
| Cyclohexane | 0.01 | 5.43 | 5.33 | 0.02 |
| Benzene | 0.00 | 2.05 | 1.85 | 0.01 |
| N-Heptane | 0.00 | 1.26 | 13.74 | 0.28 |
| 2-Methylhexane | 0.00 | 1.21 | 4.27 | 0.03 |
| 3-Methylhexane | 0.00 | 1.06 | 4.77 | 0.04 |
| 2-2-Dimethylpentane | 0.00 | 0.26 | 0.21 | 0.00 |
| 2,3-Dimethylpentane | 0.00 | 0.74 | 2.52 | 0.02 |
| 2,4-Dimethylpentane | 0.00 | 0.28 | 0.27 | 0.00 |
| 3,3-Dimethylpentane | 0.00 | 0.10 | 0.20 | 0.00 |
| 2,3,3-Trimethylbutane | 0.00 | 0.03 | 0.03 | 0.00 |
| 3-Ethylpentane | 0.00 | 0.04 | 0.25 | 0.00 |
| 1,1-Dimethylcyclopentane | 0.00 | 0.03 | 0.07 | 0.00 |
| 1,Cis-2-DimethylcyC5 | 0.00 | 0.05 | 0.66 | 0.02 |
| 1,Cis-3-DimethylcyC5 | 0.00 | 0.45 | 2.00 | 0.02 |
| 1-Trans-2-DimethcyC5 | 0.00 | 0.73 | 3.29 | 0.03 |
| 1-Trans-3-DimethcyC5 | 0.00 | 0.64 | 2.48 | 0.02 |
| Ethylcyclopentane | 0.00 | 0.08 | 1.75 | 0.07 |
| Methylcyclohexane | 0.00 | 1.12 | 16.94 | 0.47 |
| Toluene (Methylbenzene) | 0.00 | 0.14 | 6.69 | 0.68 |
| N-Octane | 0.00 | 0.03 | 4.93 | 3.98 |
| I-Octane | 0.00 | 0.12 | 12.51 | 3.68 |
| Methyl-Ethylcyclopentane | 0.00 | 0.04 | 4.17 | 1.23 |
| Dimethylcyclohexane | 0.00 | 0.00 | 0.76 | 2.24 |
| P-Xylene | 0.00 | 0.00 | 0.26 | 1.22 |
| M-Xylene | 0.00 | 0.00 | 0.38 | 1.95 |
| O-Xylene | 0.00 | 0.00 | 0.04 | 0.42 |
| Ethylbenzene | 0.00 | 0.00 | 0.36 | 1.23 |
| N-Nonane | 0.00 | 0.00 | 0.05 | 1.17 |
| C9 isoparaffins | 0.00 | 0.01 | 1.82 | 7.83 |
| Isobutylcyclopentane | 0.00 | 0.00 | 0.03 | 0.14 |

# SPR CRUDE OIL COMPREHENSIVE ANALYSIS

Sample ID **MLI008** **BAYOU CHOCTAW, SOUR** **Date of Assay** **5/1/1998**

**Crude**

| | | | | | | |
|---|---|---|---|---|---|---|
| Specific Gravity, 60/60° F | 0.8645 | Ni, ppm | 11.1 | RVP, psi @ 100° F | | 3.6 |
| API Gravity | 32.2 | V, ppm | 40.3 | Acid number, mg KOH/g | | 0.13 |
| Sulfur, Wt. % | 1.43 | Fe, ppm | 2.44 | Mercaptan Sulfur, ppm | | 16.4 |
| Nitrogen, Wt. % | 0.140 | Cu, ppm | na | $H_2S$ Sulfur, ppm | | na |
| Micro Car. Res., Wt. % | 3.96 | Org. Cl, ppm | na | Viscosity: 77° F | 10.15 cSt | |
| Pour Point, °F | 11 | UOP "K" | 11.85 | 100° F | 6.539 cSt | |

