## 5.3 Formation Pressure Measurements

A Dresser Atlas Formation Multi Tester (FMT) with a HP quartz gauge was used for formation pressure measurements (fig. 5.3). One segregated sample was sent to the laboratory for PVT-analyses (ref. chapter 5.5). After evaluating the pressure measurements, 13 points have been used to define the oil/water contact. The pressure vs. depth plot defines the oil/water contact at 2586 m RKB (fig. 5.4). The oil gradient from the plot is 0.069 bar/m and the water gradient is 0.099 bar/m. PLT-logging during production test No. 1 (fig. 5.5) also proved mobile oil down to 2586 m RKB.

## 5.4 Testing

Two tests were carried out in the upper member of the Lunde Formation.

Before testing was initiated a cement squeeze was performed in the interval 2579 - 2580 m RKB to isolate the oil bearing sands above the perforation intervals of test No. 1.

Test No. 1, the exploration test, was carried out in two sands straddling the oil water contact. The sands were interpreted from the open hole logs to be separated by a 1 m shale section.

The perforated intervals were:

2579 - 2587 m RKB
2590 - 2596 m RKB

The depths refer to the CDL-CNL-GR log of March 13, 1987.

The test objectives were to:

- determine if movable oil exists in the "residual" oil zones and thereby determine the oil water contact,
- obtain formation water samples,
- measure the injectivity in the "residual" oil zone.

After the test a 7" liner was run to isolate the perforations and to give enough rathole to drop the guns in test No. 2.

Test No. 2, the special test, included 18 days of continuous production from five sands. The perforated intervals were:

2506.0 - 2512.5 m RKB
2517.0 - 2529.0 m RKB
2532.5 - 2535.5 m RKB
2544.0 - 2550.5 m RKB
2560.0 - 2566.0 m RKB

The test objectives were to:

- investigate the longer term production behaviour during commingled flow from several sands in the upper Lunde,
- investigate the relative zonal contribution to the total production as well as changes with time in the relative rates,
- qualitatively compare the results with the three dimensional geological/reservoir simulation model predictions,
- investigate the reservoir parameters and possible reservoir heterogeneities,
- obtain reservoir fluid samples,
- define, if possible, the interconnected pore volume drained during the test.

The main components of the test string were:

- Schlumberger tubing conveyed perforating system.
- Gun release with shifting tool.
- Three bundle carriers with pressure and temperature gauges with external and internal sensing.
- Standard Halliburton teststring with a downhole testervalve, circulating valves (including OMNI-APR) and retrievable packer.
- 4 1/2 inch IF Mannesmann tubing.
- Flopetrol subsea test tree, lubricator valve and surface test tree.

The main test results are shown in fig. 5.6.

The well has been temporarily abandoned with two memory gauges in the well. They are programmed to record 60-120 days of the final build-up after test No. 2.

Test No. 1, Exploration test:

The well was perforated with 45 bar underbalance to the formation. A 18 minutes initial flow was carried out and followed by a 4.5 hour initial build up period with downhole shut-in. Two clean up periods of 2 and 5 hours duration, respectively, were performed. Unsuccessful attempts to run in the hole with a gun release tool on a slick line were performed during the following build up periods. A thick emulsion or a waxy well fluid prevented the wireline tool from entering the well.

The well produced with a fairly stable rate of 405 $Sm^3/d$ during the main flow period of 30 hours. The water cut was 53%. The well was shut in at the downhole tester valve for a 28 hours build up period.

A new clean up flow was carried out. The well fluid was then displaced by seawater, the slick line tool was run in the hole and the gun successfully dropped into the rathole. Finally the production logging tool, PLT, was run in the hole.

Passes with the PLT were made while performing a 6 hours flow period with a rate of 650 $Sm^3/d$. After a short build up, filtered seawater treated with scale inhibitor, biocide and oxygen scavenger was injected into the formation at a final rate of 395 $Sm^3/d$. The 25 hours injection period was followed by a 6 hours fall off period.

An oil water emulsion was produced during the entire test. The emulsion was broken by injecting demulsifier at the subsea test tree and by running the separator at a high temperature. Small amounts of oil in the produced water were removed by flowing to the tank.

The main test results are listed in fig. 5.7.

The test performance is shown in fig. 5.8.

Test No. 2, Special test:

The well was perforated with 35 bar underbalance to the formation. An initial flow period of 12 minutes was carried out followed by a 3 hours build up with downhole shut-in. The well was then cleaned up for 5 hours and the perforation guns dropped into the rathole by use of a slick line releasing tool. A second 2.5 hours clean up flow was then performed and a production logging tool run in the hole and calibrated.

A multirate pretest flow was then carried out. The purpose of this pretest flow was to define the permeability and skin for each layer and to carry out the following build up with a minimum of cross flow. The spinner was located above each layer and rate changes introduced to measure the rate and pressure transients of the layers below. Before moving the tool to the next layers, logging passes over the perforated intervals were made. The flow rate was varied between 500 and 1740 $Sm^3/d$. After the 26 hours pretest flow, the tool was positioned above the uppermost perforations and the well was shut in at the choke manifold for a 34 hours build-up period. A set of logging passes were performed after 3 hours of shut in.

The extended flow period was carried out with the production logging tool located below the lowermost perforations. Logging passes were performed after 1, 6, 13 and 18 days of flow. Except for a 53 minutes shut in period after 65 hours of flow, the well was flowed continuously for 18 days. After a small initial decline in the rate, a fairly constant rate was obtained.

The flowrate decreased from an initial value of 1550 to 1378 $Sm^3/d$ with the wellhead pressure dropping from 176 to 161 bar. During the flow period, the wellhead temperature fluctuated between 24 and 35 deg C causing the choke performance to change and the flowrate to vary with up to 4%.

Before the well was shut in at the choke manifold, the PLT was located above the uppermost perforations. The final shut in period lasted for 35 hours and the test was then terminated.

Foaming problems were observed in the test separator and defoamer had to be injected during the entire test to obtain a good separation of the oil.

The main test results are given in fig. 5.9.

The test performance is shown in fig. 5.10.

## 5.5 Fluid Analyses

FMT sample

One segregated FMT chamber was collected at 2509 m RKB. The chamber contained approximately 2 litres of oil and 1.1 litres of water. Analyses showed the water to be mud filtrate.

Test No. 1

During the different flow periods in test No. 1, water samples were collected at regular intervals at the wellhead. Analyses of some of the ions were performed offshore and used to establish when constant composition of the produced water was reached. In addition water samples where collected and analysed for the tritium concentration since tritium was used as a tracer in the mud when the reservoir interval was drilled. The tritium analyses showed the water produced at the end of the test to be true formation water contaminated with less than 0.1% of mudfiltrate. In fig. 5.11 the formation water composition is listed.

During test No. 1, six sets of separator recombination samples were collected. PVT analyses have been performed on a reservoir fluid recombined from one separator oil and one separator gas sample. The main results are presented in figs. 5.12 and 5.13.

Trace component analyses were performed both offshore and onshore, with the results presented in fig. 5.14.

Test No. 2

During production test No. 2, 12 monophasic oil samples were taken at the wellhead, as the bubble point pressure of the fluid was below the wellhead flowing pressure. Seven sets of separator recombination samples were also taken at regular intervals during this long test.

PVT analyses have been performed on one of the monophasic oil samples, with the main results presented in figs. 5.13 and 5.15.

Trace component analyses were performed both offshore and onshore. The results are presented in fig. 5.14.

