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Denne rapport
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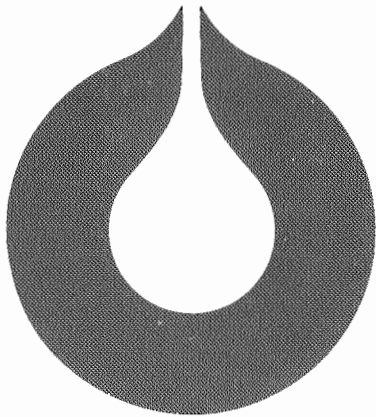
 **STATOIL**

~~99.595-~~
L&U DOK. SENTER

L.NR. 12484150020

KODE Well 34/10-16 nr35

Returneres etter bruk



statoil



Classification

Requested by

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Subtitle

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Title

PVT - Analysis
Well: 34/10-16
DST no. 1
STATOIL
EXPLORATION & PRODUCTION
LABORATORY

Jan.-84

LAB 84.202

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INTRODUCTION

The present report gives the results of a PVT analysis on a bottom hole sample from DST # 1 on well 34/10-16 obtained by FLOPETROL 10.09.1983.

Two bottom hole samples and one set separator samples were initially checked for consistency. The bottom hole samples were heated to ca 80 C, transferred to a PVT cell, and subjected to a constant mass expansion at reservoir temperature. The two samples showed a similar bubble point of 403 and 408 barg respectively (page 3 and 11 respectively). The sample with the highest bubble point was chosen for further study, and was flashed to standard conditions to determine the reservoir composition (page 4). The extended reservoir composition, density and molecular weights given on page 5 were calculated from a TBP distillation of the stock tank oil. The TBP distillation is reported separately.

During the single flash it was observed that the STO was solid at normal flash temperature of 15 C. The flash was therefore carried out at 28 C and atmospheric pressure. The STO density at 15 C is calculated from the measured value at 28 C (0.853 g/cm³). Similarly, the density at 15 C of the residual oil from the differential liberation is calculated from a value of 0.8529 g/cm³ measured at 30 C.

The separator samples were analysed separately (page 12 and 14), recombined and subjected to a constant mass expansion (page 17). Both the bubble point and calculated reservoir fluid composition (page 16) are similar to the bottom hole samples.

Differential liberation of the bottom hole sample was carried out through a series of pressure steps with the results given on page 6,7 and 8.

A separate portion of the bottom hole sample was charged to a rolling ball viscosimeter for measuring the oil viscosity (page 9).

Separator tests were simulated with an SRK equation of state model. The results, together with an experimental single flash, are on page 10. Since separator tests were not requested a temperature equal to the test separator was assumed.

SAMPLING CONDITIONS *)

| | |
|--------------------------------|---------------------------------------|
| FIELD | 34/10 ALPHA |
| WELL | 34/10-16 |
| TEST | DST 1 |
| PERFORATION | 3397 - 3407 mRKB |
| DATE | 10-11.09.83 |
| RESERVOIR FLUID | OIL |
| SAMPLE, BHS # 1 | Bottle 16251/33 |
| BHS # 2 | Bottle 9214/315 |
| Separator oil | Bottle nr 83021412 |
| Separator gas | Bottle nr A14693 |
| SEPARATOR TEMP | 60.0 C |
| SEPARATOR PRESSURE | 22 Barg |
| FLOWING BOTTOM HOLE PRESSURE | |
| During BHS | 450 Bara |
| During sep sampl | 304 Bara |
| STATIC BOTTOM HOLE PRESSURE ** | 459.4 Bara |
| BOTTOM HOLE TEMPERATURE ** | 128.5 C |
| OIL RATE | 1031.7 m ³ /D |
| GAS RATE | 181.5 MSCM/D |
| METER FACTOR | 0.9938 |
| GAS-OIL RATIO (Separator) | 177.0 Sm ³ /m ³ |

*)