| Fraction | Gas | 1 | 2 | 3 | 4 | 5 | 6 | Residuum | Residuum |
|---|---|---|---|---|---|---|---|---|---|
| Cut Temp. | $C_2$ - $C_4$ | C5 - 175° F | 175° - 250° F | 250° - 375° F | 375° - 530° F | 530° - 650° F | 650° - 1050° F | 650° F+ | 1050° F+ |
| Vol. % | 1.8 | 6.9 | 6.6 | 14.5 | 16.0 | 10.2 | 30.0 | 44.1 | 14.1 |
| Vol. Sum % | 1.8 | 8.8 | 15.3 | 29.8 | 45.8 | 56.0 | 85.9 | 100.0 | 100.0 |
| Wt. % | 1.2 | 5.3 | 5.5 | 13.0 | 15.2 | 10.2 | 32.4 | 49.1 | 16.8 |
| Wt. Sum % | 1.2 | 6.5 | 12.1 | 25.0 | 40.3 | 50.5 | 82.8 | 99.6 | 99.6 |
| Specific Gravity, 60/60° F | | 0.6644 | 0.7290 | 0.7754 | 0.8235 | 0.8659 | 0.9324 | 0.9637 | 1.030 |
| API Gravity | | 81.5 | 62.6 | 51.0 | 40.3 | 31.9 | 20.3 | 15.3 | 5.8 |
| Sulfur, Wt. % | | 0.0061 | 0.0117 | 0.0442 | 0.40 | 1.15 | 1.98 | 2.51 | 3.54 |
| Molecular Weight | | 97 | 111 | 138 | 184 | 243 | 411 | | |
| Hydrogen, Wt. % | | 16.11 | 14.88 | na | | | | 11.96 | 9.79 |
| Mercaptan Sulfur, ppm | | 42.7 | 58.4 | 58.8 | 20.3 | | | | |
| $H_2S$ Sulfur, ppm | | 3.6 | 3.3 | 2.0 | < 0.1 | | | | |
| Organic Cl, ppm | | 8.0 | 4.2 | 4.9 | 2.6 | | | | |
| Research Octane Number* | | 66.0 | 55.1 | 33.7 | | | | | |
| Motor Octane Number* | | 64.7 | 53.3 | 31.8 | | | | | |
| Flash Point, ° F | | | | 82 | 172 | 246 | 303 | | |
| Aniline Point, ° F | | | | 125.8 | 142.8 | 156.5 | 179.6 | | |
| Acid Number, mg KOH/g | | | | | 0.03 | 0.06 | | | |
| Cetane Index | | | | | 47.8 | 49.1 | | | |
| Diesel Index | | | | 64.1 | 57.6 | 50.0 | | | |
| Naphthalenes, Vol. % | | | | | 4.19 | 10.67 | | | |
| Smoke point, mm | | | | | 18.6 | 13.8 | | | |
| Nitrogen, Wt. % | | | | | 0.0017 | 0.015 | 0.174 | 0.303 | 0.552 |
| Viscosity, cSt 77° F | | | | | 2.470 | | | | |
| 100° F | | | | | 1.964 | 5.218 | | | |
| 130° F | | | | | | 3.521 | 45.49 | 236.7 | |
| 180° F | | | | | | | 16.62 | 57.59 | 20120 |
| 210° F | | | | | | | | | 4446 |
| 250° F | | | | | | | | | 407.8 |
| Freezing Point, °F | | | | | -32.4 | | | | |
| Cloud Point, °F | | | | | | 24.5 | 100 | | |
| Pour Point, °F | | | | | | 22.0 | 96 | 61 | |
| Ni, ppm | | | | | | | | 21.8 | 61.9 |
| V, ppm | | | | | | | | 78.8 | 225 |
| Fe, ppm | | | | | | | | 7.0 | 20.6 |
| Cu, ppm | | | | | | | | na | na |
| Micro Car. Res., Wt. % | | | | | | | | 8.33 | 23.79 |

## Compositional Analysis Report (MLI008)

| | Gas | 1 | 2 | 3 |
|---|---|---|---|---|
| | IBP 59° F | 59 - 175° F | 175° - 250° F | 250° - 375° F |
| **Paraffins, Wt.%** | 99.91 | 87.05 | 65.63 | 43.80 |
| **Naphthenes, Wt.%** | 0.09 | 11.78 | 26.43 | 33.83 |
| **Aromatics, Wt.%** | 0.00 | 1.17 | 7.94 | 22.37 |
| **Benzene Precursor Index** | 0.03 | 8.44 | 4.10 | 0.01 |