# Formation Pressures, Well 34/4-7

| Depth | Hydrostatic mud pressure | | Temperature Formation | Corrected Pressure |
|---|---|---|---|---|
| | before | after | | |
| mRKB | PSIA | PSIA | PSIA | BAR |
| RUN 2A | | | | |
| 2509.0 | 6151.0 | 6151.0 | 5566.4 | 383.79 |
| 2518.6 | 6174.0 | 6174.0 | 5575.6 | 384.42 |
| 2526.0 | 6192.0 | 6192.0 | 5583.0 | 384.93 |
| 2533.5 | 6211.0 | 6211.0 | 5591.0 | 385.49 |
| 2547.0 | 6243.5 | 6243.5 | 5603.7 | 386.36 |
| 2560.4 | 6276.0 | 6276.0 | 5617.1 | 387.28 |
| 2575.4 | 6314.5 | 6314.5 | 5713.7 | 393.95 |
| 2581.0 | 6327.5 | 6327.5 | 5622.7 | 387.67 |
| 2584.1 | 5974.0 | 5973.5 | 5641.3 | 388.95 |
| 2592.0 | 5996.5 | 5996.5 | 5652.7 | 389.74 |
| 2604.5 | 6025.5 | 6065.5 | 5669.5 | 390.91 |
| 2620.5 | 6065.5 | 6065.5 | 5695.0 | 392.66 |
| 2632.5 | 6096.5 | 6096.0 | 5712.7 | 393.88 |
| 2584.0* | 5971.0 | 5971.0 | 5639.0 | 388.79 |
| 2584.4** | 5971.5 | 5973.5 | 5638.7 | 388.77 |

* Opened 2 3/4 gal chamber, lost seal.
** Segregated sample.

| Run 2B | | | | |
|---|---|---|---|---|
| 2592.1* | 5991.5 | 5991.5 | 5651.9 | 384.68 |
| 2592.5** | 5996.0 | 5999.6 | 5654.3 | 389.85 |

* Opened 2 3/4 gal chamber, lost seal.
** Segregated sample.

Fig. 5.3 Formation pressures, well 34/4-7

| Date 6/87 | Auth TF | Appr BR |
|---|---|---|
| Draw by | Ref EPF | |

# Formation Pressures, Well 34/4-7

| Depth | Hydrostatic mud pressure before | Hydrostatic mud pressure after | Temperature Corrected Formation | Pressure |
|---|---|---|---|---|
| mRKB | PSIA | PSIA | PSIA | BAR |
| Run 3D | | | | |
| 2509.0 | 5799.1 | 5798.2 | 5566.4 | 383.79 |
| 2526.0 | 5840.2 | 5838.8 | 5583.3 | 384.95 |
| 2547.0 | 5891.1 | 5889.5 | 5604.0 | 386.38 |
| 2557.8 | 5917.7 | 5914.8 | 5624.5 | 387.79 |
| 2575.2 | 5961.0 | 5958.6 | 5688.0 | 392.17 |
| 2581.0 | 5972.8 | 5971.8 | 5638.9 | 388.79 |
| 2582.0 | 5975.2 | 5974.6 | 5639.1 | 388.80 |
| 2586.0 | 5985.8 | 5985.3 | 5642.9 | 389.06 |
| 2590.0 | 5997.2 | 5663.5 | 5663.5 | 390.48 |
| 2595.5 | 6010.7 | 6010.2 | 5657.4 | 390.06 |
| 2604.5 | 6032.7 | 6032.7 | 5670.7 | 390.98 |
| 2620.5 | 6073.6 | 6073.1 | 5692.9 | 392.51 |
| 2748.5 | 6391.0 | 6390.9 | 5875.9 | 405.13 |
| 2874.0 | 6704.0 | 6703.7 | 6058.5 | 417.72 |
| 2581.5* | 5977.2 | 5978.4 | 5639.3 | 388.82 |

* Segregated sample. Lost seal when opening 1 gal chamber.

Fig. 5.3 Formation pressures, well 34/4-7

| Date 6/87 | Auth. TF | Appr BR |
|---|---|---|
| Draw by | Ref EPF | |

# Formation Pressures, Well 34/4-7

| Depth | Hydrostatic mud pressure | | Temperature Corrected Formation | Pressure |
|---|---|---|---|---|
| | before | after | | |
| mRKB | PSIA | PSIA | PSIA | BAR |
| **Run 3E** | | | | |
| 2581.3* | 5974.0 | 5969.7 | 5640.6 | 388.91 |
| 2582.1* | 5976.4 | 5974.5 | 5637.3 | 388.68 |
| 2509.0** | 5795.5 | 5796.5 | 5567.3 | 383.85 |
| **Run 3F** | | | | |
| 2582.7[1] | 5974.4 | 5973.8 | 5640.8 | 388.91 |
| 2581.7[1] | 5973.0 | 5973.0 | 5638[3] | 388.72 |
| 2580.9[1] | 5970.0 | 5972.0 | 5641[3] | 388.93 |
| 2580.2 | 5970.0 | 5971.0 | 5644[3] | 389.14 |
| 2581.4[1] | 5975.0 | 5974.0 | 5642[3] | 389.00 |
| 2583.3[2] | 5978.0 | 5978.0 | 5643[3] | 389.07 |
| 2581.8[2] | 5974.0 | 5974.0 | 5640[3] | 388.86 |

* Opened 2 3/4 gal chamber, lost seal.
** Segregated sample.

[1] Opened 2 3/4 gal chamber, lost seal.
[2] Lost seal when opening 1 gal chamber.
[3] Strain gauge.

Fig. 5.3 Formation pressures, well 34/4-7

| Date 6/87 | Auth. TF | Appr BR |
|---|---|---|
| Draw by | Ref EPF | |

# Formation Pressures, Well 34/4-7

Formation pressure evaluation

**RUN 2A**

| Depth (mRKB) | Formation (PSIA) | Pressure (BAR) | Quality |
|---|---|---|---|
| 2509.0 | 5566.4 | 383.79 | e |
| 2518.6 | 5575.6 | 384.42 | e |
| 2526.0 | 5583.0 | 384.93 | e |
| 2547.0 | 5603.7 | 386.36 | e |
| 2560.4 | 5617.1 | 387.28 | e-m |
| 2584.1 | 5641.3 | 388.95 | e |
| 2592.0 | 5652.7 | 389.74 | e |
| 2604.5 | 5669.7 | 390.91 | e |
| 2632.5 | 5712.7 | 393.88 | e-m |

**RUN 3 D**

| Depth (mRKB) | Formation (PSIA) | Pressure (BAR) | Quality |
|---|---|---|---|
| 2582.0 | 5639.1 | 388.80 | e-m |
| 2595.5 | 5675.4 | 390.00 | e-m |
| 2620.5 | 5692.9 | 392.51 | e |
| 2748.5 | 5875.9 | 405.13 | e |

