

10423

Exhibit No. _____
Worldwide Court
Reporters, Inc.

From: Edmond Shtepani Intertek <edmond.shtepani@intertek.com>
Sent: Tuesday, June 15, 2010 9:52 AM
To: Wang, Yun <Yun.Wang@bp.com>
Cc: Stephanie Heard Intertek <stephanie.heard@intertek.com>; McAughan, Kelly <Kelly.McAughan@bp.com>
Subject: RE: CCE and Viscosity Data
Attach: WTC-10-001812 BP CCE Visc Tables 061510.xls

Yun,

The results including the viscosities at 100 F are attached

Regards,

Edmond

From: Wang, Yun [mailto:Yun.Wang@bp.com]
Sent: Friday, June 11, 2010 1:42 PM
To: Edmond Shtepani Intertek
Cc: Stephanie Heard Intertek; McAughan, Kelly
Subject: RE: CCE and Viscosity Data
Importance: High

Edmond,

Thanks for the data. A few immediate questions:

1. Did you measure STO molecular weight? In your report all STO MWs are listed as calculated properties. They should not be.
2. I couldn't find the component MW. Did you use Katz-Firoozabadi MW? I need the component MW explicitly in the report, even though you have the mass-to-mole conversion. It is very important.
3. Could you add your capillary viscometer calibration run results to your report? What is your capillary tube measurement range?
4. Could you check your MSF separator pressures? Are the reported pressures in psig or psia? The numbers are different from what I have requested (see the attached email).

Regards,

Yun Wang, Ph.D.

Complex Fluids CoP Leader

Reservoir Management Specialist Technical Support

Exploration and Production Technology

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Complex Fluids Community of Practice:

<http://ssw.bpweb.bp.com/Networks/ReservoirFluids/tabid/885/Default.aspx>

DW 0007272

TREX 010423.0001

TREX-010423.0001

From: Edmond Shtepani Intertek [mailto:edmond.shtepani@intertek.com]
Sent: Friday, June 11, 2010 10:38 AM
To: Wang, Yun
Cc: Stephanie Heard Intertek
Subject: CCE and Viscosity Data

Yun,

The CCE and Viscosity Data at 243 F are attached. The only test remaining is the viscosity study at 100 F

Please let me know if you have any questions

Regards,

Edmond

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DW 0007273

TREX 010423.0002

TREX-010423.0002

ATTACHMENT INFO

Name: WTC-10-001812 BP CCE Visc Tables
061510.xls

Comments: THIS FILE WAS PRODUCED IN NATIVE
FORMAT

ATTACHMENT INFO

DW 0007274

TREX 010423.0003

TREX-010423.0003

WTC-10-001812 - BP - . . . - BOTTOMHOLE FLUID

TABLE 1
SAMPLE COLLECTION DATA

| | | |
|------------------------|-----------------|-----------|
| Project File: | WTC-10-001812 | |
| Operator Name: | BP | |
| Pool or Zone: | . | |
| Field or Area: | . | |
| Well Location: | . | |
| Fluid Sample: | BOTTOMHOLE | |
| Solvent Gas | CO ₂ | |
| Sampling Company: | . | |
| Name of Sampler: | . | |
| Sampling Date: | . | |
| Sampling Point: | BOTTOMHOLE | |
| Sampling Temperature: | 243.0 F | 390.4 K |
| Sampling Pressure: | 13500.0 psia | 93.08 MPa |
| Reservoir Temperature: | 243.0 F | 390.4 K |
| Reservoir Pressure: | 13500.0 psia | 93.08 MPa |

