

3.3 FMT Summary

Two runs with the Schlumberger MDT tool was run. In the first run - 1A - no samples was taken due to a short in the pumpmodule i.e. only pressure readings obtained. Out of 45 attempts only 5 good pressure readings was obtained. Run 1B was the run for sampling. Tree samples was taken and 4 acceptable pressure points out of 26 attepts.

MDT PRESSURES WELL 6506/11-5S

Figure 3.3.1 Formation Pressure (bar)

WFT Data								supercharge / unable
Well			6506/11-5S					very good >=100
Point								good >= 10
ID					Form.			Moderate >= 1
Pressure	Fm	Depth	Depth TVD	Vol	Pressure		Mobility	Low >= 0.1
flag		m RKB	m RKB	cc	Bar	Comment	MD/CP	Very low >= 0.01
								Tight / no value
1A-1		4250,10	4190,50	7,00	484,17	Low	0,05	CQG
1A-2		4250,10	4190,50	0,60		Still increasing		CQG
1A-3		4253,60	4194,10	5,00	493,87	Good	161,00	CQG
1A-4		4253,60	4194,10	20,00		Lost seal		CQG
1A-5		4253,60	4194,10	20,00		Lost seal		CQG
1A-6		4255,00	4195,00	1,40	482,61	Low	0,20	CQG
1A-7		4258,50	4198,90	1,40		Tight		CQG
1A-8		4259,00	4199,40	2,30		Tight		CQG
1A-9		4262,60	4203,00	3,40	485,28	Low	0,50	CQG
1A-10		4280,50	4220,90	20,00	484,45	Moderate	1,80	CQG
1A-11		4291,60	4232,00	1,60	485,63	Low	0,40	CQG
1A-12		4331,00	4271,40	1,80	474,95	Low	0,80	CQG
1A-13		4342,60	4283,00	1,70	474,31	Low	0,50	CQG
1A-14		4347,00	4287,30	20,00	474,30	Good	18,60	CQG
1A-15		4355,00	4295,30	20,00	474,57	Moderate	4,00	CQG
1A-16		4367,00	4307,20	20,00	474,87	Moderate	2,30	CQG
1A-17		4410,00	4350,50	2,40		Tight		CQG
1A-18		4466,00	4406,10	4,50		Still increase	0,20	CQG
1A-19		4471,00	4411,00	2,50	497,43	Supercharge ?	0,10	CQG
1A-20		4474,90	4415,00	4,00		Seal failure		CQG
1A-21		4476,00	4416,00	2,20	486,05	Still increasing		CQG
1A-22		4512,00				Lost seal		CQG
1A-23		4521,00	4460,90	3,00	488,65	???		CQG
1A-24		4530,00	4469,90	2,30		Supercharged		CQG
1A-25		4533,00	4472,90	3,20		Tight		CQG

1A-26	4536,00	4575,90	20,00		No seal, 2x		CQG
1A-27	4541,00	4480,80	20,00		No seal		CQG
1A-28	4545,50	4485,30	3,80		Tight		CQG
1A-29	4554,50	4494,30	20,00		No seal		CQG
1A-30	4559,50	4499,30	8,20		Still increasing		CQG
1A-31	4563,50	4503,30	20,00		No seal		CQG
1A-32	4576,00	4515,70	9,40		Tight		CQG
1A-33	4594,90	4534,60			No seal		CQG
1A-34	4610,00	4549,60	2,45		Tight		CQG
1A-35	4633,20	4572,70	3,10		Tight		CQG
1A-36	4652,50	4591,90	2,31		Seal fail		CQG
1A-37	4671,00	4610,30	2,10		Tight		CQG
1A-38	4675,00	4614,30	21,50	486,41	Moderate	5,00	CQG
1A-39	4683,00	4622,20	2,12		Tight		CQG
1A-40	4689,50	4628,70			No seal		CQG
1A-41	4708,00	4647,10	2,79		Tight		CQG
1A-42	4708,50	4647,60	2,48		Tight		CQG
1A-43	4743,40	4682,50			No seal		CQG
1A-44	4750,00	4689,00			No seal		CQG
1A-45	4780,00	4718,90	3,20		Tight		CQG
1A-46	4781,00	4719,80	12,20		No seal		CQG
1A-47	4781,50	4720,30			No seal		CQG
1A-48	4782,00	4720,80			No seal		CQG
1B-49	4671,20	4610,50	2,50	488,49	Moderate	1,90	CQG
1B-50	4671,50	4610,80	2,10	487,11	Low		CQG
1B-51	4672,20	4611,50	20,00	486,44	Moderate	5,90	CQG
1B-52	4672,60	4611,90	3,20	486,86	Moderate	4,90	CQG
1B-53	4673,00	4612,30	1,70	486,75	Moderate	1,80	CQG
1B-54	4673,50	4612,80	3,40	486,45	Moderate	3,90	CQG
1B-55	4674,00	4613,30	20,00	486,43	Sample	24,40	CQG
1B-56	4674,00	4613,30			Reset Sample		CQG
1B-57	4707,80	4647,00	3,60		Lost seal		CQG
1B-58	4708,10		3,30		Lost seal		CQG
1B-59	4708,60		3,10		Lost seal x 2		CQG