e = excellent

m = medium

Fig. 5.3 Formation pressures, well 34/4-7

| Date 6/87 | Auth. TF | Appr BR |
|---|---|---|
| Draw by | Ref EPF | |

# Formation Pressures, Well 34/4-7

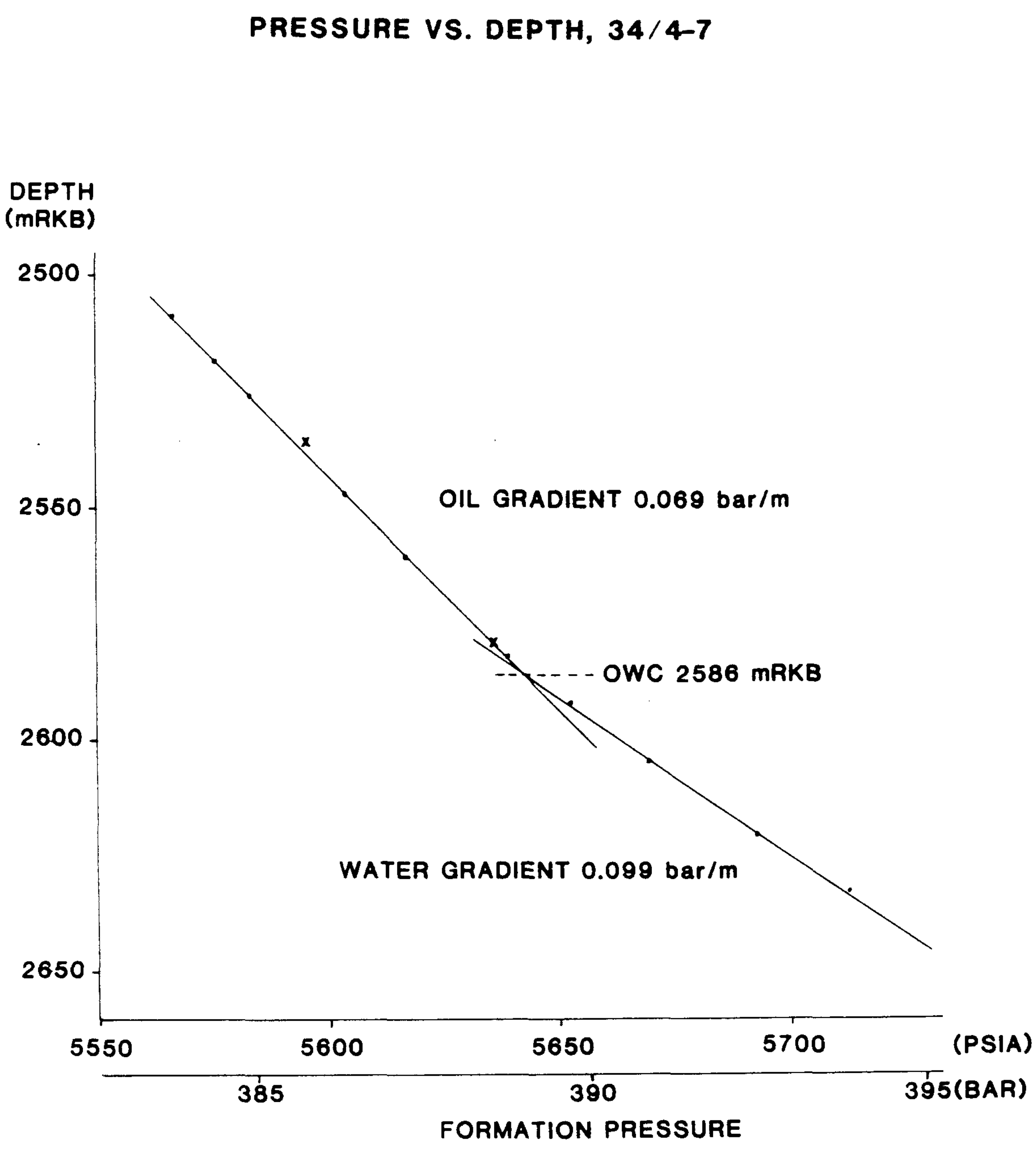
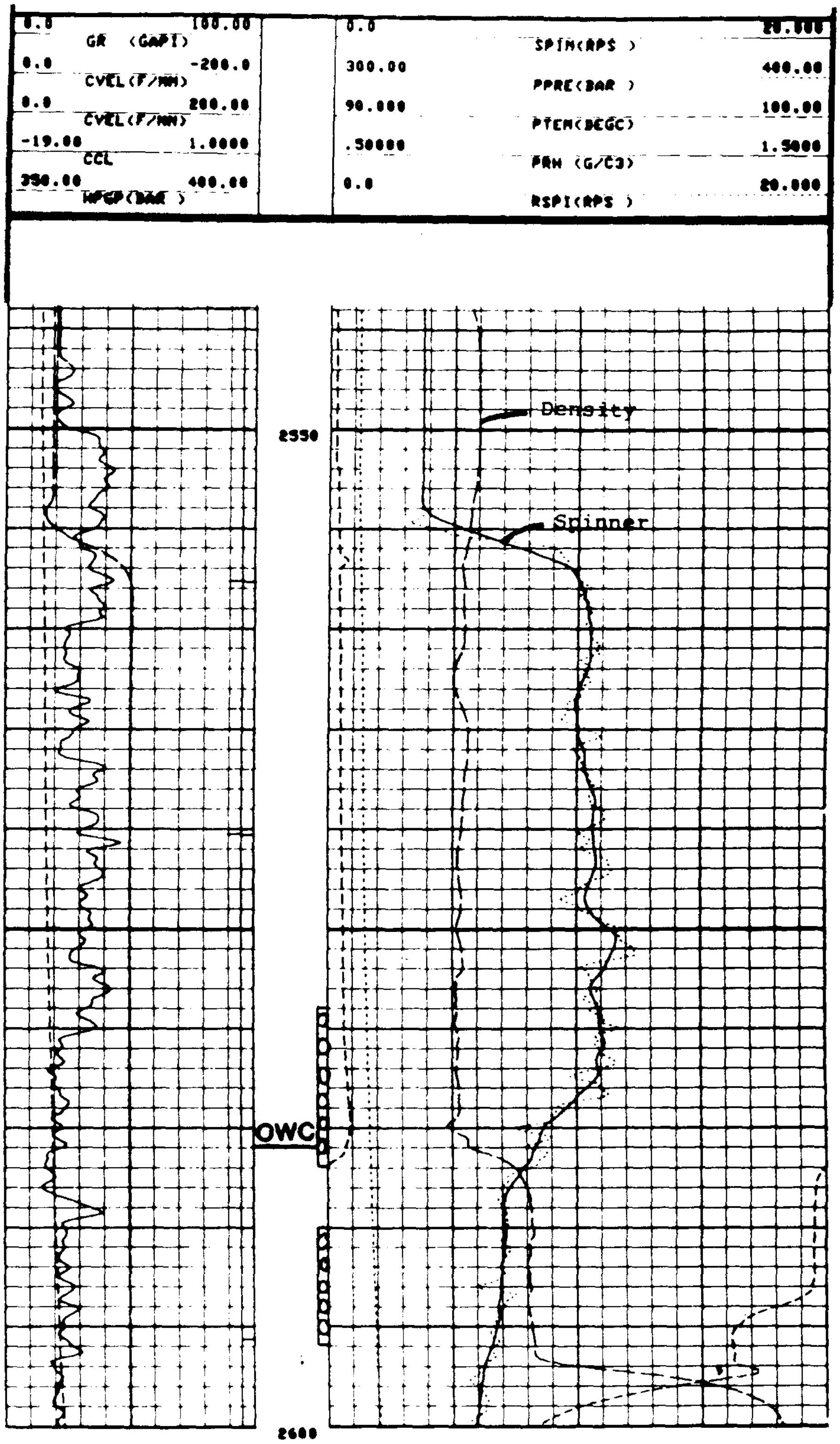



Fig. 5.4 Formation pressure vs depth, well 34/4-7

| Date 6/87 | Auth. TF | Appr. BR |
|---|---|---|
| Drawn by | Ref. EPF | |

# PLT Log Test No 1, Well 34/4 7




| | | |
|---|---|---|
| Date 6/87 | Auth IV | Appr |
| Draw by AMJo | Ref EPF | |

Fig 5.5 PLT-log test No. 1, well 34/4-7

# Well 34/4-7

MAIN RESULTS WELL NO. 34/4-7

| Test no | 1 | 1 | 2 |
|---|---|---|---|
| Perforation interval (mRKB) | 2579-2587<br>2590-2596 | 2579-2587<br>2590-2596 | 2506 -2512.5<br>2517 -2529<br>2532.5-2535.5<br>2544 -2550.5<br>2560 -2566 |
| Test type | Production | Injection | Production |
| Choke size (mm) | 7.9 | | 14.3 |
| Oil rate (Sm3/D) | 190 | | 1378 |
| Water rate (Sm3/D) | 215 | -395 | 0 |
| Wellhead pressure (bar) | 126 | 186 | 161 |
| Wellhead temperature (deg. C) | 21 | | 32 |
| Flowing bottom hole press. (bar) | 337.8 | 441.3 | 339.3 |
| Reference depth (mRKB) | 2518.9 | 2518.9 | 2421.8 |
| Gas-Oil ratio (Sm3/Sm3) | 105 | | 85 |
| Separator pressure (bar) | 24 | | 48 |
| Separator temperature (deg C) | 64 | | 57 |
| Dead oil density (kg/Sm3) | 833 | | 835 |
| Gas gravity (Air = 1) | 0.81 | | 0.73 |

