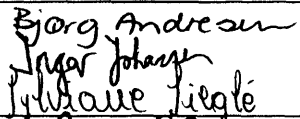

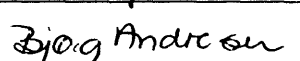




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Report type IFE/KR/F-99/167 Report title DATAREPORT ON MOLECULAR AND STABLE ISOTOPE COMPOSITION OF GAS SAMPLES FROM WELL 6507/3-3 (IFE ref. no. 2.3.131.99) Client Statoil Client reference Ordre nr. 99-17	Date 1999-11-24	Date of last revision	
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Summary Five gas samples from well 6507/3-3; MDT run 1B, 2686.1m; MDT run 2B, 3388m; MDT run 2A, 3468.2m; MDT run 2A, 3543.8m and MDT run 2A, 3700.5m are analysed for gas and isotopic composition The work is done in accordance with «The Norwegian Industry Guide to Organic Geochemical Analyses», third edition 1993.		Distribution Statoil (1) File, IFE (1)	
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1 Introduction

Five gas samples from well 6507/3-3; MDT run 1B, 2686.1m; MDT run 2B, 3388m; MDT run 2A, 3468.2m; MDT run 2A, 3543.8m and MDT run 2A, 3700.5m are analysed for gas and isotopic composition.

On the samples C₁ - C₅ and CO₂ are quantified. The $\delta^{13}\text{C}$ 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 0.2 ml are sampled with a syringe for analysis on a Poraplot Q column connected with flame ionisation (FID) and thermal conductivity (TCD) detectors. The detection limit for the hydrocarbon gas components is 0.001 $\mu\text{l/ml}$, for CO₂ 0.05 $\mu\text{l/ml}$.

For the isotope analysis 5-10 ml of the gas 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 analytical procedures are tested with a laboratory gas standard mixture. Based on repeated analysis of the gas standard, the reproducibility in the $\delta^{13}\text{C}$ value is better than 0.5‰ PDB for all components. The reproducibility in the δD value is likewise better than 10‰.

3 Results

The normalised volume composition of the gas samples is shown in Table 1. The stable isotope composition is shown in Table 2. The hydrogen isotopic composition of methane on sample MDT run 2A 3700.5m (IFE no. 991326) is not included because the gas bottle was emptied by a mistake after determination of the carbon isotopic composition.

The molecular composition related to the carbon isotope variations in methane from the samples 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 variation in ethane related to the carbon isotope variations in methane in Figure 3 (Schoell, 1983).

Table 1 Volume composition of gas samples (normalised values) from well 6507/3-3

Well	Sample	Sample depth m	IFE no GEO	C ₁ %	C ₂ %	C ₃ %	iC ₄ %	nC ₄ %	C ₅₊ %	CO ₂ %	ΣC ₁ -C ₅ %	Wet- ness	iC ₄ / nC ₄
6507/3-3	MDT, run 1B	2686.1	991322	92.8	2.6	1.1	0.07	0.12	2.7	0.57	99.4	0.07	0.62
6507/3-3	MDT, run 2B	3388	991323	90.8	3.6	1.8	0.12	0.32	0.59	2.7	97.3	0.07	0.38
6507/3-3	MDT, run 2A	3468.2	991324	86.2	3.6	1.8	0.20	0.35	5.6	2.3	97.7	0.12	0.58
6507/3-3	MDT, run 2A	3543.8	991325	86.5	4.0	2.1	0.20	0.35	3.7	3.1	96.9	0.11	0.58
6507/3-3	MDT, run 2A	3700.5	991326	90.1	3.4	1.7	0.11	0.31	0.78	3.6	96.4	0.07	0.36

Table 2 Isotopic composition of gas samples from well 6507/3-3

Well	Sample	Sample depth m	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
6507/3-3	MDT, run 1B	2686.1	991322	-41.5	-191	-30.1	-28.2	-26.4	-27.6	-14.3	-8.9
6507/3-3	MDT, run 2B	3388	991323	-35.0	-191	-27.4	-26.7	-22.7	-25.9	-9.7	-16.9
6507/3-3	MDT, run 2A	3468.2	991324	-34.8	-172	-27.4	-27.1	-23.6	-26.5	-9.3	-11.8
6507/3-3	MDT, run 2A	3543.8	991325	-34.7	-165	-27.3	-26.5	-23.5	-25.6	-8.2	-10.6
6507/3-3	MDT, run 2A	3700.5	991326	-34.4	-	-27.1	-26.9	-22.5	-27.0	-7.3	-18.0

4 Literature

Schoell, M. (1983). Genetic characterisation of natural gases. *The American Association of Petroleum Geologists Bulletin*, **67**,2225-2238.

**GEOCHEMICAL DATA
REPORT
(Preliminary)**

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Contract No. DTJ 020215

TITLE

**Geochemical Data Report
for Oils from Well
NOCS 6507/3-3**

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62485

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62485-3

FRONT PAGE

1 of 1

Comments

Four liquid samples from fluid tests on well NOCS 6507/3-3 were received for analysis. The samples consisted of small amounts (< 10 ml.) of mixed waters / muds and various amounts of what appeared to be straw/yellow coloured, probable condensate-range oils, in glass bottles (the samples were described as 'dead condensates'). The samples were left to settle before the gravitationally separated hydrocarbon phase was removed using a syringe. This latter material was the basis for all analyses. The analytical program is shown in Table 1.

