

3.3 FMT pressures

Six FMT-runs were performed in the 6610/3-1 and 6610/3-1R wells. Out of this, two runs were performed in the 17 1/2" section and one run in the 12 1/4" section in the well 6610/3-1 and three runs in the 8 1/2" section in the well 6610/3-1R. The pretest pressures are listed in table 3.3.1 to 3.3.5 and plotted in figures 3.3 and 3.4.

Well 6610/3-1 (Table 3.3.1 and 3.3.2 and figure 3.3):

Run 2A: Out of nine attempts seven were good, one tight and one No Seal. The good pretest pressure points give a water gradient of 1.026 g/cc.

Run 2B: One Segregated sample was taken at 1645 m RKB.

Run 3B: Out of 41 attempts eight indicated good permeability, eight indicated fair permeability, three indicated poor permeability, twelve gave no seal and ten tight pretest pressure points. The eight good pretest pressure points gives a water gradient of 1.013 g/cc. One segregated sample was taken at 2664 m RKB.

The analysis of the ion composition of the sample gave:

	TDS, ppm	Cl ⁻ , ppm
Mudfiltrate	46736	21289
10 litre tank	32953	16269
4 litre tank	24881	12014

The sample were highly contaminated by mudfiltrate. But the analysis gives an indication of the salinity of the formation water.

Well 6610/3-1R (Table 3.3.3, 3.3.4 and 3.3.5 and figure 3.4):

Run 2A: Out of 19 attempts four gave very low permeability, twelve were tight and three no seal. There is no possibility of defining a gradient.

Run 3B: Out of 43 attempts two were poor permeability, 23 were tight, and 16 No Seal. There is no possibility of defining a gradient.

Run 3C: Out of 12 attempts five were poor permeability, three were tight, and four No Seal. There is no possibility of defining a gradient.

One segregated sample was taken at 4064.6 m MD RKB. The 10 litre chamber contained one litre of mudfiltrate and the four litre chamber contained 200 ml of mudfiltrate. The permeability is reported as poor. The salinity of the sample was measured offshore to 39000 ppm Cl⁻. The pressure in both chambers were measured to be atmospheric.

FMT PRESSURES

WELL: 6610/3-1, 17 1/2" SECTION

RUN no.	Depth m MD RKB	Hyd. pres. kPa	Form. pres. kPa	Form. pres. g/cc	Comment
2A	1735.8	22827	17343	1.018	Good
2A	1709.5	22536	17051	1.017	Good
2A	1700.1	22417	16982	1.018	Good
2A	1686	22234	16826	1.017	Good
2A	1678	22129	16755	1.018	Good
2A	1660	21900	16575	1.018	Good
2A	1645	21702	16421	1.018	Good
2A	1595	21040	20429	1.306	Tight
2B	1645	21696	16415	1.017	Good, Sampling

Table 3.3.1

WELL: 6610/3-1, 12 1/4" SECTION

RUN no.	Depth m MD RKB	Hyd. pres. kPa	Form. pres. kPa	Form. pres. g/cc	Comment
3B	1763	21950	17575	1.016	Good Perm.
3B	1770	22050	17594	1.013	Good Perm.
3B	1774	22090	17636	1.013	Good Perm.
3B	1790.5	22300	17798	1.013	Good Perm.
3B	1800.5	22424	17895	1.013	Good Perm.
3B	1825	22720	18142	1.013	Good Perm.
3B	1844	22960	18336	1.014	Fair Perm.
3B	2285	28380	22798	1.017	Poor Perm.
3B	2288	28420	22750	1.014	Good Perm
3B	2291.6	28470	22854	1.017	Fair Perm.
3B	2296	28520	-	-	Tight
3B	2299.5	28570	-	-	Tight
3B	2302.5	28600	22896	1.014	Good Perm
3B	2459.1	30536	25180	1.044	Poor Perm.
3B	2514.8	31215	-	-	Tight
3B	2519.1	31275	25298	1.024	Fair Perm.
3B	2533	31442	-	-	Tight
3B	2560.1	31775	27883	1.11	Poor Perm.
3B	2585.3	32085	-	-	Tight
3B	2632.5	32670	-	-	Tight
3B	2655.3	32930	29945	1.15	Poor Perm.
3B	2664	33040	26434	1.011	Fair Perm.Sample
3B	2668	33080	26406	1.009	Fair Perm.
3B	2669.5	33100	26447	1.01	Fair Perm.
3B	2671.6	33130	26482	1.01	Fair Perm.
3B	2674.6	33160	26480	1.009	Fair Perm.
3B	2680	33230	-	-	Tight

3B	2684.5	33290	-	-	Tight
3B	2686.8	33320	-	-	Tight
3B	2831.7	35070	-	-	Tight

Table 3.3.2

WELL: 6610/3-1R, 8 1/2" SECTION

RUN no.	Depth m MD RKB	Hyd. pres. kPa	Form. pres. kPa	Form. pres. g/cc	Comment
2A	3718.5	65080	-	-	Tight
2A	3718.2	65074	-	-	Tight
2A	3720.5	65104	-	-	Tight
2A	3732.6	65313	-	-	Tight
2A	3733.8	65335	-	-	Tight
2A	3737.8	56400	-	-	
2A	3681	64400	-	-	Tight
2A	3668.8	64152	-	-	Tight
2A	3665.2	64110	-	-	Tight
2A	3646.6	63780	-	-	Tight
2A	3631.4	63526	-	-	Tight
2A	3626.6	63435	-	-	Tight
2A	3615.3	-	-	-	
2A	3615.1	-	-	-	
2A	3562.5	62330	-	-	Tight
2A	3551.1	62123	55800	1.602	W. Low Perm
2A	3539.7	61932	-	-	W. Low Perm
2A	3538.8	61904	-	-	W. Low Perm
2A	3511.3	61435	-	-	W. Low Perm

Table 3.3.3

WELL: 6610/3-1R, 8 1/2" SECTION

RUN no.	Depth m MD RKB	Hyd. pres. kPa	Form. pres. kPa	Form. pres. g/cc	Comment
3B	3717.5	64935	-	-	Tight
3B	3736.5	65251	-	-	Tight
3B	3756	65588	-	-	Tight
3B	3764	65703	-	-	Tight
3B	3774.2	65890	-	-	Tight
3B	3852	67203	67314	1.781	Poor
3B	3873.2	67567	-	-	Tight
3B	3874.8	67588	-	-	Tight
3B	3878.9	67652	-	-	Tight
3B	3878.5	67624	-	-	Tight
3B	3888.5	67814	-	-	Tight
3B	3892	67886	-	-	Tight
3B	3909.2	68146	-	-	
3B	3921.1	68380	-	-	Tight
3B	3939.9	68700	-	-	Tight
3B	3944	68745	-	-	Tight
3B	3943.8	68738	-	-	Tight
3B	3943.3	68731	-	-	Tight
3B	3950	68869	-	-	Tight
3B	3953.7	68937	-	-	Tight
3B	3955	68941	-	-	Tight
3B	3957	68979	60850	1.568	Poor Perm
3B	3986.5	69479	-	-	Tight
3B	3996.5	69633	70242	-	Tight
3B	4007.4	69806	-	-	Tight
3B	4043	70245	-	-	Tight
3B	4075.5	70913	-	-	Tight
3B	3852	67114	-	-	No Seal

Table 3.3.4

WELL: 6610/3-1R, 8 1/2" SECTION

RUN no.	Depth m MD RKB	Hyd. pres. kPa	Form. pres. kPa	Form. pres. g/cc	Comment
3C	4066.1	70672	70833	1.776	Poor Perm
3C	4066.1	70687	70715	1.773	Poor Perm
3C	4069	70735	70178	1.758	Poor Perm
3C	4064.6	70643	70660	1.772	Poor Perm
3C	3972	69087	-	-	Tight
3C	3976	69164	-	-	Tight
3C	4057.9	70507	-	-	Tight
3C	4064.6	70644	70634	1.771	Poor Perm , samples

Table 3.3.5

3.4 Well Testing

Two drill stem tests were performed DST no. 1 was perforated in the interval 3370 - 3412 m RKB and DST no. 2 was perforated in the interval 3201 - 3249 m RKB. No fluids were produced to surface. Both test intervals were tight.

DRILLSTEM TESTING

*ACTIVITY START
DURATION*

*21.11.93 AT 12:30 HRS
9,23 DAYS (221,5 HRS)*

DST no 1 3412 - 3370m
DST no 2 3249 - 3201m

Testing fluid: Ancotherm
Weight: 1,40 g/cm³

No problems were experienced with the test fluid.

Dst. no. 1 Perforated - no flow.
 Shut in for pressure build up - none.
 Waited in 13,5 hrs. for daylight to perforate and flow the well.

Dst.no. 2, Perforated - no flow.
 Shut in for pressure build up - none
 Waited in 2 hrs. for daylight to perforate and flow the well.

No operational problems was experienced during the testing of the well.

TOTAL MATERIAL COST AND CONSUMPTION

OPERATOR: STATOIL

WELL: 6610/3-1

Product	Unit size	Unit price NOK	36" 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	P & A Cost NOK	Total consumed	Total cost NOK
Barite	M.T	825,00	17 14 025,00	130 107 250,00	348 287 100,00	970 800 250,00		124 102 300,00	1589	1 310 925,00
Bentonite	M.T.	2 240,00		1 2 240,00		21 47 040,00		22 49 280,00	44	98 560,00
Soda Ash	kg	2,31		25 57,75		125 288,75		100 231,00	250	577,50
Celpol LV	kg	28,00			16000 448 000,00	40000 1 120 000,00			56000	1 568 000,00
Celpol Reg	kg	28,00			1075 30 100,00	5725 160 300,00		50 1 400,00	6850	191 800,00
KCL Brine	m3									
CMC EHV	kg	14,56	3950 57 512,00	6925 100 828,00	425 6 188,00				11300	164 528,00
Lime	kg	2,30		20 46,00	660 1 518,00	4640 10 672,00		60 138,00	5380	12 374,00
Mica	kg	3,92			1225 4 802,00				1225	4 802,00
Ancocide	ltr	16,22			2150 34 873,00	6500 105 430,00			8650	140 303,00
Nutplug	kg	3,75			1725 6 468,75				1725	6 468,75
Ligthin	kg	15,20				100 1 520,00			100	1 520,00
Ancotemp	kg	90,37								
Anco Resin	kg	12,46								
Ironite Sponge	kg	24,81			272 6 748,32			635 15 754,35	907	22 502,67
Desco CF	kg	19,68								
Bicarbonate	kg	2,31				500 1 155,00		500 1 155,00	1000	2 310,00
Gypsum	kg	1,62			21550 34 911,00	50125 81 202,50			71675	116 113,50
Thermopol	kg									
Defoamer	ltr	15,55								
Citric Acid	kg	13						50		
Bentonite	kg	2,45				375 918,75		500 1 225,00	875	2 143,75
Total cost	NOK		71 537,00	210 421,75	860 709,07	2 328 777,00		171 483,35		3 642 928,17
Hole drilled	m		63	540	823	1367				2793
Cost per metre	NOK		1 135,51	389,67	1 045,82	1 703,57				1 304,31
Total days			2	6	16	84			3	111
Cost per day	NOK		35 768,50	35 070,29	53 794,32	27 723,54		57 161,12		32 819,17
Mud mixed	m3		305	635	1290	3152		214		5 596,00
Cost per m3	NOK		234,55	331,37	667,22	738,83		801,32		650,99

TOTAL COST AND CONSUMPTION												
OPERATOR: STATOIL						WELL: 6610/3-1R						
Product	Unit size	Unit price NOK	Clean out cement	Cost NOK	12 1/4" sect.	Cost NOK	8 1/2" sect.	Cost NOK	TEST, P & A	Cost NOK	Total consumed	Total cost NOK
Barite	MT	825,00	60	49 500,00	413	340 725,00	478	394 350,00	329	271 425,00	1280	1 056 000,00
Bentonite	M.T.	2 240,00	12	26 880,00					31	69 440,00	43	96 320,00
ANCO 2000 mud	m3	700,00			93	65 100,00	-126	-88 200,00			-33	-23 100,00
Celpol LV	kg	28,00			9300	260 400,00	575	16 100,00			9875	276 500,00
Celpol Reg	kg	28,00	25	700,00	2950	82 600,00	125	3 500,00	100	2 800,00	3200	89 600,00
KCL Brine	m3	485,00			440	213 400,00					440	213 400,00
Lime	kg	2,30	100	230,00	185	425,50			15	34,50	300	690,00
KCL	kg	2,00			20000	40 000,00					20000	40 000,00
Thermopol	kg	148,00			1175	173 900,00	4225	625 300,00	2050	303 400,00	7450	1 102 600,00
Ligthin	kg	15,20	775	11 780,00			125	1 900,00	500	7 600,00	1400	21 280,00
Ancotemp	kg	90,37					3525	318 554,25	1550	140 073,50	5075	458 627,75
Anco Resin	kg	12,46					4500	56 070,00			4500	56 070,00
Mica Fine	kg	3,92			250	980,00					250	980,00
Mica Medium	kg	3,92			275	1 078,00					275	1 078,00
Soda ash	kg	2,31	100	231,00	2350	5 428,50	25	57,75	200	462,00	2675	6 179,25
Sod. bicarb.	kg	2,31	550	1 270,50	650	1 501,50	6675	15 419,25	425	981,75	8300	19 173,00
Citric Acid	kg	13,00	625	8 125,00	725	9 425,00	4675	60 775,00	375	4 875,00	6400	83 200,00
Anco 208	ltr	17,00			25152	427 584,00	2909	49 453,00			28061	477 037,00
Defoamer SB	kg	21,53					100	2 153,00	200	4 306,00	300	6 459,00
Nutplug Fine	kg	3,75			400	1 500,00	100	375,00			500	1 875,00
Total cost	NOK			98 716,50		1 624 047,50		1 455 807,25		805 397,75		3 983 969,00
Hole drilled	m					1233		1838		720		3791
Cost per metre	NOK					80,06		883,59		2 021,95		1 050,90
Total days						2		34		31		87
Cost per day	NOK					49 358,25		47 766,10		46 961,52		45 792,75
Mud mixed	m3					204		733		257		1635
Cost per m3	NOK					483,90		2 215,62		5 664,62		2 436,68



Report no.
GEOCHEM 94.36
Copy no.
No of copies: 10

SECTOR FOR GEOTECHNOLOGY

Geochemistry Department

Grading Confidential

BA-94-1985-1
07 OKT. 1994
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OLJEDIREKTORATET

Title
SOURCE ROCK CHARACTERIZATION OF THE SPEKK FORMATION
IN WELL 6610/3-1R, AND SUMMARIZED EVALUATION OF SHOWS IN
WELLS 6610/3-1 AND 6610/3-1R.

