STATOIL

FMT PRESSURE MEASUREMENTS 34/10-37

No.	Depth, m MD RKB	Hydr. press. before kPa	Form. press. kPa	Hydr. press. after kPa	Temp. °C	Seal	Remarks
1A							
1	2616.3	40.827	37.680	40.808	81.8	Y	Good permeability
2	2619.6	40.853	37.697	40.846	82.7	Y	Moderate permeability
3	2620.5	40.867	37.699	40.858	82.9	Y	Very good permeability
4	2623.2	40.905	37.716	40.897	83.2	Y	Very good permeability
5	2624.6	40.928	37.725	40.917	83.5	Y	Very good permeability
6	2628.5	40.984	38.049	40.977	83.9	Y	Good permeability
7	2629.8	41.006	38.057	40.997	84.1	Y	Good permeability
8	2631.5	41.031	38.064	41.024	84.3	Y	Good permeability
9	2616.4	40.794	37.687	40.794	84.4	Y	Very good permeability
10	2620.0	40.865	37.703	40.849	84.3	Y	Very good permeability
11	2624.7	40.924	37.728	40.920	84.4	Y	Very good permeability
12	2640.0	41.178	38.145	41.160	85.0	Y	Very good permeability
13	2635.6	41.101	38.143	41.095	85.6	Y	Very good permeability
14	2641.0	41.187	38.151	41.178	85.8	Y	Very good permeability
15	2642.0	41.205	38.160	41.198	86.1	Y	Very good permeability
16	2645.2	41.256	-	41.255		Y	Tight
17	2646.5	41.283	38.193	41.273	87.5	Y	Very good permeability
18	2647.6	41.304	38.206	41.293	87.7	Y	Very good permeability
19	2648.4	41.312	38.214	41.305	87.9	Y	Very good permeability
20	2650.0	41.342	38.231	41.327	88.0	Y	Good permeability
21	2651.2	41.362	-	41.348	88.1	Y	Supercharged
22	2667.5	41.625	38.427	41.595	89.3	Y	Very good permeability
23	2670.2	41.655	38.456	41.632	89.5	Y	Very good permeability
24	2679.0	41.789	38.546	41.772	90.0	Y	Moderate permeability
25	2691.1	41.790	-	41.956	90.4	Y	Low perm.
26	2707.0	42.211	38.775	42.198	91.0	Y	Good permeability
27	2731.0	42.585	38.955	42.570	91.9	Y	Very good permeability

Table 3.3.1

FMT PRESSURE MEASUREMENTS 34/10-37 (continued)

No.	Depth, m MD RKB	Hydr. press. before kPa	Form. press. kPa	Hydr. press. after kPa	Temp. °C	Seal	Remarks
1A							
28	2734.5	42.653	38.988	42.629	92.1	Y	Very good permeability
29	2746.5	42.824	39.027	42.811	92.7	Y	Good permeability
30	2772.0	43.240	39.330	43.192	93.6	Y	Good permeability
31	2775.6	43.272	39.369	43.256	93.9	Y	Moderate permeability
32	2642.0	41.225		41.220	89.4	Y	Segregated sample. Fillup time 32 sec. Suspected tool plugged. No drawdown when opening 4 l chamber. Sampling aborted. Plugged line?
	2641.8	41.218	38.158	41.209	88.9	Y	Attempt to sample into 4 litre chamber. No drawdown. Plugged line?
	2640.0	41.179	38.150	41.187	88.8	Y	Attempt to sample into 4 l chamber. No drawdown. Plugged line?
	2624.5	40.955	37.731			Y	Attempt to sample into 4 l chmber. No drawdown. Plugged?
1B							
33	2624.7	40.976	37.733	40.951	85.5	Y	Segregated sample
1C							
34	2670.0	41.710	38.461	41.676	88.1	Y	Segregated sample
1D							
35	2629.0	41.079	38.062	41.039	87.0	Y	Segregated sample
1E							
36	2624.7	41.034	37.755	40.990	85.5	Y	Segregated sample