Data from Flopetrol Well Testing Report 83/2301/35

**)

Data supplied by STATOIL, LET/B

WELL:34/10-16
BHS # 1

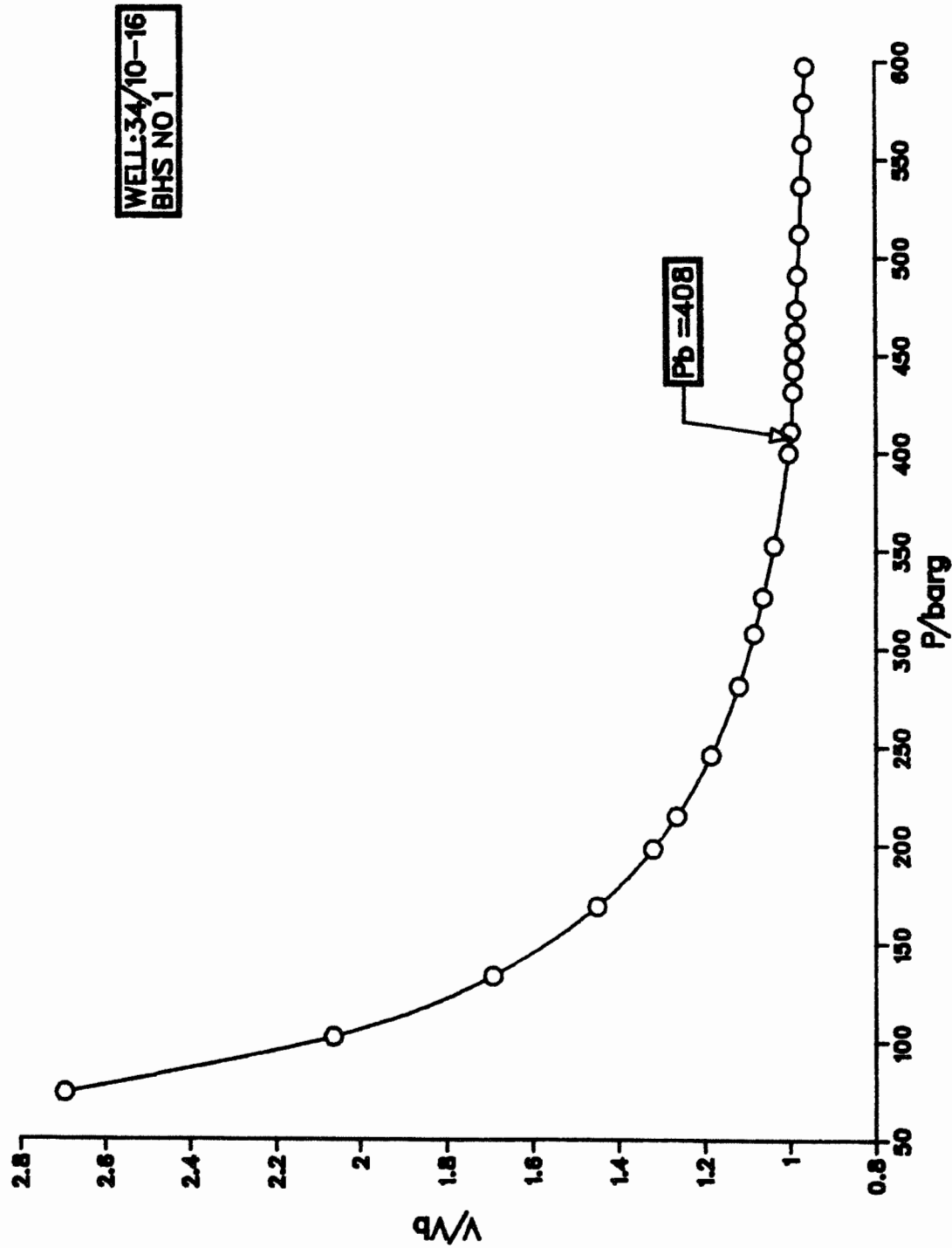
CONSTANT MASS EXPANSION AT 128.5 C

| PRESSURE BARG | REL VOL V/Vb | COMPRESSIBILITY 1/BAR | Y-FACTOR |
|------------------|-----------------|--------------------------|----------|
| 548.7 | 0.9727 | 1.66E-04 | |
| 524.5 | 0.9772 | 1.76E-04 | |
| 501.0 | 0.9809 | 1.86E-04 | |
| 476.5 | 0.9856 | 1.97E-04 | |
| 451.7 | 0.9904 | 2.07E-04 | |
| 429.2 | 0.9954 | 2.17E-04 | |
| 414.2 | 0.9987 | 2.23E-04 | |
| Pb = 408.0 | 1.0000 | 2.25E-04 | |
| 404.1 | 1.0022 | | 4.32 |
| 389.1 | 1.0112 | | 4.32 |
| 368.0 | 1.0263 | | 4.13 |
| 339.7 | 1.0507 | | 3.97 |
| 307.6 | 1.0840 | | 3.88 |
| 276.1 | 1.1277 | | 3.74 |
| 253.8 | 1.1666 | | 3.65 |
| 221.4 | 1.2417 | | 3.49 |
| 202.0 | 1.3009 | | 3.39 |
| 173.6 | 1.4168 | | 3.24 |
| 146.2 | 1.5760 | | 3.11 |
| 115.7 | 1.8616 | | 2.93 |
| 82.8 | 2.4190 | | 2.77 |

FOR P < Pb Y = 2.398 + 4.81E-03 x P
FOR P > Pb V/Vb = 1.12976 - 4.1095E-04 x P + 2.2769E-07 x P x P

FIG.1

CONSTANT MASS EXPANSION AT 128.5 °C



34/10-16
BHS # 1

COMPOSITION OF RESERVOIR FLUID
(Single flash to stock tank conditions)

| | STOCK TANK OIL MOL% | EVOLVED GAS MOL% | RECOMBINED LIQUID | | |
|---|------------------------|---------------------|-------------------|--------|--------------------------------------|
| | | | WEIGHT% | MOL WT | MOL% |
| NITROGEN | 0.00 | 0.15 | 0.04 | 28.0 | 0.11 |
| CARBONDIOXIDE | 0.00 | 2.22 | 0.84 | 44.0 | 1.62 |
| METHANE | 0.00 | 81.74 | 11.25 | 16.0 | 59.79 |
| ETHANE | 0.06 | 7.76 | 2.01 | 30.1 | 5.69 |
| PROPANE | 0.21 | 3.67 | 1.42 | 44.1 | 2.74 |
| i-BUTANE | 0.12 | 0.58 | 0.31 | 58.1 | 0.46 |
| n-BUTANE | 0.43 | 1.31 | 0.73 | 58.1 | 1.07 |
| i-PENTANE | 0.39 | 0.44 | 0.36 | 72.2 | 0.43 |
| n-PENTANE | 0.64 | 0.52 | 0.47 | 72.2 | 0.55 |
| HEXANES | 1.69 | 0.51 | 0.82 | 84.7 | 0.82 |
| HEPTANES | 5.08 | 0.66 | 1.93 | 89.1 | 1.84 |
| OCTANES | 8.03 | 0.37 | 2.89 | 101.6 | 2.43 |
| NONANES | 5.90 | 0.06 | 2.23 | 116.3 | 1.63 |
| DECANE PLUS | 77.45 | 0.01 | 74.71 | 306.0 | 20.82 |
| | ----- | ----- | ----- | | ----- |
| | 100.00 | 100.00 | 100.00 | | 100.00 |
| MOL WEIGHT | 259.2 | 21.34 | | | 85.27 |
| Gas oil ratio | | | = | 214.2 | Sm ³ /Sm ³ STO |
| Flash formation volume factor of bubble point liquid | | | = | 1.638 | m ³ /Sm ³ STO |
| Density at bubble point | | | = | 0.645 | g/cm ³ |
| Density of STO | | | = | 0.863 | g/cm ³ at 15C |
| Gas gravity (air=1) | | | = | 0.737 | |
| Density of C10+ | | | = | 0.869 | g/cm ³ |

34/10-16
BHS # 1

1)
EXTENDED RESERVOIR FLUID COMPOSITION

| COMPONENT | WEIGHT% | MOL WEIGHT | MOL% | DENSITY g/cm ³ at 15C |
|-----------|---------|------------|--------|-------------------------------------|
| N2 | 0.04 | 28.0 | 0.11 | |
| CO2 | 0.84 | 44.0 | 1.62 | |
| C1 | 11.25 | 16.0 | 59.79 | |
| C2 | 2.01 | 30.1 | 5.69 | |
| C3 | 1.42 | 44.1 | 2.74 | |
| iC4 | 0.31 | 58.1 | 0.46 | |
| nC4 | 0.73 | 58.1 | 1.07 | |
| iC5 | 0.36 | 72.2 | 0.43 | |
| nC5 | 0.47 | 72.2 | 0.55 | |
| C6 | 0.82 | 84.7 | 0.82 | 0.695 |
| C7 | 1.93 | 89.1 | 1.84 | 0.751 |
| C8 | 2.89 | 101.6 | 2.43 | 0.778 |
| C9 | 2.23 | 116.3 | 1.63 | 0.793 |
| C10 | 2.04 | 132.0 | 1.33 | 0.798 |
| C11 | 1.58 | 147.0 | 0.92 | 0.803 |
| C12 | 1.94 | 163.0 | 1.02 | 0.817 |
| C13 | 1.72 | 175.0 | 0.85 | 0.836 |
| C14 | 3.03 | 190.0 | 1.37 | 0.843 |
| C15 | 3.07 | 205.0 | 1.29 | 0.849 |
| C16 | 1.68 | 215.0 | 0.67 | 0.853 |
| C17 | 3.41 | 237.0 | 1.24 | 0.844 |
| C18 | 3.11 | 251.0 | 1.07 | 0.846 |
| C19 | 2.55 | 263.0 | 0.83 | 0.855 |
| C20+ | 50.58 | 425.0 | 10.24 | 0.885 |
| | ----- | | ----- | |
| | 100.00 | | 100.01 | |

1)
Data to C9 based on single flash,
remaining on TBP distillation

WELL: 34/10-16
BHS # 1

DIFFERENTIAL DEPLETION AT 128.5 C

| PRESSURE | OIL FORM | SOLUTION | GAS FORM | RES OIL | COMPR | GAS |
|----------|----------|----------|----------|-------------------|--------|---------|
| BARG | VOL FACT | GOR | VOL FACT | DENSITY | FACTOR | VISCOSI |
| | Bod | Rsd | Bg | g/cm ³ | Z | cP |
| 408.0 | 1.655 | 214.5 | | 0.644 | | |
| 386.8 | 1.604 | 194.7 | 3.85E-03 | 0.653 | 1.062 | 0.0318 |
| 353.7 | 1.552 | 174.1 | 4.15E-03 | 0.662 | 1.045 | 0.0284 |
| 296.6 | 1.452 | 139.0 | 4.74E-03 | 0.686 | 1.003 | 0.0247 |
| 248.3 | 1.400 | 113.0 | 5.41E-03 | 0.696 | 0.958 | 0.0220 |
| 197.7 | 1.343 | 89.6 | 6.64E-03 | 0.711 | 0.938 | 0.0197 |
| 125.7 | 1.264 | 57.0 | 1.04E-02 | 0.734 | 0.936 | 0.0169 |
| 71.2 | 1.210 | 34.2 | 1.85E-02 | 0.750 | 0.951 | 0.0152 |
| 31.5 | 1.168 | 17.6 | 4.25E-02 | 0.763 | 0.981 | 0.0140 |
| 0 | 1.096 | | | 0.788 | | |
| 0 * | 1.000 | | | 0.864 | | |