Requested by
Per Emil Eliassen, RUN-NORD

Project
PL177

Date
28.09.94

No. of pages
198

No. of enclosures
3

Key words
organic geochemistry, source rocks, shows, Nordland III

Abstract

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1 INTRODUCTION

This study was performed in order to characterize potential source rocks within the Spekk Formation in well 6610/3-1R, as well as oil recovered from this formation through the mud. In addition, a summary of other significant oil shows from the penetrated section at this location, i.e. wells 6610/3-1 and 6610/3-1R (re-entry), is given together with possible oil-oil and oil-source correlations. The reader is referred to the previous geochemical studies: "Geochemical evaluation of well 6610/3-1, part 1 of 2" (GEOCHEM 93.02), "Geochemical evaluation of shows in sandstones of Lower Tertiary and Upper Cretaceous age, well 6610/3-1" (GEOCHEM 93.03) and "Geochemical evaluation of well 6610/3-1R, part 2 of 2" (GEOCHEM 94.21).

The following analytical program was performed in this study:

ANALYSIS	NUMBER OF SAMPLES			
	Cuttings	SWC	Oil in mud	Total
TOC	9	30		39
THA pyrolysis	9	30		39
Kerogen description		7		7
Solvent extraction	7	6	1	14
Iatroscan separation	7	6	1	14
MPLC separation	7	6	1	14
GC deasphalened extract	7	6	1	14
GC saturates	7	6	1	14
GC aromatics	7	6	1	14
GC-MS biomarkers, saturates	7	6	1	14
GC-MS biomarkers, aromatics	7	6	1	14

The project was carried out at Statoil's Department of Geochemistry with subcontracts to Geolab Nor (visual kerogen descriptions). The analyses were performed in accordance with the guidelines given in "The Norwegian Industry Guide to Organic Geochemical Analyses, 1993".

Contamination by mud additives has affected parts of the geochemical data. The nature of these contamination effects has previously been described in detail in "Geochemical evaluation of well 6610/3-1R, part 2 of 2".

TABLE 1 SAMPLES ANALYSED IN THIS STUDY

Depth m RKB	Type	S.no.	Lithology
3534.00	Ctgs.	S7647A	Clst: 40% olv gry, sft, blk - amor, slty, i/p sdy, micromic, calc. 5% sst.
3534.00	Ctgs.	S7647B	Clst: 40% olv blk, frm - mod hd, subfiss, v micromic - mic, carb, sl calc. 5% sst.
3535.50	SWC	S7493	Slst: olv gry - dk yelsh brn, frm, blk, micromic, v micropyr, carb, sl dol - dol.
3537-40	oil in mud	S7655	
3537.00	SWC	S7494	Clst: brnsh blk, frm - mod hd, blk, sl micromic, sl carb, non calc.
3539.50	SWC	S7495	Clst: brnsh blk, frm - mod hd, blk, sl micromic, sl carb, non calc, inbd w/slst as 3535.50m.
3540.00	Ctgs.	S7648	Clst: 90% brn blk, pred frm, slty, sb blk - blk, abd micropyr, tr carb matr, non calc. 10% sst
3541.00	SWC	S7496	Clst: brnsh gry - brnsh blk, mod hd - hd, blk - subfiss, sl slty, micromic, i/p micropyr.
3542.00	SWC	S7497	Clst: brnsh blk, mod hd, blk, micromic, carb, non calc.
3543.00	SWC	S7498	Clst: brnsh blk, mod hd, blk, sl micromic, carb, non calc.
3543.00	Ctgs.	S7649	Clst: 100% brn blk, pred frm, slty, sb blk - blk, abd micropyr, tr carb matr, non calc.
3543.50	SWC	S7499	Clst: brnsh blk, mod hd, blk, sl micromic, carb, non calc.
3546.00	Ctgs.	S7650	Clst: 100% brn blk, pred frm, slty, sb blk - blk, abd micropyr, tr carb matr, non calc, occ brn blk - blk clst, v carb.
3548.00	SWC	S7500	Clst: brnsh blk - dsky yelsh brn, mod hd, blk - subfiss, sl micromic - micromic, carb, disseminated pyr.
3549.00	SWC	S7569	Clst: dsky yelsh brn - brnsh blk, frm - mod hd, blk - subfiss, sl micropyr, carb, disseminated pyr.
3550.00	SWC	S7501	Clst: dsky yelsh brn - brnsh blk, frm - mod hd, blk - subfiss, sl micropyr, carb, disseminated pyr.

TABLE 1, CONT.

Depth m RKB	Type	S.no.	Lithology
3551.50	SWC	S7502	Clst: brnsh blk, mod hd, blk, sl micromic, sl carb, non calc.
3552.00	Ctgs.	S7651	Clst: 100% brnsh blk - dsky yelsh brn, pred frm, slty, sb blk - blk, abd micropyr, tr carb matr, non calc, occ v calc.
3555.00	SWC	S7503	Clst: brnsh blk - dsky yelsh brn, mod hd, blk - subfiss, sl micromic, v carb, non calc, i/p dissem pyr.
3558.00	SWC	S7504	Clst: brnsh blk - dsky yelsh brn, mod hd - frm, micromic, carb, i/p dissem pyr.
3558.00	Ctgs.	S7652	Clst: 100% brnsh blk - dsky yelsh brn, frm, sb blk - subfiss, micromic, micropyr, v carb, non - v sl calc.
3561.00	SWC	S7505	Clst: brnsh blk - dsky yelsh brn, mod hd - frm, micromic, carb, i/p dissem pyr.
3563.50	SWC	S7506	Clst: brnsh blk - dsky yelsh brn, mod hd - frm, micromic, carb, i/p dissem pyr.
3565.00	SWC	S7570	Clst: brnsh blk - olv blk - dk gry, mod hd, blk - subfiss, micromic, i/p carb, non calc.
3566.00	SWC	S7507	Clst: brnsh blk - dsky yelsh brn, mod hd - frm, blk - subfiss, micromic, carb, non calc, i/p dissem pyr.
3567.00	Ctgs.	S7653	Clst: 100% brnsh blk - dsky yelsh brn, frm, sb blk - subfiss, micromic, micropyr, v carb, non - v sl calc.
3568.00	SWC	S7541	Clst: olv blk, frm, sl slty, carb, micromic, non calc.
3570.00	SWC	S7542	Clst: olv blk, frm, sl slty, carb, micromic, non calc.
3571.00	SWC	S7543	Clst: olv blk, frm, sl slty, carb, micromic, non calc.
3573.00	SWC	S7544	Clst: olv blk, frm, sl slty, carb, micromic, non calc.
3576.00	SWC	S7545	Clst: olv blk, frm, sl slty, carb, micromic, non - sl calc.
3578.00	SWC	S7546	Clst: olv blk, frm, sl slty, carb, micromic, non calc.
3580.00	SWC	S7547	Clst: olv blk, frm, sl slty, carb, micromic, sl calc.

TABLE 1, CONT.

Depth m RKB	Type	S.no.	Lithology
3582.00	SWC	S7548	Clst: olv blk, frm, sl slty, carb, micromic, sl calc.
3583.50	SWC	S7549	Clst: olv blk, frm, sl slty, carb, micromic, sl calc.
3588.00	SWC	S7550	Clst: olv blk, frm, sl slty, carb, micromic, non calc.
3589.50	SWC	S7551	Clst: olv blk, frm, sl slty, carb, micromic, non calc.
3591.00	Ctgs.	S7654	Clst: 100% brn blk, sft - frm, blk, subfiss, micromic, micropyr, non - sl calc.
3596.00	SWC	S7508	Clst: olv blk, frm, sl slty, carb, micromic, sl calc.
3598.00	SWC	S7552	Clst: olv blk, frm, sl slty, carb, micromic, non calc.

TABLE 2 TOC AND ROCK-EVAL TYPE PYROLYSIS DATA

Depth m RKB	Type	S. no	S1 < mg HC / g roc	S2 mg HC / g roc	TOC wt %	HI mg HC/g T	PP mg HC/ g rock	PI	Tmax oC	Lithology
3534.0	Ctgs.	S7647A	1.2	0.22	0.66	33	1.4	0.85	ND	clst.
3534.0	Ctgs.	S7647B	0.86	1.1	1.8	63	2.0	0.43	445	clst.
3535.5	SWC	S7493	4.0	0.91	1.2	73	4.9	0.81	ND	clst.
3537.0	SWC	S7494	4.5	4.5	6.6	68	9.0	0.50	444	clst.
3539.5	SWC	S7495	2.0	0.61	1.1	54	2.6	0.76	ND	clst.
3540.0	Ctgs.	S7648	5.4	7.9	6.7	118	13.3	0.41	449	clst.
3541.0	SWC	S7496	0.71	0.09	0.66	14	0.8	0.89	ND	clst.
3542.0	SWC	S7497	6.5	10.6	9.6	110	17.0	0.38	458	clst.
3543.0	SWC	S7498	4.7	3.2	7.5	43	7.9	0.59	443	clst.
3543.0	Ctgs.	S7649	4.8	5.7	6.2	93	10.5	0.45	452	clst.
3543.5	SWC	S7499	6.5	6.1	8.2	74	12.5	0.52	449	clst.
3546.0	Ctgs.	S7650	6.1	6.7	7.3	91	12.8	0.48	452	clst.
3548.0	SWC	S7500	7.1	5.2	7.2	72	12.3	0.58	444	clst.
3549.0	SWC	S7569	9.7	7.5	8.5	87	17.1	0.56	447	clst.
3550.0	SWC	S7501	4.6	1.7	3.3	50	6.2	0.74	448	clst.
3551.5	SWC	S7502	4.4	3.2	4.9	65	7.6	0.58	457	clst.
3552.0	Ctgs.	S7651	6.4	6.9	7.3	95	13.2	0.48	451	clst.
3555.0	SWC	S7503	5.9	6.2	7.0	88	12.0	0.49	458	clst.
3558.0	SWC	S7504	5.2	5.1	5.5	93	10.3	0.50	455	clst.
3558.0	Ctgs.	S7652	5.1	7.0	7.9	89	12.1	0.42	456	clst.
3561.0	SWC	S7505	5.0	4.3	5.3	80	9.2	0.54	459	clst.
3563.5	SWC	S7506	3.7	1.9	3.5	56	5.6	0.65	455	clst.
3565.0	SWC	S7570	4.6	2.8	4.3	66	7.4	0.62	450	clst.
3566.0	SWC	S7507	5.8	7.7	8.9	87	13.5	0.43	465	clst.
3567.0	Ctgs.	S7653	7.3	7.3	7.9	93	14.7	0.50	458	clst.
3568.0	SWC	S7541	5.8	8.3	8.6	97	14.2	0.41	451	clst.
3570.0	SWC	S7542	5.2	6.4	8.7	73	11.6	0.45	450	clst.
3571.0	SWC	S7543	6.2	9.4	8.8	107	15.6	0.40	453	clst.
3573.0	SWC	S7544	5.1	8.4	8.1	104	13.5	0.38	458	clst.
3576.0	SWC	S7545	2.9	3.7	4.4	86	6.6	0.43	457	clst.
3578.0	SWC	S7546	5.1	6.9	8.5	81	12.0	0.43	455	clst.
3580.0	SWC	S7547	4.4	3.8	6.5	59	8.3	0.53	457	clst.
3582.0	SWC	S7548	4.7	7.3	9.1	81	12.1	0.39	458	clst.
3583.5	SWC	S7549	4.8	7.6	8.0	95	12.4	0.39	461	clst.
3588.0	SWC	S7550	4.1	6.3	8.6	73	10.4	0.39	458	clst.
3589.5	SWC	S7551	5.1	9.3	9.3	100	14.3	0.35	459	clst.
3591.0	Ctgs.	S7654	8.3	7.4	8.4	88	15.8	0.53	456	clst.
3596.0	SWC	S7508	4.8	3.9	4.9	79	8.6	0.55	449	clst.
3598.0	SWC	S7552	3.2	7.3	7.9	93	10.6	0.31	465	clst.