Table 3.3.1 (continued)

FMT SAMPLING 34/10-37

Run no: Depth m MD RKB	1A 2642.0 oil sample	1B 2624.7 oil sample	1C 2670.0 water sample	1D 2629.0 oil sample	1E 2624.7 oil sample
Preflush chamber,litre:	10	10	30	10	10
Opening pressure, bar	186	159		152	186
Oil volume, litre	4.6	4.6		2.7	4.8
Water/filtrate, litre			30	3.8	
Gas volume, litre	396	514	289	348	716
H_2S, ppm	0	0	1.5	0	0
CO_2 , %	0.7	0.4	0.4	0.3	0.5
4 litre chambre:					
Opening pressure, bar	145	6.9		152	145
Flowing pressure, bar	no visible drawdown	305	370	275	270

Table 3.3.2

STATOIL

FMT PRESSURE MEASUREMENTS 34/10-37A

No.	Depth, m MD RKB	Depth, m TVD RKB	Hydrost. pressure before kPa	Formation pressure kPa	Hydrost. pressure after kPa	Temp. °C	Seal	Remarks
1A								
1.0	2660.5	2596.8	40186.0	36775.0	40162.0	81.4	Y	Very good
2.0	2662.5	2598.5	40190.0	36782.0	40181.0	81.7	Y	Very good
3.0	2667.8	2603.0	40261.0	36804.0	40246.0	82.0	Y	Very good
4.0	2670.5	2605.3	40290.0	36819.0	40279.0	82.3	Y	Very good
5.0	2674.0	2608.3	40333.0	36835.0	40323.0	82.7	Y	Good
6.0	2678.0	2611.7	40380.0	36854.0	40373.0	83.1	Y	Very good
7.0	2681.5	2614.7	40427.0	36870.0	40418.0	83.3	Y	Very good
8.0	2683.5	2616.4	40451.0	36881.0	40444.0	83.6	Y	Very good
9.0	2690.0	2621.9	40528.0	36910.0	40523.0	83.8	Y	Very good
10.0	2692.6	2624.0	40561.0	36922.0	40558.0	84.0	Y	Very good
11.0	2695.5	2626.5	40597.0	36937.0	40595.0	84.2	Y	Very good
12.0	2701.8	2631.8	40722.0	36987.0	40698.0	84.8	Y	Good
13.0	2711.5	2640.1	40801.0	37066.0	40798.0	84.9	Y	Very good
14.0	2712.6	2641.0	40821.0	37070.0	40818.0	85.1	Y	Good
15.0	2715.0	2643.0	40852.0	37082.0	40848.0	85.3	Y	Good
16.0	2730.6	2656.2	41048.0	37628.0	41045.0	85.8	Y	Very good
17.0	2732.0	2657.3	41070.0	37640.0	41068.0	86.2	Y	Good
18.0	2741.0	2664.9	41186.0	37601.0	41178.0	86.8	Y	Very good
19.0	2751.6	2673.9	41314.0	37675.0	41315.0	88.0	Y	Good
20.0	2753.5	2675.5	41346.0	37691.0	41342.0	88.7	Y	Good
21.0	2772.5	2691.6	41594.0	38277.0	41592.0	90.7	Y	Good
22.0	2783.8	2701.2	41736.0	38320.0	41736.0	90.9	Y	Good
23.0	2786.0	2703.1	41767.0	38338.0	41767.0	91.1	Y	Moderate
24.0	2797.2	2712.7	41931.0	38584.0	41909.0	91.4	Y	Good
25.0	2805.5	2719.8	42025.0	38764.0	42018.0	91.6	Y	Good
26.0	2820.0	2732.1	42204.0	38973.0	42206.0	92.2	Y	Good
27.0	2832.0	2742.3	42361.0	39768.0	42362.0	92.6	Y	Moderate
28.0	2845.5	2753.9	42561.0	39229.0	42559.0	94.7	Y	Very good
29.0	2885.0	2788.0	43080.0	39596.0	43069.0	94.9	Y	Very good
30.0	2903.0	2803.6	43334.0	39748.0	43308.0	95.4	Y	Good

Table 3.3.3

3.4 Well Testing

One DST test was performed

The main objectives of the test were to investigate reservoar properties and productivity by flowing the well at high rate, obtain representative fluid samples and investigate boundary effects.