Fig. 5.6 Main test results

| Date 6/87 | Auth IV | Appr |
|---|---|---|
| Draw by AMJo | Ref EPF | |

# Well 34/4-7, Test No. 1

| TIME | WHP (bar) | WHT (°C) | BHP 1) (bar) | BHT (°C) | TOTAL RATE ($Sm^3/D$) | WATER CUT (%) | GOR ($Sm^3/Sm^3$) | SEPARATOR PRESS (bar) | SEPARATOR TEMP (°C) | PI/II 2) ($Sm^3/D/bar$) |
|---|---|---|---|---|---|---|---|---|---|---|
| 31.3.87 | | | | | | | | | | |
| 2035 | Perforate, initial flow period, chokesize = 3.2 mm | | | | | | | | | |
| 2048 | 66.9 | 7.2 | 343.3 | 86.5 | 645 | - | - | - | - | 16.1 |
| 2053 | Shut in well downhole | | | | | | | | | |
| 1.4.87 | | | | | | | | | | |
| 0320 | 1st clean up flow period, chokesize increasing from 6.4 mm to 11.1 mm | | | | | | | | | |
| 0350 | 52.2 | 9.8 | 320.6 | 92.6 | 710 | - | - | - | - | 11.3 |
| 0520 | Shut in well downhole | | | | | | | | | |
| 0930 | 2nd clean up flow period, chokesize = 11.1 mm | | | | | | | | | |
| 1035 | 98.3 | 17.1 | 318.5 | 96.7 | 786 | - | - | - | - | 12.1 |
| 1059 | Shut in well at surface | | | | | | | | | |
| 1600 | Main flow period, chokesize = 7.9 mm | | | | | | | | | |
| 2130 | 126.5 | 14.1 | 341.0 | 97.9 | 418 | 53 | 108 | 24 | 64 | 9.9 |
| 2.4.87 | | | | | | | | | | |
| 2130 | 126.0 | 20.8 | 337.8 | 98.8 | 405 | 53 | 105 | 24 | 64 | 8.9 |
| 2132 | Shut in well downhole | | | | | | | | | |
| 4.4.87 | | | | | | | | | | |
| 0930 | 3rd clean up flow period, variable chokesizes | | | | | | | | | |
| 0945 | 67.0 | 32.3 | 275.9 | 99.6 | 900 3) | 59 3) | - | - | - | 8.4 |
| 1059 | Shut in well at surface<br>Bullhead tubing content with seawater and release the gun<br>Run in the hole with PLT | | | | | | | | | |
| 5.4.87 | | | | | | | | | | |
| 1749 | PLT flow period, chokesize = 11.1 mm | | | | | | | | | |
| 2300 | 100.6 | 19.9 | 303.6 | 99.4 | 633 | 46 | 112 | 20 | 63 | 7.9 |
| 2340 | Shut in well at surface | | | | | | | | | |
| 6.4.87 | | | | | | | | | | |
| 0108 | Injection period | | | | | | | | | |
| 0130 | 187.2 | - | 390.5 | 96.7 | -133 | | | | | 18.5 |
| 1604 | Increase injection rate | | | | | | | | | |
| 2330 | 185.8 | - | 441.3 | 43.4 | -395 | | | | | 6.8 |
| 7.4.87 | | | | | | | | | | |
| 0220 | Shut in well at surface | | | | | | | | | |

1) BHP reference, SDP 85373 at 2518.9 mRKB
2) Pi = 383.3 bar at 2518.9 mRKB
3) Unstable separator conditions

Fig. 5.7 Main test results

| Date 6/87 | Auth IV | Appr |
|---|---|---|
| Draw by AMJo | Ref EPF | |

## Well 34/4-7, Test No. 1

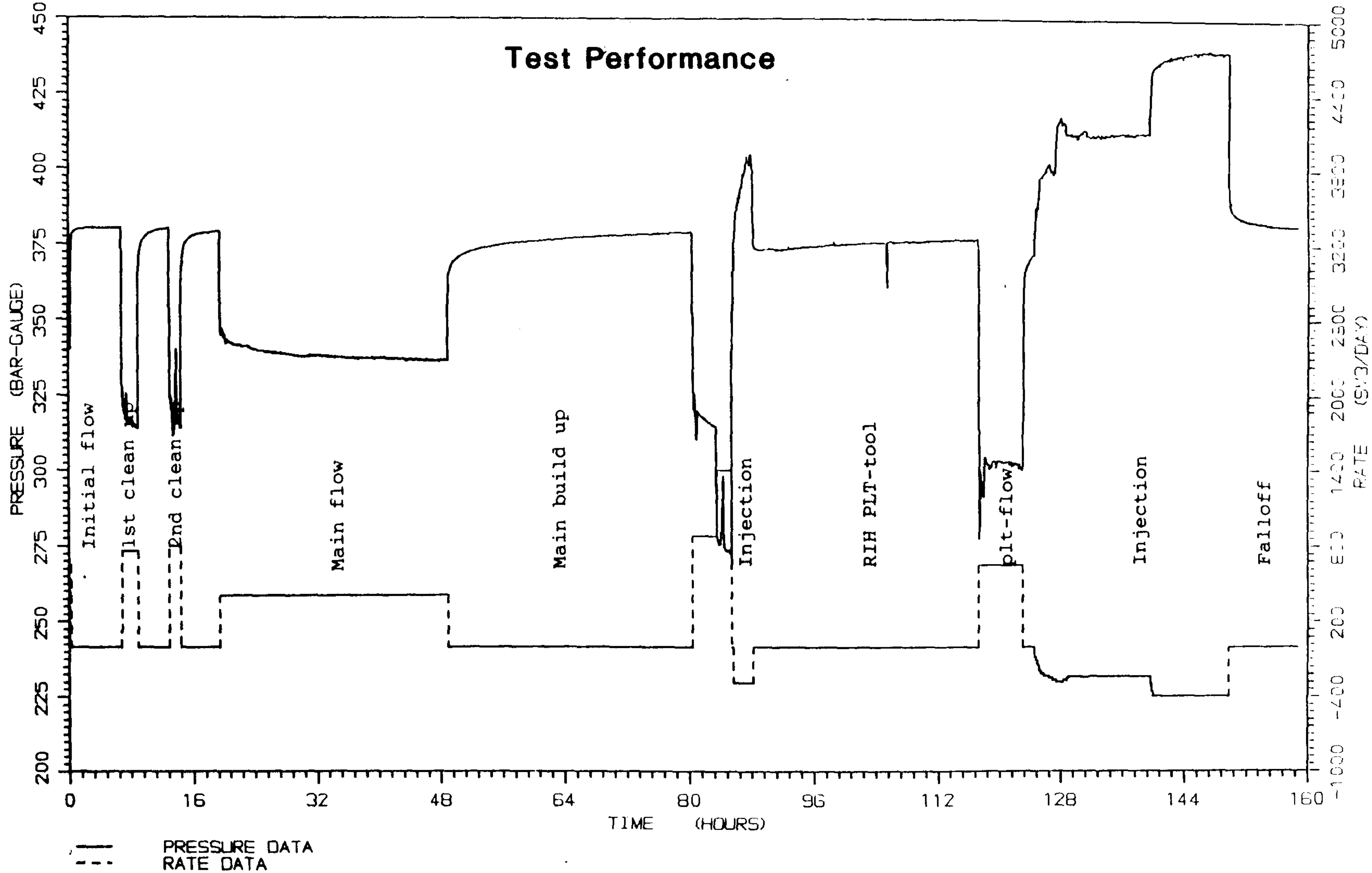



Fig. 5.8 Pressure and and rate vs. time

| Date 6/87 | Auth IV | Appr |
|---|---|---|
| Drawn by AMJo | Ref EPF | |

# Well 34/4-7, Test No. 2

| TIME | WHP (bar) | WHT (°C) | BHP[1)] (bar) | BHT[1)] (°C) | OIL RATE ($Sm^3/D$) | GOR ($Sm^3/Sm^3$) | SEPARATOR PRESS (bar) | SEPARATOR TEMP (°C) | PI[2)] ($Sm^3/D/bar$) |
|---|---|---|---|---|---|---|---|---|---|
| 13.4.87 | | | | | | | | | |
| 0143 | Perforate, initial flow period, choke size = 15.9 mm | | | | | | | | |
| 0150 | 35.1 | 8.0 | | | 691 | | | | |
| 0155 | Shut in well downhole | | | | | | | | |
| 0457 | 1st clean up flow, choke size = 12.7 mm | | | | | | | | |
| 0900 | 187.9 | 20.7 | 366.1 | 92.9 | 1279 | 94 | 43 | 63 | 109 |
| 1001 | Shut in well downhole | | | | | | | | |
| | Release the gun | | | | | | | | |
| 1638 | 2nd flow, variable choke sizes | | | | | | | | |
| 1800 | 174.9 | 21.7 | 362.2 | 94.1 | 1743 | 84 | 49 | 55 | 112 |
| 1910 | Shut in well at surface | | | | | | | | |
| | Run in the hole with PLT | | | | | | | | |
| 14.4.87 | | | | | | | | | |
| 0309 | Pretest flow, chokesize = 15.9 mm | | | | | | | | |
| 0415 | 172.6. | 20.0 | 362.3 | 94.5 | 1721 | - | 47 | 60 | 111 |
| 0430 | Choke size = 11.1 mm | | | | | | | | |
| 0600 | 192.5 | 20.1 | 366.1 | 94.7 | 1046 | 91 | 45 | 64 | 90 |
| 0609 | Choke size = 15.9 mm | | | | | | | | |
| 1000 | 172.7 | 30.7 | 358.6 | 95.6 | 1702 | 80 | 58 | 66 | 89 |
| 1033 | Choke size = 11.1 mm | | | | | | | | |
| 1300 | 190.3 | 22.0 | 363.1 | 95.5 | 1049 | 84 | 55 | 67 | 71 |
| 1406 | Choke size = 15.9 mm | | | | | | | | |
| 1700 | 171.5 | 30.6 | 356.6 | 96.0 | 1678 | 80 | 58 | 67 | 79 |
| 1736 | Choke size = 7.9 mm | | | | | | | | |
| 2100 | 198.8 | 15.1 | 365.7 | 95.5 | 517 | - | 50 | 66 | 43 |
| 2141 | Choke size = 15.9 mm | | | | | | | | |
| 15.4.87 | | | | | | | | | |
| 0000 | 170.5 | 27.4 | 355.8 | 96.3 | 1007 | 76 | 67 | 67 | 46 |
| 0432 | Shut in well at surface | | | | | | | | |