Table 8a: MPLC Bulk Composition: Weight of Oil and Fraction for WELL 6507/3-3 OILS

Well	Whole oil (mg)	Light (mg)	Topped (mg)	Sat (mg)	Aro (mg)	Asph (mg)	NSO (mg)	HC (mg)	Non-HC (mg)	Sample
6507/3-3	139.5	41.9	97.6	60.1	30.8	0.3	6.4	90.9	6.7	T45/0004
6507/3-3	144.1	44.6	99.5	70.8	27.1	0.2	1.4	97.9	1.6	T45/0001
6507/3-3	128.7	30.0	98.7	77.1	19.4	0.2	2.0	96.5	2.2	T45/0002
6507/3-3	217.4	122.9	94.5	53.7	39.3	0.1	1.4	93.0	1.5	T45/0003

Table 8b: MPLC Bulk Composition: Comparison of topped oil (%) for WELL 6507/3-3 OILS

Well	Description	Sat	Aro	Asph	NSO	Total	HC	Non-HC	Recov. MPLC	Recov. Asph	Sample
6507/3-3		61.56	31.60	0.31	6.54	100.00	93.16	6.84	1.20	0.52	T45/0004
6507/3-3		71.14	27.28	0.20	1.38	100.00	98.42	1.58	1.74	0.57	T45/0001
6507/3-3		78.12	19.63	0.20	2.05	100.00	97.75	2.25	1.28	0.66	T45/0002
6507/3-3		56.79	41.58	0.11	1.52	100.00	98.37	1.63	1.19	0.59	T45/0003

Table 8c: MPLC Bulk Composition: Ratios in topped oil for WELL 6507/3-3 OILS

Well	Sat	HC	Asp	Sample
	Aro	Non-HC	NSO	
6507/3-3	1.95	13.61	0.05	T45/0004
6507/3-3	2.61	62.20	0.15	T45/0001
6507/3-3	3.98	43.49	0.10	T45/0002
6507/3-3	1.37	60.46	0.07	T45/0003

Table 8F: Iatroscan TLC Bulk Composition: Rel. percentages of sep. fractions for WELL 6507/3-3 OILS

Well	Sat HC	Aro HC	NSO	Asp	Total	HC	Non-HC	Recov. Iatr.	Recov. Asp	Sample
6507/3-3	58.51	40.70	0.78	0.31	100.31	99.22	1.09	0.62	0.52	T45/0004
6507/3-3	62.98	35.88	0.94	0.20	100.00	98.86	1.14	0.63	0.57	T45/0001
6507/3-3	76.30	22.87	0.84	0.20	100.20	99.16	1.04	0.79	0.65	T45/0002
6507/3-3	58.27	41.43	0.30	0.11	100.11	99.70	0.41	0.61	0.59	T45/0003

Table 9a: Quantitative Analysis of Saturated Fraction for WELL 6507/3-3 OILS

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
11,06	10,63	2,51	10,45	4,83	9,30	1,34	9,39	8,21	7,81	7,20	6,98	6,63	6,08	4,98	4,36	3,31	2,89	2,00	1,73	1,03	1,19	0,67
11,90	11,05	3,32	10,80	4,72	9,31	2,00	8,12	6,90	5,87	5,36	4,96	4,53	4,22	3,58	2,84	2,56	1,58	0,90	0,68	0,43	0,44	0,24
22,67	19,98	3,88	16,76	7,23	14,72	2,01	12,72	10,61	9,25	7,98	7,28	5,81	5,43	4,04	3,38	2,37	1,82	1,09	0,62	0,37	0,49	0,27
21,99	19,71	4,67	17,52	9,57	15,82	2,19	15,21	12,50	11,53	10,26	9,53	8,51	7,94	5,97	4,83	3,53	2,78	1,62	1,19	0,72	0,90	0,51

Table 9B: Saturated Hydrocarbon Ratios (peak area) for WELL 6507/3-3 OILS

Well	Pristane	Pristane	Pristane/nC17	Phytane	CPI1	nC17	Sample
	nC17	Phytane	Phytane/nC18	nC18		nC17+nC27	
6507/3-3	0.55	4.37	3.95	0.14	1.13	0.78	T45/0004
6507/3-3	0.46	3.61	3.21	0.14	1.11	0.71	T45/0001
6507/3-3	0.44	2.36	2.03	0.22	1.03	0.79	T45/0002
6507/3-3	0.43	3.60	3.16	0.14	1.14	0.83	T45/0003