A secondary objective was to see if a maximum sand free production rate could be established.

To be able to flow the well at high rates, the surface testing facility was upgraded with one extra separator. During clean-up and main flow, the oil flow was diverted to the vessel Crystal Sea. A total of 4235 Sm^3 was produced to the vessel and shipped to Mongstad.

The test sequence consisted of a clean-up flow of 21 hours, a build-up period of 8 hours, a high rate main flow of 57 hours and a main build up period of 72 hours. The test was ended with a sampling flow to collect one additional set of separator samples.
The test was interrupted twice and the test string disconnected due to bad weather. This had some influence on the test sequence, but except for delaying the operations all main objectives of the test were achieved.

The production data from the test are shown in Table 3.4.1.

Comments to the separator fluid samples are made in chapter 3.3, including a brief comparison with FMT samples from 34/10-37.

DST No.	1
Formation	
Perforation interval	2667.0 - 2697.0 m MD RKB
PRODUCTION DATA (main flow)	
Oil rate	1950 Sm^3/day
Gas rate	645000 Sm^3/day
Separator GOR	330 Sm^3/Sm^3
Bottomhole flowing pressure	354,80 bar at 2644.0 m (gauge depth)
Bottomhole temperature	97.2 °C
Wellhead pressure, separator A	85 bar
Wellhead temperature, separator A	75 °C
CO_2/H_2S	0.9 % / 0.4 ppm
Oil density	820 kg/m^3 at 22 °C
Gas gravity	0.73 (air=1)

Table 3.4.1

Anchor Drilling Fluids

MUD VOLUME DISTRIBUTION SUMMARY

Anchor Drilling Fluids

WELL: 34/10-37 *AREA: NORTH SEA* *RIG: DEEPSEA BERGEN*

Hole size	Hole From-to	Hole Length	Mud Built	Volume Received	Dumped	Lost to Formation	Lost on surface equipment	Mud left between csg/csg plus left in hole	cuttings volume drilled	Mud transf. to next section	Mud type used for interval
inch	*m*	*m*	*m3*		*m3*	*m3*	*m3*	*m3*	*m3*	*m3*	
36	163 - 225	62	267	0	67	0	0	0	40,7	200	BENTONITE/CMC EHV
17 1/2	225 - 1525	1300	479	0	679	0	0	0	201,7	0	BENTONITE/CMC EHV
12 1/4	1525 - 2369	844	460	235	34	94	161	21	64,2	385	KCL/PAC
8 1/2	2369 - 2873	504	93	0	81	0	49	7	18,5	341	KCL/PAC

TOTALS							
Volume Received:	235	m3		Total mud left/lost downhole:	122	m3	
Mud built:	1299	m3		Total mud to sea:	1071	m3	
Mud dumped:	861	m3		Total cuttings volume drilled:	325,07	m3	
Mud lost to formation:	94	m3					
Mud lost over solids			COMMENTS:	36" SECTION: Returns to seabed.			
control equipment:	210	m3		17 1/2" SECTION: Returns to seabed.			
Mud left between csg/csg				12 1/4" SECTION: 21 m3 left behind casing. Received mud from well 33/9-18A			
plus left in hole:	28	m3		8 1/2" SECTION: 7 m3 left in hole when plugging back.			
Final volume:	341	m3					