### Composition, Wt.%

| | | | | |
|---|---|---|---|---|
| Ethane | 0.35 | - | - | - |
| Propane | 15.05 | 0.00 | 0.00 | 0.00 |
| N-Butane | 55.20 | 1.46 | 0.00 | 0.00 |
| I-Butane | 13.58 | 0.08 | 0.00 | 0.00 |
| N-Pentane | 5.31 | 21.86 | 0.06 | 0.00 |
| I-Pentane | 9.89 | 13.11 | 0.01 | 0.00 |
| Cyclopentane | 0.10 | 2.44 | 0.04 | 0.00 |
| N-Hexane | 0.06 | 19.33 | 4.26 | 0.01 |
| 2-Methylpentane | 0.12 | 12.85 | 0.88 | 0.00 |
| 3-Methylpentane | 0.05 | 8.55 | 0.89 | 0.00 |
| 2,2-Dimethtylbutane | 0.00 | 0.09 | 0.00 | 0.00 |
| 2,3-Dimethlybutane | 0.02 | 1.84 | 0.09 | 0.00 |
| Methylcyclopentane | 0.01 | 6.41 | 2.17 | 0.00 |
| Cyclohexane | 0.00 | 2.77 | 3.19 | 0.01 |
| Benzene | 0.00 | 1.43 | 1.52 | 0.00 |
| N-Heptane | 0.00 | 1.43 | 18.38 | 0.30 |
| 2-Methylhexane | 0.00 | 1.37 | 5.69 | 0.03 |
| 3-Methylhexane | 0.00 | 1.20 | 6.35 | 0.05 |
| 2-2-Dimethylpentane | 0.00 | 0.29 | 0.27 | 0.00 |
| 2,3-Dimethylpentane | 0.00 | 0.84 | 3.36 | 0.02 |
| 2,4-Dimethylpentane | 0.00 | 0.32 | 0.35 | 0.00 |
| 3,3-Dimethylpentane | 0.00 | 0.11 | 0.27 | 0.00 |
| 2,3,3-Trimethylbutane | 0.00 | 0.04 | 0.05 | 0.00 |
| 3-Ethylpentane | 0.00 | 0.05 | 0.33 | 0.00 |
| 1,1-Dimethylcyclopentane | 0.00 | 0.02 | 0.05 | 0.00 |
| 1,Cis-2-DimethylcyC5 | 0.00 | 0.03 | 0.49 | 0.01 |
| 1,Cis-3-DimethylcyC5 | 0.00 | 0.28 | 1.47 | 0.01 |
| 1-Trans-2-DimethcyC5 | 0.00 | 0.46 | 2.42 | 0.02 |
| 1-Trans-3-DimethcyC5 | 0.00 | 0.40 | 1.82 | 0.01 |
| Ethylcyclopentane | 0.00 | 0.05 | 1.29 | 0.04 |
| Methylcyclohexane | 0.00 | 0.59 | 10.45 | 0.23 |
| Toluene (Methylbenzene) | 0.00 | 0.11 | 6.64 | 0.55 |
| N-Octane | 0.00 | 0.03 | 5.88 | 3.84 |
| I-Octane | 0.00 | 0.11 | 13.77 | 3.27 |
| Methyl-Ethylcyclopentane | 0.00 | 0.03 | 3.97 | 0.94 |
| Dimethylcyclohexane | 0.00 | 0.00 | 0.69 | 1.62 |
| P-Xylene | 0.00 | 0.00 | 0.35 | 1.34 |
| M-Xylene | 0.00 | 0.00 | 0.35 | 1.46 |
| O-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.41 | 1.15 |
| N-Nonane | 0.00 | 0.00 | 0.04 | 0.76 |
| C9 isoparaffins | 0.00 | 0.01 | 1.69 | 5.88 |