Table 9Ca: Aromatic Hydrocarbon Ratios (peak area) for WELL 6507/3-3 OILS

Well	MNR	DMNR	BPhR	2/1MP	MPI1	MPI2	Rc	DBT/P	4/1MDBT	(3+2) /1MDBT	Sample
6507/3-3	1.59	5.50	0.28	2.40	1.05	1.49	1.03	-	-	-	T45/0004
6507/3-3	1.46	5.85	0.47	1.89	1.26	1.61	1.16	-	-	-	T45/0001
6507/3-3	1.73	6.91	0.54	1.85	1.23	1.61	1.14	-	-	-	T45/0002
6507/3-3	1.95	6.65	0.55	1.84	1.13	1.49	1.08	-	-	-	T45/0003

Table 9Cb: Aromatic Hydrocarbon Ratios (peak area) for WELL 6507/3-3 OILS

Well	F1	F2	Sample
6507/3-3	0.59	0.42	T45/0004
6507/3-3	0.59	0.38	T45/0001
6507/3-3	0.58	0.38	T45/0002
6507/3-3	0.58	0.38	T45/0003

Table 10a: Tabulation of carbon isotope data on oils for WELL 6507/3-3 OILS

<u>Well</u>	<u>Whole oil</u>	<u>Topped oil</u>	<u>Saturated</u>	<u>Aromatic</u>	<u>NSO</u>	<u>Asphaltenes</u>	<u>Sample</u>
6507/3-3	-	-26.83	-27.35	-26.27	-36.12	-23.72	T45/0004
6507/3-3	-	-26.75	-28.02	-26.22	-30.69	-	T45/0001
6507/3-3	-	-27.36	-28.27	-26.56	-	-	T45/0002
6507/3-3	-	-26.50	-27.81	-26.02	-28.30	-	T45/0003

Table 10b: Tabulation of cv values from carbon isotope data for WELL 6507/3-3 OILS

<u>Well</u>	<u>Saturated</u>	<u>Aromatic</u>	<u>cv value</u>	<u>Sample</u>
6507/3-3	-27.35	-26.27	-0.77	T45/0004
6507/3-3	-28.02	-26.22	1.03	T45/0001
6507/3-3	-28.27	-26.56	0.91	T45/0002
6507/3-3	-27.81	-26.02	0.94	T45/0003

Table 11a: Variation in Triterpane Distribution (peak height) SIR for WELL 6507/3-3 OILS

Well	Ratio1	Ratio2	Ratio3	Ratio4	Ratio5	Ratio6	Ratio7	Ratio8	Ratio9	Rat.10	Rat.11	Rat.12	Rat.13	Rat.14	Sample
6507/3-3	1.91	0.66	0.21	1.01	0.50	0.09	0.04	0.04	0.04	0.03	0.90	0.50	0.11	59.32	T45/0004
6507/3-3	1.27	0.56	0.15	0.55	0.36	0.13	0.05	0.09	0.04	0.06	0.89	0.36	0.13	60.11	T45/0001
6507/3-3	1.44	0.59	0.18	0.85	0.46	0.09	0.05	0.06	0.05	0.04	0.90	0.46	0.11	60.50	T45/0002
6507/3-3	1.24	0.55	0.14	0.48	0.33	0.12	0.04	0.08	0.04	0.03	0.90	0.33	0.12	59.45	T45/0003

List of Triterpane Distribution Ratios

Ratio 1: 27Tm / 27Ts

Ratio 2: 27Tm / 27Tm+27Ts

Ratio 3: 27Tm / 27Tm+30aβ+30βa

Ratio 4: 29aβ / 30aβ

Ratio 5: 29aβ / 29aβ+30aβ

Ratio 6: 30d / 30aβ

Ratio 7: 28aβ / 30aβ

Ratio 8: 28aβ / 29aβ

Ratio 9: 28aβ / 28aβ+30aβ

Ratio 10: 24/3 / 30aβ

Ratio 11: 30aβ / 30aβ+30βa

Ratio 12: 29aβ+29βa / 29aβ+29βa+30aβ+30βa

Ratio 13: 29βa+30βa / 29aβ+30aβ

Ratio 14: 32aβS / 32aβS+32aβR (%)

Table 11b: Variation in Sterane Distribution (peak height) SIR for WELL 6507/3-3 OILS

Well	Ratio1	Ratio2	Ratio3	Ratio4	Ratio5	Ratio6	Ratio7	Ratio8	Ratio9	Ratio10	Sample
6507/3-3	0.44	45.39	78.37	0.54	0.80	0.18	0.13	0.64	0.83	3.32	T45/0004
6507/3-3	0.56	49.98	74.79	0.60	0.75	0.21	0.14	0.60	1.00	2.97	T45/0001
6507/3-3	0.57	46.47	77.56	0.70	0.79	0.21	0.15	0.63	0.87	3.23	T45/0002
6507/3-3	0.51	51.33	76.36	0.61	0.76	0.28	0.21	0.62	1.05	3.32	T45/0003

List of Sterane Distribution Ratios

Ratio 1: $27d\beta S / 27d\beta S + 27aaR$

Ratio 2: $29aaS / 29aaS + 29aaR$ (%)

Ratio 3: $2 * (29\beta\beta R + 29\beta\beta S) / (29aaS + 29aaR + 2 * (29\beta\beta R + 29\beta\beta S))$ (%)