Anchor Drilling Fluids

MUD VOLUME DISTRIBUTION SUMMARY

Anchor Drilling Fluids

WELL: 34/10-37A | *AREA: NORTH SEA* | *RIG: DEEPSEA BERGEN*

Hole size	Hole From-to	Hole Length	Mud Built	Volume Received	Dumped	Lost to Formation	Lost on surface equipment	Mud left between csg/csg plus left in hole	cuttings volume drilled	Mud transf. to next section	Mud type used for interval
inch	*m*	*m*	*m3*		*m3*	*m3*	*m3*	*m3*	*m3*	*m3*	
									0,0	0	
									0,0	0	
8 1/2	2055 - 2950	895	276	341	125	0	111	0	32,8	381	KCL/PAC
P & A			96	0	180	0	21	73	N/A	203	KCL/PAC

TOTALS					
Volume Received:	341	m3		Total mud left/lost downhole:	73 m3
Mud built:	372	m3		Total mud to sea:	437 m3
Mud dumped:	305	m3		Total cuttings volume drilled:	32,77 m3
Mud lost to formation:	0	m3			
Mud lost over solids			COMMENTS:		
control equipment:	132	m3			
Mud left between csg/csg					
plus left in hole:	73	m3	8 1/2" SECTION: 73 m3 left in hole when plugging back.		
Final volume:	203	m3	P & A SECTION: 203 m3 transfered to well 34/10-38S		

Water base mud Properties, daily records

Well: 34/10-38 S

Operator: Statoil

Anchor Drilling Fluids

Rig: Deep Sea Bergen

Date	FSR	Section	Depth	Density	Funnel	600	300	200	100	6	3	PV	YP	10 s. gel	10 m. gel	pH	API FL	HTHP FL	Chlorides	Pm	Pf	Mf	Ca	Sand	Solids	Water	MBT	LGS	KCl	Anco 208
			m	SG	sec.	rpm	rpm	rpm	rpm	rpm	rpm	cPs	Pa	Pa	Pa		ml	ml	mg/l	ml	ml	ml	mg/l	%	%	%	kg/m3	kg/m3	kg/m3	%
3-4-95	1	36"	0	1,56	125																									
4-4-95	2	36"	0	1,56	125																									
5-4-95	3	36"	223	1,20	42	29	22	19	17	16	16	7	7,5	9	9															
6-4-95	4	36"	225	1,20	42	29	22	19	17	16	16	7	7,5	9	9															
												0	0,0																	
7-4-95	5	26"	262	1,05	100+							0	0,0																	
8-4-95	6	26"	670	1,05	100+							0	0,0																	
9-4-95	7	26"	659	1,20	125	80	54	42	27	4	3	26	14,0	1,5	11		5,8													
10-4-95	8	17 1/2"	659	1,25		66	47	39	28	10	7	19	14,0	3	5	9,5	3,4		84000	1,4	0,60	1,0	720	0,7	11,8	85,2	13	12	126	3
11-4-95	9	17 1/2"	1100	1,28	70	73	53	44	32	12	10	20	16,5	4	6	8,7	3,2		69000		0,15	0,5	720	1,5	15	82	19	207	121	3