# SPR CRUDE OIL COMPREHENSIVE ANALYSIS

Sample ID **MLI009** **BIG HILL, SWEET** **Date of Assay** **5/4/1998**

**Crude**

| | | | | | | |
|---|---|---|---|---|---|---|
| Specific Gravity, 60/60° F | 0.8451 | Ni, ppm | 12.1 | RVP, psi @ 100° F | | 5.22 |
| API Gravity | 35.9 | V, ppm | 16.3 | Acid number, mg KOH/g | | 0.22 |
| Sulfur, Wt. % | 0.48 | Fe, ppm | 4.24 | Mercaptan Sulfur, ppm | | 10.1 |
| Nitrogen, Wt. % | 0.196 | Cu, ppm | na | $H_2S$ Sulfur, ppm | | na |
| Micro Car. Res., Wt. % | 2.49 | Org. Cl, ppm | 0.9 | Viscosity: 77° F | 5.871 cSt | |
| Pour Point, °F | 15 | UOP "K" | 11.88 | 100° F | 4.177 cSt | |

| Fraction | Gas | 1 | 2 | 3 | 4 | 5 | 6 | Residuum | Residuum |
|---|---|---|---|---|---|---|---|---|---|
| Cut Temp. | $C_2$ - $C_4$ | C5 - 175° F | 175° - 250° F | 250° - 375° F | 375° - 530° F | 530° - 650° F | 650° - 1050° F | 650° F+ | 1050° F+ |
| Vol. % | 2.7 | 8.2 | 9.8 | 15.4 | 15.5 | 10.8 | 27.8 | 37.6 | 9.8 |
| Vol. Sum % | 2.7 | 10.9 | 20.7 | 36.1 | 51.5 | 62.4 | 90.2 | 100.0 | 100.0 |
| Wt. % | 1.8 | 6.6 | 8.6 | 14.3 | 15.2 | 11.1 | 30.3 | 42.2 | 11.8 |
| Wt. Sum % | 1.8 | 8.4 | 17.0 | 31.3 | 46.5 | 57.5 | 87.9 | 99.7 | 99.7 |
| Specific Gravity, 60/60° F | | 0.6764 | 0.7450 | 0.7815 | 0.8305 | 0.8623 | 0.9226 | 0.9477 | 1.019 |
| API Gravity | | 77.7 | 58.4 | 49.6 | 38.9 | 32.6 | 21.9 | 17.8 | 7.4 |
| Sulfur, Wt. % | | 0.0020 | 0.0033 | 0.0201 | 0.14 | 0.39 | 0.80 | 0.98 | 1.44 |
| Molecular Weight | | 96 | 111 | 133 | 183 | 245 | 407 | | |
| Hydrogen, Wt. % | | 15.77 | 14.51 | na | | | | 12.53 | 10.14 |
| Mercaptan Sulfur, ppm | | 6.2 | 20.2 | 27.1 | 22.1 | | | | |
| $H_2S$ Sulfur, ppm | | < 0.1 | < 0.1 | < 0.1 | < 0.1 | | | | |
| Organic Cl, ppm | | 7.3 | 1.0 | < 0.1 | < 0.1 | | | | |
| Research Octane Number* | | 70.0 | 64.7 | 50.4 | | | | | |
| Motor Octane Number* | | 67.6 | 61.8 | 48.4 | | | | | |
| Flash Point, ° F | | | | 77 | 170 | 246 | 301 | | |
| Aniline Point, ° F | | | | 122.8 | 144.0 | 162.2 | 186.0 | | |
| Acid Number, mg KOH/g | | | | | 0.08 | 0.24 | | | |
| Cetane Index | | | | | 44.6 | 50.3 | | | |
| Diesel Index | | | | 60.9 | 56.0 | 52.9 | | | |
| Naphthalenes, Vol. % | | | | | 4.60 | 9.61 | | | |
| Smoke point, mm | | | | | 18.1 | 15.0 | | | |
| Nitrogen, Wt. % | | | | | 0.0059 | 0.034 | 0.307 | 0.505 | 1.012 |
| Viscosity, cSt 77° F | | | | | 2.65 | | | | |
| 100° F | | | | | 2.093 | 5.416 | | | |
| 130° F | | | | | | 3.646 | 52.62 | 170.8 | |
| 180° F | | | | | | | 18.59 | 44.00 | 25410 |
| 210° F | | | | | | | | | 5419 |
| 250° F | | | | | | | | | 472.6 |
| Freezing Point, °F | | | | | -26.0 | | | | |
| Cloud Point, °F | | | | | | 23.5 | 105 | | |
| Pour Point, °F | | | | | | 22.3 | 101 | 92 | |
| Ni, ppm | | | | | | | | 30.7 | 107 |
| V, ppm | | | | | | | | 38.9 | 134 |
| Fe, ppm | | | | | | | | 14.8 | 49.5 |
| Cu, ppm | | | | | | | | na | na |
| Micro Car. Res., Wt. % | | | | | | | | 5.88 | 20.84 |