* AT 15 C

Bod : Volume of oil at P and T per volume
of residual oil at 15 C and atm P

Rsd : Standard m³ gas per m³ residual oil
at 15 C and atm P

Bg : m³ gas at T and P per standard m³ gas

WELL:34/10-16

BHS # 1

DIFFERENTIAL DEPLETION AT 128.5 C

(Molecular composition of differentially liberated gas, mol%)

| PRESSURE/BARG | 386.8 | 353.7 | 296.6 | 248.3 | 197.7 | 125.7 | 71.2 | 31.5 | 0.0 |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| NITROGEN | 0.25 | 0.20 | 0.25 | 0.22 | 0.16 | 0.16 | 0.08 | 0.06 | 0.00 |
| CARBONDIOXIDE | 1.91 | 1.95 | 1.97 | 2.03 | 2.09 | 2.26 | 2.52 | 2.90 | 2.93 |
| METHANE | 85.06 | 85.73 | 86.19 | 86.79 | 86.77 | 85.60 | 82.79 | 75.62 | 50.23 |
| ETHANE | 5.59 | 5.69 | 5.74 | 5.91 | 6.07 | 6.83 | 8.35 | 11.57 | 18.01 |
| PROPANE | 2.18 | 2.21 | 2.19 | 2.22 | 2.24 | 2.51 | 3.19 | 5.00 | 12.16 |
| i-BUTANE | 0.31 | 0.33 | 0.32 | 0.31 | 0.31 | 0.33 | 0.42 | 0.68 | 2.08 |
| n-BUTANE | 0.68 | 0.68 | 0.66 | 0.65 | 0.63 | 0.68 | 0.85 | 1.41 | 4.65 |
| i-PENTANE | 0.23 | 0.23 | 0.22 | 0.21 | 0.20 | 0.20 | 0.25 | 0.40 | 1.54 |
| n-PENTANE | 0.28 | 0.28 | 0.26 | 0.25 | 0.23 | 0.24 | 0.28 | 0.47 | 1.74 |
| HEXANES | 0.35 | 0.34 | 0.31 | 0.28 | 0.26 | 0.26 | 0.29 | 0.46 | 1.73 |
| HEPTANES | 0.58 | 0.57 | 0.50 | 0.47 | 0.43 | 0.39 | 0.42 | 0.65 | 2.05 |
| OCTANES | 0.62 | 0.56 | 0.49 | 0.37 | 0.34 | 0.31 | 0.33 | 0.49 | 1.64 |
| NONANES | 0.41 | 0.27 | 0.22 | 0.13 | 0.13 | 0.12 | 0.12 | 0.15 | 0.69 |
| DECANES+ | 1.55 | 0.96 | 0.68 | 0.16 | 0.14 | 0.12 | 0.12 | 0.14 | 0.56 |
| | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

| | | | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| MOLE WEIGHT | 22.72 | 21.72 | 21.03 | 19.92 | 19.91 | 20.05 | 20.77 | 22.90 | 37.34 |
| GRAVITY (Air=1) | 0.784 | 0.750 | 0.726 | 0.688 | 0.687 | 0.692 | 0.717 | 0.791 | 1.289 |

DIFFERENTIAL DEPLETION AT 128.5 C
(Molecular composition of residual oil)

| COMPONENT | MOL% | |
|-----------------|--------|-------------------|
| NITROGEN | 0.00 | |
| CARBONDIOXIDE | 0.00 | |
| METHANE | 0.00 | |
| ETHANE | 0.04 | |
| PROPANE | 0.23 | |
| i-BUTANE | 0.13 | |
| n-BUTANE | 0.47 | |
| i-PENTANE | 0.38 | |
| n-PENTANE | 0.62 | |
| HEXANES | 1.44 | |
| HEPTANES | 4.37 | |
| OCTANES | 6.97 | |
| NONANES | 5.15 | |
| DECANES+ | 80.20 | |
| | ----- | |
| | 100.00 | |
| DENSITY AT 15 C | 0.864 | g/cm ³ |
| MOLE WEIGHT | 263.2 | |