TABLE 1
COMPOSITIONAL ANALYSIS OF RESERVOIR FLUID

| Component Name | Chemical Symbol | Mole Fraction | Mass Fraction | Calculated Properties | |
|-----------------------|------------------|---------------|---------------|---------------------------|--------|
| Nitrogen | N ₂ | 0.0049 | 0.0026 | Total Sample | |
| Carbon Dioxide | CO ₂ | 0.0092 | 0.0076 | Molecular Weight | 53.45 |
| Hydrogen Sulphide | H ₂ S | 0.0000 | 0.0000 | | |
| Methane | C ₁ | 0.6485 | 0.1947 | | |
| Ethane | C ₂ | 0.0639 | 0.0360 | C ₇₊ Fraction | |
| Propane | C ₃ | 0.0459 | 0.0379 | | |
| i-Butane | i-C ₄ | 0.0094 | 0.0102 | | |
| n-Butane | n-C ₄ | 0.0215 | 0.0234 | Molecular Weight | 213.92 |
| i-Pentane | i-C ₅ | 0.0088 | 0.0119 | Mole Fraction | 0.1573 |
| n-Pentane | n-C ₅ | 0.0110 | 0.0149 | Density (g/cc) | 0.8532 |
| Hexanes | C ₆ | 0.0195 | 0.0315 | C ₁₂₊ Fraction | |
| Heptanes | C ₇ | 0.0173 | 0.0315 | | |
| Octanes | C ₈ | 0.0268 | 0.0539 | | |
| Nonanes | C ₉ | 0.0142 | 0.0341 | Molecular Weight | 311.12 |
| Decanes | C ₁₀ | 0.0119 | 0.0316 | Mole Fraction | 0.0778 |
| Undecanes | C ₁₁ | 0.0093 | 0.0256 | Density (g/cc) | 0.8921 |
| Dodecanes | C ₁₂ | 0.0076 | 0.0229 | C ₃₀₊ Fraction | |
| Tridecanes | C ₁₃ | 0.0075 | 0.0247 | | |
| Tetradecanes | C ₁₄ | 0.0066 | 0.0233 | | |
| Pentadecanes | C ₁₅ | 0.0056 | 0.0214 | Molecular Weight | 592.42 |
| Hexadecanes | C ₁₆ | 0.0048 | 0.0199 | Mole Fraction | 0.0156 |
| Heptadecanes | C ₁₇ | 0.0042 | 0.0185 | Density (g/cc) | 0.9708 |
| Octadecanes | C ₁₈ | 0.0039 | 0.0183 | C ₃₆₊ Fraction | |
| Nonadecanes | C ₁₉ | 0.0035 | 0.0174 | | |
| Eicosanes | C ₂₀ | 0.0028 | 0.0145 | | |
| Heneicosanes | C ₂₁ | 0.0026 | 0.0140 | Molecular Weight | 662.30 |
| Docosanes | C ₂₂ | 0.0022 | 0.0127 | Mole Fraction | 0.0105 |
| Tricosanes | C ₂₃ | 0.0020 | 0.0121 | Density (g/cc) | 0.9926 |
| Tetracosanes | C ₂₄ | 0.0018 | 0.0112 | | |
| Pentacosanes | C ₂₅ | 0.0017 | 0.0108 | | |
| Hexacosanes | C ₂₆ | 0.0015 | 0.0099 | | |
| Heptacosanes | C ₂₇ | 0.0014 | 0.0098 | | |
| Octacosanes | C ₂₈ | 0.0013 | 0.0097 | | |
| Nonacosanes | C ₂₉ | 0.0011 | 0.0086 | | |
| Tricontanes | C ₃₀ | 0.0011 | 0.0083 | | |
| Hentriacontanes | C ₃₁ | 0.0010 | 0.0077 | | |
| Dotriacontanes | C ₃₂ | 0.0009 | 0.0072 | | |
| Tritriacontanes | C ₃₃ | 0.0008 | 0.0066 | | |
| Tetratriacontanes | C ₃₄ | 0.0008 | 0.0066 | | |
| Pentatriacontanes | C ₃₅ | 0.0006 | 0.0059 | | |
| Hexatriacontanes plus | C ₃₆₊ | 0.0105 | 0.1304 | | |
| | | 1.0000 | 1.0000 | | |

TABLE 2
AVERAGE FLUID COMPRESSIBILITIES @ 243.0 F (390.4 K) WITH MIXER

| Pressure Range | | Average Fluid Compressibility (psi ⁻¹) |
|----------------|------------------|--|
| From (psia) | To (psia) | |
| 13500 | 12500 | 1.2284E-05 |
| 12500 | 11500 | 1.2789E-05 |
| 11500 | 10500 | 1.3753E-05 |
| 10500 | 9500 | 1.5323E-05 |
| 9500 | 8500 | 1.7331E-05 |
| 8500 | 7500 | 2.0654E-05 |
| 7500 | 6438 Psat | 2.6101E-05 |

| Pressure Range | | Average Fluid Compressibility (MPa ⁻¹) |
|----------------|-------------------|--|
| From (MPa) | To (MPa) | |
| 93.08 | 86.18 | 1.7816E-03 |
| 86.18 | 79.29 | 1.8550E-03 |
| 79.29 | 72.39 | 1.9947E-03 |
| 72.39 | 65.50 | 2.2225E-03 |
| 65.50 | 58.61 | 2.5137E-03 |
| 58.61 | 51.71 | 2.9957E-03 |
| 51.71 | 44.39 Psat | 3.7857E-03 |