## Compositional Analysis Report (MLI009)

| | Gas | 1 | 2 | 3 |
|---|---|---|---|---|
| | IBP 59° F | 59 - 175° F | 175° - 250° F | 250° - 375° F |
| **Paraffins, Wt.%** | 99.88 | 75.51 | 47.87 | 23.31 |
| **Naphthenes, Wt.%** | 0.12 | 22.42 | 43.14 | 52.65 |
| **Aromatics, Wt.%** | 0.00 | 2.07 | 8.99 | 24.04 |
| **Benzene Precursor Index** | 0.02 | 11.84 | 5.65 | 0.02 |

### Composition, Wt.%

| | | | | |
|---|---|---|---|---|
| Ethane | 0.28 | - | - | - |
| Propane | 18.90 | 0.00 | 0.00 | 0.00 |
| N-Butane | 56.25 | 1.82 | 0.00 | 0.00 |
| I-Butane | 12.30 | 0.08 | 0.00 | 0.00 |
| N-Pentane | 4.16 | 20.94 | 0.04 | 0.00 |
| I-Pentane | 7.71 | 12.47 | 0.01 | 0.00 |
| Cyclopentane | 0.12 | 3.82 | 0.05 | 0.00 |
| N-Hexane | 0.04 | 15.21 | 2.72 | 0.01 |
| 2-Methylpentane | 0.08 | 11.01 | 0.61 | 0.00 |
| 3-Methylpentane | 0.02 | 4.48 | 0.38 | 0.00 |
| 2,2-Dimethtylbutane | 0.00 | 0.16 | 0.00 | 0.00 |
| 2,3-Dimethlybutane | 0.01 | 1.09 | 0.04 | 0.00 |
| Methylcyclopentane | 0.02 | 12.03 | 3.31 | 0.01 |
| Cyclohexane | 0.00 | 5.27 | 4.93 | 0.02 |
| Benzene | 0.00 | 2.55 | 2.19 | 0.01 |
| N-Heptane | 0.00 | 1.16 | 12.05 | 0.30 |
| 2-Methylhexane | 0.00 | 1.14 | 3.83 | 0.03 |
| 3-Methylhexane | 0.00 | 1.00 | 4.28 | 0.05 |
| 2-2-Dimethylpentane | 0.00 | 0.24 | 0.18 | 0.00 |
| 2,3-Dimethylpentane | 0.00 | 0.70 | 2.26 | 0.02 |
| 2,4-Dimethylpentane | 0.00 | 0.26 | 0.24 | 0.00 |
| 3,3-Dimethylpentane | 0.00 | 0.09 | 0.18 | 0.00 |
| 2,3,3-Trimethylbutane | 0.00 | 0.03 | 0.03 | 0.00 |
| 3-Ethylpentane | 0.00 | 0.04 | 0.22 | 0.00 |
| 1,1-Dimethylcyclopentane | 0.00 | 0.04 | 0.10 | 0.00 |
| 1,Cis-2-DimethylcyC5 | 0.00 | 0.08 | 0.92 | 0.03 |
| 1,Cis-3-DimethylcyC5 | 0.00 | 0.66 | 2.78 | 0.03 |
| 1-Trans-2-DimethcyC5 | 0.00 | 1.06 | 4.58 | 0.05 |
| 1-Trans-3-DimethcyC5 | 0.00 | 0.93 | 3.45 | 0.03 |
| Ethylcyclopentane | 0.00 | 0.12 | 2.44 | 0.12 |
| Methylcyclohexane | 0.00 | 1.11 | 16.07 | 0.55 |
| Toluene (Methylbenzene) | 0.00 | 0.16 | 7.47 | 0.94 |
| N-Octane | 0.00 | 0.02 | 3.60 | 3.59 |
| I-Octane | 0.00 | 0.13 | 12.94 | 4.70 |
| Methyl-Ethylcyclopentane | 0.00 | 0.06 | 6.43 | 2.34 |
| Dimethylcyclohexane | 0.00 | 0.00 | 0.50 | 1.83 |
| P-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| M-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| O-Xylene | 0.00 | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 | 0.00 |
| N-Nonane | 0.00 | 0.00 | 0.00 | 0.00 |
| C9 isoparaffins | 0.00 | 0.00 | 0.95 | 5.07 |