Fig. 5.9 Main test results

| Date 6/87 | Auth IV | Appr |
|---|---|---|
| Draw by AMJo | Ref EPF | |

# Well 34/4-7, Test No. 2

| TIME | WHP (bar) | WHT (°C) | BHP[1] (bar) | BHT[1] (°C) | OIL RATE ($Sm^3/D$) | GOR ($Sm^3/Sm^3$) | SEPARATOR PRESS (bar) | SEPARATOR TEMP (°C) | PI[2] ($Sm^3/D/bar$) |
|---|---|---|---|---|---|---|---|---|---|
| 16.4.87 | | | | | | | | | |
| 1423 Extended flow, chokesize = 14.3 mm | | | | | | | | | |
| 1800 | 176.0 | 23.8 | 359.9 | 96.2 | 1550 | 74 | 59 | 52 | 87 |
| 17.4.87 | | | | | | | | | |
| 0000 | 174.2 | 23.2 | 357.0 | 96.5 | 1524 | 73 | 60 | 52 | 73 |
| 1200 | 172.1 | 25.9 | 353.6 | | 1496 | 74 | 59 | 54 | 62 |
| 18.4.87 | | | | | | | | | |
| 0000 | 170.5 | 27.5 | 351.4 | 96.7 | 1480 | 74 | 61 | 55 | 56 |
| 0847 Shut in well at surface | | | | | | | | | |
| 0940 Reopen well | | | | | | | | | |
| 1200 | 170.0 | 29.8 | 350.0 | | 1452 | 76 | 61 | 58 | 52 |
| 19.4.87 | | | | | | | | | |
| 0000 | 168.0 | 24.7 | 348.6 | 96.8 | 1473 | 74 | 61 | 53 | 50 |
| 1200 | 168.8 | 27.7 | 348.4 | | 1442 | 77 | 60 | 58 | 49 |
| 20.4.87 | | | | | | | | | |
| 0000 | 168.3 | 29.3 | 347.4 | 96.8 | 1427 | 76 | 61 | 57 | 47 |
| 1200 | 168.3 | 33.5 | 346.9 | | 1406 | 76 | 61 | 57 | 45 |
| 21.4.87 | | | | | | | | | |
| 0000 | 167.6 | 33.6 | 346.3 | 96.9 | 1406 | 75 | 61 | 56 | 45 |
| 1200 | 166.5 | 31.2 | 345.6 | | 1420 | 76 | 60 | 57 | 44 |
| 22.4.87 | | | | | | | | | |
| 0000 | 166.7 | 30.4 | 345.3 | 96.9 | 1403 | 76 | 60 | 56 | 43 |
| 1200 | 165.9 | 28.6 | 344.7 | | 1417 | 76 | 60 | 56 | 43 |
| 23.4.87 | | | | | | | | | |
| 0000 | 165.6 | 30.3 | 344.3 | 96.9 | 1413 | 75 | 61 | 57 | 42 |
| 1200 | 165.6 | 31.6 | 344.1 | | 1399 | 75 | 59 | 55 | 41 |
| 24.4.87 | | | | | | | | | |
| 0000 | 165.3 | 33.1 | 343.7 | 96.9 | 1398 | 75 | 60 | 57 | 41 |
| 1200 | 165.0 | 32.9 | 343.5 | | 1395 | 76 | 60 | 57 | 41 |
| 25.4.87 | | | | | | | | | |
| 0000 | 164.8 | 33.7 | 343.2 | 96.9 | 1395 | 76 | 60 | 56 | 40 |
| 1200 | 164.5 | 34.7 | 342.9 | | 1391 | 76 | 59 | 56 | 40 |

Fig. 5.9 Main test results, continued

| Date 6/87 | Auth IV | Appr |
|---|---|---|
| Draw by AMJo | Ref EPF | |

# Well 34/4-7, Test No. 2

| TIME | WHP (bar) | WHT (°C) | BHP 1) (bar) | BHT 1) (°C) | OIL RATE ($Sm^3/D$) | GOR ($Sm^3/Sm^3$) | SEPARATOR PRESS (bar) | SEPARATOR TEMP (°C) | PI 2) ($Sm^3/D/bar$) |
|---|---|---|---|---|---|---|---|---|---|
| 26.4.87 | | | | | | | | | |
| 0000 | 164.0 | 32.9 | 342.6 | 96.9 | 1398 | 74 | 61 | 57 | 40 |
| 1200 | 163.9 | 33.4 | 342.4 | | 1387 | 86 | 48 | 57 | 39 |
| 27.4.87 | | | | | | | | | |
| 0000 | 163.1 | 29.9 | 341.9 | 96.9 | 1407 | 86 | 47 | 56 | 39 |
| 1200 | 163.1 | 31.7 | 341.8 | | 1394 | 86 | 47 | 57 | 39 |
| 28.4.87 | | | | | | | | | |
| 0000 | 162.6 | 29.5 | 341.4 | 96.9 | 1399 | 86 | 48 | 57 | 38 |
| 1200 | 162.4 | 30.3 | 341.2 | | 1401 | 86 | 47 | 56 | 38 |
| 29.4.87 | | | | | | | | | |
| 0000 | 162.5 | 30.8 | 341.2 | 96.9 | 1387 | 86 | 47 | 57 | 38 |
| 1200 | 162.1 | 32.3 | 340.9 | | 1391 | 86 | 46 | 55 | 38 |
| 30.4.87 | | | | | | | | | |
| 0000 | 162.4 | 32.7 | 340.9 | 96.9 | 1385 | 86 | 48 | 57 | 38 |
| 1200 | 162.3 | 32.7 | 340.7 | | 1376 | 87 | 47 | 58 | 37 |
| 01.5.87 | | | | | | | | | |
| 0000 | 162.4 | 31.4 | 340.6 | 96.9 | 1365 | 85 | 49 | 56 | 37 |
| 1200 | 162.2 | 33.2 | 340.5 | | 1369 | | 48 | 54 | 37 |
| 02.5.87 | | | | | | | | | |
| 0000 | 161.9 | 33.6 | 340.3 | 96.9 | 1380 | 85 | 48 | 57 | 37 |
| 1200 | 161.5 | 30.1 | 340.1 | | 1380 | 85 | 47 | 55 | 37 |
| 03.5.87 | | | | | | | | | |
| 0000 | 160.0 | 24.0 | 339.5 | 96.6 | 1424 | 85 | 49 | 57 | 37 |
| 1200 | 159.7 | 25.0 | 339.1 | | 1427 | 85 | 48 | 56 | 37 |
| 04.5.87 | | | | | | | | | |
| 0000 | 160.2 | 27.8 | 339.1 | 96.7 | 1393 | 85 | 48 | 56 | 36 |
| 1200 | 160.8 | 31.3 | 339.3 | | 1379 | 86 | 48 | 57 | 36 |
| 1430 Shut in well at surface | | | | | | | | | |

1) BHP and BHT reference, SDP 82787 at 2421.8 mRKB
2) Pi = 377.78 bar at 2421.8 mRKB