Ratio 4: $27d\beta S + 27d\beta R + 27daR + 27daS / 29d\beta S + 29d\beta R + 29daR + 29daS$

Ratio 5: $29\beta\beta R + 29\beta\beta S / 29\beta\beta R + 29\beta\beta S + 29aaS$

Ratio 6: $21a + 22a / 21a + 22a + 29aaS + 29\beta\beta R + 29\beta\beta S + 29aaR$

Ratio 7: $21a + 22a / 21a + 22a + 28daS + 28aaS + 29daR + 29aaS + 29\beta\beta R + 29\beta\beta S + 29aaR$

Ratio 8: $29\beta\beta R + 29\beta\beta S / 29aaS + 29\beta\beta R + 29\beta\beta S + 29aaR$

Ratio 9: $29aaS / 29aaR$

Ratio 10: $29\beta\beta R + 29\beta\beta S / 29aaR$

Table 11c: Raw triterpane data (peak height) m/z 191 SIR for WELL 6507/3-3 OILS

Well	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	
6507/3-3	25309.7 229382.0 78884.4	7902.7 42090.1 59966.7	4128.0 19906.0 41122.4	36524.6 26093.6 32411.3	3019.0 7870.5 20054.6	34929.5 226549.4 18635.4	66873.6 24027.1 11190.5	9203.6 6120.0 12503.4	13376.8 109245.0 6137.7	T45/0004
6507/3-3	3146.0 10666.5 5061.2	1208.3 3636.7 4998.2	606.5 2610.2 3316.7	2853.9 1494.1 2505.9	529.9 697.4 1598.1	3020.3 19373.2 1528.7	3843.9 2381.8 993.3	907.1 634.2 1069.4	1028.5 7484.4 432.1	T45/0001
6507/3-3	13392.2 111361.7 36121.2	5027.6 29376.7 28877.5	2728.6 11501.1 18851.5	15192.2 12721.2 15638.3	2232.9 6234.0 9374.9	22206.0 131380.2 7672.1	32005.1 14233.3 4242.3	6283.8 3406.6 4190.9	7761.5 50217.2 2117.1	T45/0002
6507/3-3	16143.5 78582.0 43060.0	4503.0 31371.8 38244.1	1913.1 19504.9 26082.7	21594.0 10388.8 19790.9	1378.9 3584.8 12337.4	23880.9 162497.7 11238.4	29665.0 19063.6 6578.8	6630.9 4033.4 4497.1	5694.0 64527.6 2386.8	T45/0003

Table 11d: Raw sterane data (peak height) m/z 217 SIR for WELL 6507/3-3 OILS

Well	21a	22a	27dBS	27dBR	27daR	27daS	28dBS	28dBR	28daR*	Sample
	29dBS*	28daS*	27aaR	29dBR	29daR	28aaS	29daS*	28BS		
	28aaR	29aaS	29BSR	29BS	29aaR					
6507/3-3	10450.2	4896.3	14548.1	9039.6	4823.5	3976.3	10865.4	5600.9	12775.1	T45/0004
	30329.8	12426.2	18653.7	14018.6	6623.3	10738.7	8822.0	10358.6		
	6207.2	10912.7	26287.0	17281.8	13130.7					
6507/3-3	1408.3	775.9	2496.1	1589.4	834.9	892.7	1783.8	1020.2	1366.5	T45/0001
	4376.6	1635.5	1953.7	2582.8	1386.4	1839.0	1338.9	1599.9		
	1007.2	1661.7	2837.6	2095.0	1663.3					
6507/3-3	7678.1	3955.6	16119.3	9745.4	3878.3	3659.5	7934.8	3645.3	7534.0	T45/0002
	23873.2	9920.7	12391.3	11353.0	5419.7	5349.2	7302.0	8726.4		
	4356.3	7640.5	16257.5	12147.4	8800.5					
6507/3-3	7022.1	3725.2	8657.1	5391.5	3411.8	2457.5	6040.4	3208.3	5870.2	T45/0003
	16789.7	5022.1	8464.0	8505.7	3971.8	4762.0	3592.6	4582.1		
	2408.8	5504.1	10498.8	6823.1	5219.1					

* 28daR coel with 27aaS, 29dBS coel with 27BSR, 28daS coel with 27BS, 29daS coel with 28BS

Table 11e: Raw sterane data (peak height) m/z 218 SIR for WELL 6507/3-3 OILS

Well	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
6507/3-3	23779.9	16112.5	13647.1	15287.8	36267.7	27017.5	2769.2	2506.7	T45/0004
6507/3-3	2667.9	1654.1	1651.9	1861.8	3587.8	2949.0	443.9	318.9	T45/0001
6507/3-3	20683.7	14426.9	11759.4	13021.9	25064.5	21149.9	2623.3	2255.9	T45/0002
6507/3-3	10514.9	6136.2	5413.8	6320.4	14124.8	10484.4	1578.0	1200.2	T45/0003