12-4-95	10	17 1/2"	1654	1,32	77	90	62	49	34	12	10	28	17,0	4	6	8,2	3,0		73000	0,5	0,00	0,0	820	780	18	79,2	29	261	123	2,8
13-4-95	11	17 1/2"	2075	1,32	77	99	67	54	37	11	9	32	17,5	4	7,5	8,0	3,1		84000	0,0	0,00	0,6	980	820	17,9	79,1	43	229	130	3
14-4-95	12	17 1/2"	2075	1,33	72	90	62	49	35	11	9	28	17,0	4,5	7,5	8,2	3,8		75000	0,4	0,00	0,3	980	820	18	79	54	240	125	3
15-4-95	13	17 1/2"	2075	1,25	72	46	30	24	15	4	3	16	7,0	1,5	2,5	8,7	4,0		55000	0,4	0,00	0,6	980	820	13,7	84,8	36	187	80	1,5
16-4-95	14	17 1/2"	2075	1,26	62	50	30	24	16	3	2	20	5,0	1	2	9,0	4,0		55000	1,0	0,15	0,7	960	820	13,8	84,7	36	160	80	1,5
17-4-95	15 A	17 1/2"	2079	1,26	62	50	30	24	16	3	2	20	5,0	1	2	9,8	4,0		55000	1,2	0,20	0,8	960	820	13,8	84,7	36	176	85	1,5
17-5-95	45	Completion	3666	1,55	100+	104	68	54	35	10	9	36	16,0	10	29	10,5			400								80			
18-5-95	46	Completion	3666	1,55	100+	104	68	54	35	10	9	36	16,0	10	29	10,5			400								80			
19-5-95	47	Completion	3666	1,55	100+	104	68	54	35	10	9	36	16,0	10	29	10,5			400								80			
20-5-95	48	Completion	3666	1,55	100+	104	68	54	35	10	9	36	16,0	10	29	10,5			400								80			
21-5-95	49	Completion	3666	1,55	100+	104	68	54	35	10	9	36	16,0	10	29	10,5			400								80			
22-5-95	50	Completion	3666	1,55	100+	104	68	54	35	10	9	36	16,0	10	29	10,5			400								80			
23-5-95	51	Completion	3666	1,55	100+	104	68	54	35	10	9	36	16,0	10	29	10,5			400								80			
24-5-95	52	Completion	3666	1,55	100+	92	60	45	32	13	12	32	14,0	9	32	9,4			400								80			
25-5-95	53	Completion	3165	1,55	100+	92	60	45	32	13	12	32	14,0	9	32	9,4			400								80			
26-5-95	54	Completion	3165	1,55	100+	98	64	51	35	15	14	34	15,0	11	48	9,4			400								80			
27-5-95	55	Completion	609	1,40	58	72	46	35	22	5	4	26	10,0	4	14	9,1			400								80			
28-5-95	56	Completion	0	1,40	65	85	53	40	24	5	4	32	10,5	4	19	8,4			400								80			
29-5-95	57	Completion	0	1,40	65	85	53	40	24	5	4	32	10,5	4	19	8,4			400								80			
30-5-95	58	Completion	0	1,40	65	85	53	40	24	5	4	32	10,5	4	19	8,4			400								80			