Fig. 5.9 Main test results, continued

| Date 6/87 | Auth IV | Appr |
|---|---|---|
| Drawn by AMJo | Ref EPF | |

## Well 34/4-7, Test No. 2

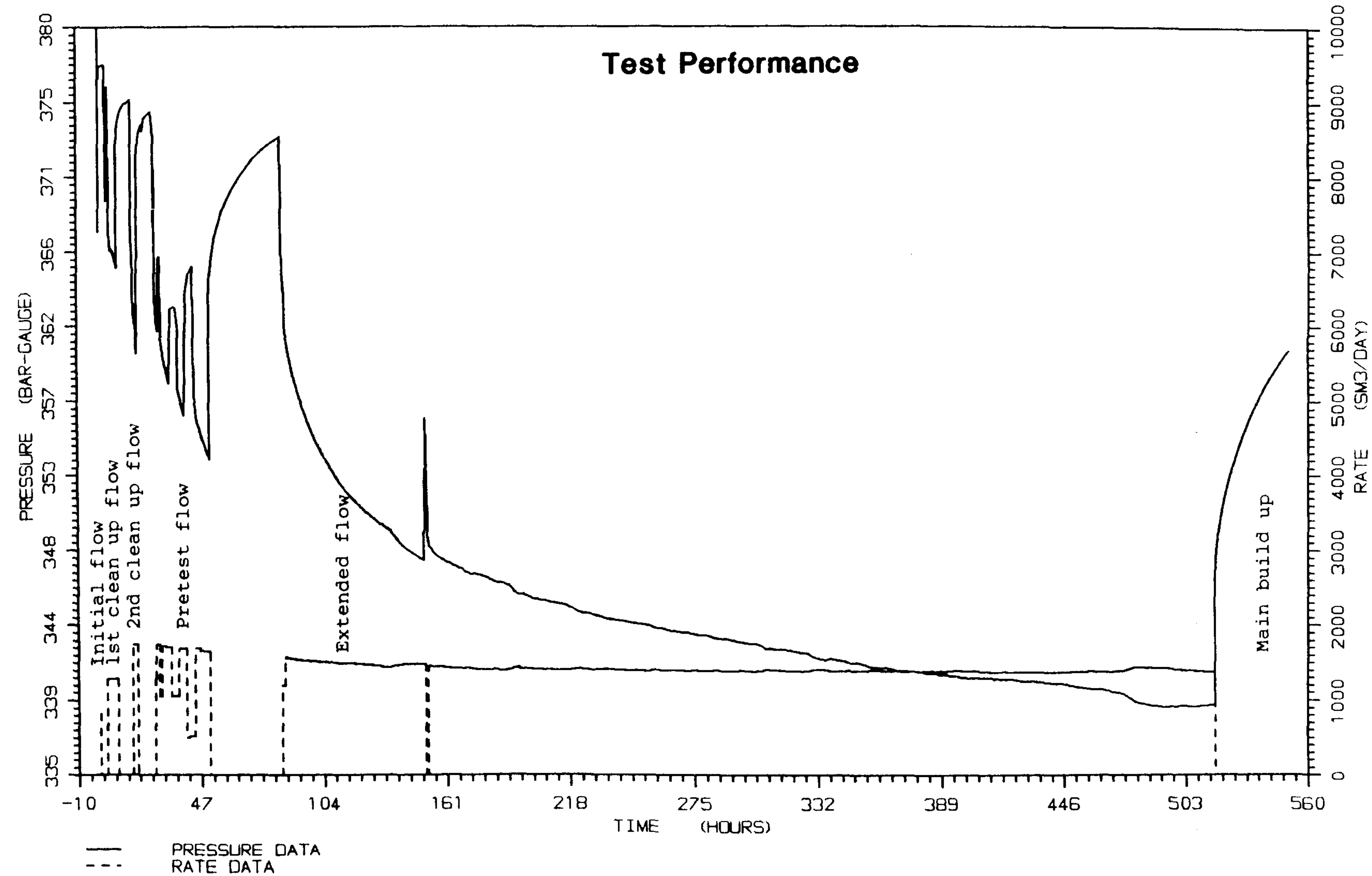



**Fig. 5.10 Pressure and rate vs. time**

| Date 6/87 | Auth IV | Appr |
|---|---|---|
| Draw by | Ref | |

# Well 34/4-7, Test No. 1

FORMATION WATER COMPOSITION

DISSOLVED SOLIDS

| | mg/l | me/l |
|---|---|---|
| <u>Cations</u> | | |
| Sodium | 11700 | 509 |
| Calcium | 2330 | 116 |
| Magnesium | 202 | 16.6 |
| Barium | 3.89 | - |
| Iron (dissolved) | 1.02 | - |
| Iron (total) | 8.46 | - |
| Potassium | 350 | 8.95 |
| Strontium | 274 | 6.25 |
| <u>Anions</u> | | |
| Cloride | 23200 | 654 |
| Sulfate | 82.6 | 1.72 |
| Carbonate | - | |
| Bicarbonate | 277 | 4.54 |

pH (measured at 18.6°C) : 6.47
Specific gravity : 1.0288
Resistivity (ohm-m) at 25°C : 0.171

Figure 5.11 Formation water composition

| Date 8/87 | Auth JMH | Appr JMH |
|---|---|---|
| Draw by AMJo | Ref EPR | |

# Well 34/4-7, Test No. 1

## Summary of general PVT data

Well : 34/4-7
Fluid: OIL

| | | | |
|---|---|---|---|
| Initial pressure used in analysis | : | 38900.0 | (kPa) |
| Temperature used in analysis | : | 100.20 | (deg C) |
| Saturation pressure | : | 17890.0 | (kPa) |
| Reservoir oil density | : | 0.689 | (g/cc) |
| Viscosity ai initial pressure | : | 0.000 | (mPa*s) |
| Viscosity at saturation pressure | : | 0.401 | (mPa*s) |

DIFFERENTIAL LIBERATION

| | | | |
|---|---|---|---|
| BO | : | 1.552 | (Rcm/Scm) |
| GOR | : | 164.6 | (Scm/Scm) |
| Residual oil dens. | : | 0.843 | (g(ccm) |

| FLASH DATA (const. mass expansion) | | SINGLE | MULTI |
|---|---|---|---|
| BO | (Rcm/Scm): | 1.47 | 1.35[illegible] |
| GOR | (Scm/Scm): | 155.0[illegible] | 122.3 |
| Stock oil density | (g/cc) : | 0.8346 | 0.8210 |

Separator conditions for single stage flash:

| | | |
|---|---|---|
| 1) | 101 kPa | 15 degC |

Separator conditions for multi stage flash:

| | | |
|---|---|---|
| 1) | 6300 kPa | 66 degC |
| 2) | 3100 kPa | 60 degC |
| 3) | 1100 kPa | 54 degC |
| 4) | 100 kPa | 15 degC |

Figure 5.12 General PVT-data

| | | |
|---|---|---|
| Dato 9/87 | Forf JMH | Godkj JMH |
| Tegn av AMJo | Ref EPR | |

# Well 34/4-7

RESERVOIR FLUID COMPOSITION, TEST NO. 1

Well : 34/4-7
Fluid: OIL

| Component | mol % | wt % | mol wt | density (g/cc) |
|---|---|---|---|---|
| CO2 | 0.22 | 0.10 | 0.00 | 0.000 |
| N2 | 1.36 | 0.40 | 0.00 | 0.000 |
| C1 | 35.69 | 6.07 | 0.00 | 0.000 |
| C2 | 8.26 | 2.63 | 0.00 | 0.000 |
| C3 | 8.21 | 3.84 | 0.00 | 0.000 |
| i-C4 | 1.18 | 0.73 | 0.00 | 0.000 |
| n-C4 | 4.35 | 2.68 | 0.00 | 0.000 |
| i-C5 | 1.43 | 1.09 | 0.00 | 0.000 |
| n-C5 | 2.20 | 1.68 | 0.00 | 0.000 |
| C6 | 2.90 | 2.59 | 84.20 | 0.670 |
| C7 | 34.20 | 78.19 | 215.80 | 0.849 |

RESERVOIR FLUID COMPOSITION, TEST NO. 2

Well : 34/4-7
Fluid: OIL

| Component | mol % | wt % | mol wt | density (g/cc) |
|---|---|---|---|---|
| CO2 | 0.22 | 0.10 | 0.00 | 0.000 |
| N2 | 1.10 | 0.33 | 0.00 | 0.000 |
| C1 | 36.81 | 6.33 | 0.00 | 0.000 |
| C2 | 8.69 | 2.80 | 0.00 | 0.000 |
| C3 | 8.39 | 3.97 | 0.00 | 0.000 |
| i-C4 | 1.19 | 0.74 | 0.00 | 0.000 |
| n-C4 | 4.21 | 2.62 | 0.00 | 0.000 |
| i-C5 | 1.35 | 1.04 | 0.00 | 0.000 |
| n-C5 | 2.03 | 1.57 | 0.00 | 0.000 |
| C6 | 2.61 | 2.36 | 84.50 | 0.670 |
| C7 | 33.40 | 78.14 | 219.00 | 0.817 |

