**HAMACA - SUMMARY OF MAJOR CUTS**

| | Whole Crude | Light Naphtha | Medium Naphtha | Heavy Naphtha | Kero | Atm Gas Oil | Light VGO | Heavy VGO | Vacuum Resid | Atm Resid |
|---|---|---|---|---|---|---|---|---|---|---|
| TBP Temp At Start, °C | Start | 10 | 80 | 150 | 200 | 260 | 340 | 450 | 570 | 340 |
| TBP Temp At End, °C | End | 80 | 150 | 200 | 260 | 340 | 450 | 570 | End | End |
| TBP Temp At Start, °F | Start | 55 | 175 | 300 | 400 | 500 | 650 | 850 | 1050 | 650 |
| TBP Temp At End, °F | End | 175 | 300 | 400 | 500 | 650 | 850 | 1050 | End | End |
| Yield at Start, vol% | | 2.0 | 5.9 | 12.9 | 19.9 | 30.1 | 47.8 | 67.9 | 79.1 | 47.8 |
| Yield at End, vol% | | 5.9 | 12.9 | 19.9 | 30.1 | 47.8 | 67.9 | 79.1 | 100.0 | 100.0 |
| Yield of Cut (wt% of Crude) | | 2.9 | 5.9 | 6.3 | 9.7 | 17.1 | 20.5 | 11.7 | 24.8 | 57.0 |
| Yield of Cut (vol% of Crude) | | 3.9 | 7.0 | 7.0 | 10.3 | 17.7 | 20.1 | 11.2 | 20.9 | 52.2 |
| Gravity, °API | 26.0 | 85.0 | 54.8 | 44.7 | 35.8 | 31.0 | 23.2 | 19.7 | 1.0 | 12.8 |
| Specific Gravity | 0.8984 | 0.6536 | 0.7597 | 0.8031 | 0.8458 | 0.8708 | 0.9146 | 0.9359 | 1.0682 | 0.9807 |
| Sulfur, wt% | 1.55 | 0.00 | 0.00 | 0.00 | 0.01 | 0.20 | 1.31 | 1.11 | 4.50 | 2.66 |
| Mercaptan Sulfur, ppm | | 0 | 1 | 2 | 0 | 0 | 1 | 1 | | |
| Nitrogen, ppm | 2474 | 0 | 0 | 1 | 1 | 50 | 563 | 910 | 9031 | 4327 |
| Hydrogen, wt% | 14.2 | 16.4 | 14.5 | 18.7 | 17.9 | 17.0 | 15.5 | 13.4 | 8.7 | 12.1 |
| Viscosity @ 40 °C (104 °F), cSt | 11.09 | | | 0.912 | 1.73 | 5.26 | 35.9 | 142 | ######### | 544 |
| Viscosity @ 50 °C (122 °F), cSt | 9.22 | | | 0.821 | 1.40 | 4.13 | 22.9 | 88.2 | 8.45E+08 | 394 |
| Viscosity @ 100 °C (212 °F), cSt | 4.56 | | | 0.545 | 0.648 | 1.72 | 4.94 | 17.2 | 1.21E+05 | 119 |
| Viscosity @ 135 °C (275 °F), cSt | 3.23 | | | 0.443 | 0.452 | 1.14 | 2.54 | 8.38 | 7210 | 66.9 |
| Freeze Point, °C | | | -82.000 | -69.000 | -55.000 | -31.000 | | | | |
| Freeze Point, °F | | | -115 | -92 | -67 | -23 | | | | |
| Pour Point, °C | 6 | | -92 | -78 | -64 | -39 | -9 | 19 | 144 | 42 |
| Pour Point, °F | 43 | | -133 | -108 | -84 | -38 | 15 | 66 | 292 | 108 |
| Smoke Point, mm (ASTM) | | | 30 | 24 | 20 | 16 | | | | |
| Aniline Point, °C | | | 43 | 55 | 54 | 68 | 78 | 93 | | |
| Aniline Point, °F | | | 109 | 131 | 130 | 155 | 173 | 199 | | |
| Total Acid Number, mg KOH/g | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 1.2 | 0.8 | | |
| Cetane Index, ASTM D976 | | | | 31 | 38 | 46 | | | | |
| Diesel Index | | | 60 | 58 | 47 | 48 | 40 | 39 | | |
| Characterization Factor (K Factor) | 11.8 | 12.9 | 11.7 | 11.6 | 11.5 | 11.6 | 11.6 | 11.9 | 11.4 | 11.7 |
| Research Octane Number, Clear | | 64.9 | 54.4 | 50.2 | | | | | | |
| Motor Octane Number, Clear | | 64.1 | 52.9 | | | | | | | |
| Paraffins, vol% | | 94.3 | 47.6 | 30.4 | 28.3 | 28.3 | 14.6 | | | |
| Naphthenes, vol% | | 5.7 | 42.8 | 58.0 | 52.7 | 43.5 | 46.3 | | | |
| Aromatics, vol% | | 0.0 | 9.6 | 11.6 | 18.8 | 27.3 | 35.1 | | | |
| Thiophenes, vol% | | | | 0.0 | 0.1 | 0.9 | 3.9 | | | |
| Molecular Weight | 266 | 103 | 115 | 142 | 171 | 223 | 306 | 441 | 1294 | 420 |
| Gross Heating Value, MM BTU/bbl | 6.04 | 4.79 | 5.37 | 5.60 | 5.81 | 5.94 | 6.11 | 6.23 | 6.59 | 6.36 |
| Gross Heating Value, kcal/kg | 10680 | 11610 | 11210 | 11060 | 10900 | 10810 | 10600 | 10580 | 9780 | 10290 |
| Gross Heating Value, MJ/kg | 44.7 | 48.6 | 46.9 | 46.3 | 45.6 | 45.2 | 44.4 | 44.3 | 40.9 | 43.1 |
| Heptane Asphaltenes, wt% | 6.4 | | | | | | | | 25.8 | 11.2 |
| Micro Carbon Residue, wt% | 7.3 | | | | | | | | 29.4 | 12.8 |
| Ramsbottom Carbon, wt% | 7.1 | | | | | | | | 28.6 | 12.5 |
| Vanadium, ppm | 152 | | | | | | | | 613 | 267 |
| Nickel, ppm | 42 | | | | | | | | 170 | 74 |
| Iron, ppm | 13 | | | | | | | | 51 | 22 |