Oil base mud Properties, daily records

Well: 34/10-38 S

Operator: Statoil

Anchor Drilling Fluids

Rig: Deep Sea Bergen

Date	FSR	Section	Depth m	Density SG	Funnel sec.	600 rpm	300 rpm	200 rpm	100 rpm	6 rpm	3 rpm	PV cPs	YP Pa	10 s. gel Pa	10 m. gel Pa	ESV	HTHP FL ml	Mp	Ex Lime kg/m3	CaCl2 g / ltr	Activty	O / W ratio	Sand %	Solids %	Water %	HGS kg/m3	LGS kg/m3	Oil %
17-4-95	15	8 1/2" pilot	2082	1,55	120	109	63	47	30	13	12	46	8,5	13	22	880	1,2	0,75	2,8	244	0,86	80/20		24	15,4	698	174	60,6
18-4-95	16	8 1/2" pilot	2552	1,60	105	99	57	39	22	7	6	42	7,5	4	12	880	1,6	1,1	4,1	209	0,87	80/20	0,75	26,4	15	719	223	58,6
19-4-95	17	8 1/2" pilot	2986	1,60	103	112	66	45	27	11	9	46	10,0	7	22	1060	1,3	1,4	5,2	187	0,89	80/20	0,5	26	14,5	745	200	59,5
20-4-95	18	8 1/2" pilot	3140	1,60	120	121	71	52	31	12	10	50	10,5	8	25	1140	1,2	1,2	4,5	193	0,88	81/19	0,5	25,5	14	771	171	60,5
21-4-95	19	8 1/2" pilot	3160	1,60	150	120	70	52	31	12	10	50	10,0	8	26	1200	1,1	1,5	5,6	178	0,89	81/19	0,5	25,5	14	774	171	60,5
22-4-95	20	8 1/2" pilot	3229	1,60	128	123	71	52	31	9	7	52	9,5	10	26	1300	1,0	1,7	6,3	173	0,90	81/19	0,5	25,5	74,5	775	170	60,5
23-4-95	21	8 1/2" pilot	3320	1,60	158	134	77	56	34	12	10	57	10,0	9	25	1400	1,0	1,4	5,2	162	0,91	81/19	0,5	25,5	74,5	777	170	60,5
24-4-95	22	8 1/2" pilot	3466	1,60	158	136	79	57	34	12	10	57	11,0	9,5	26	1220	1,0	1,65	6,1	179	0,89	82/18	0,5	25,5	74,5	777	169	61
25-4-95	23	8 1/2" pilot	3482	1,60	195	139	82	60	38	14	12	57	12,5	11	28	1280	1,0	1,8	6,7	185	0,89	82/18	0,5	26	74	757	194	61
26-4-95	24	8 1/2" pilot	3485	1,60	200	136	79	58	33	12	11	57	11,0	10	28	1280	1,0	1,8	6,7	180	0,89	82/18	0,5	26	74	757	194	61
27-4-95	25	8 1/2" pilot	3514	1,60	155	123	71	52	31	10	9	52	9,5	9	26,5	1240	1,0	1,8	6,7	185	0,89	82/18	0,5	26	74	757	194	61
28-4-95	26	8 1/2" pilot	3537	1,60	163	126	73	54	32	11	10	53	10,0	9,5	27	1260	1,0	1,8	6,7	185	0,89	82/18	0,7	26	74	757	194	61
29-4-95	27	8 1/2" pilot	3565	1,60	155	122	71	52	32	11	10	51	10,0	11	27	1240	1,0	1,8	6,7	185	0,89	82/18	0,7	26	74	757	194	61
30-4-95	28	8 1/2" pilot	3598	1,60	145	119	68	50	30	11	10	51	8,5	8,5	27	1460	1,1	1,8	6,7	187	0,89	83/17	1,1	25,5	74,5	783	165	62