# SPR CRUDE OIL COMPREHENSIVE ANALYSIS

Sample ID **MLI010** **Big Hill, Sour** **Date of Assay** **9/25/1998**

(Composite of BH 106, 107, 108, 109, 110, 111, 112, &113)

**Crude**

| | | | | | | |
|---|---|---|---|---|---|---|
| Specific Gravity, 60/60° F | 0.8719 | Ni, ppm | 13.0 | RVP, psi @ 100° F | | 3.95 |
| API Gravity | 30.8 | V, ppm | 43.8 | Acid number, mg KOH/g | | 0.22 |
| Sulfur, Wt. % | 1.42 | Fe, ppm | 0.875 | Mercaptan Sulfur, ppm | | 17.7 |
| Nitrogen, Wt. % | 0.144 | Cu, ppm | 3.79 | $H_2S$ Sulfur, ppm | | na |
| Micro Car. Res., Wt. % | 4.47 | Org. Cl, ppm | 0.5 | Viscosity: 77° F | 12.32 cSt | |
| Pour Point, °F | 12 | UOP "K" | 11.83 | 100° F | 8.146 cSt | |

| Fraction | Gas | 1 | 2 | 3 | 4 | 5 | 6 | Residuum | Residuum |
|---|---|---|---|---|---|---|---|---|---|
| Cut Temp. | $C_2$ - $C_4$ | C5 - 175° F | 175° - 250° F | 250° - 375° F | 375° - 530° F | 530° - 650° F | 650° - 1050° F | 650° F+ | 1050° F+ |
| Vol. % | 3.0 | 8.0 | 5.9 | 9.7 | 15.2 | 11.0 | 32.8 | 47.2 | 14.5 |
| Vol. Sum % | 3.0 | 10.9 | 16.9 | 26.5 | 41.8 | 52.8 | 85.5 | 100.0 | 100.0 |
| Wt. % | 1.9 | 6.1 | 5.0 | 8.7 | 14.4 | 10.9 | 35.2 | 52.4 | 17.2 |
| Wt. Sum % | 1.9 | 8.0 | 13.0 | 21.6 | 36.0 | 47.0 | 82.1 | 99.3 | 99.3 |
| Specific Gravity, 60/60° F | | 0.6622 | 0.7316 | 0.7804 | 0.8252 | 0.8670 | 0.9351 | 0.9668 | 1.039 |
| API Gravity | | 82.2 | 61.9 | 49.8 | 40.0 | 31.7 | 19.8 | 14.9 | 4.7 |
| Sulfur, Wt. % | | 0.0044 | 0.0094 | 0.0633 | 0.42 | 1.12 | 1.94 | 2.34 | 3.15 |
| Molecular Weight | | 95 | 110 | 140 | 184 | 244 | 412 | | |
| Hydrogen, Wt. % | | 16.11 | 14.73 | na | | | | 11.85 | 9.53 |
| Mercaptan Sulfur, ppm | | 19.5 | 31.8 | 53.0 | 20.0 | | | | |
| $H_2S$ Sulfur, ppm | | 6.9 | 20.9 | 45.1 | < 0.1 | | | | |
| Organic Cl, ppm | | 1.3 | 1.1 | 0.9 | 1.9 | | | | |
| Research Octane Number* | | 67.5 | 57.3 | 42.5 | | | | | |
| Motor Octane Number* | | 66.1 | 55.2 | 39.4 | | | | | |
| Flash Point, ° F | | | | 84 | 171 | 246 | 303 | | |
| Aniline Point, ° F | | | | 125.9 | 142.9 | 155.8 | 178.1 | | |
| Acid Number, mg KOH/g | | | | | 0.04 | 0.07 | | | |
| Cetane Index | | | | | 46.9 | 48.8 | | | |
| Diesel Index | | | | 62.7 | 57.1 | 49.4 | | | |
| Naphthalenes, Vol. % | | | | | 4.08 | 10.84 | | | |
| Smoke point, mm | | | | | 18.0 | 13.3 | | | |
| Nitrogen, Wt. % | | | | | 0.0010 | 0.015 | 0.167 | 0.303 | 0.579 |
| Viscosity, cSt 77° F | | | | | 2.413 | | | | |
| 100° F | | | | | 1.916 | 4.978 | | | |
| 130° F | | | | | | 3.404 | 49.72 | 250.3 | |
| 180° F | | | | | | | 18.15 | 62.39 | 138700 |
| 210° F | | | | | | | | | 19250 |
| 250° F | | | | | | | | | 999.3 |
| Freezing Point, °F | | | | | -27.71 | | | | |
| Cloud Point, °F | | | | | | 23.8 | 94 | | |
| Pour Point, °F | | | | | | 17.6 | 90 | 50 | |
| Ni, ppm | | | | | | | | 24.7 | 74.0 |
| V, ppm | | | | | | | | 88.2 | 253 |
| Fe, ppm | | | | | | | | 3.11 | 8.50 |
| Cu, ppm | | | | | | | | 5.77 | 15.9 |
| Micro Car. Res., Wt. % | | | | | | | | 8.64 | 25.52 |