Standards

BVM	0.50	19.8	20.3	0.02	422
BVM	0.48	19.3	19.8	0.02	421
BVM	0.49	18.9	19.4	0.03	420

TABLE 3 VISUAL KEROGEN DESCRIPTIONS (%)

Depth / S.no	Spl	Lithology	Amorphous			Algal / Phytoplankton				Herbaceous				Woody			Coaly						
			AM%	FA	HA	AP%	Cy	Ta	Bo	Di	De	HE%	SP	Cu	De	WO%	FL	NF	De	CO%	FS	De	
3535.5/S7493	swc	clst	45	*	*	tr	*				*			5	**	*	*	20	**	*	30	**	*
3539.5/S7495	swc	clst	50	*	*	tr	*							10	*		**	25	*	*	15	*	**
3543.5/S7499	swc	clst	30		*	tr	*							10	*		**	20	**	*	40	*	*
3548 /S7500	swc	clst	50		*	tr	*							tr	*		*	20	**	*	30	*	*
3558 /S7504	swc	clst	70		*	tr	*							tr	*		*	20	**	*	10	**	*
3571 /S7543	swc	clst	75		*	tr	*							tr	*		*	5	*	**	10	**	*
3580 /S7547	swc	clst	55		*	tr	*							tr	*		*	10	**	*	35	**	*

TABLE 4 NORMALISED COMPONENT GROUP COMPOSITION (wt%) OF EXTRACTED ORGANIC MATTER (C15+),

Depth m RKB	Type	Sample no.	Rock (g)	EOM (mg)	EOM (ppm)	Sat (%)	Aro (%)	Pol (%)	Asph (%)	HC (%)	nonHC (%)
3534.00	Ctgs	S7647	8.33	24.7	2965	13	3	75	9	16	84
3539.50	SWC	S7495	7.10	54	7606	6	2	87	5	8	92
3540.00	Ctgs	S7648	8.04	76	9453	17	18	52	13	35	65
3543.00	Ctgs	S7649	6.94	64.1	9236	18	17	52	13	35	65
3546.00	SWC	S7650	13.14	137.3	10449	29	21	40	10	50	50
3549.00	SWC	S7569	17.19	179.2	10425	8	2	83	7	10	90
3552.00	Ctgs	S7651	12.66	134.5	10624	44	21	26	9	64	36
3558.00	Ctgs	S7652	10.94	96.9	8857	24	23	37	15	47	53
3567.00	Ctgs	S7653	11.01	155.3	14105	9	10	70	10	20	80
3571.00	SWC	S7543	3.69	32.2	8726	23	19	37	21	42	58
3578.00	SWC	S7546	1.28	12.7	9922	18	19	36	27	38	62
3583.50	SWC	S7549	3.23	27.3	8452	31	21	26	22	51	49
3591.00	Ctgs	S7654	10.78	185.1	17171	6	7	74	13	13	87
3537-40	Oil in mud	S7655		187.1		27	12	57	3	40	60

TABLE 5 COMPONENT GROUP COMPOSITION (CONCENTRATIONS) OF EXTRACTED ORGANIC MATTER (C15+),

Depth m RKB	Type	Sample no.	TOC (%)	EOM	mg/g TOC					Sat Aro	HC non HC
					Sat	Aro	Pol	Asph	Sat Aro		
3534.00	Ctgs	S7647	0.66	449.3	58.1	14.4	336.5	40.3	4	0.2	
3539.50	SWC	S7495	2.0	390.0	22.8	8.4	338.8	20.0	3	0.1	
3540.00	Ctgs	S7648	5.4	174.1	29.3	31.4	90.2	23.1	1	0.5	
3543.00	Ctgs	S7649	4.8	194.4	35.5	33.2	100.9	24.8	1	0.5	
3546.00	SWC	S7650	6.1	171.0	49.6	36.0	68.8	16.7	1	1.0	
3549.00	SWC	S7569	9.7	108.0	9.1	1.9	89.9	7.2	5	0.1	
3552.00	Ctgs	S7651	6.4	167.3	73.2	34.7	43.6	15.8	2	1.8	
3558.00	Ctgs	S7652	5.1	174.0	42.3	40.2	64.7	26.8	1	0.9	
3567.00	Ctgs	S7653	7.3	192.7	18.3	20.1	135.5	18.8	1	0.3	
3571.00	SWC	S7543	6.2	141.0	32.4	26.8	51.8	30.0	1	0.7	
3578.00	SWC	S7546	5.1	193.8	35.6	37.6	69.1	51.5	1	0.6	
3583.50	SWC	S7549	4.8	175.0	53.4	36.5	45.8	39.2	1	1.0	
3591.00	Ctgs	S7654	8.3	206.1	12.8	14.9	151.9	26.5	1	0.2	

TABLE 6 GAS CHROMATOGRAPHIC DATA, WELL 6610/3-1 AND 6610/3-1R.

Depth m RKB	Type	Sample no.	A <u>Pristane</u> n-C17	B <u>Phytane</u> n-C18	A B	Pri Phy	nC17 nC17+nC27	CPI 1	F 1	F 2	MPI 1
3534.00	Ctgs	S7647	0.72	0.49	1.46	1.93	0.79	1.1	0.37	0.20	0.58
3539.50	SWC	S7495	0.59	0.37	1.59	1.82	0.78	1.0	0.39	0.21	0.64
3540.00	Ctgs	S7648	0.56	0.40	1.41	1.81	0.70	1.2	0.39	0.20	0.62
3543.00	Ctgs	S7649	0.54	0.39	1.39	1.76	0.78	1.1	0.39	0.21	0.64
3546.00	SWC	S7650	0.61	0.40	1.52	1.76	0.76	1.1	0.41	0.28	0.67
3549.00	SWC	S7569	0.64	0.43	1.51	1.64	0.75	1.1	0.39	0.24	0.64
3552.00	Ctgs	S7651	0.71	0.46	1.55	1.79	0.63	1.2	0.39	0.21	0.65
3558.00	Ctgs	S7652	0.64	0.38	1.70	1.92	0.77	1.2	0.40	0.20	0.65
3567.00	Ctgs	S7653	0.59	0.40	1.48	1.72	0.78	1.1	0.41	0.20	0.69
3571.00	SWC	S7543	0.74	0.39	1.89	2.15	0.72	1.2	0.42	0.22	0.71
3578.00	SWC	S7546	n.d.	0.31	n.d.	n.d.	0.86	n.d.	0.42	0.22	0.71
3583.50	SWC	S7549	0.59	0.39	1.53	2.27	0.81	1.2	0.43	0.23	0.74
3591.00	Ctgs	S7654	0.66	0.38	1.74	2.00	0.77	1.1	0.45	0.23	0.76
1675.00	SWC	S6752	1.2	0.37	3.2	1.2	0.50	1.5	0.74	0.30	0.63
3203.00	SWC	S7520	0.61	0.44	1.4	2.0	0.88	n.d.	n.d.	n.d.	n.d.
3200-49	Oil in mud	S7656	0.74	0.58	1.3	1.6	0.95	1.1	0.46	0.23	0.77
3318.00	CORE	S7533	0.55	0.38	1.4	1.5	0.53	1.1.	0.48	0.25	0.82
3537-40	Oil in mud	S7655	0.74	0.56	1.3	1.6	0.94	1.1	0.47	0.26	0.78

TABLE 7 BIOMARKER PARAMETERS¹ FROM GC-MS ANALYSIS OF SATURATED HYDROCARBONS, WELL 6610/3-1 AND 6610/3-1R.

Depth m RKB	Type	Sample no.	20S	$\beta\beta$	22S	Ts/Tm	TtX	30D/H	30 $\alpha\beta$
source rocks									
3534	Ctgs.	S7647	0.50	0.57	0.57	2.1	2.4	0.31	0.87
3539.5	SWC	S7495	0.56	0.58	0.54	1.5	2.0	0.34	0.83
3540	Ctgs.	S7648	0.58	0.60	0.57	2.9	10	1.7	0.88
3543	Ctgs.	S7649	0.53	0.60	0.59	2.9	8.6	1.6	0.88
3546	Ctgs.	S7650	0.63	0.57	0.59	2.5	9.0	1.2	0.88
3549	SWC	S7569	0.55	0.58	0.59	1.2	1.6	0.25	0.84
3552	Ctgs.	S7651	0.70*	0.55	0.57	1.9	12	6.1	1.00
3558	Ctgs.	S7652	0.59	0.64	0.57	2.2	8.9	5.7	0.82
3567	Ctgs.	S7653	0.82*	0.69	0.53	2.0	8.7	4.6	1.00
3571	SWC	S7543	0.50	0.61	0.59	2.1	7.6	2.9	1.00
3578	SWC	S7546	0.47	0.59	0.57	2.0	7.5	1.7	0.90
3583.5	SWC	S7549	0.68*	0.67	0.55	1.9	7.0	3.3	1.00
3591	Ctgs.	S7654	0.70*	0.67	0.56	1.9	6.9	4.6	1.00
4073	SWC	S7487	0.45	0.54	n.d.	4.6	1.4	0.11	0.91
1645	FMT	S6895	0.47	0.49	0.58	1.0	0.38	0.05	0.86
1675	SWC	S6752	0.50	0.43	0.57	1.1	0.38	0.05	0.89
2293.75	CORE	S6690	0.74	0.73	n.d.	n.d.	n.d.	n.d.	n.d.
2303.95	CORE	S6696	0.74	0.69	n.d.	n.d.	n.d.	n.d.	n.d.
2309.15	CORE	S6699	0.73	0.69	n.d.	n.d.	n.d.	n.d.	n.d.
2309.25	CORE	S6700	0.67	0.68	n.d.	n.d.	n.d.	n.d.	n.d.
* 3203.00	SWC	S7520	0.56	0.61	0.63	1.8	3.1	0.19	0.91
3200-3249	Oil in mud	S7656	0.54	0.55	0.56	1.3	0.83	0.09	0.88
3318.00	CORE	S7533	0.58	0.64	0.59	2.6	9.6	0.60	0.92
3537-40	Oil in mud	S7655	0.53	0.57	0.57	0.96	0.57	0.06	0.92

* unreliable

TABLE 7, CONT.

Depth m RKB	Type	Sample no.	%C27	%C28	%C29	C30/st	Dia/ reg	28 α β /H	H/S
3534	Ctgs.	S7647	34*	30	36	0.11	2.4	0.00	7.5
3539.5	SWC	S7495	36	31	33	0.07	2.2	0.09	5.2
3540	Ctgs.	S7648	35*	34	32	0.11	3.1	0.00	3.4
3543	Ctgs.	S7649	32*	34	34	0.12	3.9	0.00	4.3
3546	Ctgs.	S7650	37*	32	31	0.10	3.6	0.00	5.3
3549	SWC	S7569	32*	31	37	0.08	2.0	0.08	8.1
3552	Ctgs.	S7651	40*	32	28	0.11	3.9	0.00	3.8
3558	Ctgs.	S7652	37*	30	33	0.07	2.9	0.00	4.6
3567	Ctgs.	S7653	37*	29	34	0.07	2.7	0.00	3.9
3571	SWC	S7543	34*	29	37	0.08	2.7	0.00	6.0
3578	SWC	S7546	32*	29	39	0.07	1.9	0.11	6.7
3583.5	SWC	S7549	37*	28	35	0.06	2.5	0.17	4.8
3591	Ctgs.	S7654	36*	28	37	0.06	2.6	0.17	4.8
4073	SWC	S7487	30*	27	43	0.10	0.45	0.05	n.d.
1645	FMT	S6895	33	27	40	0.09	1.1	0.05	16
1675	SWC	S6752	35	27	37	0.16	1.3	1.8	4.7
2293.75	CORE	S6690	29	31	40	0.12	2.8	n.d.	n.d.
2303.95	CORE	S6696	32	30	39	0.11	2.6	n.d.	n.d.
2309.15	CORE	S6699	31	30	38	0.12	1.2	n.d.	n.d.
2309.25	CORE	S6700	31	31	38	0.11	2.1	n.d.	n.d.
3203	SWC	S7520	32	31	38	0.12	1.3	0.06	3.1
3200-49	Oil in mud	S7656	47	28	25	0.06	2.9	0.15	3.1
3318	CORE	S7533	31	33	36	0.14	3.5	0.06	3.6
3537-40	Oil in mud	S7655	38	27	34	0.06	1.8	0.1	3.7

* unreliable due to co-elution problem for C27.

TABLE 7, CONT.