1B-60	4709,10		3,20		Tight		CQG
1B-61	4711,50	4650,60	3,00		Tight		CQG
1B-62	4711,70	4650,80	2,40		Tight		CQG
1B-63	4466,50	4406,60	2,80		Tight		CQG
1B-64	4467,60	4407,60	2,50		Tight		CQG
1B-65	4469,00	4409,00	4,20		Tight		CQG
1B-66	4471,00	4411,00	2,50		Tight		CQG
1B-67	4474,00	4414,00	2,50		Tight		CQG
1B-68	4475,00	4415,00	2,60		Tight		CQG
1B-69	4476,00	4416,00	2,30	491,27	Low	0,70	CQG
1B-68	4476,30	4416,40	5,00	492,30	Low	1,60	CQG
1B-69	4529,50	4469,40	2,50		Tight		CQG
1B-70	4530,10	4470,00	2,70		Seal fail		CQG
1B-71	4536,00	4475,90	2,50		Seal fail		CQG
1B-72	4553,50	4493,30	5,70		No seal		CQG
1B-73	4347,00		2,70	474,69	Lost seal		CQG

FIG. 3.2.1.
 Well 6506/11-5S
 Temperature Plot based on wells in the area.

3.4 Well Testing

Well 6506/11-5S was considered as an observation well during the extended well test of 6506/12-11S, to evaluate communication between the two wells. The clean up of 6506/11-5S was performed by a separate standard well test string before the pressure monitoring completion string was attempted to be ran. As the evaluation of the pressure response in 6506/11-5S was the main objective the clean up flow period was limited to approx. 1 hour or one string volume only to ensure communication to the formation and to clean out brine from the perforated interval. Unfortunately, due to technical problems, running of the pressure monitoring completion string was abondend and no pressure data observed during the test of 6506/12-11S(R).