## Compositional Analysis Report (MLI010, BH, sour)

| | Gas | 1 | 2 | 3 |
|---|---|---|---|---|
| | IBP 59° F | 59 - 175° F | 175° - 250° F | 250° - 375° F |
| **Paraffins, Wt.%** | 99.88 | 82.29 | 57.04 | 50.03 |
| **Naphthenes, Wt.%** | 0.12 | 15.45 | 30.85 | 12.80 |
| **Aromatics, Wt.%** | 0.00 | 2.26 | 12.11 | 37.16 |
| **Benzene Precursor Index** | 0.02 | 8.03 | 5.00 | 0.02 |
| **Composition, Wt.%** | | | | |
| Ethane | 1.55 | - | - | - |
| Propane | 19.10 | 0.00 | 0.00 | 0.00 |
| N-Butane | 53.25 | 1.99 | 0.00 | 0.00 |
| I-Butane | 13.56 | 0.11 | 0.00 | 0.00 |
| N-Pentane | 4.13 | 24.02 | 0.08 | 0.00 |
| I-Pentane | 7.80 | 14.59 | 0.02 | 0.00 |
| Cyclopentane | 0.08 | 2.68 | 0.05 | 0.00 |
| N-Hexane | 0.04 | 17.58 | 4.85 | 0.01 |
| 2-Methylpentane | 0.08 | 12.28 | 1.06 | 0.00 |
| 3-Methylpentane | 0.04 | 7.98 | 1.04 | 0.00 |
| 2,2-Dimethtylbutane | 0.01 | 0.48 | 0.01 | 0.00 |
| 2,3-Dimethlybutane | 0.01 | 1.59 | 0.10 | 0.00 |
| Methylcyclopentane | 0.01 | 6.15 | 2.60 | 0.00 |
| Cyclohexane | 0.00 | 2.47 | 3.56 | 0.01 |
| Benzene | 0.00 | 1.78 | 2.36 | 0.00 |
| N-Heptane | 0.00 | 1.09 | 17.49 | 0.22 |
| 2-Methylhexane | 0.00 | 1.11 | 5.76 | 0.03 |
| 3-Methylhexane | 0.00 | 0.97 | 6.43 | 0.04 |
| 2-2-Dimethylpentane | 0.00 | 0.24 | 0.28 | 0.00 |
| 2,3-Dimethylpentane | 0.00 | 0.68 | 3.40 | 0.01 |
| 2,4-Dimethylpentane | 0.00 | 0.26 | 0.36 | 0.00 |
| 3,3-Dimethylpentane | 0.00 | 0.09 | 0.27 | 0.00 |
| 2,3,3-Trimethylbutane | 0.00 | 0.03 | 0.05 | 0.00 |
| 3-Ethylpentane | 0.00 | 0.04 | 0.33 | 0.00 |
| 1,1-Dimethylcyclopentane | 0.00 | 0.02 | 0.06 | 0.00 |
| 1,Cis-2-DimethylcyC5 | 0.00 | 0.03 | 0.53 | 0.01 |