Depth m RKB	Type	Sample no.	ppmH	ppmS	3R/H	4R/H	35/34H	29/30H	Dem/H	O/H	G/H
3534	Ctgs.	S7647	36	5	0.26	0.13	1.06	0.72	0.00	0.00	0.00
3539.5	SWC	S7495	54	10	0.42	0.12	1.11	0.88	0.17	0.00	0.04
3540	Ctgs.	S7648	21	6	0.61	0.19	1.29	0.61	0.22	0.00	0.00
3543	Ctgs.	S7649	24	5	0.53	0.24	1.06	0.63	0.00	0.00	0.01
3546	Ctgs.	S7650	47	9	0.29	0.12	1.11	0.65	0.27	0.00	0.02
3549	SWC	S7569	90	11	0.25	0.09	1.00	0.76	0.16	0.00	0.03
3552	Ctgs.	S7651	38	10	1.33	0.25	0.89	0.50	0.83	0.00	0.00
3558	Ctgs.	S7652	26	6	1.07	0.43	1.40	0.57	0.79	0.00	0.02
3567	Ctgs.	S7653	21	5	1.06	0.29	0.38	0.59	0.65	0.00	0.00
3571	SWC	S7543	37	6	0.67	0.33	0.33	0.71	0.48	0.00	0.04
3578	SWC	S7546	59	9	0.56	0.24	0.39	0.82	0.29	0.00	0.00
3583.5	SWC	S7549	49	10	0.96	0.22	0.42	0.70	0.52	0.00	0.00
3591	Ctgs.	S7654	19	4	0.94	0.39	0.38	0.67	0.72	0.00	0.01
4073	SWC	S7487	n.d.	4	0.33	n.d.	n.d.	0.78	0.00	0.00	0.00
1645	FMT	S6895	n.d.	n.d.	0.08	0.05	1.1*	0.55	0.08	0.00	0.03
1675	SWC	S6752	1207	259	0.29	0.18	1.1*	0.75	0.18	0.00	0.07
2293.75	CORE	S6690	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
2303.95	CORE	S6696	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
2309.15	CORE	S6699	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
2309.25	CORE	S6700	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
3203	SWC	S7520	161	52	0.10	0.10	0.96	0.55	0.24	0.00	0.03
3200-49	Oil in mud	S7656	33	11	1.32	0.38	1.2	0.74	0.09	0.00	
3318	CORE	S7533	284	80	0.21	0.06	0.88	0.38	0.13	0.00	0.01
3537-40	Oil in mud	S7655	127	35	0.41	0.24	1.0	1.0	0.00	0.00	0.04

* unreliable

† The derivation of parametrs is described in Appendix B.

TABLE 8 BIOMARKER PARAMETERS¹ FROM GC-MS ANALYSIS OF AROMATIC HYDROCARBONS.

Depth m RKB	Type	Sample no.	Arom1	Arom2	Crack1	Crack2
3534.0	Ctgs.	S7647	1.00*	0.27*	0.93	0.74
3539.5	SWC	S7495	1.00*	0.37*	0.86	0.62
3540.0	Ctgs.	S7648	n.d.	0.24*	1.00	1.00
3543.0	Ctgs.	S7649	n.d.	n.d.	n.d.	n.d.
3546.0	Ctgs.	S7650	n.d.	0.22*	1.00	1.00
3549.0	SWC	S7569	1.00*	0.36*	0.87	0.59
3552.0	Ctgs.	S7651	1.00*	0.32*	0.93	0.73
3558.0	Ctgs.	S7652	n.d.	n.d.	n.d.	n.d.
3567.0	Ctgs.	S7653	n.d.	0.10*	n.d.	1.00
3571.0	SWC	S7543	n.d.	n.d.	n.d.	n.d.
3578.0	SWC	S7546	n.d.	0.10*	n.d.	1.00
3583.5	SWC	S7549	n.d.	0.20*	1.00	1.00
3591.0	Ctgs.	S7654	n.d.	0.08*	n.d.	1.00
3537-40	Oil in mud	S7655	0.87	0.56	0.75	0.50
BULGARIA Standard						
		6610A100	0.77	0.54	0.27	0.13
		6610A126	0.83	0.52	0.30	0.13

*unreliable due to uncertain peak identification

¹ The derivation of parameters is described in Appendix C.

n.d. = not determined

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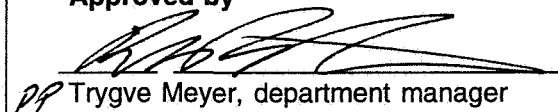
Grading confidential

Title GEOCHEMICAL EVALUATION OF WELL 6610/3-1R, PART 2 OF 2.		
Requested by RUN-NORD v/P. E. Eliassen	Project PL 177	
Date 02.06.94	No. of pages 263	No. of enclosures

Keywords Organic geochemistry, maturity, source rocks, shows
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Abstract This report presents the results of a standard geochemical study of well 6610/3-1R, which was drilled as a continuation of well 6610/3-1, from 1742 to 4200 mRKB. Contamination by mud additives has in several instances affected the geochemical data. Thus, interpretation of screening and extract data has partly been tentative.

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1 INTRODUCTION

This report presents the results of a standard geochemical study of well 6610/3-1R (Figure 1). This well was drilled as a continuation of the 6610/3-1 well (cf. "Geochemical evaluation of well 6610/3-1, part 1 of 2"), from 1742 to 4200 mRKB. Part 1 refers to the geochemical evaluation. The aims of this study were to identify and evaluate possible source rock intervals, and to document and characterize migrated petroleum in terms of its parent source rock facies and levels of thermal maturity. In addition, the maturity trend throughout the well was evaluated.

A total of 23 canned cuttings gases, 82 sediment samples (cf. Table 1) and 1 fluid were analysed according to the following analytical program:

ANALYSIS	NUMBER OF SAMPLES				
	Cuttings	SWC	Core	Fluid	Total
Headspace and occluded gas					23
TOC	7	25			32
THA pyrolysis	8	42	4		54
Vitrinite reflectance	18	9	1		28
Kerogen description	9	1			10
Thermal extraction-GC		3			3
Solvent extraction	4	12	2		18
Iatroscan separation	4	12	2	1	19
MPLC separation	4	1	2	1	8
GC total extract		11		1	12
GC saturates	4	1	2	1	8
GC aromatics	4	1	2	1	8
GC-MS biomarkers, saturates	3	5	2	1	11
GC-MS biomarkers, aromatics	2		1	1	4
$\delta^{13}\text{C}$ of EOM and fractions				1	1

The project was carried out at Statoil's Department of Geochemistry with subcontracts to Geolab Nor (visual kerogen descriptions; "Geochemical analysis of gas from canned cuttings", Appendix G; $^{13}\text{C}/^{12}\text{C}$ isotope ratios for oil in mud", Appendix H).

The analyses were performed in accordance with the guidelines given in "The Norwegian Industry Guide to Organic Geochemical Analyses, 1993". However, the analytical program and reporting partly deviate from these guidelines, due the contamination problems as described in chapter 2.

2 MUD CONTAMINATION PROBLEMS

The ANCO 2000 mud system was used during drilling of this well. Although the system is waterbased, several of the mud components added in order to optimize the operational conditions during drilling have affected the organic geochemical data for both rock and fluid (oil in mud) samples. A compilation of organic geochemical data on four of the chemicals (ANCO 208, ANCO RESIN; ANCO TEMP, THERMOPOL) used in this mud system is found in Appendix A. They all show high TOC values and variable values for the Rock-Eval type pyrolysis parameters (Table A1 and Figure A1). Iatroscan analysis of contaminated rock extracts indicates that the contaminants mainly elute together with the polars. This is supported by the results from Iatroscan analysis of ANCO 208 (dissolved in DCM) where the polars constitute 100 %. With regard to GC traces, only ANCO 208 seems to affect this type of analysis (Figure A2). This chemical also gives signals in the GC-MS traces (Figure A3). GC and GC-MS traces of whole extracts show high abundances of these contaminant peaks. Preparative group type separation by MPLC was performed in an attempt to eliminate these contamination effects. On the whole, a large portion of the organic geochemical analyses have been distorted by chemicals applied in the ANCO 2000 mud system. The implications of these results will be further discussed in the course of the report.

TABLE 1 SAMPLES ANALYSED FROM WELL 6610/3-1R.

Depth m RKB	Type	S.no.	Lithology
2914.00	Ctgs.		Clst: 100% gry blk - med dk gry, sft - frm, blk, slty, i/p v slty, i/p sdy, micromic, non - sl calc.
2808.00	SWC	S7468	Clst: med dk gry - gry, mod hd, micromic, non calc.
2820.00	Ctgs.		Clst: 100% gry blk - med dk gry, sft - frm, blk, slty, i/p v slty, i/p sdy, micromic, non - mod calc.
2830.00	Ctgs.	S7509	Clst: 100% med gry - gry blk, sft - frm, blk, sdy, grad arg sst, slty, non - mod calc.
2860.00	Ctgs.	S7510	Clst: 90% med dk gry - gry blk, blk, occ subfiss, slty - sdy, mica, non - sl calc. 10% sst.
2870.00	Ctgs.		Clst: 100% med dk gry - gry blk, blk, slty - sdy, mica, non - sl calc.
2882.00	SWC	S7469	Clst: dk gry - med dk gry, mod hd, sl mic, non calc.
2910.00	Ctgs.		Clst: 70% med dk gry - gry blk, blk, slty - sdy, mica, non - sl calc. 30% sst.
2957.50	SWC		Clst: olv gry - olv blk, sdy, mod hd, subfiss, micromic, non - sl calc.
3012.00	SWC		Clst: olv blk, sdy, mod hd, subfiss, micromic, non calc.
3054.00	Ctgs.		Clst: 95% dk gry - olv blk, sft - frm, slty, i/p v mic, blk, occ subfiss, tr carb, non - sl calc. 5% sst.
3057.00	Ctgs.	S7511	Clst: 100% dk gry - olv blk, sft - frm, slty, i/p v mic, blk, occ subfiss, tr carb, non - sl calc.
3093.00	Ctgs.	S7512	Clst: 100% dk gry - olv blk, sft - frm, slty, i/p v mic, blk, tr carb, non - sl calc.
3102.00	Ctgs.		Clst: 100% dk gry - olv blk, sft - frm, slty, i/p v mic, blk, occ subfiss, tr carb, non - sl calc.
3135.00	SWC	S7470	Sh: olv gry, mod hd, blk, micromic, mod calc.
3150.00	Ctgs.		Clst: 100% dk gry - olv gry, sft - frm, blk, slty, micromic, sl calc - calc.
3174.00	Ctgs.	S7513	Clst: 95% dk gry - olv gry, sft - frm, blk, slty, tr carb, micromic, non - sl calc. 5% ls.

TABLE 1 SAMPLES ANALYSED FROM WELL 6610/3-1R.

Depth m RKB	Type	S.no.	Lithology
3198.00	Ctgs.		Clst: 100% dk gry, olv gry - olv blk, frm, blk, slty, micromic, carb, occ calc.
3252.00	Ctgs.		Clst: 70% dk gry, olv gry - olv blk, frm - sft, blk, slty, micromic, carb, non calc - calc. 30% sst.
3303.00	Ctgs.		Clst: 60% olv gry - mod dk gry, blk, slty, occ sdy, carb, non calc - calc. 30% sst. 10% ls.
3369.00	Ctgs.		Clst: 20% gry blk, fri, slty - sdy, carb frag, v mica, occ v carb. 80% sst.
3399.00	Ctgs.		Clst: 20% dk gry, mod hd, blk, micromic, non calc. 80% sst.
3450.00	Ctgs.		Clst: 100 % olv gry - olv blk, sft - frm, blk, v slty, i/p sdy, micromic, v carb, calc.
3453.00	SWC	S7471	Sh: brn blk, mod hd, subfiss, micromic, sli - non clac, slty.
3474.50	SWC	S7472	Sh: brn blk, mod hd, subfiss - fiss, micromic, mica i.p., sl clac.
3521.00	SWC		Clst: dk gry - grysh blk, mod hd - hd, blk, sl slty, micromic, non calc.
3526.50	SWC	S7490	Clst: dk gry - grysh blk, mod hd - hd, blk, sl slty, v micromic, non clac.
3531.50	SWC	S7491	Clst: dk gry - grysh blk, mod hd - hd, blk, sl slty, v micromic, non clac.
3543.00	Ctgs.	S7649	Clst: 90% brn blk, pred frm, sb blk - blk, slty, adb micropyr, tr carb matr, non calc. 10 % sst.
3551.50	SWC		Clst: brnsh blk, mod hd, blk, sl micromic, sl carb, non calc.
3558.00	Ctgs.	S7652	Clst: 80% brn blk - dsky yel brn, frm, sb blk - subfiss, micromic, i/p micropyr, carb - v carb., non - v sl calc. 20 % sst.
3571.00	SWC	S7543	Clst: grysh blk - brnsh blk, mod hd - hd, blk - subfiss, sl micromic, non clac.

TABLE 1 SAMPLES ANALYSED FROM WELL 6610/3-1R.

Depth m RKB	Type	S.no.	Lithology
3588.00	SWC		Clst: olv blk, frm, sl slty, micromic, carb, non calc.
3602.00	SWC	S7473	Clst: olv blk, frm, non calc, sl slty, carb, micromic.
3605.00	SWC	S7474	Clst: olv blk, frm, non calc, sl slty, carb, micromic.
3613.00	SWC	S7475	Clst: olv blk, frm, sl calc, sl slty, micromic, sst lam.
3619.00	SWC	S7476	Clst: olv blk, frm, non calc, sl slty, v micromic.
3631.50	SWC	S7477	Clst: olv blk, frm, non calc, sl slty, v micromic.
3645.00	SWC	S7478	Clst: olv blk, frm, mod calc, sl slty, micromic.
3650.00	SWC		Clst: olv gry, v arg, frm, mod calc, micromic.
3659.00	SWC	S7479	Clst: dk olv gry, v arg, frm, mod calc, v micromic.
3668.00	SWC	S7480	Slst: olv gry, v arg, frm, non calc, v micromic.
3692.00	SWC	S7481	Slst: dk olv gry, v arg, sl calc, v micromic.
3721.80	Core		Clst: dk gry, slty, mod hd, sl micromic, calc.
3769.00	SWC		Clst: olv gry, v slty, micromic, non calc.
3792.00	Ctgs.		Slst: 80% olv gry, clyly mudst, sft - frm, micromic, blkly, non calc. 20% sst.
3843.00	Ctgs.		Mudst: 80% olv gry - olv blk, sft - frm, non calc, blkly, occ sdy, i/p grd clst. 20% sst.
3868.50	SWC	S7482	Clst: olv blk, frm, non calc, v slty, micromic.
3872.00	SWC	S7483	Clst: olv blk, mod hd, non calc, mod slty, micromic.