FIG. 2

DIFFERENTIAL DEPLETION AT 128.5 °C
OIL FORMATION VOLUME FACTOR

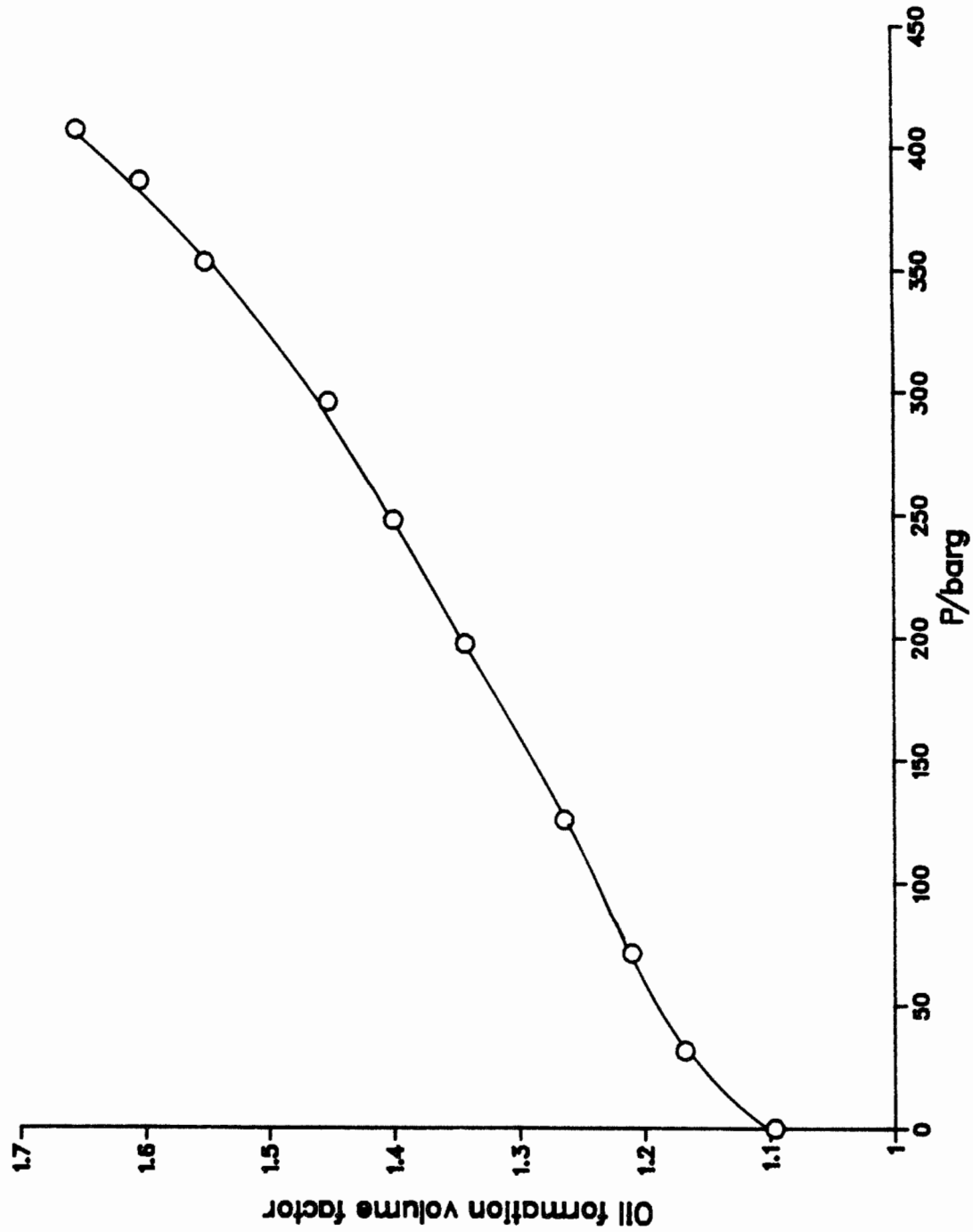


FIG. 3

DIFFERENTIAL DEPLETION AT 128.5 °C
SOLUTION GOR

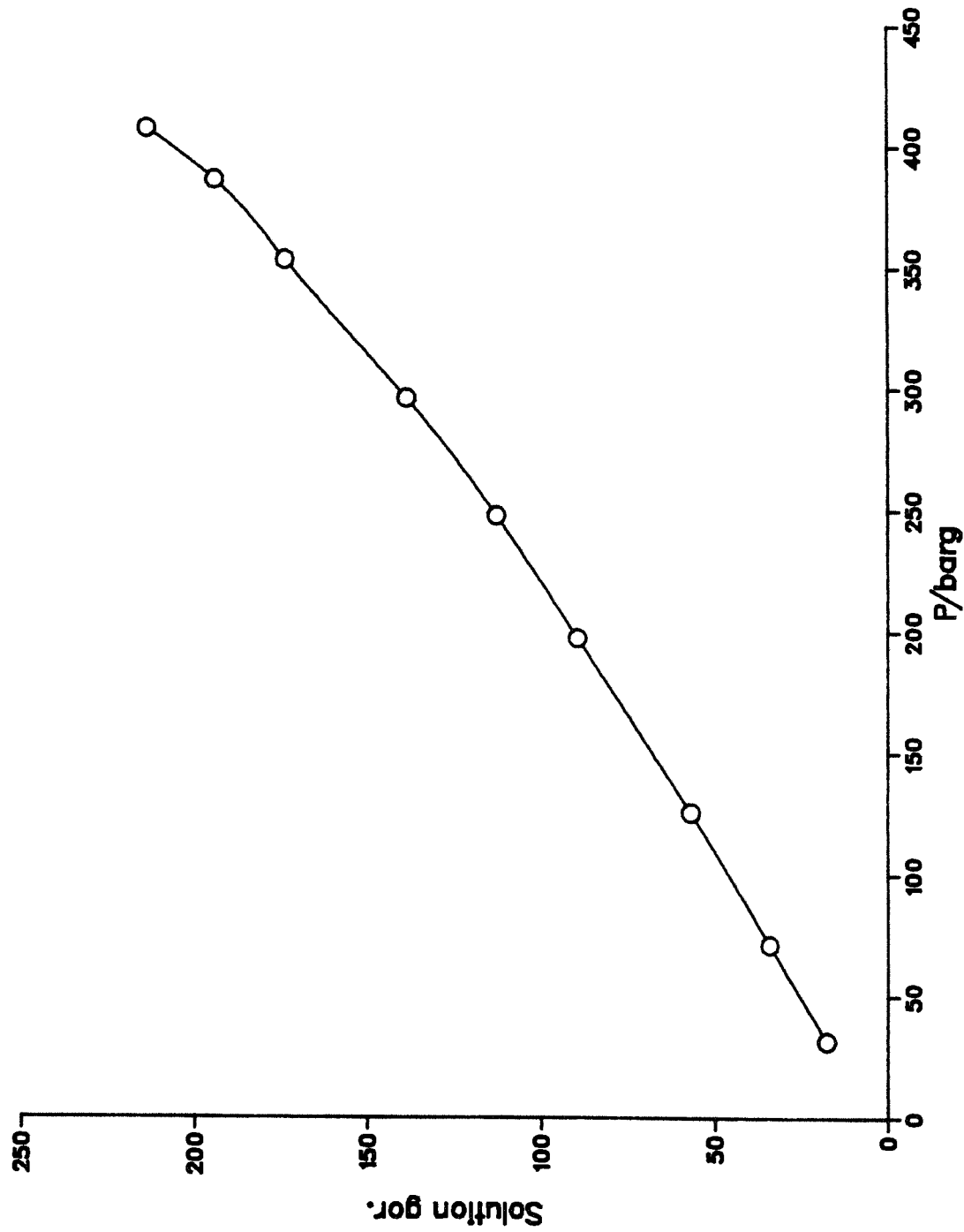


FIG. 4