Table 11f: Raw triterpane data (peak height) m/z 177 SIR for WELL 6507/3-3 OILS

Well	25nor28a β	25nor30a β	Sample
6507/3-3	6116.9	7564.2	T45/0004
6507/3-3	351.1	201.7	T45/0001
6507/3-3	1853.0	2707.6	T45/0002
6507/3-3	3460.7	3091.3	T45/0003

Table 11g: Amount of triterpanes (ppb) m/z 191 SIR for WELL 6507/3-3 OILS

Well	Descript.	23/3	24/3	25/3	24/4	26/3	27Ts	27Tm	28aß	25nor30aß	Sample
		29aß	29Ts	30d	29Ba	300	30aß	30Ba	30G	31aßS	
		31aßR	32aßS	32aßR	33aßS	33aßR	34aßS	34aßR	35aßS	35aßR	
6507/3-3		23910.3	7465.8	3899.8	34505.1	2852.1	32998.3	63176.2	8694.7	12637.2	T45/0004
		216699.5	39762.9	18805.4	24650.9	7435.3	214023.5	22698.6	5781.6	103204.8	
		74522.9	56651.2	38848.7	30619.3	18945.8	17605.0	10571.8	11812.1	5798.4	
6507/3-3		16285.7	6254.7	3139.7	14773.6	2743.3	15634.8	19898.1	4695.6	5324.0	T45/0001
		55216.1	18825.9	13511.8	7734.2	3610.2	100287.3	12329.7	3283.2	38743.7	
		26199.8	25873.7	17169.2	12971.8	8272.6	7913.2	5141.8	5536.1	2236.9	
6507/3-3		16919.2	6351.7	3447.2	19193.4	2821.0	28054.3	40434.2	7938.7	9805.6	T45/0002
		140690.7	37113.6	14530.1	16071.5	7875.9	165981.4	17981.9	4303.8	63442.8	
		45634.3	36482.9	23816.4	19756.9	11843.9	9692.6	5359.6	5294.7	2674.7	
6507/3-3		13169.6	3673.5	1560.7	17616.2	1124.9	19481.8	24200.3	5409.4	4645.1	T45/0003
		64106.3	25592.8	15911.9	8475.1	2924.4	132563.8	15551.9	3290.4	52640.9	
		35127.9	31199.1	21278.0	16145.2	10064.7	9168.2	5366.9	3668.7	1947.2	

Table 11h: Amount of steranes (ppb) m/z 217 SIR for WELL 6507/3-3 OILS

Well	21a	22a	27d β S	27d β R	27daR	27daS	28d β S	28d β R	28daR*	Sample
	29d β S*	28daS*	27aaR	29d β R	29daR	28aaS	29daS*	28 β β S		
	28aaR	29aaS	29 β β R	29 β β S	29aaR					
6507/3-3	9872.4	4625.5	13743.8	8539.8	4556.8	3756.4	10264.7	5291.2	12068.7	T45/0004
	28652.8	11739.2	17622.4	13243.5	6257.1	10144.9	8334.2	9785.8		
	5864.0	10309.3	24833.6	16326.3	12404.7					
6507/3-3	7290.2	4016.5	12921.4	8227.9	4321.8	4621.0	9234.2	5281.0	7073.9	T45/0001
	22656.0	8466.4	10113.4	13370.1	7176.8	9519.6	6931.1	8281.8		
	5213.7	8601.9	14688.9	10845.1	8610.0					
6507/3-3	9700.3	4997.4	20364.6	12312.1	4899.7	4623.3	10024.5	4605.3	9518.2	T45/0002
	30160.7	12533.4	15654.8	14343.0	6847.0	6758.0	9225.1	11024.7		
	5503.6	9652.8	20539.2	15346.7	11118.3					
6507/3-3	5728.5	3039.0	7062.3	4398.4	2783.3	2004.8	4927.7	2617.3	4788.9	T45/0003
	13696.9	4097.0	6904.8	6938.8	3240.1	3884.8	2930.8	3738.0		
	1965.1	4490.2	8564.8	5566.2	4257.7					

* 28daR coel with 27aaS, 29d β S coel with 27 β β R, 28daS coel with 27 β β S, 29daS coel with 28 β β R

Table 11i: Amount of standard and weight of sample for WELL 6507/3-3 OILS

<u>Well</u>	<u>Standard</u>	<u>Amount</u>	<u>Weight</u>	<u>Sample</u>
6507/3-3	131144.8	1.400	11.3	T45/0004
6507/3-3	13128.6	1.400	20.6	T45/0001
6507/3-3	58018.3	1.400	19.1	T45/0002
6507/3-3	153225.9	1.400	11.2	T45/0003

Table 12a: Variation in Triaromatic Sterane Distribution (peak height) for WELL 6507/3-3 OILS

<u>Well</u>	<u>Ratio1</u>	<u>Ratio2</u>	<u>Ratio3</u>	<u>Ratio4</u>	<u>Ratio5</u>	<u>Sample</u>
6507/3-3	0.85	0.67	0.63	0.65	0.83	T45/0004
6507/3-3	0.72	0.55	0.46	0.47	0.69	T45/0001
6507/3-3	0.78	0.63	0.50	0.52	0.70	T45/0002
6507/3-3	0.80	0.66	0.55	0.56	0.77	T45/0003