4.10 Drilling Fluid Summary

TOTAL MATERIAL COST AND CONSUMPTION

OPERATOR: STATOIL

WELL: 6506/11-5S

Product	Unit size	Unit price NOK	36" sect.	Cost NOK	26" sect.	Cost NOK	17 1/2" sect.	Cost NOK	12 1/4" sect. OBM	Cost NOK	8 1/2" sect. OBM	Cost NOK	DST sect.	Cost NOK	Total consumed	Total cost NOK
Barite	mt	708,68	88	62 363,84	18	12 756,24	130	92 128,40	530	375 600,40	95	67 324,60	44	31 181,92	905	641 355,40
Base Oil	m3	2946,86							105	309 420,30	88	259 323,68	7	20 628,02	200	589 372,00
Base Oil KSU	m3	3094,20							77	238 253,40			8	24 753,80	85	263 007,00
Anco Vert P	kg	33,00							8550	282 150,00	9500	313 500,00	1900	62 700,00	19950	658 350,00
Anco Vert S	kg	33,25							3800	126 350,00	4750	157 937,50	950	31 587,50	9500	315 875,00
Anco Vert Vis	kg	31,29							4125	129 071,25	3425	107 168,25	75	2 348,75	7625	238 586,25
Anco Vert F	kg	27,90							2000	55 800,00	6200	172 980,00			8200	228 780,00
Anco Vert M	kg	54,60							950	51 870,00	190	10 374,00			1140	62 244,00
CaCl2	kg	2,63							4650	12 229,50	3550	9 336,50	50	131,50	8250	21 697,50
Lime	kg	2,02	80	161,60	60	121,20			5400	10 908,00	5880	11 837,20			11400	23 028,00
Celpol ESL	kg	30,49					9625	293 466,25							9625	293 466,25
Anco 208, 1m3	m3	16355,85					15	245 337,75							15	245 337,75
Anco 208, 2,2 m3	m3	17405,85					18,9	328 970,57							19	328 970,57
Anco Superwash	kg	47,25													4032	190 512,00
Bentonite	mt	1799,85	22	39 596,70	33	59 395,05									55	98 991,75
KCl Brine	m3	518,70					491	254 681,70			20	10 374,00			511	265 055,70
KCl Powder	kg	1,71														
Rhodopol 23P	kg	79,05					3900	308 295,00					700	55 335,00	4600	363 630,00
Soda Ash	kg	2,92	100	292,00	75	219,00	400	1 168,00							575	1 679,00
Anco Vert OBM	m3	2500,00							-32	-80 000,00	-74	-185 000,00	-10	-25 000,00	-116	-290 000,00
Anco 2000 Mud	m3	700,00					70	49 000,00							70	49 000,00
NaCl Brine	m3	458,79											479	219 760,41	479	219 760,41
NaCl Powder	kg	1,21											4000	4 840,00	4000	4 840,00
KD 40	Kg	46,16											544	25 110,00	544	25 110,00
Total cost	NOK			102 414,14		72 491,49		1 573 047,67		1 511 652,85		935 155,73		643 886,70		4 838 648,58
Hole drilled	m			65		247		1518		2098		552				4480
Cost per metre	NOK			1 575,60		293,49		1 036,26		720,52		1 694,12				1 080,06
Total days				3		2		6		11		15		29		66
Cost per day	NOK			34 138,05		36 245,75		262 174,61		137 422,99		62 343,72		22 202,99		73 312,86
Mud mixed	m3			338		293		724		338		139		506		2338
Cost per m3	NOK			303,00		247,41		2 172,72		4 472,35		6 727,74		1 272,50		2 069,57

GEOCHEMICAL DATA REPORT

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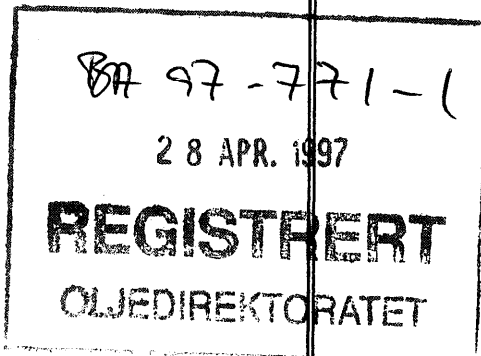
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TITLE

Geochemical Analysis of Gas and Condensate Samples from two Smørbukk Wells

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PAGE

1 of 1

Table 8b: MPLC Bulk Composition: Oil fraction (%) for Statoil, Norsk Sektor, Norske Havet

Well	Description	Sat	Aro	Asph	NSO	HC	Non-HC	Sat	HC	Sample
		T.Oil	T.Oil	T.Oil	T.Oil	T.Oil	T.Oil	Aro	Non-HC	
6506/11-5S	MDT	89.78	8.50	0.30	1.42	98.28	1.72	1056.25	5710.45	O45/0001

Table 9A: Quantitative Analysis of Saturated Fraction for well NOCS 6506/11-5S.