DIFFERENTIAL DEPLETION AT 128.5 °C
COMPRESSIBILITY FACTOR

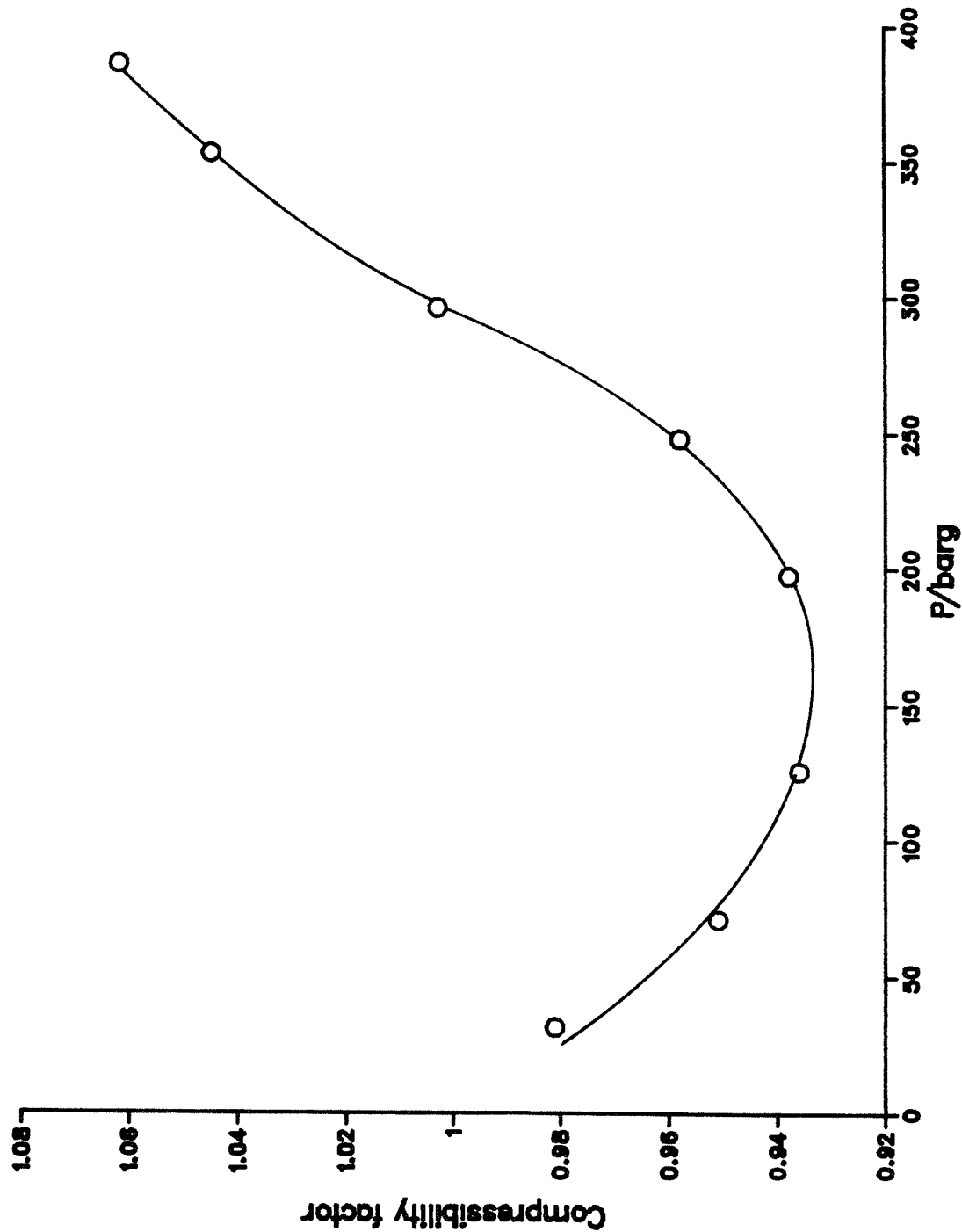


FIG 5

DIFFERENTIAL DEPLETION AT 128.5 °C
GAS FORMATION VOLUME FACTOR

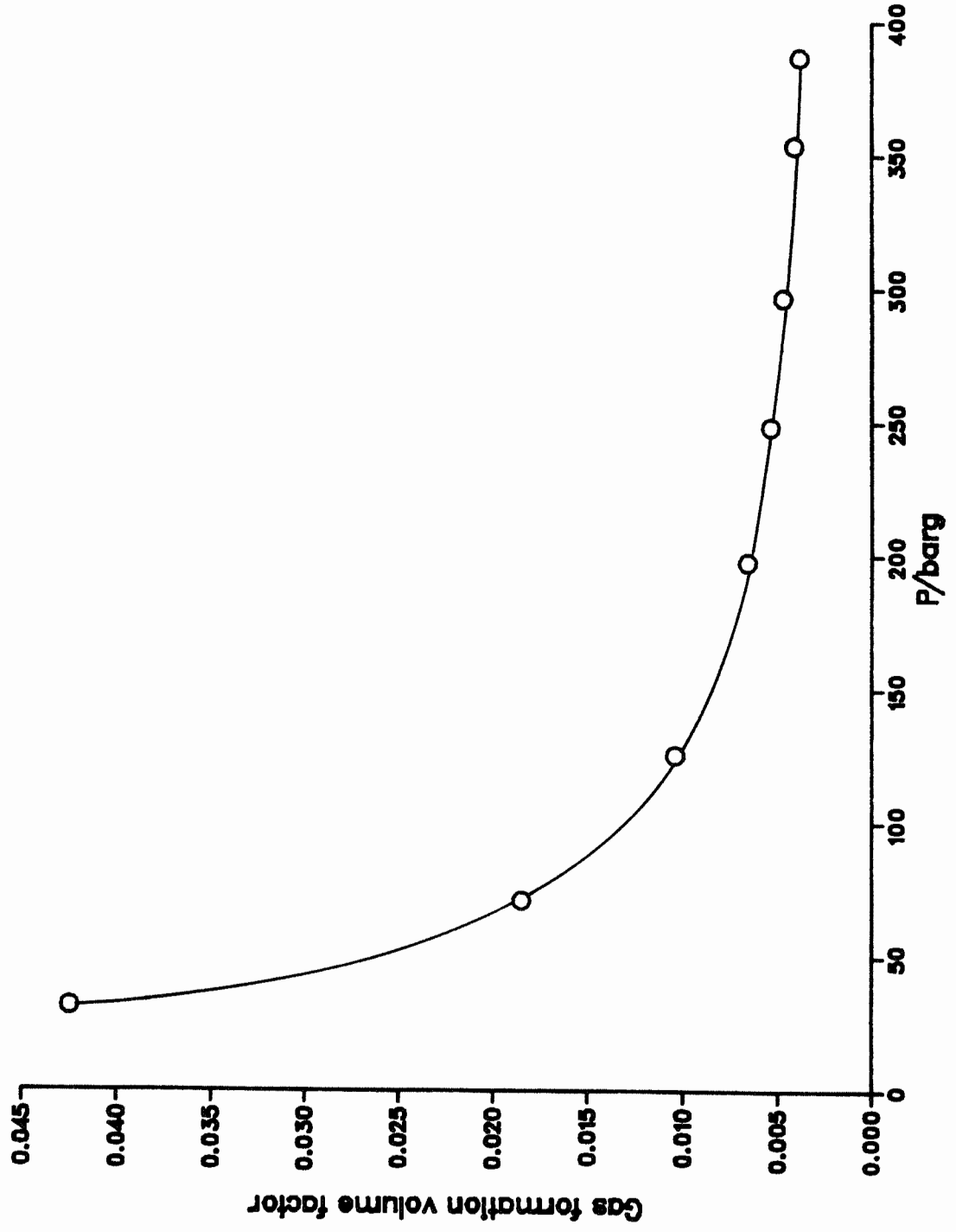
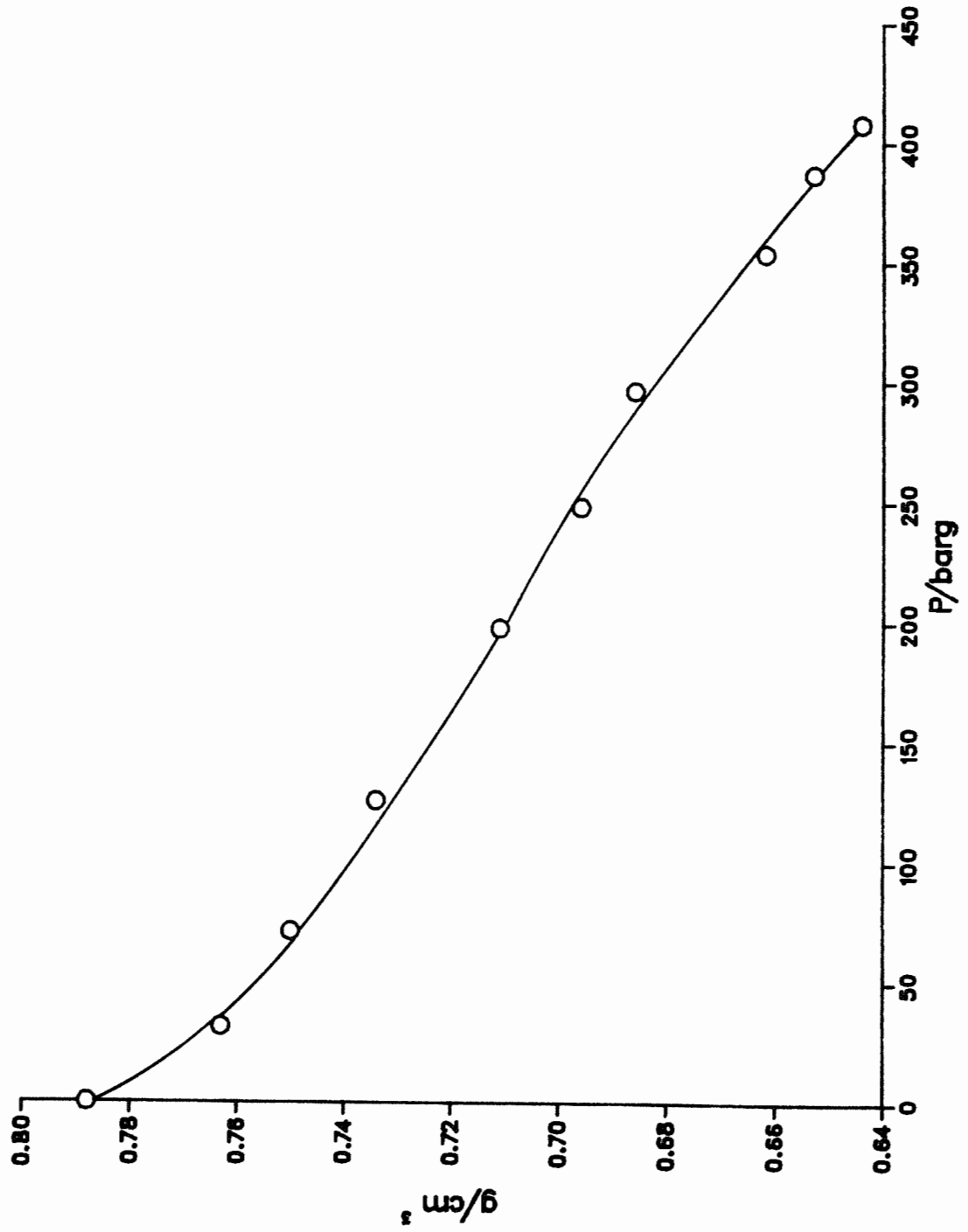