1-5-95	29	8 1/2" pilot	3613	1,60	185	128	74	54	33	11	10	54	10,0	10	28	1500	1,1	1,8	6,7	187	0,89	83/17	1,3	25,8	74,2	769	182	61,7
2-5-95	30	8 1/2" pilot	3631	1,60	153	116	67	49	29	10	9	49	9,0	8,5	24,5	1420	1	1,7	6,3	173	0,9	84/16	1,8	26	74	764	191	61,8
3-5-95	31	8 1/2" pilot	3631	1,60	262	129	76	56	35	13	11	53	11,5	13	33	1540	1	1,7	6,3	173	0,9	84/16	1,5	25,8	74,2	773	180	62
4-5-95	32	8 1/2" pilot	3827	1,60	122	128	76	56	34	12	11	52	12,0	12	33	1600	1	1,7	6,3	157	0,91	83/17	1,6	25,8	74,2	774	181	61,7
5-5-95	33	8 1/2" pilot	3940	1,60	123	124	72	53	32	11	10	52	10,0	9	34	1380	1	1,8	6,7	176	0,9	84/16	1,5	26,2	73,8	756	202	61,8
6-5-95	34	8 1/2" pilot	3940	1,60	247	130	76	54	34	12	11	54	11,0	10	34	1340	1	1,8	6,7	176	0,9	84/16	1,5	26,2	73,8	756	202	61,8
7-5-95	35	8 1/2" pilot	3940	1,60	247	130	75	54	34	12	11	55	10,0	10	34,5	1340	1	1,8	6,7	176	0,9	84/16	1,5	26,2	73,8	756	202	61,8
8-5-95	36	8 1/2" pilot	3940	1,60	251	132	78	56	35	12	11	54	12,0	10	34,5	1280	1	1,8	6,7	176	0,9	84/16	1,5	26,2	73,8	756	202	61,8
9-5-95	37	8 1/2" pilot	3940	1,60	256	133	78	56	35	12	11	55	11,5	10	35	1260	1	1,8	6,7	176	0,9	84/16	1,5	26,2	73,8	756	202	61,8
10-5-95	38	8 1/2" pilot	3940	1,60	268	135	79	59	38	14	12	56	11,5	11	36	1220	1,0	1,6	5,9	164,0	0,91	84/16	1,5	26,2	73,8	758	202	61,8
11-5-95	39	8 1/2" pilot	3940	1,60	221	134	77	56	36	13	11	57	10,0	11,5	33	1360	1,0	1,6	5,9	164,0	0,91	84/16	1,5	26,2	73,8	758	202	61,8
12-5-95	40	8 1/2" pilot	3940	1,60	230	132	76	54	34	11	9	56	10,0	10	36	1440	1,0	1,6	5,9	164,0	0,91	84/16	1,5	26,2	73,8	758	202	61,8
13-5-95	41	Completion	3740	1,60	188	131	75	55	33	11	9	56	9,5	9	31	1360	1,0	1,6	5,9	164,0	0,91	84/16	1,5	26,1	73,9	762	196	61,8
14-5-95	42	Completion	3740	1,60	231	133	76	56	33	11	9	57	9,5	10	32	1360	1,0	1,6	5,9	163,0	0,91	84/16	1,5	26,1	73,9	762	196	61,8
15-5-95	43	Completion	3740	1,60	195	124	70	51	29	9	8	54	8,0	8	27	1300	1,0	1,55	5,7	157,0	0,91	84/16	1,5	26,1	73,9	763	196	61,8
16-5-95	44	Completion	3740	1,60	195	124	70	51	29	9	8	54	8,0	8	27	1300	1,0	1,55	5,7	157,0	0,91	84/16	1,5	26,1	73,9	763	196	61,8