sample	nC15 mg/g sat	nC16 mg/g sat	iC18 mg/g sat	nC17 mg/g sat	Pr mg/g sat	nC18 mg/g sat	Ph mg/g sat	nC19 mg/g sat	nC20 mg/g sat	nC21 mg/g sat	nC22 mg/g sat	nC23 mg/g sat	nC24 mg/g sat	nC25 mg/g sat	nC26 mg/g sat	nC27 mg/g sat	nC28 mg/g sat	nC29 mg/g sat	nC30 mg/g sat	nC31 mg/g sat	nC32 mg/g sat	nC33 mg/g sat	nC34 mg/g sat
4674	16.39	14.85	4.57	12.48	7.88	11.39	5.08	8.77	7.80	6.49	5.75	4.97	4.60	4.02	3.53	2.98	2.58	2.03	1.66	1.27	0.84	0.56	0.85

Table 9Ca: Aromatic Hydrocarbon Ratios (peak area) for Statoil, Norsk Sektor, Norske Havet

Well	Description	MNR	DMNR	BPhR	2/1MP	MPI1	MPI2	Rc	DBT/P	4/1MDBT	(3+2) /1MDBT	Sample
6506/11-5S	MDT	1.88	2.62	0.62	1.22	0.83	0.99	0.90	-	18.59	4.59	O45/0001

Table 10A: Tabulation of carbon isotope data on oils for Statoil, Norsk Sektor, Norske Havet

<u>Well</u>	<u>Descript.</u>	<u>Whole oil</u>	<u>Topped oil</u>	<u>Saturated</u>	<u>Aromatic</u>	<u>NSO</u>	<u>Asphaltenes</u>	<u>Sample</u>
6506/11-5S	MDT	-28.12	-	-28.05	-26.91	-29.63	-	O45/0001

Table 11a: Variation in Triterpane Distribution (peak height) SIR for Statoil, Norsk Sektor, Norske Havet

Well	Descript.	Ratio1	Ratio2	Ratio3	Ratio4	Ratio5	Ratio6	Ratio7	Ratio8	Ratio9	Rat.10	Rat.11	Rat.12	Rat.13	Rat.14	Sample
6506/11-5S	MDT	0.29	0.22	0.20	0.75	0.43	0.45	0.11	0.15	0.10	0.52	0.89	0.42	0.11	57.95	045/0001

Table 11b: Variation in Sterane Distribution (peak height) SIR for Statoil, Norsk Sektor, Norske Havet

<u>Well</u>	<u>Descript.</u>	<u>Ratio1</u>	<u>Ratio2</u>	<u>Ratio3</u>	<u>Ratio4</u>	<u>Ratio5</u>	<u>Ratio6</u>	<u>Ratio7</u>	<u>Ratio8</u>	<u>Ratio9</u>	<u>Ratio10</u>	<u>Sample</u>
6506/11-5S	MDT	0.74	48.72	78.17	1.07	0.79	0.46	0.33	0.64	0.95	3.49	O45/0001

Table 11c: Raw triterpane data (peak height) m/z 191 SIR for Statoil, Norsk Sektor, Norske Havet

Well	Descript.	23/3	24/3	25/3	24/4	26/3	27Ts	27Tm	28aß	25nor30aß	Sample
		29aß	29Ts	30d	29ßa	300	30aß	30ßa	30G	31aßS	
		31aßR	32aßS	32aßR	33aßS	33aßR	34aßS	34aßR	35aßS	35aßR	
6506/11-5S	MDT	930.5	728.9	345.2	645.7	249.1	1347.9	390.2	155.5	196.0	O45/0001
		1048.4	867.8	635.5	104.0	0.0	1405.6	172.2	0.0	444.1	
		367.2	223.0	161.8	130.7	94.7	69.7	0.0	0.0	0.0	

Table 11e: Raw sterane data (peak height) m/z 218 SIR for Statoil, Norsk Sektor, Norske Havet

Well	Descript.	27 β BR	27 β BS	28 β BR	28 β BS	29 β BR	29 β BS	30 β BR	30 β BS	Sample
6506/11-5S	MDT	784.9	651.0	557.4	695.4	674.6	633.9	194.6	192.6	O45/0001

Table 11g: Amount of triterpanes (ppb) m/z 191 SIR for Statoil, Norsk Sektor, Norske Havet