TABLE 1 SAMPLES ANALYSED FROM WELL 6610/3-1R.

Depth m RKB	Type	S.no.	Lithology
3897.00	Ctgs.		Slst: 70% dk gry - olv gry, clyly - sdy, occ grdg to arg v f sst, frm, micromic, blk, non calc. 30% sst.
3920.00	SWC	S7484	Clst: med dk gry, frm, non calc, sl slty.
3945.00	Ctgs.		Coal: 50% blk, shny, subfiss, i/p brittle. 50% sst
4028.00	SWC	S7485	Clst: olv blk, frm, non calc, sl slty, micromic.
4059.00	SWC	S7486	Carb.clst: dk gry - blk, brittle, sl arg.
4073.00	SWC	S7487	Coal: blk, brittle, sl arg.
4074.00	Ctgs.		Coal: 20% blk, brittle, arg. 30% clst. 50% sst.
4097.00	SWC	S7488	Carb.clst: dk gry - blk, brittle, sl arg.
4102.50	SWC	S7489	Clst: olv blk, frm, sl calc, sl slty, micromic.

TABLE 1 SAMPLES ANALYSED FROM WELL 6610/3-1R.

Depth m RKB	Type	S.no.	Lithology
2914.00	SWC	S7514	Sst: lt gry - lt med gry, v fn - fn, mod hd, mod srted, arg, micromic, non calc, mod - pr vis por.
2922.50	SWC	S7515	Sst: med gry, v fn, mod hd, mod srted, arg, micromic, sl calc, mod - pr vis por.
2938.00	SWC	S7516	Sst: lt gry, v fn - fn, frm, mod srted, arg lam, micromic, sl calc, pr vis por.
2950.00	SWC	S7517	Sst: med gry, v fn - fn, mod hd, mod srted, arg, micromic, v calc, mod - pr vis por.
2980.00	SWC	S7518	Sst: med lt gry, v fn - fn, frm, mod srted, arg micromic, v calc, mod - pr vis por.
3028.00	SWC	S7519	Sst: lt - med gry, clr qtz, fn - med fn, fri - mod hd, mod srted, calc cmt, pr vis por.
3203.00	SWC	S7520	Sst: med gry, clr - lt brn qtz, fn - med fn, hd, mod srted, calc cmt, no vis por, mica, sl glau..
3230.00	SWC	S7521	Sst: med lt gry, clr - lt brn qtz, fn - med fn, hd, mod srted, calc cmt, no vis por, mica, sl glau..
3317.60	Core	S7532	Sst: gry, fn - crs, hd, mic.
3318.60	Core	S7533	Sst: gry, fn - crs, hd, mic.
3392.00	SWC	S7522	Sst: dk brn gry, v fn - fn, mod hd, mod srted, calc cmt, no vis por, mica, sl glau..
3720.05	Core	S7534	Sst: dk gry - gry, fn, mic, arg lam.
3745.85	Core	S7535	Sst: dk gry - gry, fn, mic, arg lam.
3870.00	SWC	S7523	Sst: lt gry, v fn- fn, w srted, w calc cmt, sl arg, micromic.
3871.00	SWC	S7524	Sst: lt gry, v fn- fn, w srted, w calc cmt, micromic, sl arg, clst lam..
3874.50	SWC	S7525	Sst: lt gry, v fn- fn, w srted, w calc cmt, micromic, sl arg, clst lam..
3882.00	SWC	S7526	Sst: lt gry, v fn- fn, w srted, non calc, micromic, sl arg, cly clasts..
3900.00	SWC	S7527	Sst: wh lt gry, v fn- fn, w srted, w calc cmt, micromic, no vis por, sl arg mtx, occ cly clasts..

TABLE 1 SAMPLES ANALYSED FROM WELL 6610/3-1R.

Depth m RKB	Type	S.no.	Lithology
3965.00	SWC	S7528	Sst: v lt gry, v fn - fn, w srted, w calc cmt, arg mtx, coal clasts.
3972.00	Ctgs.	S7540	Sst: gry - lt gry, fn, mod hd.
4018.00	SWC	S7529	Sst: v lt gry, v fn - fn, mod srted, sl calc, arg mtx, sl mica.
4065.00	SWC	S7530	Sst: v lt gry, v fn - fn, w calc cmt, fri, mica, coal frags.

TABLE 2 TOC AND ROCK-EVAL TYPE PYROLYSIS DATA, WELL 6610/3-1R.

Depth m RKB	Type	S. no <	S1 mg HC / g rock	S2 >	TOC wt %	HI mg HC/g TOC	PP mg HC / g rock	PI	Tmax °C	Lithology	Type of pyrogram ¹
2808,00	SWC	S7468	0,79	0,42	1,1	39	1,2	0,65	ND	clst.	A
2830,00	Ctgs.	S7509	0,47	0,41	1,0	39	0,88	0,53	ND	clst.	B
2860,00	Ctgs.	S7510	0,97	0,26	1,1	23	1,2	0,79	ND	clst.	B
2882,00	SWC	S7469	1,0	2,0	1,1	194	3,1	0,34	ND	clst.	C
3057,00	Ctgs.	S7511	1,0	0,68	1,8	39	1,7	0,60	445 ²	clst.	B
3093,00	Ctgs.	S7512	1,1	0,69	1,7	41	1,8	0,61	447 ²	clst.	B
3135,00	SWC	S7470	1,1	0,42	1,2	37	1,5	0,73	ND	sh.	B
3174,00	Ctgs.	S7513	1,0	0,70	1,3	54	1,7	0,59	444 ²	clst.	B
3453,00	SWC	S7471	1,0	0,04	0,86	5	1,0	0,96	ND	sh.	C
3474,50	SWC	S7472	2,2	0,57	1,2	49	2,8	0,80	ND	sh.	D
3526,50	SWC	S7490	3,2	0,51	1,5	35	3,7	0,86	ND	clst.	D
3531,50	SWC	S7491	4,0	1,8	4,3	41	5,7	0,69	441 ²	clst.	B
3543,00	Ctgs.	S7649	4,8	5,7	6,2	93	10,5	0,45	452	clst.	
3558,00	Ctgs.	S7652	5,1	7,0	7,9	89	12,1	0,42	456	clst.	
3571,00	SWC	S7543	6,2	9,4	8,8	107	15,6	0,40	453	clst.	
3602,00	SWC	S7473	2,1	3,5	5,6	62	5,6	0,38	463	clst.	
3605,00	SWC	S7474	4,6	9,3	9,1	102	13,9	0,33	454	clst.	
3613,00	SWC	S7475	2,0	2,9	5,1	57	5,0	0,41	459	clst.	
3619,00	SWC	S7476	2,6	4,8	6,5	75	7,5	0,35	461	clst.	
3631,50	SWC	S7477	2,3	2,3	6,3	36	4,6	0,50	464	clst.	
3645,00	SWC	S7478	1,5	1,5	3,8	40	3,0	0,50	457	clst.	
3659,00	SWC	S7479	2,0	1,8	4,3	42	3,8	0,53	465 ²	clst.	B
3668,00	SWC	S7480	0,77	0,05	0,89	6	0,8	0,94	ND	clst.	D
3692,00	SWC	S7481	1,1	0,53	1,7	31	1,7	0,68	ND	clst.	B
3868,50	SWC	S7482	1,4	0,04	1,5	3	1,4	0,97	ND	clst.	D
3872,00	SWC	S7483	1,3	1,1	1,4	73	2,3	0,54	ND	clst.	A
3920,00	SWC	S7484	0,58	0,79	1,4	56	1,4	0,42	ND	clst.	B
4028,00	SWC	S7485	1,5	1,4	1,8	78	2,9	0,51	ND	clst.	B
4059,00	SWC	S7486	1,8	13,2	15,1	87	15,0	0,12	475	carb. clst	
4073,00	SWC	S7487	8,8	78,9	81,8	96	87,6	0,10	478	coal	
4097,00	SWC	S7488	2,4	11,5	20,8	55	13,9	0,17	482	carb. clst	
4102,50	SWC	S7489	1,2	1,1	4,2	27	2,3	0,53	479 ²	clst.	B
2914,00	SWC	S7514	1,2	1,1				0,50		sst.	C
2922,50	SWC	S7515	1,5	0,42				0,78		sst.	C
2938,00	SWC	S7516	1,5	1,8				0,45		sst.	C
2950,00	SWC	S7517	1,2	0,13				0,90		sst.	
2980,00	SWC	S7518	0,36	0,63				0,36		sst.	C
3028,00	SWC	S7519	1,1	0,16				0,88		sst.	
3203,00	SWC	S7520	1,5	0,07				0,96		sst.	
3230,00	SWC	S7521	5,2	1,3				0,80		sst.	
3317,60	Core	S7532	1,5	0,07				0,95		sst.	
3318,60	Core	S7533	1,9	0,06				0,97		sst.	
3392,00	SWC	S7522	3,3	1,8				0,65		sst.	C
3720,05	Core	S7534	0,26	0,28				0,48		sst.	
3745,85	Core	S7535	0,31	0,19				0,62		sst.	D
3870,00	SWC	S7523	0,82	0,07				0,92		sst.	D
3871,00	SWC	S7524	0,68	0,14				0,83		sst.	D
3874,50	SWC	S7525	1,1	0,07				0,94		sst.	D
3882,00	SWC	S7526	0,76	0,70				0,52		sst.	C
3900,00	SWC	S7527	0,78	0,03				0,96		sst.	D
3965,00	SWC	S7528	1,9	0,09				0,95		sst.	D
3972,00	Ctgs.	S7540	0,19	0,42				0,31		sst.	
4018,00	SWC	S7529	0,87	0,03				0,97		sst.	D
4065,00	SWC	S7530	1,1	0,14				0,88		sst.	D
Standards											
BVM					4,3						
BVM			0,46	21,1			21,5	0,02	423		
BVM			0,48	18,5			19,0	0,03	419		
BVM			0,50	19,8			20,3	0,02	422		
BVM			0,46	19,2			19,7	0,02	420		
BVM			0,47	20,9			21,4	0,02	420		

¹See Figure 1 for illustration of the different types of pyrograms²Unreliable

TABLE 3 VISUAL KEROGEN DESCRIPTIONS (%), WELL 6610/3-1R

Depth / S.no	Spl	Lithology	Amorphous			Algal / Phytoplankton				Herbaceous				Woody			Coaly						
			AM%	FA	HA	AP%	Cy	Ta	Bo	Di	De	HE%	SP	Cu	De	WO%	FL	NF	De	CO%	FS	De	
2860 / S7510	swc	Clst	35		*	tr	*						tr	*		*	10		*	*	55	*	**
3174 / S7513	swc	Clst	80		*	tr	*						tr	*		*	5			*	15		*
3558 / S7405	swc	Clst	70		*	tr	*						tr	*		*	20		**	*			
3571 / S7543	swc	Clst	75		*	tr	*						tr	*		*	5		*	**	10	**	*
3602 / S7473	swc	Clst	60		*	tr	*						5	*		*	20		**	*	10	*	**
3619 / S7476	swc	Clst	65		*	tr	*						10	*	?	*	15		*	*	15	*	*
3659 / S7479	swc	Clst	40	*	*	tr	*						5	*			40		**	*	10	*	*
4059 / S7486	swc	Carb. clst	20		*	tr	*						tr	*		*	60		**	*	15	**	*
4073 / S7487	swc	Coal	tr		*	tr	*						tr	*		*	75		**	*	20	**	*
																					25	**	*

TABLE 4 NORMALIZED COMPONENT GROUP COMPOSITION (WT%) OF EXTRACTED ORGANIC MATTER (C₁₅+), WELL 6610/3-1R.

Depth m RKB	Type	Sample no.	Rock (g)	EOM (mg)	EOM (ppm)	Sat (%)	Aro (%)	Pol (%)	Asph (%)	HC (%)	nonHC (%)
2860,00	Ctgs.	S7510	20,05	66,4	3312	0	1	76	22	2	98
3174,00	Ctgs.	S7513	17,92	59,4	3315	2	4	72	22	6	94
3543,00	Ctgs.	S7649	6,94	64,1	9236	18	17	52	13	35	65
3558,00	Ctgs.	S7652	10,94	96,9	8857	24	23	37	15	47	53
3571,00	SWC	S7543	3,69	32,2	8726	23	19	37	21	42	58
3605,00	SWC	S7474	1,60	15,5	9688	8	14	55	22	23	77
3619,00	SWC	S7476	2,94	14,5	4932	14	19	37	30	32	68
3692,00	SWC	S7481	2,71	10	3690	20	6	53	21	27	73
4028,00	SWC	S7485	1,66	9,3	5602	25	2	58	14	27	73
4059,00	SWC	S7486	2,37	17,2	7257	4	17	18	61	21	79
4073,00	SWC	S7487	3,62	16,6	4586	2	16	21	61	18	82
2950,00	SWC	S7517	4,78	19,1	3996	2	0	84	14	2	98
3028,00	SWC	S7519	3,04	12,9	4243	2	0	84	14	2	98
3203,00	SWC	S7520	2,65	12,1	4566	9	2	72	17	12	88
3200-3249	Oil in mud	S7656				25	7	46	22	32	68
3318,00	Core	S7533	18,57	58	3123	79	12	4	5	91	9
3745,85	Core	S7535	21,05	10,6	504	54	10	21	16	63	37
3874,50	SWC	S7525	4,54	19,2	4229	1	0	91	9	1	99
3965,00	SWC	S7528	2,40	12,6	5250	2	0	85	13	2	98

JANUSFJELLET

JAN39

15,09

31,6

2094

27

12

42

19

39

61

TABLE 5 COMPONENT GROUP COMPOSITION (CONCENTRATIONS) OF EXTRACTED ORGANIC MATTER (C₁₅+), WELL 6610/3-1R.