Ratio1: $a1 / a1 + g1$

Ratio2: $b1 / b1 + g1$

Ratio3: $a1 + b1 / a1 + b1 + c1 + d1 + e1 + f1 + g1$

Ratio4: $a1 / a1 + e1 + f1 + g1$

Ratio5: $a1 / a1 + d1$

Table 12b: Variation in Monoaromatic Sterane Distribution (peak height) for WELL 6507/3-3 OILS

Well	Ratio1	Ratio2	Ratio3	Ratio4	Sample
6507/3-3	0.51	0.53	0.30	0.31	T45/0004
6507/3-3	0.52	0.52	0.30	0.29	T45/0001
6507/3-3	0.42	0.42	0.24	0.24	T45/0002
6507/3-3	0.56	0.59	0.34	0.34	T45/0003

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 12c: Aromatisation of Steranes (peak height) for WELL 6507/3-3 OILS

Well	Ratio1	Ratio2	Sample
6507/3-3	0.54	0.76	T45/0004
6507/3-3	0.48	0.82	T45/0001
6507/3-3	0.71	0.66	T45/0002
6507/3-3	0.49	0.79	T45/0003

$$\text{Ratio1: } \frac{C1+D1+E1+F1+G1+H1+I1}{C1+D1+E1+F1+G1+H1+I1 + c1+d1+e1+f1+g1}$$

$$\text{Ratio2: } g1 / g1 + I1$$

Table 12d: Raw triaromatic sterane data (peak height) m/z 231 for WELL 6507/3-3 OILS

Well	a1	b1	c1	d1	e1	f1	g1	Sample
6507/3-3	6510.5	2318.0	443.5	1331.4	1720.6	593.5	1137.3	T45/0004
6507/3-3	15111.8	7194.2	2423.0	6913.6	8303.8	2986.4	5851.0	T45/0001
6507/3-3	7708.7	3750.1	1230.9	3381.4	3516.5	1300.5	2236.9	T45/0002
6507/3-3	6759.2	3254.7	769.9	2000.5	2743.8	919.5	1651.2	T45/0003

Table 12e: Raw monoaromatic sterane data (peak height) m/z 253 for WELL 6507/3-3 OILS

Well	A1	B1	C1	D1	E1	F1	G1	H1	I1	Sample
6507/3-3	1343.1	1451.7	664.5	506.1	1287.7	485.6	1834.2	1096.2	357.6	T45/0004
6507/3-3	4980.4	4856.2	2902.9	2206.6	4551.0	1720.3	6950.1	4563.1	1246.9	T45/0001
6507/3-3	4504.5	4491.2	3709.2	2621.7	6129.2	2409.0	8289.6	4362.9	1166.3	T45/0002
6507/3-3	1909.8	2119.4	1074.3	697.6	1471.0	540.6	2222.5	1332.6	437.9	T45/0003

Table 13A: Light Hydrocarbons from Whole Oil GC for WELL 6507/3-3 OILS

Well	iC4	nC4	iC5	nC5	2,2DMC4	2,3DMC4	2MC5	3MC5	nC6	MCyC5	Benz	Sample
6507/3-3	-	-	-	-	0.15	0.55	-	-	4.00	2.80	3.45	T45/0004
6507/3-3	-	-	-	-	0.17	0.46	-	-	3.96	2.88	3.77	T45/0001
6507/3-3	-	-	-	-	0.14	0.37	-	-	3.45	2.56	3.15	T45/0002
6507/3-3	-	-	-	-	0.01	0.04	-	-	0.69	0.61	0.87	T45/0003

Table 13B: Light Hydrocarbons from Whole Oil GC for WELL 6507/3-3 OILS

Well	CyC6	2MC6	3MC6	1,3ci- DMCyC5	1,3tr- DMCyC5	1,2tr- DMCyC5	nC7	MCyC6	Tol	nC8	p/m- Xylene	Sample
6507/3-3	5.59	2.06	1.31	0.58	0.54	0.99	4.23	13.26	11.96	4.12	8.65	T45/0004
6507/3-3	5.31	1.99	1.28	0.56	0.52	0.94	3.89	11.93	12.71	3.75	9.17	T45/0001
6507/3-3	4.91	1.88	1.23	0.53	0.49	0.91	3.89	11.96	12.71	4.15	10.09	T45/0002
6507/3-3	1.55	0.86	0.61	0.25	0.25	0.46	2.66	8.37	12.05	6.39	19.30	T45/0003

Table 13C: Thompson's indices for WELL 6507/3-3 OILS

Well	A	B	X	W	C	I	F	H	U	R	S	Sample
6507/3-3	0.86	2.83	2.10	6.17	0.44	1.60	0.32	14.53	2.00	2.05	26.67	T45/0004
6507/3-3	0.95	3.27	2.45	7.10	0.46	1.62	0.33	14.47	1.84	1.95	23.29	T45/0001
6507/3-3	0.91	3.27	2.43	6.42	0.44	1.61	0.33	14.86	1.92	2.07	24.64	T45/0002
6507/3-3	1.26	4.53	3.02	5.61	0.34	1.53	0.32	17.67	2.54	3.09	69.00	T45/0003