Date Created
6/4/2003

Date Assayed
2002

**HAMACA - DISTILLATION SUMMARY**

| | | Whole Crude | Light Naphtha | Medium Naphtha | Heavy Naphtha | Kero | Atm Gas Oil | Light VGO | Heavy VGO | Vacuum Resid | Atm Resid |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TBP Temp At Start, °C | | | 10 | 80 | 150 | 200 | 260 | 340 | 450 | 570 | 340 |
| TBP Temp At End, °C | | | 80 | 150 | 200 | 260 | 340 | 450 | 570 | End | End |
| TBP Temp At Start, °F | | | 55 | 175 | 300 | 400 | 500 | 650 | 850 | 1050 | 650 |
| TBP Temp At End, °F | | | 175 | 300 | 400 | 500 | 650 | 850 | 1050 | End | End |
| Yield at Start, vol% | | | 2.0 | 5.9 | 12.9 | 19.9 | 30.1 | 47.8 | 67.9 | 79.1 | 47.8 |
| Yield at End, vol% | | | 5.9 | 12.9 | 19.9 | 30.1 | 47.8 | 67.9 | 79.1 | 100.0 | 100.0 |
| Yield of Cut (wt% of Crude) | | | 2.9 | 5.9 | 6.3 | 9.7 | 17.1 | 20.5 | 11.7 | 24.8 | 57.0 |
| Yield of Cut (vol% of Crude) | | | 3.9 | 7.0 | 7.0 | 10.3 | 17.7 | 20.1 | 11.2 | 20.9 | 52.2 |
| TBP Distillation, vol% | °C Start | | 10 | 80 | 150 | 200 | 260 | 340 | 450 | 570 | 340 |
| | °C 5% | | 23 | 81 | 152 | 207 | 264 | 349 | 458 | 588 | 357 |
| | °C 10% | | 28 | 90 | 156 | 210 | 268 | 354 | 463 | 608 | 371 |
| | °C 30% | | 36 | 99 | 166 | 222 | 286 | 374 | 482 | 698 | 431 |
| | °C 50% | | 59 | 118 | 178 | 234 | 304 | 394 | 492 | 806 | 493 |
| | °C 70% | | 64 | 136 | 193 | 245 | 321 | 421 | 502 | 944 | 676 |
| | °C 90% | | 70 | 146 | 201 | 255 | 336 | 444 | 553 | 1138 | 987 |
| | °C 95% | | 71 | 151 | 203 | 257 | 339 | 451 | 566 | 1258 | 1171 |
| | °C End | | 80 | 160 | 200 | 260 | 340 | 460 | 580 | End | End |
| TBP Distillation, vol% | °F Start | | 50 | 175 | 300 | 400 | 500 | 650 | 850 | 1050 | 650 |
| | °F 5% | | 74 | 177 | 306 | 404 | 507 | 661 | 857 | 1091 | 674 |
| | °F 10% | | 82 | 194 | 312 | 410 | 515 | 670 | 866 | 1127 | 700 |
| | °F 30% | | 96 | 210 | 331 | 432 | 547 | 706 | 900 | 1289 | 808 |
| | °F 50% | | 139 | 245 | 353 | 453 | 579 | 742 | 917 | 1483 | 920 |
| | °F 70% | | 148 | 277 | 380 | 473 | 609 | 789 | 936 | 1732 | 1249 |
| | °F 90% | | 158 | 295 | 394 | 491 | 636 | 832 | 1027 | 2081 | 1808 |
| | °F 95% | | 160 | 304 | 397 | 495 | 643 | 844 | 1050 | 2296 | 2140 |
| | °F End | | 175 | 320 | 400 | 500 | 650 | 860 | 1070 | End | End |