Well	Descript.	23/3	24/3	25/3	24/4	26/3	27Ts	27Tm	28aß	25nor30aß	Sample
		29aß	29Ts	30d	29ßa	300	30aß	30ßa	30G	31aßS	
		31aßR	32aßS	32aßR	33aßS	33aßR	34aßS	34aßR	35aßS	35aßR	
6506/11-5S	MDT	12884.3	10092.7	4780.0	8939.8	3449.4	18663.4	5402.4	2152.9	2713.7	O45/0001
		14515.9	12015.2	8799.7	1440.0	0.0	19462.0	2384.6	0.0	6149.0	
		5083.9	3087.1	2239.8	1810.1	1311.5	965.2	0.0	0.0	0.0	

Table 11i: Amount of standard and weight of sample for Statoil, Norsk Sektor, Norske Havet

<u>Well</u>	<u>Descript.</u>	<u>Standard</u>	<u>Amount</u>	<u>Weight</u>	<u>Sample</u>
6506/11-5S	MDT	1994.3	1.400	50.7	045/0001

Table 12b: Variation in Monoaromatic Sterane Distribution (peak height) for Statoil, Norsk Sektor, Norske Havet

Well	Descript.	Ratio1	Ratio2	Ratio3	Ratio4	Sample
6506/11-5S	MDT	0.76	0.64	0.60	0.44	045/0001

Ratio1: $A1 / A1 + E1$
 Ratio2: $B1 / B1 + E1$

Ratio3: $A1 / A1 + E1 + G1$
 Ratio4: $A1+B1 / A1+B1+C1+D1+E1+F1+G1+H1+I1$

Table 12d: Raw triaromatic sterane data (peak height) m/z 231 for Statoil, Norsk Sektor, Norske Havet

Well	Descript.	a1	b1	c1	d1	e1	f1	g1	Sample
6506/11-5S	MDT	2660.3	2414.7	134.1	163.4	120.5	80.6	74.9	O45/0001

Table 13A: Light Hydrocarbons from Whole Oil GC for Statoil, Norsk Sektor, Norske Havet

Well	Description	iC4	nC4	iC5	nC5	2,2DMC4	2,3DMC4	2MC5	3MC5	nC6	MCyC5	Benz	Sample
6506/11-5S	MDT	-	-	-	-	0.06	-	-	-	3.69	2.30	1.97	O45/0001

Table 13C: Thompson's indices for Statoil, Norsk Sektor, Norske Havet

Well	Description	A	B	X	W	C	I	F	H	U	R	S	Sample
6506/11-5S	MDT	0.53	1.53	1.29	4.77	0.71	1.28	0.63	21.64	1.80	2.41	61.50	045/0001

Table 14A: Volume Composition of Gas Samples from well SMØRBUKK WELLS

Depth unit of measure: m

Well	Descript.	C1	C2	C3	iC4	nC4	iC5	nC5	CO2	sum C1-C5	wet- ness	iC4/ nC4	Sample
6506/11-5S	MDT 4674.00m	73.00	10.80	6.20	1.00	2.10	0.64	0.68	5.60	94.4	0.22	0.48	0001-0B

Table 17 API-gravity data for well NOCS 6506/11-5S oil						
Sample			API-gravity			
MDT	4674.0 m		40.08			



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CLIENT REF. G96-23		NUMBER OF ISSUES 16		
SUMMARY <p>Four gas samples from well 6506/12-1 (DST 2A, DST 4B, DST 5D and DST 7), and one gas sample from well 6506/11-5S (MDT), are analysed for gas and isotopic composition.</p> <p>The work is done in accordance with the "The Norwegian Industry Guide to Organic Geochemical Analyses", Third Edition 1993.</p>			DISTRIBUTION Geolab Nor/Statoil (10) Andresen, B. Bjørnstad, T. Johansen, H. Sieglé, S. File (2)	
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1 Introduction

Four gas samples from well 6506/12-1 (DST 2, DST 4B, DST 5D and DST 7) and one gas sample from well 6506/11-5S (MDT) are analysed for gas and isotopic composition.

On the samples C₁ - C₅ and CO₂ are quantified. The δ¹³C value is measured on methane, ethane, propane, the butanes and CO₂. In addition the δD value is measured on methane.