FIG. 6

DIFFERENTIAL DEPLETION AT 128.5 °C
RESERVOIR OIL DENSITY



WELL: 34/10-16

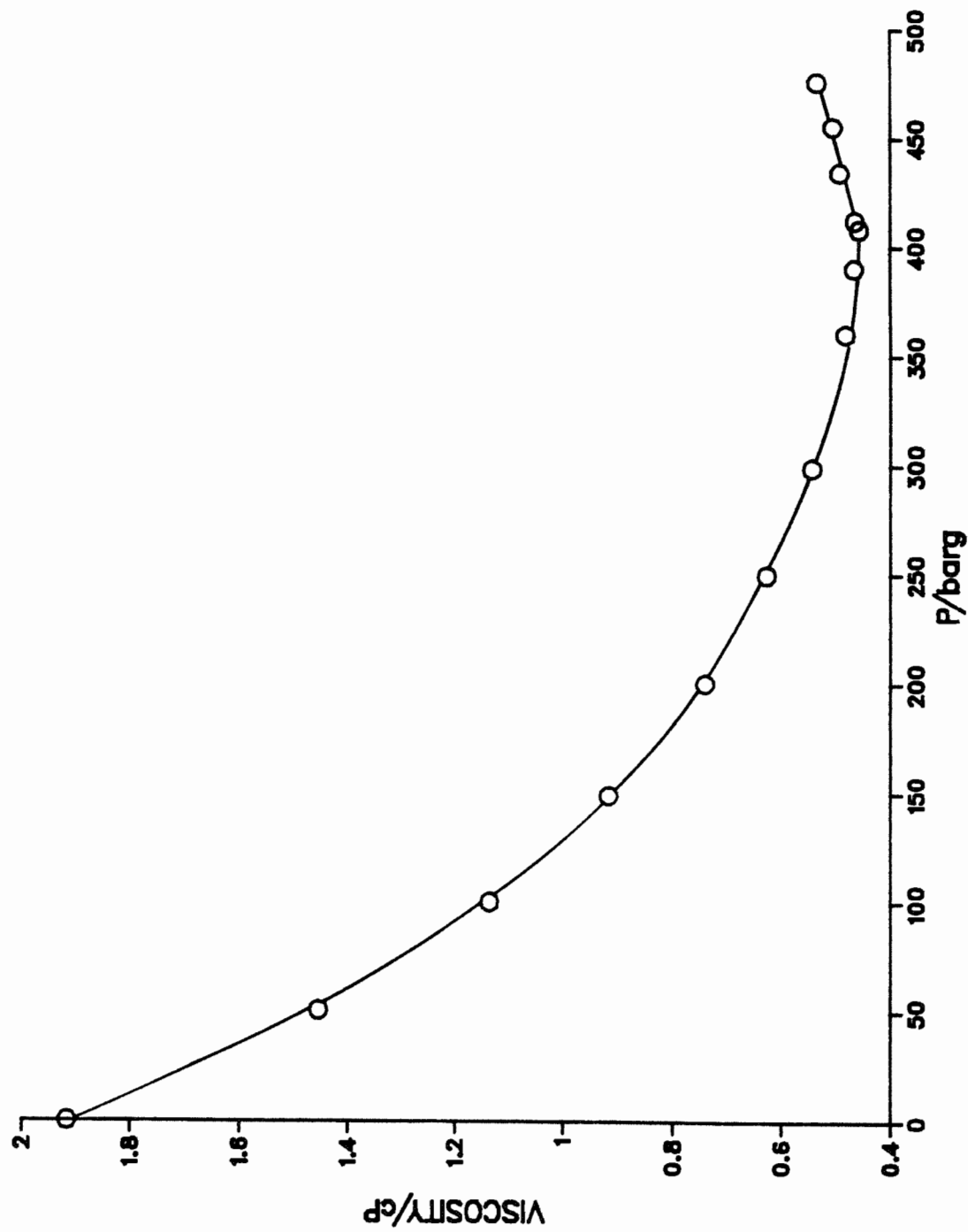
BHS # 1

VISCOSITY OF RESERVOIR FLUID AT 128.5 C

| PRESSURE (Barg) | VISCOSITY (Centipoise) |
|--------------------|---------------------------|
| 475.6 | 0.535 |
| 455.1 | 0.506 |
| 434.1 | 0.494 |
| 412.1 | 0.466 |
| Pb = 408.0 | 0.458 |
| 390.2 | 0.467 |
| 360.0 | 0.483 |
| 298.7 | 0.544 |
| 249.7 | 0.627 |
| 200.2 | 0.740 |
| 149.0 | 0.916 |
| 100.3 | 1.136 |
| 50.6 | 1.454 |
| 0 | 1.917 |

FIG. 7

VISCOSITY OF RESERVOIR FLUID AT 128.5 °C



WELL:34/10-16

DST 1

SEPARATOR TEST OF RESERVOIR FLUID

Calculated values from EOS simulation

| SEPARATOR | | GAS-OIL RATIO | | GAS GRAVITY | | FORM | DENSITY |
|-----------|------|------------------------------------|------------|-------------|------------|--------|-------------------|
| Pressure | Temp | (Sm ³ /m ³) | | (Air = 1) | | FACTOR | STO 15C |
| Barg | C | Separator | Stock tank | Separator | Stock Tank | Bof | g/cm ³ |
| * 0 | 28 | 214 | | 0.737 | | 1.638 | 0.863 |
| 0 | 28 | 211 | | 0.727 | | 1.635 | 0.879 |
| 65 | 60 | 166 | 36 | 0.645 | 0.853 | 1.595 | 0.873 |
| 40 | 60 | 179 | 22 | 0.665 | 0.883 | 1.582 | 0.873 |
| 22 | 60 | 190 | 11 | 0.669 | 0.890 | 1.584 | 0.873 |