Psat - Saturation Pressure

TABLE 3
CONSTANT COMPOSITION EXPANSION @ 243.0 F (390.4 K) WITH MIXER

| Pressure (psia) (MPa) | | Relative Volume [1] | Y-Function [2] | Liquid Volume (% of Vtot) | Fluid Density (g/cc) |
|--|--------------|---------------------------|-------------------|---------------------------------|----------------------------|
| 13500 | 93.08 | 0.886046 | | | 0.6017 |
| 12500 | 86.18 | 0.897065 | | | 0.5943 |
| 11500 | 79.29 | 0.908687 | | | 0.5867 |
| 10500 | 72.39 | 0.921358 | | | 0.5787 |
| 9500 | 65.50 | 0.935696 | | | 0.5698 |
| 8500 | 58.61 | 0.952199 | | | 0.5599 |
| 7500 | 51.71 | 0.972281 | | | 0.5484 |
| 6438 * | 44.39 | 1.000000 | | 100.00 | 0.5332 |
| 6378 | 43.98 | 1.002437 | 3.8373 | 86.50 | |
| 6299 | 43.43 | 1.005779 | 3.8117 | 74.51 | |
| 6230 | 42.96 | 1.008803 | 3.7894 | 70.01 | |
| 6155 | 42.44 | 1.012208 | 3.7652 | 68.68 | |
| 6141 | 42.34 | 1.012860 | 3.7606 | 68.67 | |
| 5844 | 40.29 | 1.027735 | 3.6647 | 66.27 | |
| 5547 | 38.25 | 1.045009 | 3.5688 | 64.25 | |
| 5250 | 36.20 | 1.065157 | 3.4729 | 62.52 | |
| 4953 ** | 34.15 | 1.088782 | 3.3770 | 60.48 | |
| 4656 ** | 32.10 | 1.116648 | 3.2811 | 58.81 | |
| 4359 ** | 30.05 | 1.149738 | 3.1852 | 57.08 | |
| 4062 ** | 28.01 | 1.189343 | 3.0893 | 55.03 | |
| 3765 ** | 25.96 | 1.237177 | 2.9934 | 52.87 | |
| 3468 ** | 23.91 | 1.295569 | 2.8975 | 50.09 | |
| 3171 ** | 21.86 | 1.367750 | 2.8016 | 47.17 | |
| 2874 ** | 19.82 | 1.458330 | 2.7057 | 43.55 | |
| 2577 ** | 17.77 | 1.574099 | 2.6098 | 40.12 | |
| 2280 ** | 15.72 | 1.725457 | 2.5138 | 36.03 | |
| 1983 ** | 13.67 | 1.929138 | 2.4179 | 31.75 | |
| [1] Volume at indicated pressure per volume at saturation pressure | | | | | |
| [2] Y Function = ((P _{sat} -P)/P)/(Relative Volume - 1) | | | | | |
| * Saturation Pressure | | | | | |
| ** Asphaltenes Precipitation | | | | | |

TABLE 4
AVERAGE FLUID COMPRESSIBILITIES @ 243.0 F (390.4 K) WITHOUT MIXER

| Pressure Range | | Average Fluid Compressibility (psi ⁻¹) |
|----------------|------------------|--|
| From (psia) | To (psia) | |
| 13500 | 12500 | 1.3071E-05 |
| 12500 | 11500 | 1.3339E-05 |
| 11500 | 10500 | 1.4003E-05 |
| 10500 | 9500 | 1.5571E-05 |
| 9500 | 8500 | 1.8090E-05 |
| 8500 | 7500 | 2.2475E-05 |
| 7500 | 6362 Psat | 2.6983E-05 |

| Pressure Range | | Average Fluid Compressibility (MPa ⁻¹) |
|----------------|-------------------|--|
| From (MPa) | To (MPa) | |
| 93.08 | 86.18 | 1.8958E-03 |
| 86.18 | 79.29 | 1.9346E-03 |
| 79.29 | 72.39 | 2.0309E-03 |
| 72.39 | 65.50 | 2.2584E-03 |
| 65.50 | 58.61 | 2.6238E-03 |
| 58.61 | 51.71 | 3.2597E-03 |
| 51.71 | 43.86 Psat | 3.9135E-03 |