Depth m RKB	Type	Sample no.	TOC (%)	mg/g TOC					Sat x 100 Aro	HC x 100 non HC
				EOM	Sat	Aro	Pol	Asph		
2860,00	Ctgs.	S7510	1,1	301	1	4	229	67	31	2
3174,00	Ctgs.	S7513	1,3	255	4	11	183	57	37	6
3543,00	Ctgs.	S7649	6,2	149	27	25	77	19	107	55
3558,00	Ctgs.	S7652	7,9	112	27	26	42	17	105	90
3571,00	SWC	S7543	8,8	99	23	19	36	21	121	72
3605,00	SWC	S7474	9,1	106	9	15	58	24	60	29
3619,00	SWC	S7476	6,5	76	10	14	28	23	72	48
3692,00	SWC	S7481	1,7	217	44	14	114	45	325	37
4028,00	SWC	S7485	1,8	311	78	7	182	45	1173	37
4059,00	SWC	S7486	15,1	48	2	8	9	29	26	27
4073,00	SWC	S7487	81,8	6	0	1	1	3	16	22

TABLE 6 GAS CHROMATOGRAPHIC DATA FOR EXTRACT FRACTIONS, WELL 6610/3-1R.

Depth m RKB	Type	Sample no.	A Pristane n-C17	B Phytane n-C18	A B	Pri Phy	nC17 nC17+nC27	CPI 1	F 1	F 2	MPI 1
2860,0	Ctgs.	S7510	0,94	0,43	2,2	2,7	0,64	1,2	0,42	0,19	0,54
3174,0	Ctgs.	S7513	0,57	0,27	2,1	3,2	0,75	1,2	0,41	0,20	0,57
3543,00	Ctgs.	S7649	0,54	0,39	1,4	1,8	0,78	1,1	0,39	0,21	0,64
3558,00	Ctgs.	S7652	0,64	0,38	1,7	1,9	0,77	1,2	0,40	0,20	0,65
3571,00	SWC	S7543	0,74	0,39	1,9	2,2	0,72	1,2	0,42	0,22	0,71
3230,00	SWC	S7521	0,61	0,44	1,4	2,0	0,88				
3200-49	Oil in mud	S7656	0,74	0,58	1,3	1,6	0,95	1,1	0,46	0,23	0,77
3318,00	Core	S7533	0,55	0,38	1,4	1,5	0,53	1,1	0,48	0,25	0,82
3745,85	Core	S7535	0,29	0,15	2,0	2,1	0,75	1,1	0,37	0,16	0,50
		JANUS39	0,96	0,60	1,6	1,9	0,68	1,2	0,43	0,20	0,72

TABLE 7 BIOMARKER PARAMETERS¹ FROM GC-MS ANALYSIS OF SATURATED HYDROCARBONS, WELL 6610/3-1R.

Depth m RKB	Type	Sample no.	20S	$\beta\beta$	22S	Ts/Tm	TtX	30D/H	30 $\alpha\beta$
2860,00	Ctgs.	S7510	0,40	0,28	0,57	0,05	0,10	0,04	0,66
3174,00	Ctgs.	S7513	0,46	0,51	0,59	0,59	1,9	0,22	0,83
3543,00	Ctgs.	S7649	0,53	0,60	0,59	2,9	8,6	1,6	0,88
3558,00	Ctgs.	S7652	0,61	0,64	0,56	2,0	8,2	5,5	1,0
3571,00	SWC	S7543	0,50	0,61	0,58	2,1	7,6	2,8	0,87
3605,00	SWC	S7485	0,48	0,53	0,64	0,76	0,40	0,05	0,89
4073,00	SWC	S7487	0,45	0,54	n.d.	4,6	1,4	0,11	0,91
3203,00	SWC	S7520	0,56	0,61	0,63	1,8	3,1	0,19	0,91
3200-3249	Oil in mud	S7656	0,54	0,55	0,56	1,3	0,83	0,09	0,88
3318,00	Core	S7533	0,58	0,64	0,59	2,6	9,6	0,60	0,92
3745,85	Core	S7535	0,45	0,55	0,58	1,0	1,0	0,13	0,89
	Standard	JAN39	0,50	0,53	0,60	1,5	2,6	0,12	0,87
	Standard	6610M21	0,50	0,42	0,57	1,4	1,0	0,10	0,87
	Standard	BUL1803H	0,51	0,44	0,60	1,5	1,0	0,08	0,89

TABLE 7, CONT

Fm	Depth m RKB	Type	Sample no.	%C27	%C28	%C29	C30/st	Dia/ reg	28 α β /H	H/S		
	2860,00	Ctgs.	S7510	29	33	38	0,11	0,73	0,04	73		
	3174,00	Ctgs.	S7513	30	31	39	0,08	2,0	0,00	27		
	3543,00	Ctgs.	S7649	32	34	34	0,12	3,9	0,00	4,3		
	3558,00	Ctgs.	S7652	37	31	32	0,07	3,0	0,00	5,5		
	3571,00	SWC	S7543	33	30	37	0,08	3,2	0,00	7,6		
	3605,00	SWC	S7485	38	25	37	0,06	1,4	0,07	5,0		
	4073,00	SWC	S7487	30	27	43	0,10	0,45	0,05	n.d.		
	3203,00	SWC	S7520	32	31	38	0,12	1,3	0,06	3,1		
	3200-3249	Oil in mud	S7656	47	28	25	0,06	2,9	0,15	3,1		
	3318,00	Core	S7533	31	33	36	0,14	3,5	0,06	3,6		
	3745,85	Core	S7535	30	28	43	0,11	0,89	0,09	9,8		
JANUSFJELLET		Standard	JAN39	34	28	38	0,08	1,3	0,05	4,9		
BULGARIA		Standard	6610M21	28	38	34	0,06	0,58	0,18	5,9		
		Standard	BUL1803H	30	37	33	0,05	0,55	0,21	3,7		
	Depth m RKB	Type	Sample no.	ppmH	ppmS	3R/H	4R/H	35/34H	29/30H	Dem/H	O/H	G/H
	2860,00	Ctgs.	S7510	n.d.	n.d.	0,03	0,07	0,67	0,93	0,00	0,00	
	3174,00	Ctgs.	S7513	n.d.	n.d.	0,05	0,09	0,67	0,54	0,07	0,00	0,04
	3543,00	Ctgs.	S7649	24	5	0,53	0,24	1,1	0,63	0,00	0,00	0,01
	3558,00	Ctgs.	S7652	31	6	0,87	0,47	1,3	0,60	0,87	0,00	
	3571,00	SWC	S7543	51	7	0,56	0,30	1,2	0,70	0,48	0,00	
	3605,00	SWC	S7485	511	101	0,16	0,10	1,2	0,79	0,15	0,00	0,08
	4073,00	SWC	S7487	n.d.	4	0,33	n.d.	n.d.	0,78	0,00	0,00	
	3203,00	SWC	S7520	161	52	0,10	0,10	0,96	0,55	0,24	0,00	0,03
	3200-3249	Oil in mud	S7656	33	11	1,32	0,38	1,2	0,74	0,09	0,00	
	3318,00	Core	S7533	284	80	0,21	0,06	0,88	0,38	0,13	0,00	0,01
	3745,85	Core	S7535	65	7	0,22	0,09	1,4	0,72	0,00	0,00	0,02
JANUSFJELLET		Standard	JAN39	1700	348	0,10	0,05	0,48	0,35	0,00	0,00	0,02
BULGARIA		Standard	6610M21	n.d.	n.d.	0,07	0,09	1,1	0,43	0,00	0,28	
		Standard	BUL1803H	n.d.	n.d.	0,06	0,08	1,2	0,49	0,00	0,27	0,01

¹ The derivation of parameters is described in Appendix E
n.d. = not determined

TABLE 8 BIOMARKER PARAMETERS¹ FROM GC-MS ANALYSIS OF AROMATIC HYDROCARBONS, WELL 6610/3-1R.

Depth m RKB	Type	Sample no.	Arom 1	Arom 2	Crack1	Crack2
2860,00	Ctgs.	S7510	n.d.	n.d.	0,54	0,19
3174,00	Ctgs.	S7513	n.d.	n.d.	0,79	0,52
3200-3249	Oil in mud	S7656	0,74	0,48	0,89	0,67
3318,00	Core	S7533	n.d.	n.d.	0,91	0,72
JANUSFJELLET	Standard	JAN39	0,95	0,86	0,38	0,23
BULGARIA	Standard	Bulgaria	0,72	0,52	0,29	0,14
BULGARIA	Standard	Bulgaria	0,71	0,50	0,26	0,13

¹ The derivation of parameters is described in Appendix F
n.d. = not determined

TABLE 9 VITRINITE REFLECTANCE DATA, 6610/3-1R.

Depth mRKB	Sample type	Lithology	Vitrinite reflectance				sample quality
			%Rm	(N)	STD	reliability	
2750	cutt	clst	0.59	(6)	0.04	P	LLHL
2820	cutt	clst	0.5	(12)	0.07	F	LIII
2870	cutt	clst	0.58	(1)	-	P	LIII
2910	cutt	clst	0.64	(5)	0.02	P	LLHL
2957.5	swc	clst	0.55	(20)	0.07	F	LIII
3012	swc	clst	-	(0)			
3054	cutt	clst	0.67	(1)	-	P	LIII
3102	cutt	clst	0.64	(3)	0.02	P	LIII
3150	cutt	clst	0.68	(5)	0.06	P	LIII
3198	cutt	clst	0.63	(4)	0.01	P	LIII
3252	cutt	clst	0.64	(5)	0.04	P	LIII
3303	cutt	clst	0.67	(6)	0.04	P	LIII
3369	cutt	clst	0.71	(8)	0.06	P	LIII
3399	cutt	clst	0.75	(9)	0.05	P	LIII
3450	cutt	clst	0.70	(1)	-	P	LIII
3521	swc	clst	-	(0)			
3551.5	swc	clst	0.76	(6)	0.02	P	LIII
3588	swc	clst	0.85	(14)	0.07	F	IIII
3650	swc	clst	0.76	(3)	0.04	P	LIII
3721.8	core	clst	0.97	(2)	-	P	LLHL
3769	swc	clst	0.95	(3)	0.01	P	LIII
3792	cutt	slst	0.93	(24)	0.07	G	IIII
3843	cutt	mudst	0.95	(1)	-	P	LIII
3897	cutt	slst	1.01	(1)	-	P	LIII
3945	cutt	coal	1.16	(20)	0.07	G	IIII
4059	swc	carb. clst	1.20	(25)	0.05	G	IIII
4074	cutt	coal	1.19	(24)	0.10	G	IIII
4097	swc	carb. clst	1.17	(7)	0.04	F	IIII

G: good

F: fair

P: poor

Sample quality:

item 1: particle surface quality

item 2: particle size

item 3: type of vitrinite

item 4: identification of vitrinite

item 5: abundance of vitrinite

L: may give a too low vitrinite reflectance value

I: has no effect on the resulting vitrinite reflectance value

H: may give a too high vitrinite reflectance value

TABLE 10 INTERPRETED VITRINITE
REFLECTANCE TREND,
WELL 6610/3-1 AND 6610/3-1R.

Depth mRKB	Vitrinite reflectance %Rm
1000	0.31
1500	0.35
2000	0.41
2200	0.42
2400	0.47
2600	0.50
2800	0.54
3000	0.59
3200	0.62
3400	0.74
3600	0.83
3800	1.03
4000	1.14

TABLE 11 SPORE COLOUR INDICES, WELL 6610/3-1R

Depth m RKB	Type	S no.	Lithology	SCI
2680	Ctgs.	S7510	clst	5.5 - 6.0
3174	Ctgs.	S7513	clst	5.5 (?)
3539.5	SWC	S7495	clst	6.0
3558	Ctgs.	S7504	clst	7.5 (??)
3571	SWC	S7543	clst	8.0
3602	SWC	S7473	clst	8.5
3619	SWC	S7476	clst	8.0 - 8.5
3659	SWC	S7479	clst	6.5 - 7.0
4059	SWC	S7486	carb. clst	7.0 - 7.5
4073	SWC	S7487	coal	8.5 (??)

APPENDIX A

ORGANIC GEOCHEMICAL ANALYSES
OF COMPONENTS USED IN THE ANCO 2000 MUD SYSTEM

MUD COMPONENTS INVESTIGATED:

Component	Description
ANCO 208	Polyalkylene glykol
ANCO RESIN	Polyanionic lignin
ANCO TEMP	Low molecular weight synthetic co-polymer
THERMOPOL	High temperature stable polyacrylamide co-polymer

TABLE A1 TOC AND ROCK-EVAL TYPE PYROLYSIS DATA FOR MUD COMPONENTS

Component	S1 < mg HC / g rock >	S2 >	TOC wt %	HI mg HC/g TOC	PP mg HC/ g rock	PI	Tmax oC
ANCO 208	575,1	1,4	45,4	3	576,5	1,00	nd
ANCO RESIN	7,8	4,0	41,6	10	11,8	0,66	484
ANCO TEMP	1,8	83,6	23,1	362	85,4	0,02	423
THERMOPOL	139,0	27,3	32,3	85	166,3	0,84	nd

RESULTS FROM IATROSCAN ANALYSIS

ANCO 208 : 100% POLARS.