Figure 5.13 Reservoir fluid composition

| Dato 9/87 | Forf JMH | Godkj JMH |
|---|---|---|
| Tegn av AMJo | Ref EPR | |

# Well 34/4-7

TRACE ELEMENT ANALYSES

| | Production test no. 1 | Production test no. 2 |
|---|---|---|
| <u>Gas phase</u> | | |
| $H_2S$ (ppm-mol) | <0.1 | <0.1 |
| Mercaptanes (ppm-mol) | <0.1 | <0.1 |
| $CO_2$ (mol %) | 0.30-0.40 | 0.30 |
| Radon-222 (Bq/l) | 0.37 | 0.03-0.14 |
| $H_2O$ (mg/l) | | 1.9-7.1 |
| Total mercury (µg/$m^3$) | 2.0-2.7 | 3.7-17.7 |
| Helium (mol %) | 0.020 | 0.010-0.015 |
| <u>Oil phase</u> | | |
| Density (g/$cm^3$) | | 0.83 |
| Water (mg/l) at 20°C | | 1000-2207 |
| Total sulphur (Wt %) | | 0.15 |
| Polonium-210 (Bq/l) | | 0.1-0.2 |
| Nickel (ppm-weight) | | 1.2 |
| Vanadium (ppm-weight) | | 1.3 |
| Mercury (µg/l) | | <0.001-0.004 |

Figure 5.14 Trace element analyses

| Date 8/87 | Auth JMH | Appr JMH |
|---|---|---|
| Draw by AMJo | Ref EPR | |

# Well 34/4-7, Test No. 2

Summary of general PVT data

Well : 34/4-7
Fluid: OIL

| | | | |
|---|---|---|---|
| Initial pressure used in analysis | : | 38600.0 | (kPa) |
| Temperature used in analysis | : | 100.80 | (deg C) |
| Saturation pressure | : | 18450.0 | (kPa) |
| Reservoir oil density | : | 0.667 | (g/cc) |
| Viscosity ai initial pressure | : | 0.397 | (mPa*s) |
| Viscosity at saturation pressure | : | 0.316 | (mPa*s) |

DIFFERENTIAL LIBERATION

| | | | |
|---|---|---|---|
| BO | : | 1.573 | (Rcm/Scm) |
| GOR | : | 170.7 | (Scm/Scm) |
| Residual oil dens. | : | 0.838 | (g(ccm) |

| FLASH DATA (const. mass expansion) | | SINGLE | MULTI |
|---|---|---|---|
| BO | (Rcm/Scm): | 1.48 | 1.41 |
| GOR | (Scm/Scm): | 150.7 | 130.8 |
| Stock oil density | (g/cc) : | 0.8300 | 0.8210 |

Separator conditions for single stage flash:

1) 101 kPa 15 degC

Separator conditions for multi stage flash:

| | | |
|---|---|---|
| 1) | 6300 kPa | 66 degC |
| 2) | 3100 kPa | 60 degC |
| 3) | 1100 kPa | 54 degC |
| 4) | 100 kPa | 15 degC |

Figure 5.15 General PVT-data

| | | | |
|---|---|---|---|
| Dato 9/87 | Forf JMH | Godkj JMH | |
| Tegn av AMJo | Ref EPR | | |

## 6.2.1 MUD PROPERTIES, DAILY REPORT
Well no: 34/4-7

| Date | Hole size | Hole depth | Mud weight | PV | YP | Gel strength | pH | Alkalinity Pf / Mf | Ca++ mg/l | Cl- mg/l | Sand % | Solids % | Mudtype |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 870214 | | .0 | 1.03 | | | | | | | | | | WATER BASED |
| 870215 | | .0 | 1.03 | | | | | | | | | | WATER BASED |
| 870216 | | .0 | 1.03 | | | | | | | | | | WATER BASED |
| 870217 | 36 | 422.0 | 1.06 | | | | | | | | | | SPUD MUD |
| 870218 | 36 | 470.0 | 1.06 | | | | | | | | | | SPUD MUD |
| 870219 | 36 | 470.0 | 1.06 | | | | | | | | | | GEL MUD |
| 870220 | 17-1/2 | 680.0 | 1.12 | 4 | 25 | | 9.0 | | | | | | GEL MUD |
| 870221 | 17-1/2 | 915.0 | 1.14 | 4 | 26 | 13/24 | 9.0 | | | | | | GEL MUD |
| 870222 | 26 | 915.0 | 1.14 | 7 | 34 | 16/24 | 9.0 | | | | | | GEL MUD |
| 870223 | 26 | 915.0 | 1.16 | 6 | 31 | 19/28 | 8.5 | | | | | | GEL MUD |
| 870224 | 26 | 915.0 | 1.03 | | | | | | | | | | SPUD MUD |
| 870225 | 17-1/2 | 915.0 | 1.03 | | | | | | | | | | SPUD MUD |
| 870226 | 17-1/2 | 1113.0 | 1.16 | 20 | 22 | 2/4 | 8.0 | 0.0/0.2 | | 1200 | 0.8 | 5.0 | GYP/POLYMER MUD |
| 870227 | 17-1/2 | 1480.0 | 1.20 | 20 | 21 | 5/6 | 8.5 | 0.0/0.2 | | 1800 | 1.4 | 7.0 | GYP/POLYMER MUD |
| 870228 | 17-1/2 | 1644.0 | 1.30 | 25 | 23 | 5/7 | 8.0 | 0.0/0.2 | | 1700 | 1.2 | 11.5 | GYP/POLYMER MUD |
| 870301 | 17-1/2 | 1887.0 | 1.47 | 24 | 22 | 6/14 | 9.0 | 0.2/0.5 | | 1600 | 0.8 | 16.0 | GYP/POLYMER MUD |
| 870302 | 17-1/2 | 1887.0 | 1.47 | 24 | 20 | 6/15 | 9.0 | 0.1/0.4 | | 1800 | 0.8 | 16.0 | GYP/POLYMER MUD |
| 870303 | 17-1/2 | 1887.0 | 1.47 | 21 | 15 | 6/13 | 9.0 | 0.0/0.2 | | 1700 | 0.9 | 15.5 | GYP/POLYMER MUD |
| 870304 | 17-1/2 | 1887.0 | 1.47 | 21 | 17 | 6/16 | 9.0 | 0.1/0.5 | | 1800 | 0.9 | 15.5 | GYP/POLYMER MUD |
| 870305 | 12-1/4 | 2145.0 | 1.58 | 23 | 21 | 7/35 | 10.0 | 0.2/0.6 | | 2100 | 0.5 | 19.5 | GYP/POLYMER MUD |
| 870306 | 12-1/4 | 2298.0 | 1.68 | 26 | 24 | 4/56 | 10.0 | 0.2/0.6 | | 2800 | 0.5 | 23.0 | GYP/POLYMER MUD |
| 870307 | 12-1/4 | 2407.0 | 1.70 | 26 | 27 | 13/72 | 10.0 | 0.3/0.9 | | 3000 | 0.5 | 25.0 | GYP/POLYMER MUD |
| 870308 | 12-1/4 | 2471.0 | 1.70 | 23 | 16 | 4/7 | 8.0 | 0.1/0.2 | | 65000 | 0.5 | 19.5 | KCL MUD |
| 870309 | 12-1/4 | 2512.0 | 1.70 | 23 | 18 | 4/6 | 9.0 | 0.1/0.8 | | 65000 | 0.5 | 24.0 | KCL MUD |
| 870310 | 12-1/4 | 2563.5 | 1.70 | 26 | 18 | 4/6 | 8.5 | 0.1/0.4 | | 65000 | 1.0 | 24.0 | KCL MUD |
| 870311 | 12-1/4 | 2591.3 | 1.70 | 24 | 16 | 4/7 | 8.5 | 0.1/0.7 | | 63000 | 0.3 | 24.0 | KCL MUD |
| 870312 | 12-1/4 | 2647.0 | 1.70 | 25 | 18 | 5/11 | 8.5 | 0.1/0.7 | | 63000 | 1.0 | 24.0 | KCL MUD |
| 870313 | 12-1/4 | 2647.0 | 1.70 | 25 | 18 | 5/10 | 8.5 | 0.1/0.7 | 480 | 63000 | 1.0 | 24.0 | KCL MUD |
| 870314 | 12-1/4 | 2647.0 | 1.70 | 27 | 17 | 4/9 | 8.5 | 0.1/0.8 | 400 | 63000 | 0.5 | 24.0 | KCL MUD |
| 870315 | 8-1/2 | 2675.0 | 1.70 | 25 | 17 | 4/11 | 8.0 | 0.1/0.6 | 400 | 63000 | 0.8 | 24.5 | KCL MUD |
| 870316 | 8-1/2 | 2711.5 | 1.70 | 25 | 17 | 5/11 | 9.0 | 0.2/0.9 | 320 | 63000 | 0.8 | 25.0 | KCL MUD |

