

3.2

FMT results

The FMT confirmed the result from the electric logs. The quality of the measurements are good. The FMT shows that the well has normal pore pressure (1.04 g/cm^3) in the water zone. The FMT showed that the permeability in major part of the reservoir section is very good. The pressure points are plotted in Figure 3.2.1

A total of 2 FMT run were performed in the well (Run 3a and 3b).

In the first run, pressure measurements were performed in the interval 2579 to 2800 m RKB. A gas sample was collected at 2583.2 m RKB.

In the second run, an oil sample was collected at 2650.5 m RKB.

2 samples were collected. One gas sample from 2883.2 m RKB and one oil sample 2650.5 m RKB.

Gas sample

The 10 litre chamber was emptied offshore while the 1 gallon chamber was sent onshore for laboratory analysis.

Recovery of the 10 litre chamber:

1.2 m³ gas (at atm. conditions)
2.5 litres mudfiltrate
0.1 litres of condensate

Opening pressure 169 Bar.

CO₂ : 0.5 %

H₂S : 0 %

Fill up time 56 seconds.

Recovery 1 gallon chamber:

111 litres gas (at atm. conditions)

160 cm³ mudfiltrate

traces of condensate

Fill up time 22 seconds.

Opening pressure 170 Bar

Gas gravity: 0.645 (air = 1)

The amount of condensate was too small to measure any GOR.

Oil sample

The 10 litres chamber was emptied offshore while the 1 gallon chamber was sent onshore for laboratory analysis.

Recovery of the 10 litre chamber:

0.2 m³ gas (at atm. conditions)

5.5 litres mudfiltrate

3.0 litres of oil.

Opening pressure 128 Bar.

CO₂ : 0 %

H₂S : 0 %

Density of oil 870 kg/m³

Fill up time 99 seconds.

Recovery 1 gallon chamber:

57 litres gas (atm. conditions)

400 cm³ of oil

1200 cm³ of mudfiltrate

100 cm³ of oil/mudfiltrate emulsion

Fill up time 48 seconds.

Opening pressure 90 Bar.

Rates and pressures during different flow periods:

Choke mm	BHP kPa	BHT °C	WHP kPa	WHT °C	Q _o Sm ³ /D	Q _g Sm ³ /D	Flow
12.7	26466	95.2	8514	35.9	-	-	Cleanup
19.05	26099	95.8	6923	59.7	-	-	Cleanup
12.7	26567	97.9	8461	54.1	427	38265	Cond.
6.35	26900	97.6	8837	30	120	9600	Sampling
25.4	25946	97.0	5057	70.2	980	85840	Main
25.4	25950	97.9	5053	76.8	990	87212	Main
25.4	26033	98.1	4796	67.0	987	94548	Sandfree
38.1	25853	98.3	3194	75.5	1146	109395	Sandfree
72.0	25845	98.3	3189	76.2	1165	108667	Sandfree

Fluid properties measured during testing:

Flow periods	Cleanup	Main	Sample	Sandfree
Oil density (g/cm ³):	0.856	0.856	0.856	0.856
Gas density (air=1):	-	0.660	0.650	0.660
BS&W (%) :	0	0	0	0
Water in oil(%) :	0.02	0.04	0.03	0.003
H ₂ S (ppm) :	1.4	1.6	2.6	4.0
CO ₂ (%) :	1.4	1.8	1.3	1.8
Mercaptan (ppm) :	2.1	3.9	5.2	6.0

The reservoir pressure is calculated to 26889 kPa at mid perforations (2608 mRKB) for DST 3A.

Max. temperature recorded during the multirate flow was measured to 95.5°C. (Figure 3.3.4).

Rates and pressures during different flow periods:

Choke mm	BHP kPa	BHT °C	WHP kPa	WHT °C	Q _o Sm ³ /D	Q _g Sm ³ /D	Flow
19.05	21672	91.4	12015	48.2	33	595236	Cleanup A
19.05	26803	89.1	14917	57.7	49	712112	Cleanup B
19.05	26306	94.9	14895	57.2	49	726048	Main
19.05	26313	95.1	14908	59.3	44	717660	Main
19.05	26332	94.9	14844	53.8	52	718126	Sandfree
25.4	26187	95.0	10202	49.5	88	879911	Sandfree
38.1	26118	95.1	6506	41.1	100	945735	Sandfree