* Experimental, density of STO at 28 C is 0.853 g/cm³

GOR : Std m³ gas per m³ STO at 15 C

Bof : m³ bubble point oil at indicated P and T per m³ STO at 15 C

WELL:34/10-16
BHS # 2

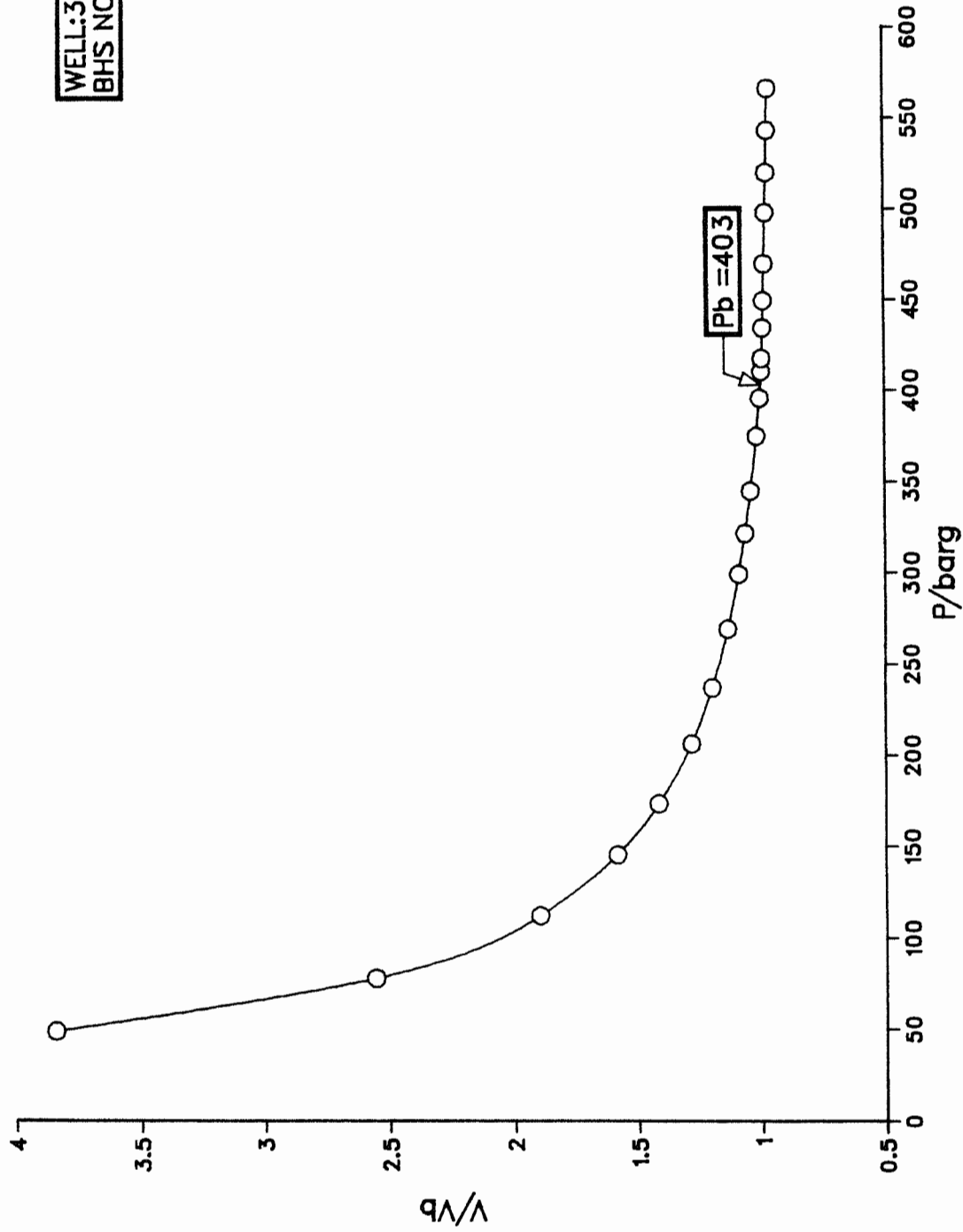
CONSTANT MASS EXPANSION AT 128.5 C

| PRESSURE BARG | REL VOL V/Vb | COMPRESSIBILITY 1/BAR | Y-FACTOR |
|------------------|-----------------|--------------------------|----------|
| 565.8 | 0.9676 | 1.68E-04 | |
| 542.7 | 0.9715 | 1.78E-04 | |
| 519.4 | 0.9757 | 1.88E-04 | |
| 497.4 | 0.9800 | 1.97E-04 | |
| 469.3 | 0.9854 | 2.09E-04 | |
| 449.0 | 0.9896 | 2.17E-04 | |
| 434.1 | 0.9928 | 2.23E-04 | |
| 417.4 | 0.9966 | 2.29E-04 | |
| 410.2 | 0.9984 | 2.32E-04 | |
| Pb = 403.0 | 1.0000 | 2.35E-04 | |
| 395.6 | 1.0043 | | 4.34 |
| 374.7 | 1.0184 | | 4.10 |
| 344.6 | 1.0430 | | 3.94 |
| 321.4 | 1.0659 | | 3.85 |
| 299.1 | 1.0924 | | 3.76 |
| 269.0 | 1.1370 | | 3.64 |
| 236.8 | 1.2012 | | 3.49 |
| 206.1 | 1.2859 | | 3.34 |
| 173.3 | 1.4184 | | 3.17 |
| 145.4 | 1.5850 | | 3.03 |
| 112.0 | 1.8976 | | 2.89 |
| 77.7 | 2.5549 | | 2.69 |
| 48.6 | 3.8435 | | 2.56 |

FOR P < Pb Y = 2.330 + 4.84E-03 x P
 FOR P > Pb V/Vb = 1.13106 - 4.1528E-04 x P + 2.2351E-07 x P x P

FIG. 8

CONSTANT MASS EXPANSION AT 128.5 °C



WELL:34/10-16
DST 1
Bottle A14693

COMPOSITION OF SEPARATOR GAS

| COMPONENT | MOL % |
|---------------|---------|
| NITROGEN | 0.249 |
| CARBONDIOXIDE | 2.236 |
| METHANE | 85.838 |
| ETHANE | 7.059 |
| PROPANE | 2.743 |
| i-BUTANE | 0.354 |
| n-BUTANE | 0.695 |
| i-PENTANE | 0.172 |
| n-PENTANE | 0.200 |
| HEXANES | 0.157 |
| HEPTANES | 0.180 |
| OCTANES | 0.098 |
| NONANES | 0.010 |
| DECANES PLUS | 0.008 |
| | ----- |
| | 100.000 |
| MOL WT | 19.45 |
| GRAVITY | 0.671 |

WELL: 34/10-16
DST # 1
(bottle 83021412)

BUBBLE POINT OF SEPARATOR OIL AT 60.0 C

| | PRESSURE Barg | RELATIVE VOLUME V/Vb |
|------|------------------|-------------------------|
| | 197.8 | 0.9850 |
| | 163.6 | 0.9877 |
| | 132.2 | 0.9903 |
| | 101.1 | 0.9929 |
| | 74.4 | 0.9951 |
| | 55.7 | 0.9968 |
| | 39.4 | 0.9984 |
| | 30.7 | 0.9992 |
| | 23.9 | 0.9998 |
| Pb = | 22.0 | 1.0000 |
| | 19.8 | 1.0259 |
| | 16.9 | 1.0735 |
| | 15.7 | 1.1280 |
| | 13.8 | 1.2164 |
| | 11.1 | 1.3663 |
| | 7.7 | 1.7299 |

34/10-16
DST 1

COMPOSITION OF SEPARATOR LIQUID
(Single flash to stock tank conditions)

| | STOCK TANK OIL | EVOLVED GAS | RECOMBINED LIQUID | | |
|---------------|----------------|-------------|-------------------|--------|--------|
| | MOL% | MOL% | WEIGHT% | MOL WT | MOL% |
| NITROGEN | 0.00 | 0.24 | 0.00 | 28.0 | 0.04 |
| CARBONDIOXIDE | 0.00 | 2.10 | 0.06 | 44.0 | 0.31 |
| METHANE | 0.00 | 59.55 | 0.63 | 16.0 | 8.69 |
| ETHANE | 0.13 | 16.58 | 0.34 | 30.1 | 2.53 |
| PROPANE | 0.67 | 11.70 | 0.46 | 44.1 | 2.27 |
| i-BUTANE | 0.32 | 1.91 | 0.15 | 58.1 | 0.56 |
| n-BUTANE | 1.15 | 3.98 | 0.41 | 58.1 | 1.56 |
| i-PENTANE | 0.75 | 1.04 | 0.26 | 72.2 | 0.80 |
| n-PENTANE | 1.19 | 1.08 | 0.39 | 72.2 | 1.17 |
| HEXANES | 2.27 | 0.75 | 0.80 | 84.7 | 2.05 |
| HEPTANES | 5.80 | 0.75 | 2.07 | 89.2 | 5.07 |
| OCTANES | 8.18 | 0.30 | 3.29 | 101.9 | 7.03 |
| NONANES | 5.57 | 0.02 | 2.52 | 115.6 | 4.76 |
| DECANE PLUS | 73.97 | 0.00 | 88.62 | 306.0 | 63.16 |
| | ----- | ----- | ----- | | ----- |
| | 100.00 | 100.00 | 100.00 | | 100.00 |
| MOL WEIGHT | 250.8 | 27.26 | | | 218.19 |

| | | | |
|--|---|-------|--------------------------------------|
| Gas oil ratio | = | 13.5 | Sm ³ /Sm ³ STO |
| Flash formation volume factor of bubble point liquid | = | 1.084 | m ³ /Sm ³ STO |
| Density at bubble point | = | 0.797 | g/cm ³ |
| Density of STO | = | 0.849 | g/cm ³ at 15C |
| Gas gravity (air=1) | = | 0.941 | |
| Density of C10+ | = | 0.869 | g/cm ³ |

RECOMBINATION OF SEPARATOR SAMPLES

FIELD VALUES

GOR = 177.0 Sm³/m³ separator liquid
Gas gravity = 0.670 (air = 1)
Z factor = 0.9615

LAB VALUES

Gas gravity = 0.671 (air = 1)
Z factor = 0.9598

CORRECTED GOR

$$\text{GOR} = \text{GOR}(\text{field}) \times \sqrt{\frac{\text{Grav}(\text{field}) \times \text{Z}(\text{field})}{\text{Grav}(\text{lab}) \times \text{Z}(\text{lab})}}$$

GOR = 177. Sm³/m³ separator liquid

RECOMBINATION

The surface samples were physically recombined in the ratio of 177.1 standard cm³ of separator gas per cm³ of bubble point separator liquid.