## 6.2.1 MUD PROPERTIES, DAILY REPORT
Well no: 34/4-7

| Date | Hole size | Hole depth | Mud weight | PV | YP | Gel strength | pH | Alkalinity Pf / Mf | Ca++ mg/l | Cl- mg/l | Sand % | Solids % | Mudtype |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 870317 | 12-1/4 | 2792.0 | 1.70 | 25 | 15 | 4/12 | 8.5 | 0.1/0.6 | 360 | 63000 | 0.8 | 25.5 | KCL MUD |
| 870318 | 12-1/4 | 2950.0 | 1.70 | 25 | 17 | 4/24 | 9.5 | 0.1/0.8 | 420 | 60000 | 1.5 | 26.0 | KCL MUD |
| 870319 | 12-1/4 | 2950.0 | 1.70 | 24 | 14 | 4/14 | 9.5 | 0.1/0.5 | 380 | 58000 | 1.0 | 26.0 | KCL MUD |
| 870320 | 12-1/4 | 2950.0 | 1.70 | 23 | 13 | 3/14 | 9.5 | 0.1/0.5 | 380 | 58000 | 0.5 | 26.0 | KCL MUD |
| 870321 | 12-1/4 | 2950.0 | 1.70 | 22 | 11 | 3/12 | 9.5 | 0.1/0.5 | 380 | 58000 | 0.5 | 26.0 | KCL MUD |
| 870322 | 12-1/4 | 2950.0 | 1.70 | 22 | 9 | 3/13 | 9.2 | 0.1/0.5 | 380 | 56000 | 0.5 | 26.0 | KCL MUD |
| 870323 | 12-1/4 | 2950.0 | 1.70 | 22 | 9 | 3/13 | 9.2 | 0.1/0.5 | 380 | 56000 | 0.5 | 26.0 | KCL MUD |
| 870324 | PB | 2869.0 | 1.70 | 20 | 10 | 3/9 | 9.0 | 0.1/0.4 | 320 | 50000 | | 24.0 | KCL MUD |
| 870325 | PB | 2869.0 | 1.70 | 13 | 9 | 3/8 | 10.5 | 0.5/0.9 | 800 | 38000 | | 24.0 | KCL MUD |
| 870326 | PB | 2869.0 | 1.70 | 14 | 9 | 6/15 | 12.0 | 2.0/2.8 | 400 | 40000 | | 25.0 | KCL MUD |
| 870327 | PB | 2869.0 | 1.70 | 12 | 11 | 8/19 | 11.5 | | | | | | KCL MUD |
| 870328 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870329 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870330 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870331 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870401 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870402 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870403 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870404 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870405 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870406 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870407 | PB | 2869.0 | 1.70 | | | | | | | | | | BRINE |
| 870408 | PB | 2784.0 | 1.70 | | | | | | | | | | BRINE |
| 870409 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870410 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870411 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870412 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870413 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870414 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870415 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870416 | PB | 2738.0 | 1.70 | | | | | | | | | | BRIN |

SAGA PETROLEUM A.S.

6.2.1 MUD PROPERTIES, DAILY REPORT
Well no: 34/4-7

| Date | Hole size | Hole depth | Mud weight | PV | YP | Gel strength | pH | Alkalinity Pf / Mf | Ca++ mg/l | Cl- mg/l | Sand % | Solids % | Mudtype |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 870417 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870418 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870419 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870420 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870421 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870422 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870423 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870424 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870425 | PB | 2738.0 | 1.72 | | | | | | | | | | BRINE |
| 870426 | PB | 2738.0 | 1.70 | | | | | | | | | | BRINE |
| 870427 | PB | 2738.0 | 1.72 | | | | | | | | | | BRINE |
| 870428 | PB | 2738.0 | 1.72 | | | | | | | | | | BRINE |
| 870429 | PB | 2738.0 | 1.72 | | | | | | | | | | BRINE |
| 870430 | PB | 2738.0 | 1.72 | | | | | | | | | | BRINE |
| 870501 | PB | 2738.0 | 1.72 | | | | | | | | | | BRINE |
| 870502 | PB | 2738.0 | 1.72 | | | | | | | | | | BRINE |
| 870503 | PB | 2738.0 | 1.72 | | | | | | | | | | BRINE |
| 870504 | PB | 2738.0 | 1.72 | | | | | | | | | | BRINE |
| 870505 | PB | 2738.0 | 1.72 | | | | | | | | | | BRINE |
| 870506 | PB | 2738.0 | 1.70 | | | | | | | | | | KCL MUD |
| 870507 | PE | 2738.0 | 1.70 | | | | | | | | | | KCL MUD |
| 870508 | PB | 2738.0 | 1.70 | 12 | 16 | 18/29 | 9.5 | 0.2/1.6 | | 27000 | 0.8 | 24.0 | KCL MUD |
| 870509 | PB | 2738.0 | 1.70 | 14 | 26 | 19/27 | 10.5 | 1.0/2.3 | | 35000 | 0.8 | 25.0 | KCL MUD |
| 870510 | PB | 2493.0 | 1.71 | 17 | 26 | 21/28 | 10.5 | 1.6/1.6 | | 25000 | 0.8 | 23.5 | KCL MUD |
| 870511 | PB | 632.0 | 1.71 | 14 | 27 | 19/26 | 10.5 | 0.8/2.2 | | 28000 | 0.8 | 23.0 | KCL MUD |

SAGA PETROLEUM A.S.

6.2.2 MUD MATERIALS USED

Well no: 34/4-7

| Materials | Unit | 36 in hole | 26 in hole | 17-1/2 hole | 12-1/4 hole | 8-1/2 hole | Total |
|---|---|---|---|---|---|---|---|
| BARITE | M/T | 0 | 36 | 404 | 952 | 242 | 1634 |
| BICARBONATE | 50 KG | 0 | 0 | 0 | 9 | 6 | 15 |
| CAUSTIC SODA | 25 KG | 5 | 9 | 20 | 30 | 33 | 97 |
| GYPSUM | 50 KG | 0 | 0 | 434 | 9 | 0 | 443 |
| LIME | 40 KG | 18 | 10 | 0 | 0 | 0 | 28 |
| KCL-powder | 50 kg | 0 | 0 | 0 | 586 | 0 | 586 |
| KwickSeal F/M | 40 lb | 0 | 0 | 0 | 21 | 0 | 21 |
| KOH -POTASS. | 50KG | 0 | 0 | 0 | 45 | 1 | 46 |
| SODA ASH | 50 KG | 0 | 0 | 0 | 1 | 0 | 1 |
| BENTONITE | M/T | 25 | 30 | 5 | 7 | 8 | 75 |
| BENTONITE | 50 KG | 0 | 0 | 40 | 0 | 0 | 40 |
| ANTISOL FL 10 | 25 KG | 0 | 0 | 63 | 147 | 0 | 210 |
| ANTISOL FL 30 | 25 KG | 0 | 0 | 219 | 87 | 17 | 323 |
| BORREWELL C | 25KG | 0 | 0 | 0 | 52 | 87 | 139 |
| DOWICIL 75 | 55GAL | 0 | 0 | 0 | 1 | 2 | 3 |
| MAGCO 101 INH | 55 GA | 0 | 0 | 0 | 3 | 16 | 19 |
| OS-1L | 55GAL | 0 | 0 | 0 | 1 | 0 | 1 |
| XC-POLYMER | 25 KG | 0 | 0 | 7 | 28 | 12 | 47 |
| KCL - BRINE | BBL | 0 | 0 | 0 | 1110 | 0 | 1110 |
| XP-20 | 50 LB | 0 | 0 | 0 | 26 | 5 | 31 |
| Ammonium Bisu | 55 ga | 0 | 0 | 0 | 0 | 2 | 2 |
| MPOC-freeing | 55 ga | 0 | 0 | 0 | 4 | 0 | 4 |