2 Analytical procedures

Aliquots of 1.0 ml of the gas samples are sampled with a syringe for analysis on a Porapak Q column connected with flame ionisation (FID) and thermal conductivity (TCD) detectors. The detection limit for the hydrocarbon gas components is 0.01 µl/ml and 0.2 µl/ml for CO₂.

For the isotope analysis 5 - 10 ml is sampled with a syringe and then separated into the different gas components by a Carlo Erba 4200 gas chromatograph. The hydrocarbon gas components are oxidised in separate CuO-ovens in order to prevent cross contamination. The combustion products CO₂ and H₂O are frozen into collection vessels and separated.

The combustion water is reduced with zinc metal in sealed quartz tubes to prepare hydrogen for isotopic analysis. The isotopic measurements are performed on a Finnigan MAT 251 and a Finnigan Delta mass spectrometer.

IFEs value on NBS 22 is $-29.77 \pm .06\text{‰}$ PDB.

The uncertainty in the δ¹³C value is estimated to be $\pm 0.3\text{‰}$ PDB and includes all the different analytical steps. The estimate is based on repeated analysis of a laboratory standard gas mixture. The uncertainty in the δD value is likewise estimated to be $\pm 5\text{‰}$.

3 Results

The volume composition of the gas samples is shown in Table 1 (normalised composition), and the stable isotope composition is shown in Table 2.

The molecular composition related to carbon isotope variations in methane from the gas samples from well 6506/12-1 and 6506/11-5S are plotted in Figure 1 (Schoell, 1983), the carbon and hydrogen variations in methane are plotted in Figure 2 (Schoell, 1983) and the carbon isotope variations in ethane related to the carbon isotope variations in methane in Figure 3 (Schoell, 1983).

Table 1 Volume composition (normalised values) of gas samples from well 6506/12-1 and well 6506/11-5S

Sample	IFE no GEO	C ₁ %	C ₂ %	C ₃ %	iC ₄ %	nC ₄ %	iC ₅ %	nC ₅ %	CO ₂ %	ΣC ₁ -C ₅ %	Wet- ness	iC ₄ / nC ₄ /
6506/12-1, DST 2	961476	76.5	10.2	5.2	0.72	1.2	0.30	0.29	5.5	94.5	0.19	0.60
6506/12-1, DST 4B	961477	77.8	9.8	5.0	0.69	1.2	0.28	0.29	4.9	95.1	0.18	0.56
6506/12-1, DST 5D	961478	79.1	9.3	5.0	0.73	1.4	0.33	0.35	3.8	96.2	0.18	0.54
6506/12-1, DST 7	961479	80.4	8.7	4.7	0.66	1.2	0.29	0.29	3.7	96.3	0.17	0.55
6506/11-5S, MDT	961480	73.0	10.8	6.2	1.00	2.1	0.64	0.68	5.6	94.4	0.23	0.49

Table 2 Isotopic composition of gas samples from well 6506/12-1 and well 6506/11-5S

Sample	IFE no GEO	C ₁ δ ¹³ C ‰ PDB	C ₁ δ D ‰ SMOW	C ₂ δ ¹³ C ‰ PDB	C ₃ δ ¹³ C ‰ PDB	iC ₄ δ ¹³ C ‰ PDB	nC ₄ δ ¹³ C ‰ PDB	CO ₂ δ ¹³ C ‰ PDB	CO ₂ δ ¹⁸ O ‰ PDB
6506/12-1, DST 2	961476	-44.2	-204	-30.7	-28.4	-28.0	-27.5	-14.3	-15.3
6506/12-1, DST 4B	961477	-45.2	-199	-30.5	-28.6	-27.5	-28.2	-11.0	-15.5
6506/12-1, DST 5D	961478	-44.8	-202	-31.2	-28.8	-29.0	-28.4	-12.1	-15.6
6506/12-1, DST 7	961479	-44.8	-198	-29.3	-28.1	-27.8	-27.9	-12.3	-16.1
6506/11-5S, MDT	961480	-44.7	-202	-30.6	-28.4	-28.0	-28.0	-14.3	-16.4