WELL: 34/10-16
DST 1

COMPOSITION OF RECOMBINED RESERVOIR FLUID

| | Separator gas (mol%) | Separator liquid (mol%) | Recombined fluid (mol%) |
|---------------|----------------------------|-------------------------------|-------------------------------|
| NITROGEN | 0.249 | 0.04 | 0.18 |
| CARBONDIOXIDE | 2.236 | 0.31 | 1.60 |
| METHANE | 85.838 | 8.69 | 60.54 |
| ETHANE | 7.059 | 2.53 | 5.57 |
| PROPANE | 2.743 | 2.27 | 2.59 |
| i-BUTANE | 0.354 | 0.56 | 0.42 |
| n-BUTANE | 0.695 | 1.56 | 0.98 |
| i-PENTANE | 0.172 | 0.80 | 0.38 |
| n-PENTANE | 0.200 | 1.17 | 0.52 |
| HEXANES | 0.157 | 2.05 | 0.78 |
| HEPTANES | 0.180 | 5.07 | 1.78 |
| OCTANES | 0.098 | 7.03 | 2.37 |
| NONANES | 0.010 | 4.76 | 1.57 |
| DECANES PLUS | 0.008 | 63.16 | 20.72 |

WELL:34/10-16
RECOMBINED SAMPLE

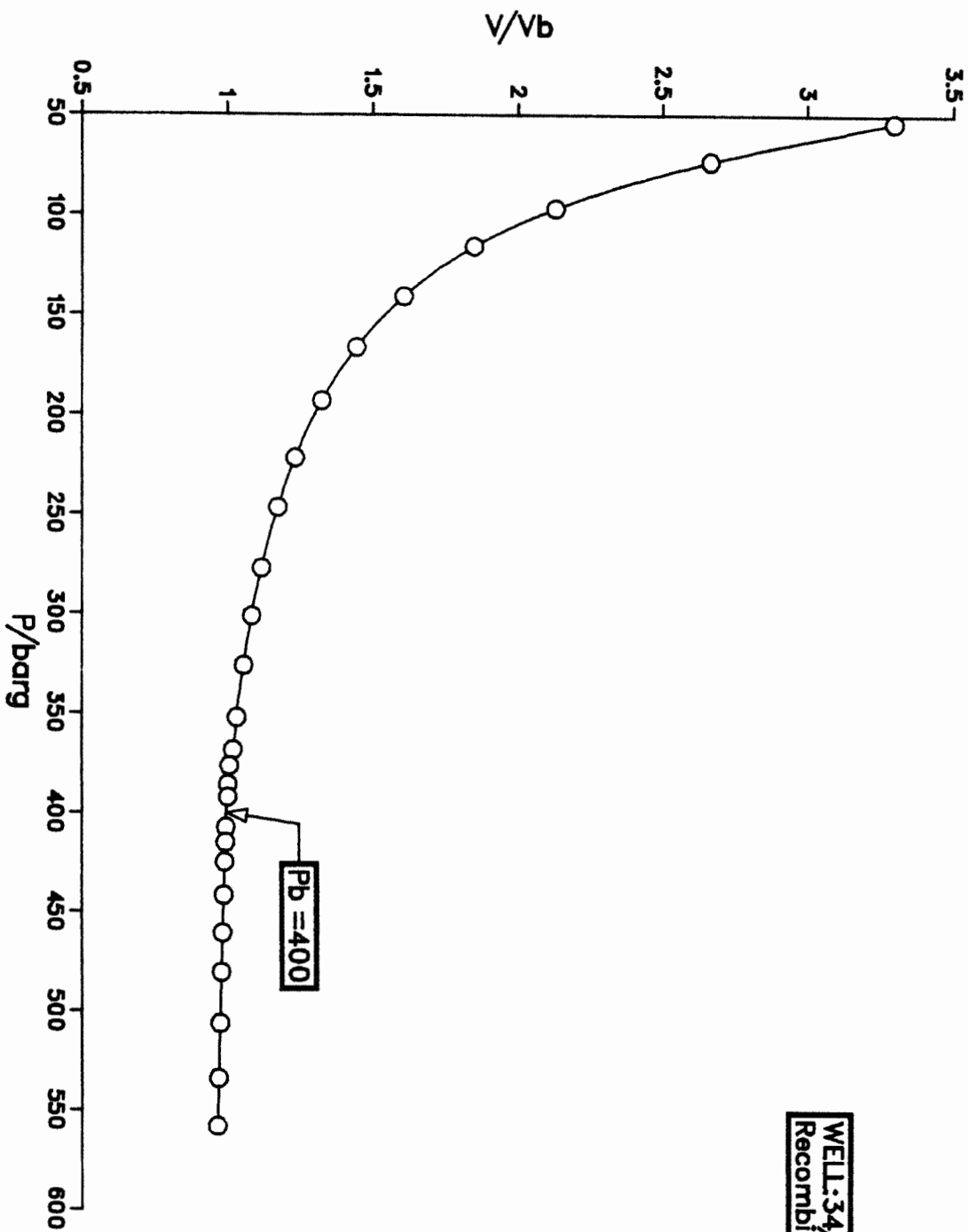
CONSTANT MASS EXPANSION AT 128.5 C

| PRESSURE BARG | REL VOL V/Vb | COMPRESSIBILITY 1/BAR | Y-FACTOR |
|------------------|-----------------|--------------------------|----------|
| 557.8 | 0.9701 | 1.62E-04 | |
| 533.7 | 0.9738 | 1.72E-04 | |
| 506.0 | 0.9788 | 1.83E-04 | |
| 480.4 | 0.9835 | 1.93E-04 | |
| 460.5 | 0.9872 | 2.00E-04 | |
| 441.5 | 0.9913 | 2.07E-04 | |
| 424.8 | 0.9944 | 2.13E-04 | |
| 415.0 | 0.9970 | 2.17E-04 | |
| 407.4 | 0.9982 | 2.20E-04 | |
| Pb = 400.0 | 1.0000 | 2.22E-04 | |
| 392.3 | 1.0045 | | 4.33 |
| 385.8 | 1.0089 | | 4.16 |
| 376.5 | 1.0153 | | 4.09 |
| 368.5 | 1.0212 | | 4.03 |
| 352.3 | 1.0341 | | 3.97 |
| 326.1 | 1.0583 | | 3.89 |
| 301.3 | 1.0860 | | 3.81 |
| 277.3 | 1.1196 | | 3.70 |
| 246.8 | 1.1745 | | 3.56 |
| 222.0 | 1.2329 | | 3.44 |
| 193.2 | 1.3240 | | 3.30 |
| 166.4 | 1.4436 | | 3.16 |
| 140.8 | 1.6065 | | 3.04 |
| 115.7 | 1.8487 | | 2.90 |
| 96.8 | 2.1296 | | 2.77 |
| 73.1 | 2.6662 | | 2.68 |
| 53.5 | 3.2989 | | 2.82 |

FOR P < Pb Y = 2.414 + 4.55E-03 x P
FOR P > Pb V/Vb = 1.12172 - 3.8631E-04 x P + 2.0501E-07 x P x P

FIG. 9

CONSTANT MASS EXPANSION AT 128.5 °C



WELL:34/10-16
Recombined sample