Fluid properties measured during testing:

Flow periods	:Cleanup DST 3A	Cleanup DST 3B	Main DST 3B	Sandfree DST 3B
Condensate (g/cm ³)	0.787	0.787	0.787	0.783
Gas density (air=1)	0.640	0.645	0.640	0.645
Water in oil (%)	0.02	0.043	0.04	-
H ₂ S (ppm)	0.5	0.5	0.4	0.5
CO ₂ (%)	1.1	1.0	1.1	1.1
Mercaptan (ppm)	1.0	1.0	1.0	1.2

Anchor Drilling Fluids			TOTAL MATERIAL COST AND CONSUMPTION														Anchor Drilling Fluids	
OPERATOR: STATOIL			RIG: ROSS RIG														WELL: 6608/10-2	
Product	Unit size	Unit price NOK	35" sect.	Cost NOK	26" sect.	Cost NOK	17 1/2" sect.	Cost NOK	12 1/4" sect.	Cost NOK	8 1/2" sect.	Cost NOK	6" sect.	Cost NOK	Test, P & A	Cost NOK	Total cons.	Total cost NOK
Barite	M.T	950,00					214	203 300,00	1223	1 161 850,00	238	226 100,00	56	53 200,00	227	215 650,00	1958	1 860 100,00
Bentonite	M.T.	2 590,00									45	116 550,00	23	59 570,00	30	77 700,00	98	253 820,00
Soda Ash	kg	2,77									375	1 038,75	25	69,25	100	277,00	500	1 385,00
Celpol LV	kg	33,19					10175	337 708,25	18975	629 780,25	3425	113 675,75	1825	60 571,75	1600	53 104,00	36000	1 194 840,00
Celpol Reg	kg	33,19					1400	46 466,00	925	30 700,75							2325	77 166,75
Staflo Exlo	kg	33,78									850	28 713,00					850	28 713,00
CMC EHV	kg	15,01	3000	45 030,00	6000	90 060,00											9000	135 090,00
Lime	kg	1,66					300	498,00	1020	1 693,20	260	431,60			60	99,60	1640	2 722,40
Gypsum	kg	2,30					11350	26 105,00	14300	32 890,00							25650	58 995,00
Ancocde	ltr	16,91					400	6 764,00	1775	30 015,25	200	3 382,00	100	1 691,00	50	845,50	2525	42 697,75
Nutplug coarse	kg	4,42							925	4 088,50							925	4 088,50
Nutplug Fine	kg	4,42							1000	4 420,00							1000	4 420,00
Bentonite	kg	2,78												1850	5 143,00	1850	5 143,00	
Ancotemp	kg	90,80									1981	179 874,80	227	20 611,60	475	43 130,00	2683	243 616,40
Anco Resin	kg	13,14									5125	67 342,50	2600	34 164,00	2250	29 565,00	9975	131 071,50
Ironite Sponge	kg	25,10					159	3 990,90									159	3 990,90
Desco CF	kg	20,35									45	915,75			147	2 991,45	192	3 907,20
Bicarbonat	kg	3,98							575	2 288,50	175	696,50	725	2 885,50	75	298,50	1550	6 169,00
Mica Fine	kg	4,59							925	4 245,75							925	4 245,75
Mica Coarse	kg	4,59							800	3 672,00							800	3 672,00
Defoamer	ltr	16,18									150	2 427,00	150	2 427,00	50	809,00	350	5 663,00
Thermopol	kg	148,00											125	18 500,00	227	33 596,00	352	52 096,00
Total cost	NOK			45 030,00		90 060,00		624 832,15		1 905 644,20		741 147,65		253 690,10		463 209,05		4 123 613,15
Hole drilled	m			65		412		668		1034		759		343				3281
Cost per metre	NOK			692,77		218,59		935,38		1 842,98		976,48		739,62		N/A		1 256,82
Total days				3		4		6		18		13		11		38		93
Cost per day	NOK			15 010,00		22 515,00		104 138,69		105 869,12		57 011,36		23 062,74		12 189,71		44 339,93
Mud mixed	m3			240		427		805		1269		598		248		321		3 908,00
Cost per m3	NOK			187,63		210,91		776,19		1 501,69		1 239,38		1 022,94		1 443,02		1 055,17