APPENDIX G

GEOCHEMICAL ANALYSIS OF GAS FROM CANNED CUTTINGS
Geolab Nor, 02.03.94

REPORT: DATA REPORT GEOCHEMICAL ANALYSIS OF GAS FROM CANNED CUTTINGS	
CLIENTS: Statoil	
RESPONSIBLE SCIENTIST: Monica Østbye Hansen	
RESPONSIBLE TECHNICIAN: Unni Weseth Strøm	
DATE: 02.03.94	GEOLAB PROJECT: 62126 CLIENTS REF.: DTJ012884

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Abbreviations
Experimental

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Table 1a: C1 to C7 hydrocarbons in HEADSPACE gas
(μl gas/kg rock)

Project: STATOILBRØNN

Well: STATOILBRØNN

Depth unit of measure: m

* Indicated values in ml gas/kg rock

Depth	C1	C2	C3	iC4	nC4	C5+	sum C1-C4	sum C2-C4	%wet ness	iC4
										nC4
3050.00	7431	1840	1154	285	324	693	11034	3603	32.7	0.88
3100.00	7990	4100	3754	778	809	1209	17431	9441	54.2	0.96
3150.00	2476	1844	2390	565	789	1227	8064	5588	69.3	0.72
3200.00	5388	3078	6941	1393	3266	4149	20066	14678	73.2	0.43
3250.00	9278	3759	3622	899	1625	3962	19183	9905	51.6	0.55
3300.00	8919	2584	2039	924	1017	3291	15483	6564	42.4	0.91
3350.00	4381	992	693	197	348	1484	6611	2230	33.7	0.57
3400.00	6609	1812	1209	365	574	1482	10569	3960	37.5	0.64
3450.00	9245	2319	2218	613	1216	3434	15611	6366	40.8	0.50
3500.00	2826	668	1006	407	950	1764	5857	3031	51.8	0.43
3550.00	12095	6088	6648	1235	3060	5712	29126	17031	58.5	0.40
3600.00	18028	11074	11585	1872	4094	4074	46653	28625	61.4	0.46
3650.00	32412	18022	14770	2394	4329	4358	71927	39515	54.9	0.55
3700.00	19044	7386	9668	3083	6398	16320	45579	26535	58.2	0.48
3750.00	3792	1711	2505	823	1778	5620	10609	6817	64.3	0.46
3800.00	27481	12320	17799	5200	9012	12775	71812	44331	61.7	0.58
3900.00	8624	3301	3090	868	1463	3326	17346	8722	50.3	0.59
3950.00	20730	6020	4422	1022	1836	5590	34030	13300	39.1	0.56
4000.00	24679	5387	2086	500	553	1484	33205	8526	25.7	0.90
4050.00	337158	14044	1871	632	666	2431	354371	17213	4.9	0.95
4100.00	87525	9017	969	235	127	417	97873	10348	10.6	1.85
4150.00	496628	22034	2355	565	313	882	521895	25267	4.8	1.81
4200.00	1257	78	22	5	10	45	1372	115	8.4	0.50

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Table 1b: C1 to C7 hydrocarbons in CUTTINGS gas
(μl gas/kg rock)

Project: STATOILBRØNN

Well: STATOILBRØNN

Depth unit of measure: m * Indicated values in ml gas/kg source rock

Depth	C1	C2	C3	iC4	nC4	C5+	sum C1-C4	sum C2-C4	%wet ness	iC4 --- nC4
3050.00	459	250	321	83	191	729	1304	845	64.8	0.43
3100.00	160	211	417	102	233	935	1123	963	85.8	0.44
3150.00	289	142	296	65	177	745	969	680	70.2	0.37
3200.00	174	117	429	101	403	1398	1224	1050	85.8	0.25
3250.00	211	94	159	39	149	1063	652	441	67.6	0.26
3300.00	202	85	94	25	66	698	472	270	57.2	0.38
3350.00	200	148	128	23	76	638	575	375	65.2	0.30
3400.00	328	208	186	44	128	1250	894	566	63.3	0.34
3450.00	162	96	241	126	454	2954	1079	917	85.0	0.28
3500.00	191	79	177	73	292	2214	812	621	76.5	0.25
3550.00	501	1392	5077	1477	4179	5249	12626	12125	96.0	0.35
3600.00	4866	15154	40919	10478	25269	29765	96686	91820	95.0	0.41
3650.00	536	599	1307	332	768	838	3542	3006	84.9	0.43
3700.00	282	120	316	115	458	1481	1291	1009	78.2	0.25
3750.00	990	246	503	193	536	2931	2468	1478	59.9	0.36
3800.00	634	126	548	412	934	3124	2654	2020	76.1	0.44
3900.00	775	83	202	76	276	1091	1412	637	45.1	0.28
3950.00	3119	195	203	48	168	764	3733	614	16.5	0.29
4000.00	576	592	341	70	182	892	1761	1185	67.3	0.38
4050.00	23870	6612	557	64	77	357	31180	7310	23.4	0.83
4100.00	28549	11313	1163	161	116	354	41302	12753	30.9	1.39
4150.00	23837	7385	787	112	69	114	32190	8353	26.0	1.62
4200.00	10505	2878	329	23	37	98	13772	3267	23.7	0.62

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Table 1c: C1 to C7 hydrocarbons in HEADSPACE and CUTTINGS gas
(μl gas/kg rock)

Project: STATOILBRØNN

Well: STATOILBRØNN

Depth unit of measure: m

* Indicated values in ml gas/kg source rock

Depth	C1	C2	C3	iC4	nC4	C5+	sum	sum	%wet ness	iC4
							C1-C4	C2-C4		---
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
3050.00	7890	2090	1475	368	515	1422	12338	4448	36.1	0.71
3100.00	8150	4311	4171	880	1042	2144	18554	10404	56.1	0.84
3150.00	2765	1986	2686	630	966	1972	9033	6268	69.4	0.65
3200.00	5562	3195	7370	1494	3669	5547	21290	15728	73.9	0.41
3250.00	9489	3853	3781	938	1774	5025	19835	10346	52.2	0.53
3300.00	9121	2669	2133	949	1083	3989	15955	6834	42.8	0.88
3350.00	4581	1140	821	220	424	2122	7186	2605	36.3	0.52
3400.00	6937	2020	1395	409	702	2732	11463	4526	39.5	0.58
3450.00	9407	2415	2459	739	1670	6388	16690	7283	43.6	0.44
3500.00	3017	747	1183	480	1242	3978	6669	3652	54.8	0.39
3550.00	12596	7480	11725	2712	7239	10961	41752	29156	69.8	0.37
3600.00	22894	26228	52504	12350	29363	33839	143339	120*	84.0	0.42
3650.00	32948	18621	16077	2726	5097	5196	75469	42521	56.3	0.53
3700.00	19326	7506	9984	3198	6856	17801	46870	27544	58.8	0.47
3750.00	4782	1957	3008	1016	2314	8551	13077	8295	63.4	0.44
3800.00	28115	12446	18347	5612	9946	15899	74466	46351	62.2	0.56
3900.00	9399	3384	3292	944	1739	4417	18758	9359	49.9	0.54
3950.00	23849	6215	4625	1070	2004	6354	37763	13914	36.9	0.53
4000.00	25255	5979	2427	570	735	2376	34966	9711	27.8	0.78
4050.00	361028	20656	2428	696	743	2788	385551	24523	6.4	0.94
4100.00	116074	20330	2132	396	243	771	139175	23101	16.6	1.63
4150.00	520465	29419	3142	677	382	996	554085	33620	6.1	1.77

- 2 -

Table 1c: C1 to C7 hydrocarbons in HEADSPACE and CUTTINGS gas
(μl gas/kg rock)

Project: STATOILBRØNN

Well: STATOILBRØNN

Depth unit of measure: m * Indicated values in ml gas/kg source rock

Depth	C1	C2	C3	iC4	nC4	C5+	sum	sum	%wet ness	iC4
							C1-C4	C2-C4		nC4
4200.00	11762	2956	351	28	47	143	15144	3382	22.3	0.60

- 1-

Table 2 : Lithology description for well STATOIL,CANNED CUTTINGS

Depth unit of measure: m

Depth	Type	Trb	Sample
Int Cvd	TOC%	%	Lithology description
3050.00			0001
		70 Sh/Clst:	drk gy to gy blk, slt, mic
		30 S/Sst :	lt gy w to gy w, f, crs, l, cem
		tr Cont :	prp
			0001-1L
			0001-2L
			0001-3L
3100.00			0002
		90 Sh/Clst:	drk gy, slt, mic
		10 S/Sst :	lt gy w to gy w, f, crs, cem
		tr Cont :	prp
			0002-1L
			0002-2L
			0002-3L
3150.00			0003
		80 Sh/Clst:	m gy to drk gy, slt, mic
		20 S/Sst :	lt gy w to gy w, crs, f, slt, cem
		tr Cont :	prp
			0003-1L
			0003-2L
			0003-3L
3200.00			0004
		85 Sh/Clst:	m gy to drk gy, slt, mic
		15 S/Sst :	lt gy w to gy w, crs, f, slt, cem
		tr Cont :	prp
			0004-1L
			0004-2L
			0004-3L
3250.00			0005
		80 S/Sst :	lt gy w to gy w, crs, f, l, cem
		20 Sh/Clst:	m gy to drk gy, slt, mic
		tr Cont :	prp
			0005-2L
			0005-1L
			0005-3L

- 2-

Table 2 : Lithology description for well STATOIL, CANNED CUTTINGS

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	%		
Lithology description				
3300.00				0006
		95 S/Sst	: lt gy w to gy w, f, crs, l, cem, mic	0006-2L
		5 Sh/Clst:	m gy to drk gy, slt, mic	0006-1L
3350.00				0007
		85 S/Sst	: lt gy w to gy w, f, crs, l, cem, mic	0007-2L
		15 Sh/Clst:	m gy to drk gy, slt, mic	0007-1L
		tr Cont	: prp	0007-3L
3400.00				0008
		90 S/Sst	: lt gy w to gy w, f, crs, l, cem, mic	0008-2L
		10 Sh/Clst:	m gy to drk gy, slt, mic	0008-1L
		tr Cont	: prp	0008-3L
3450.00				0009
		85 S/Sst	: lt gy w to gy w, crs, l, cem, mic	0009-2L
		15 Sh/Clst:	m gy to drk gy, slt, mic	0009-1L
		tr Cont	: prp	0009-3L
3500.00				0010
		85 S/Sst	: lt gy w to gy w, crs, l, cem, mic	0010-2L
		15 Sh/Clst:	m gy to drk gy, slt, mic	0010-1L
		tr Cont	: prp	0010-3L

- 3-

Table 2 : Lithology description for well STATOIL,CANNED CUTTINGS

Depth unit of measure: m

Depth	Type	Trb	Sample
Int Cvd	TOC%	%	Lithology description
3550.00			0011
		85 S/Sst	: lt gy w to gy w, crs, l, cem, mic 0011-2L
		15 Sh/Clst	: m gy to drk gy, slt, mic 0011-1L
		tr Cont	: prp 0011-3L
3600.00			0012
		90 Sh/Clst	: brn gy to drk brn gy, mic 0012-1L
		5 S/Sst	: lt gy w to gy w, f, crs, l 0012-2L
		5 Cont	: cem, prp 0012-3L
3650.00			0013
		90 Sh/Clst	: brn gy to drk brn gy, mic 0013-1L
		10 Cont	: cem, prp, bar 0013-2L
		tr S/Sst	: lt gy w to gy w, f, crs, l 0013-3L
3700.00			0014
		95 Sh/Clst	: m gy to brn gy 0014-1L
		5 Cont	: prp, bar 0014-2L
3750.00			0015
		70 Sh/Clst	: m gy to brn gy 0015-1L
		20 Cont	: prp, cem, trbofsgs 0015-2L
		10 Sltst	: lt gy to lt brn gy, s 0015-3L
3800.00			0016
		85 Sltst	: lt brn gy 0016-1L
		10 Sh/Clst	: m gy to drk gy to brn gy 0016-2L
		5 Cont	: cem, prp 0016-3L

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Table 2 : Lithology description for well STATOIL, CANNED CUTTINGS

Depth unit of measure: m

Depth	Type	Trb	Sample
Int Cvd	TOC%	%	Lithology description
3900.00			0017
			50 Sh/Clst: m gy to drk gy to brn gy 0017-2L
			30 S/Sst : lt gy w to gy w, f, crs, l 0017-3L
			20 Sltst : lt brn gy 0017-1L
			tr Kaolin : w 0017-4L
			tr Cont : prp 0017-5L
3950.00			0018
			80 Sltst : gy w to lt gy, cem 0018-1L
			15 Sh/Clst: m gy to drk gy to brn gy, carb 0018-2L
			5 S/Sst : lt gy w to gy w, f, crs, l 0018-3L
			tr Ca 0018-4L
			tr Cont : prp, trbofgs 0018-5L
4000.00			0019
			40 Sltst : gy w to lt gy w, cem, s 0019-1L
			40 Sh/Clst: m gy to drk gy to brn gy, carb 0019-2L
			20 S/Sst : lt gy w to gy w, f, crs, l 0019-3L
			tr Ca 0019-4L
			tr Cont : prp, trbofgs 0019-5L
4050.00			0020
			60 Sltst : gy w to lt gy w to lt brn gy, 0020-1L
			cem, s
			30 Sh/Clst: drk gy to brn blk to dsk brn, 0020-2L
			carb, wx
			10 S/Sst : lt gy w to gy w, f, crs, l 0020-3L
			tr Cont : prp, trbofgs 0020-4L