| 1,Cis-3-DimethylcyC5 | 0.00 | 0.25 | 1.60 | 0.01 |
| 1-Trans-2-DimethcyC5 | 0.00 | 0.40 | 2.63 | 0.01 |
| 1-Trans-3-DimethcyC5 | 0.00 | 0.35 | 1.98 | 0.01 |
| Ethylcyclopentane | 0.00 | 0.05 | 1.40 | 0.03 |
| Methylcyclohexane | 0.00 | 0.49 | 10.87 | 0.19 |
| Toluene (Methylbenzene) | 0.00 | 0.11 | 7.73 | 0.49 |
| N-Octane | 0.00 | 0.02 | 4.75 | 2.39 |
| I-Octane | 0.00 | 0.08 | 11.75 | 2.15 |
| Methyl-Ethylcyclopentane | 0.00 | 0.02 | 3.48 | 0.64 |
| Dimethylcyclohexane | 0.00 | 0.00 | 0.59 | 1.07 |
| P-Xylene | 0.00 | 0.00 | 0.22 | 0.63 |
| M-Xylene | 0.00 | 0.00 | 0.39 | 1.25 |
| O-Xylene | 0.00 | 0.00 | 0.15 | 0.98 |
| Ethylbenzene | 0.00 | 0.00 | 0.36 | 0.77 |
| N-Nonane | 0.00 | 0.00 | 0.16 | 2.57 |
| C9 isoparaffins | 0.00 | 0.00 | 1.12 | 2.99 |
| Isobutylcyclopentane | 0.00 | 0.00 | 0.04 | 0.15 |
| Isopropylcyclohexane | 0.00 | 0.00 | 0.06 | 0.52 |
| C9 Aromatics | 0.00 | 0.00 | 0.05 | 1.90 |
| N-Decane | 0.00 | 0.00 | 0.00 | 1.65 |
| I-Decane | 0.00 | 0.00 | 0.01 | 1.42 |
| EthylpropylcycloC5 | 0.00 | 0.00 | 0.00 | 0.00 |
| Isobutylcyclohexane | 0.00 | 0.00 | 0.00 | 0.19 |
| C10 Aromatics | 0.00 | 0.00 | 0.00 | 2.85 |
| N-Undecane | 0.00 | 0.00 | 0.00 | 1.48 |
| I-Undecane | 0.00 | 0.00 | 0.00 | 0.00 |
| C11 Cyclopentanes | 0.00 | 0.00 | 0.00 | 0.06 |
| C11 Cyclohexanes | 0.00 | 0.00 | 0.00 | 0.00 |
| C-11 Aromatics(Total) | 0.00 | 0.00 | 0.00 | 0.00 |
| N-Dodecane | 0.00 | 0.00 | 0.00 | 1.34 |
| I-Dodecane | 0.00 | 0.00 | 0.00 | 0.00 |
| C12 Cyclopentanes | 0.00 | 0.00 | 0.00 | 0.37 |
| C12 Cyclohexanes | 0.00 | 0.00 | 0.00 | 0.00 |
| C-12 Aromatics(Total) | 0.00 | 0.00 | 0.00 | 0.62 |