THOMPSON'S INDICES

$$A = \frac{\text{Benzene}}{nC6}$$

$$B = \frac{\text{Toluene}}{nC7}$$

$$X = \frac{\text{p/m-xylene}}{nC8}$$

$$W = \frac{\text{Benzene} * 10}{\text{CyC6}}$$

$$C = \frac{nC6 + nC7}{\text{CyC6} + \text{MCyC6}}$$

$$I = \frac{2MC6 + 3MC6}{1,3ciDMCy5 + 1,3trDMCy5 + 1,2trDMCy5}$$

$$F = \frac{nC7}{\text{MCyC6}}$$

$$H = \frac{nC7 * 100}{\text{CyC6} + 2MC6 + 2,3DMC4 + 3MC6 + 1,3ciDMCy5 + 1,3trDMCy5 + 1,2trDMCy5 + nC7 + \text{MCyC6}}$$

$$U = \frac{\text{CyC6}}{\text{MCyC5}}$$

$$R = \frac{nC7}{2MC6}$$

$$S = \frac{nC6}{2,2DMC4}$$

OLJEDIREKTORATET
16 Feb 2000
Saltdal nr 99/2925-3

**Geochemical evaluation of tracks
6507/3-3A and 6507/3-3B**

LUT-GEO2099

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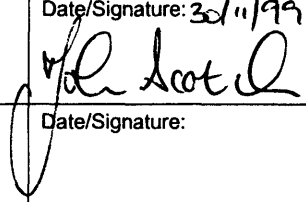
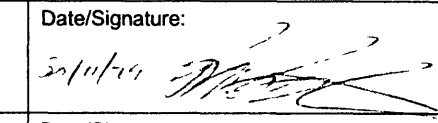
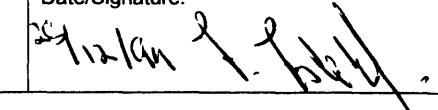
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1 INTRODUCTION

This report presents the results of a geochemical evaluation of the 6507/3-3A and -3B sidetracks, drilled in the Nordland II area, offshore mid-Norway (Figure 1). The 6507/3-3 well is a gas discovery in both the -3A and -3B sections.

The 6507/3-3A section was drilled from the 13³/₈" casing shoe at 1752m MDRT in the main track, whereas the 6507/3-3B track was drilled out of a window milled in the 9⁵/₈" casing from 3752m to 3757m MDRT in the 6507/3-3A track. Both tracks were deviated, with differences of 810.5m and 434.1m between MD and TVD being recorded at TD in the -3A and -3B sections, respectively. Both sidetracks were drilled with Interdrill NT oil-based mud.

The total numbers of analyses carried out during the course of the study are as follows:

Analysis	Cuttings	Gas	Mud	Total
Sample preparation	87			87
TOC content	78		2	80
Rock-Eval	88		2	90
Vitrinite reflectance	10			10
Spore colouration	1			1
Thermal extraction GC	10			10
Pyrolysis-GC	9			9
Solvent extraction			2	2
Whole extract GC			2	2
Gas composition		2		2
Gas isotopes		2		2

Full details of the analytical programme on a sample-by-sample basis are presented in Table 1. The analyses were carried out by Geolab Nor a.s., with the exceptions of the vitrinite reflectance and gas analyses, which were carried out by IFE. All analytical work was performed in accordance with the guidelines given in "The Norwegian Industry Guide to Organic Geochemical Analyses, 3rd edition (1993)". The analytical data are presented in Appendix 1.

Well	Sample Depth (m MDRT)	Sample Type	Vitrinite Reflectance	Kerogen Description	TOC Content	Rock- Eval	Thermal Extraction GC	Pyrolysis- GC	Solvent Extraction	Whole Extract GC	Gas Composition	Gas Isotopes
6507/3-3A Rock Samples	2705	Ctgs-sst				x	x					
	3110	Ctgs-clyst	x	x	x	x						
	3125	Ctgs-clyst			x	x						
	3140	Ctgs-clyst			x	x						
	3155	Ctgs-clyst			x	x		x				
	3170	Ctgs-clyst			x	x		x				
	3200	Ctgs-clyst			x	x						
	3230	Ctgs-clyst	x		x	x						
	3290	Ctgs-clyst			x	x						
	3335	Ctgs-clyst			x	x						
	3365	Ctgs-clyst			x	x						
	3410	Ctgs-clyst			x	x						
	3440	Ctgs-clyst			x	x						
	3470	Ctgs-clyst			x	x						
	3500	Ctgs-clyst			x	x			x			
	3545	Ctgs-clyst			x	x						
	3620	Ctgs-clyst			x	x						
	3680	Ctgs-clyst			x	x						
	3715	Ctgs-clyst			x	x						
	3730	Ctgs-clyst			x	x						
	3765	Ctgs-clyst			x	x						
	3775	Ctgs-clyst			x	x						
	3780	Ctgs-clyst	x		x	x						
	3800	Ctgs-clyst				x		x				
	3830	Ctgs-clyst				x		x				
	3850	Ctgs-clyst			x	x			x			
	3860	Ctgs-clyst			x	x						
	3870	Ctgs-clyst			x	x						
	3880	Ctgs-clyst				x		x				
	3940	Ctgs-sst				x		x				
	4020	Ctgs-clyst				x		x				
	4040	Ctgs-clyst	x		x	x						
4050	Ctgs-clyst			x	x							
4060	Ctgs-clyst			x	x			x				
4070	Ctgs-clyst			x	x							
4080	Ctgs-clyst			x	x							
4090	Ctgs-clyst			x	x							
4100	Ctgs-clyst			x	x							