- 5-

Table 2 : Lithology description for well STATOIL, CANNED CUTTINGS

Depth unit of measure: m

Depth	Type	Trb	Sample	
Int Cvd	TOC%	%	Lithology description	
4100.00			0021	
	70	Coal	: drk brn blk, cly	0021-2L
	20	Sltst	: gy w to lt gy w to lt brn gy, cem, s	0021-1L
	10	S/Sst	: lt gy w to gy w, f, crs, l	0021-3L
	tr	Cont	: prp, trbofgs	0021-4L
4150.00			0022	
	45	Coal	: drk brn blk, cly	0022-2L
	40	Sh/Clst:	m gy to drk gy to brn gy	0022-4L
	10	Sltst	: gy w to lt gy w to lt brn gy, cem, s	0022-1L
	5	S/Sst	: lt gy w to gy w, f, crs, l	0022-3L
	tr	Cont	: prp	0022-5L
4200.00			0023	
	45	S/Sst	: lt gy w to gy w, f, crs, l	0023-2L
	40	Ca	: w to lt or gy to gy pi	0023-1L
	5	Sh/Clst:	m brn, calc	0023-3L
	5	Sh/Clst:	lt gy to lt gn gy, calc	0023-4L
	5	Coal	: brn blk to blk, cly	0023-5L
	tr	Cont	: prp	0023-6L

Abbreviations

List of abbreviations used for lithology description (sorted alphabetically)

ang	= angular
bar	= Baryte (mud additive)
bit	= bituminous
bl	= blue/blueish
blk	= black
br	= brittle
brn	= brown/brownish
Ca	= Carbonate (limestone/chalk/dolomite/siderite)
calc	= calcareous
carb	= carbonaceous
cem	= cement used as additive (under "cont") or to describe cemented S/Sst
Chert	= Chert
chk	= Chalk/chalky
cly	= clayey/shaly
cngl	= conglomeratic
Coal	= Coal
Coal-ad	= Coal-like additive (e.g. chromlignosulfonate)
Congl	= Conglomerat
Cont	= Contamination(s)
crs	= coarse grained
dd	= dried drilling mud
dol	= Dolomite/dolomitic
drk	= dark (colour)
dsk	= dusk/dusky (colour)
evap	= Salt/Gypsum/Halite (natural "Other" or as additive "Cont")
f	= fine grained
fe	= ferruginous
fib	= fibres (mud additive/contamination)
fis	= fissile
fos	= fossiliferous
glauc	= glauconite/glauconitic
gn	= green/greenish
gy	= grey/greyish
hd	= hard
ign	= Igneous (material derived from igneous source)
Kaolin	= Kaolin(ite)
kn	= kaolinitic
l	= loose
lam	= laminated/laminae
lt	= light (colour)
m	= medium (colour or grain size)
Marl	= Marl (calcareous claystone/mudstone)
mic	= micaceous

Experimental

Headspace Gas Analysis

The analysis is performed using a Perkin Elmer 8310 gas chromatograph with a 50 m Plot fused silica Al_2O_3/KCL column, loop injector and flame ionization detector. Nitrogen is used as carrier gas and the column is run from 70°C to 200°C, at a rate of 12°C/min. Final hold time is 5 min.

Two cm^3 of headspace gas are removed from each sample can for chromatographic analysis of the C_1 to C_7 range of hydrocarbons.

Occluded Gas Analysis

The gas chromatograph used for this analysis is identical to that used for headspace gas analysis and is operated under the same conditions. The canned samples are washed in thermostat-controlled water to remove drilling contaminants and sieved on a 2 mm mesh sieve to remove large, caved rock fragments. An aliquot (ca 25 mg) of sieved sample is crushed with 25 cm^3 water in an airtight ball mill. After crushing, 2 cm^3 of the released gas are removed from the ball mill for gas chromatographic analysis.

APPENDIX H

$^{13}\text{C}/^{12}\text{C}$ ISOTOPE RATIOS OF OIL IN MUD
Geolab Nor, 05.05.94

REPORT: DATARAPPORT Isotopanalyse av en olje (57656)	
CLIENTS: Statoil att: Kjersti Knudsen	
RESPONSIBLE TECHNICIAN: Trine Øyås	
DATE: 05.05.94	GEOLAB PROJECT: 62136 CLIENTS REF.: DTJ013595, Geotek

Table 1A: Tabulation of carbon isotope data on oils for OIL 57656

<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>
57656		-29.15	-	-29.07	-27.82	-29.09	-28.21	K18/0001

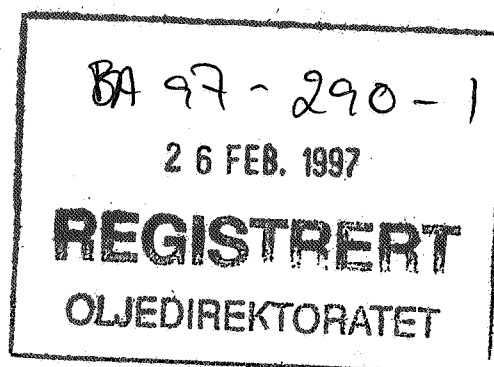
Table 1B: Tabulation of cv values from carbon isotope data for OIL 57656

<u>Well</u>	<u>Descript.</u>	<u>Saturated</u>	<u>Aromatic</u>	<u>cv value</u>	<u>Sample</u>
57656		-29.07	-27.82	0.14	K18/0001

Gabe Artigas
Executive Summary
Statoil 6610/3-1

Brenda Claxton
EPTG, Geoscience

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ATTACHMENT 1

Amoco Exploration & Production
Technology Group
Geoscience Technology Division
Houston, Texas

DATE: 6 November 1996
FILE: Technical Service No. 951105.
TO: G. B. Artigas, Amoco Norway (ANOC), Stavanger
SUBJECT: *Thermal Alteration Index (TAI) of the Statoil
6610/3-1, Norway (97-577-701256-00)*

Attached is a report by Gordon D. Wood of E&PTG, Geoscience Technology Division, Biostratigraphic Support & Development concerning the TAI of the Statoil 6610/3-1 well, Norway.

This completes the TAI aspects of Technical Service Request No.951105.

**DIRECTOR, BIOSTRATIGRAPHIC
SUPPORT & DEVELOPMENT :**

H. R. Lane

**TRANSMITTED BY
PALEONTOLOGICAL COORDINATOR:**

J. A Baesemann

Addressee(s) (1)
Author(s) (1)
Coordinator (1)
Paleo Bugdocs Custodian (3)

Introduction

Sixteen ditch cuttings samples were assessed for Thermal Alteration Index (TAI). Absence of palynological mounts necessitated examination of unsieved/unoxidized kerogen preparations. Simon Petroleum Technology Biostratigraphic (SPT) reports (Costa, 1994a, 1994b) were used in an attempt to gauge which palynomorphs were *in situ* because of the unavailability of kerogen preparations (SPT used core and sidewall core extensively in their analyses). The domination of dinoflagellates in the intervals examined (see SPT report; Amoco's in house TAI scale is correlated to pollen/spore color) compounded by the fact that kerogen preparations, unlike palynomorph mounts, do not concentrate palynomorphs and makes TAI assessment difficult. The SPT report also indicate intervals of reworking (e.g., 2650-2998m; Costa 1994a, p. 47) and extensive downhole cave/mud contamination (e.g., 3400-3444m & 3606-3743.45m; Costa, 1994b, p. 19 & 29) in both ditch cuttings and sidewall core.

Results

<u>INTERVAL (m)</u>	<u>MACERATION NO.</u>	<u>TAI VALUE*</u>
970-1000	9592-1	3/3+
1190-1220	9593-1	3/3+
1290-1320	9594-3	3/3+
1530-1560	9595-4	*
1966-2002	9596-5	3+4
2125-2158	9597-6	3+/4
2389-2416	9598-7	*
2533-2554	9599-8	4
2713-2743	9600-9	4
2917-2929	9601-10	*
3043-3070	9602-11	*
3438-3459	9603-12	*
3552-3564	9604-13	'4+'
3708-3723	9605-14	4+/5
3804-3834	9606-15	5
4098-4113	9609-18	5/5+

**in situ* palynomorphs not encountered

References

Costa, L. I. 1994a. Biostratigraphy of the Interval 403 .5m (SWC)-3121m, Statoil a.s 6610/3-1 Norwegian Sea well. Simon Petroleum Technology Report No. 4846/1a (Project No. 1a/11924): 53pp.

Costa, L. I. 1994b. Biostratigraphy of the Interval 25243m-4200m (TD), Statoil a.s. 6610/3-1 Norwegian Sea well. Simon Petroleum Technology Report No. 4994/1a (Project No. 1a/11924): 35 pp.

Engelhardt, D. W., Wood, G. D. and Barker, G. W. 1990. Amoco Standard-Thermal Alteration Index (TAI). *In* Tobin, R. and Claxton, B. L., An Explorationist's Guidebook for the Effective Use of Readily Available Thermal Maturation Technology. Amoco GETS Report G-90-6.

**Statoil 6610/3-1
Norway
97-577-01256-00**

Top	Base	Lithology	Kerogen	TOC	S1	S2	S3	HI	OI	Tmax	Tmax (% Ro equiv)	TAI	TAI %Roe	New %Ro
970	1000	olive gray shale	Amorphous	1.91	0.21	2.76	1.35	145	71	427	0.53	3/3+	0.35	0.37
1190	1220	lt. olive gray shale	Amorphous	1.39	0.09	1.19	1.09	86	78	430	0.58	3/3+	0.35	0.43
1290	1320	lt. olive gray shale	Amorphous	0.7	0.06	0.49	0.76	70	109			3/3+	0.35	0.45
1530	1560	olive gray shale	Mixed	1.88	0.13	2.16	1.11	115	59			3+/4	0.5	0.46
1966	2002	olive gray shale	Mixed	0.6	0.04	0.33	0.65	49	97			3+/4	0.5	0.62
2125	2158	med. gray shale	Mixed	0.67	0.04	0.36	1.21	54	181			3+/4	0.5	0.6
2389	2416	med. gray shale	Structured	0.76	0.08	0.48	0.49	63	64					0.67
2533	2554	med. gray shale	Mixed	0.75	0.05	0.45	0.4	60	53			3+/4		0.64
2713	2743	dk. gray shale	Structured	0.76	0.05	0.43	0.46	57	61			4		0.82
2917	2929	dk. gray shale	Structured	0.83	0.03	0.3	0.31	36	37					0.73
3043	3070	dk. gray shale	Structured	0.93	0.04	0.45	0.18	48	19					0.84
3438	3459	dk. gray shale	Mixed	1.28	0.7	1.77	1.36	138	106					0.99
3552	3564 *	dk. gray shale	Amorphous	5.6	3.85	7.52	0.87	134	16	447	0.89	"4+"		0.98
3708	3732	dk gray shale	Mixed	1.84	1.07	5.67	2.33	308	127			4+/5	0.9	1.09
3804	3834	olive gray shale	Mixed	1.57	0.98	2.99	1.24	190	79			5	1.0 - 1.1	1.11
4044	4044	black coal		13.07	14.62	70.3	2.3	538	18	479	1.46			
4044	4047	black coal	Structured	15.44	12.71	75.84	2.97	491	19	469	1.28			1.34
4098	4113	black shale	Structured	11.21	8.12	43.83	2.67	391	24	469	1.28	5/5+	1.2	1.26

* Thermally Spent Oil Prone Source Rock

**Statoil 6610/7-1
Norway
97-57-03091-00**

Top	Base		Lithology	Kerogen	%Ro
1210	1230		lt. gray shale	Structured	0.34
1250	1270		med. gray shale	Structured	0.39
2300	2333		dk. brown shale	Mixed	0.42
2477	2501		med. gray shale	Structured	0.53
2657	2663		dk. gray shale	Amorphous	0.51
2759	2765		med. brown shale	Mixed	0.45
2795	2801		med. gray siltstone	Structured	0.5
2888	2888		black coal	Structured	0.59
2942	2942		black coal	Structured	0.67
2945	2945		black coal	Structured	0.67
2951	2951		black coal	Structured	0.6
3068	3068		black coal	Structured	0.8
3071	3071		black coal	Structured	0.72
3107	3107		black coal	Structured	0.79
3146	3146		black coal	Structured	0.85

Figure 1

**Statoil 6610/7-2
Norway
97-577-03122-00**

Top	Base		Kerogen	%Ro
2067	2073		Mixed	0.46
2103	2109		Mixed	0.49
2148	2154		Structured	0.48
2166	2172		Structured	0.52
2202	2208		Structured	0.5
2319	2325		Mixed	0.57
2454	2460		Amorphous	0.71
2562	2568		Amorphous	0.79
2598	2604		Amorphous	0.8
2643	2649		Amorphous	0.77
2652	2658		Mixed	0.71

Figure 1