Psat - Saturation Pressure

TABLE 5
CONSTANT COMPOSITION EXPANSION @ 243.0 F (390.4 K) WITHOUT MIXER

| Pressure | | Relative Volume | Y-Function | Liquid Volume | Fluid Density |
|--|--------------|-----------------|------------|--------------------------|---------------|
| (psia) | (MPa) | [1] | [2] | (% of V _{tot}) | (g/cc) |
| 13500 | 93.08 | 0.879364 | | | 0.6017 |
| 12500 | 86.18 | 0.891010 | | | 0.5943 |
| 11500 | 79.29 | 0.903056 | | | 0.5867 |
| 10500 | 72.39 | 0.915881 | | | 0.5787 |
| 9500 | 65.50 | 0.930368 | | | 0.5698 |
| 8500 | 58.61 | 0.947509 | | | 0.5599 |
| 7500 | 51.71 | 0.969293 | | | 0.5484 |
| 6362 * | 43.86 | 1.000000 | | 100.00 | 0.5332 |
| 6206 | 42.79 | 1.006580 | 3.8200 | 80.41 | |
| 6050 | 41.71 | 1.013719 | 3.7591 | 73.12 | |
| 5894 | 40.64 | 1.021470 | 3.6982 | 67.93 | |
| 5738 | 39.56 | 1.029898 | 3.6373 | 65.62 | |
| 5582 | 38.49 | 1.039071 | 3.5764 | 64.18 | |
| 5426 | 37.41 | 1.049069 | 3.5155 | 62.30 | |
| 5270 | 36.34 | 1.059981 | 3.4546 | 60.63 | |
| 5114 | 35.26 | 1.071908 | 3.3937 | 59.49 | |
| 4958 | 34.18 | 1.084966 | 3.3328 | 58.31 | |
| 4802 | 33.11 | 1.099288 | 3.2719 | 57.07 | |
| 4646 | 32.03 | 1.115026 | 3.2110 | 55.94 | |
| 4490 | 30.96 | 1.132352 | 3.1501 | 54.71 | |
| 4334 | 29.88 | 1.151471 | 3.0892 | 54.10 | |
| 4178 | 28.81 | 1.172616 | 3.0283 | 52.69 | |
| 4022 | 27.73 | 1.196062 | 2.9674 | 51.80 | |
| [1] Volume at indicated pressure per volume at saturation pressure | | | | | |
| [2] Y Function = ((P _{sat} -P)/P)/(Relative Volume - 1) | | | | | |
| * Saturation Pressure | | | | | |

TABLE 6
AVERAGE FLUID COMPRESSIBILITIES @ 100.0 F (310.9 K) WITH MIXER

| Pressure Range | | Average Fluid Compressibility (psi ⁻¹) |
|----------------|------------------|--|
| From (psia) | To (psia) | |
| 13500 | 12500 | 1.1633E-05 |
| 12500 | 11500 | 1.1713E-05 |
| 11500 | 10500 | 1.1926E-05 |
| 10500 | 9500 | 1.2280E-05 |
| 9500 | 8500 | 1.3034E-05 |
| 8500 | 7500 | 1.5077E-05 |
| 7500 | 6107 Psat | 1.9269E-05 |

| Pressure Range | | Average Fluid Compressibility (MPa ⁻¹) |
|----------------|-------------------|--|
| From (MPa) | To (MPa) | |
| 93.08 | 86.18 | 1.6872E-03 |
| 86.18 | 79.29 | 1.6988E-03 |
| 79.29 | 72.39 | 1.7297E-03 |
| 72.39 | 65.50 | 1.7810E-03 |
| 65.50 | 58.61 | 1.8905E-03 |
| 58.61 | 51.71 | 2.1867E-03 |
| 51.71 | 42.11 Psat | 2.7947E-03 |