Table 1 Geochemical analytical programme

Well	Sample Depth (m MDRT)	Sample Type	Vitrinite Reflectance	Kerogen Description	TOC Content	Rock- Eval	Thermal Extraction GC	Pyrolysis- GC	Solvent Extraction	Whole Extract GC	Gas Composition	Gas Isotopes
	4110	Ctgs-clyst			x	x		x				
	4130	Ctgs-clyst			x	x						
	4160	Ctgs-clyst	x		x	x						
	4200	Ctgs-clyst			x	x						
	4240	Ctgs-clyst			x	x						
	4260	Ctgs-clyst			x	x						
	4300	Ctgs-clyst			x	x						
	4350	Ctgs-clyst			x	x						
	4410	Ctgs-clyst			x	x						
	4440	Ctgs-clyst			x	x						
	4480	Ctgs-clyst			x	x						
	4520	Ctgs-clyst	x		x	x					x	x
Gas	3807	MDT										
Mud	3850				x	x			x	x		
6507/3-3B												
Rock Samples	3770	Ctgs-clyst	x		x	x						
	3780	Ctgs-clyst			x	x						
	3790	Ctgs-clyst			x	x						
	3820	Ctgs-sst				x	x					
	3850	Ctgs-sst				x	x					
	3860	Ctgs-sh/slt			x	x						
	3960	Ctgs-sh/slt	x		x	x						
	3995	Ctgs-clyst			x	x						
	4000	Ctgs-clyst			x	x						
	4005	Ctgs-clyst			x	x						
	4010	Ctgs-clyst			x	x						
	4015	Ctgs-clyst			x	x						
	4020	Ctgs-clyst			x	x						
	4025	Ctgs-slt			x	x						
	4025	Ctgs-slt*			x	x						
	4025	Ctgs-sst				x	x					
	4030	Ctgs-clyst			x	x						
	4035	Ctgs-clyst			x	x						
	4040	Ctgs-clyst			x	x				x		
	4045	Ctgs-clyst			x	x						
	4050	Ctgs-clyst			x	x						
	4060	Ctgs-sst				x	x					
	4125	Ctgs-clyst			x	x				x		
	4130	Ctgs-clyst			x	x						

Table 1 Geochemical analytical programme

Well	Sample Depth (m MDRT)	Sample Type	Vitrinite Reflectance	Kerogen Description	TOC Content	Rock- Eval	Thermal Extraction GC	Pyrolysis- GC	Solvent Extraction	Whole Extract GC	Gas Composition	Gas Isotopes
	4135	Ctgs-clyst	x		x	x						
	4140	Ctgs-clyst			x	x						
	4155	Ctgs-clyst			x	x						
	4180	Ctgs-clyst			x	x						
	4185	Ctgs-clyst			x	x						
	4190	Ctgs-clyst			x	x						
	4195	Ctgs-clyst			x	x						
	4200	Ctgs-clyst			x	x						
	4205	Ctgs-clyst			x	x		x				
	4210	Ctgs-clyst			x	x						
	4230	Ctgs-clyst			x	x						
	4235	Ctgs-clyst			x	x						
	4240	Ctgs-clyst			x	x						
	4255	Ctgs-clyst			x	x						
	4260	Ctgs-clyst	x		x	x						
Gas	4075 6	MDT									x	x
Mud	4050				x	x			x	x		
Totals			10	1	81	91	10	9	2	2	2	2

Table 1 Geochemical analytical programme

GEOCHEMICAL DATA REPORT

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Geochemical Data Report for Sidetracks NOCS 6507/3-3A and B

AUTHOR(S)

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62485

DATE

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Comments

Cuttings and core samples from sidetracks 6507/3-3A (2705 - 4520 m), 6507/3-3B (3760 - 4260 m) were received for routine analysis. Gas samples collected from these sidetracks were analysed by IFE, and reported here.

The use of a pseudo-oil-based mud using the EDC 95-11 base oil throughout both sidetracks necessitated the solvent extraction cleaning of all samples due for source rock estimation in these intervals prior to analysis. The effects of the base oil in the samples are still however evident in the various analyses. All sample selections were performed by Statoil. Limited analyses of muds from each of the sidetracks was also performed and are reported along with the data for the other samples.