Psat - Saturation Pressure

TABLE 7
CONSTANT COMPOSITION EXPANSION @ 100.0 F (310.9 K) WITH MIXER

| Pressure | | Relative Volume | Y-Function | Liquid Volume | Fluid Density |
|--|--------------|-----------------|------------|--------------------------|---------------|
| (psia) | (MPa) | [1] | [2] | (% of V _{tot}) | (g/cc) |
| 13500 | 93.08 | 0.901806 | | | |
| 12500 | 86.18 | 0.912420 | | | |
| 11500 | 79.29 | 0.923233 | | | |
| 10500 | 72.39 | 0.934376 | | | |
| 9500 | 65.50 | 0.945993 | | | |
| 8500 | 58.61 | 0.958486 | | | |
| 7500 | 51.71 | 0.973158 | | | |
| 6107 * | 42.11 | 1.000000 | | 100.00 | |
| 5835 | 40.23 | 1.006891 | 6.7647 | 71.16 | |
| 5563 | 38.36 | 1.014929 | 6.5504 | 67.26 | |
| 5291 | 36.48 | 1.024340 | 6.3361 | 65.33 | |
| 5019 | 34.60 | 1.035410 | 6.1218 | 63.60 | |
| 4747 | 32.73 | 1.048497 | 5.9075 | 61.85 | |
| 4475 | 30.85 | 1.064057 | 5.6932 | 60.54 | |
| 4203 | 28.98 | 1.082682 | 5.4790 | 58.87 | |
| 3931 | 27.10 | 1.105144 | 5.2647 | 57.13 | |
| 3659 | 25.23 | 1.132473 | 5.0504 | 55.37 | |
| 3387 | 23.35 | 1.166059 | 4.8361 | 53.15 | |
| 3115 | 21.48 | 1.207824 | 4.6218 | 51.07 | |
| 2843 | 19.60 | 1.260485 | 4.4075 | 48.43 | |
| 2571 | 17.73 | 1.327994 | 4.1932 | 46.08 | |
| 2299 | 15.85 | 1.416290 | 3.9789 | 42.76 | |
| 2027 | 13.98 | 1.534673 | 3.7646 | 39.28 | |
| [1] Volume at indicated pressure per volume at saturation pressure | | | | | |
| [2] Y Function = ((P _{sat} -P)/P)/(Relative Volume - 1) | | | | | |
| * Saturation Pressure | | | | | |

TABLE 8
DIFFERENTIAL LIBERATION FLUID VISCOSITY @ 243.0 F (390.4 K)

| | Pressure | | Oil Viscosity (cp=mPa.s) |
|----------------------------|----------|--------------|-----------------------------|
| | (psia) | (MPa) | |
| 14000 | | 96.53 | 0.284 |
| 13000 | | 89.63 | 0.273 |
| 11000 | | 75.84 | 0.252 |
| 9000 | | 62.05 | 0.230 |
| 8000 | | 55.16 | 0.219 |
| 7000 | | 48.26 | 0.209 |
| 6438 Psat | | 44.39 | 0.202 |
| 6000 | | 41.37 | 0.240 |
| 5500 | | 37.92 | 0.289 |
| 5000 | | 34.47 | 0.334 |
| 4000 | | 27.58 | 0.404 |
| 3000 | | 20.68 | 0.487 |
| 2000 | | 13.79 | 0.605 |
| 15 | | 0.10 | 1.527 |
| Psat - Saturation Pressure | | | |

TABLE 9
DIFFERENTIAL LIBERATION FLUID VISCOSITY @ 100.0 F (310.9 K)

| Pressure | | Oil Viscosity (cp=mPa.s) |
|----------------------------|--------------|-----------------------------|
| (psia) | (MPa) | |
| 14000 | 96.53 | 0.428 |
| 13000 | 89.63 | 0.414 |
| 11000 | 75.84 | 0.383 |
| 9000 | 62.05 | 0.352 |
| 8000 | 55.16 | 0.339 |
| 7000 | 48.26 | 0.319 |
| 6500 | 44.82 | 0.311 |
| 6107 Psat | 42.11 | 0.302 |
| 5500 | 37.92 | 0.468 |
| 5000 | 34.47 | 0.544 |
| 4500 | 31.03 | 0.599 |
| 4000 | 27.58 | 0.660 |
| 3000 | 20.68 | 0.830 |
| 2000 | 13.79 | 1.103 |
| 15 | 0.10 | 4.058 |
| Psat - Saturation Pressure | | |