STATOIL

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1 INTRODUCTION

The analytical work was performed in accordance with the guidelines given in "The Norwegian Industry Guide to Organic Geochemical Analyses (1992)". The project was carried out at Geochem Group Limited, with the exception of the vitrinite reflectance analyses and the gas analysis, which were performed at IFE. Table 1 gives the analytical programme for the well.

The samples were analysed according to the following programme:

ANALYSES	NUMBER OF SAMPLES			
	Cuttings/SWC/Cores	Oil	Gas	Total
TOC	19			19
Rock-Eval pyrolysis	24			24
Vitrinite reflectance	24			24
Pyrolysis-GC	5			5
Kerogen description	5			5
$\delta^{13}C$ kerogen	10			10
Extraction and asph.precipitation	15	1		16
Iatroscan separation	15	1		16
MPLC separation	15	1		16
GC whole oil/extract		1		1
GC saturated fraction	15	1		16
GC aromatic fraction	15	1		16
GC-MS saturated fraction	15	1		16
GC-MS aromatic fraction	15	1		16
$\delta^{13}C$ of whole oil/fractions	15	1		16
$\delta^{13}C$ of gas and gas composition			1	1

TESTS

34/10-37A:	m RKB
DST 1	2667 - 2697
FMT1A	2642
FMT1B	2624.7
FMT1D	2629.0
FMT1E	2624.7

TABLE 1A. ANALYTICAL PROGRAMME FOR WELL 34/10-37

DEPTH	SAMPLE	SAMPLE	LITHOLOGY	Ro	TOC	Rock Eval	Py-GC	Visual	Bulk	GC	d13Cker	d13Ceom/	GCMS	GCMS	Thompson's	Gas-analyses
m RKB	TYPE	NO.				Pyrolysis		ker. an.	comp.	sats/arom		fractions	sats	arom	indices	
1530	Cutt	950455	clst	x												
1610	Cutt	950456	clst	x												
1700	Cutt	950457	clst	x												
1800	Cutt	950458	clst	x												
1900	Cutt	950459	clst	x												
2000	Cutt	950460	clst	x												
2100	Cutt	950461	clst	x												
2200	Cutt	950462	clst	x												
2290	Cutt	950463	clst	x												
2400	Cutt	950464	clst	x												
2468	Cutt	950465	clst	x												
2501	Cutt	950466	clst	x												
2519	Cutt	9730-001	clst		x	x										
2525	Cutt	950467	clst	x												
2528	Cutt	9730-002	clst		x	x										
2534	Cutt	9730-003	clst		x	x										
2537	Cutt	9730-004	clst		x	x										
2540	Cutt	950468	clst	x												
2546	Cutt	9730-005	clst		x	x										
2555	Cutt	9730-006	clst		x	x	x	x	x	x	x	x	x	x		
2561	Cutt	9730-007	clst		x	x			x	x	x	x	x	x		
2567	Cutt	9730-008	clst		x	x	x	x	x	x	x	x	x	x		
2573	Cutt	9730-009	clst		x	x										
2579	Cutt	9730-010	clst		x	x										
2579.5	swc	950469	clst/siltst	x												
2585	Cutt	9730-011	clst		x	x			x	x	x	x	x	x		
2591	Cutt	9730-012	clst		x	x	x	x	x	x	x	x	x	x		
2597	Cutt	9730-013	clst		x	x			x	x	x	x	x	x		
2603	Cutt	9730-014	clst		x	x										
2604.5	swc	950470	clst/siltst	x												
2612	Cutt	9730-015	coaly clst		x	x	x	x	x	x	x	x	x	x		
2615	Cutt	9730-016	coal		x	x			x	x	x	x	x	x		
2619	swc	950471	clst/siltst	x												
2625.5	swc	950472	clst/siltst	x												
2629.6	Core	9730-019	sst			x			x	x		x	x	x		
2632,85-86	Core	950473	coal	x												
2640.46	Core	9730-020	sst			x			x	x		x	x	x		
2660,92-93	Core	950474	clst/sst	x												
2717	Cutt	950475	coal/clst	x												
2804.5	swc	950476	clst/siltst	x												
2810	swc	950477	clst/siltst	x												
2828	Cutt	9730-017	clst		x	x	x	x	x	x	x	x	x	x		
2870	Cutt	950478	clst/coal	x												
2873	Cutt	9730-018	clst		x	x			x	x	x	x	x	x		
44				24	18	20	5	5	12	12	10	12	12	12		

TABLE 1B. ANALYTICAL PROGRAMME FOR WELL 34/10-37A

DEPTH	SAMPLE	SAMPLE	LITHOLOGY	Ro	TOC	Rock Eval	Py-GC	Visual	Bulk	GC	d13Cker	d13Ceom/	GCMS	GCMS	Thompson's	Gas-analyses
m RKB	TYPE	NO.				Pyrolysis		ker. an.	comp.	sats/arom		fractions	sats	arom	indices	
2590	Cutt	9731-001	clst		x	x			x	x		x	x	x		
2667.68	Core	9731-002	sst			x			x	x		x	x	x		
2689.52	Core	9731-003	sst			x			x	x		x	x	x		
2711.51	Core	9731-004	sst			x			x	x		x	x	x		
2697	DST1	9808-001							x	x		x	x	x	x	x
5					1	4			5	5		5	5	5	1	1

TABLE 2. LITHOLOGICAL DESCRIPTIONS

JOB 9730 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY mRKB	GROSS LITHOLOGIC DESCRIPTION	G S A COLOUR CODE	TOTAL ORGANIC CARBON (Wt. %)
WELL: 34/10-37				
9730-001	2519m	A 80% CALC CLAYSTONE - platy to blocky, firm, grades to arg limestone, dark grey.	N3	0.86
		B 20% SAND - fine grained, sub-angular, no F, no C, pale yellowish brown.	10YR6/2	
9730-002	2528m	A 50% SAND - fine grained, sub-angular, abundant carbonate grains, no F, no C, pale yellowish brown.	10YR6/2	
		B 45% CALC CLAYSTONE - as 001A, dark grey	N3	0.76
		C 5% Limestone.		
730-003	2534m	A 60% SAND - as 002A, no F, no C, pale yellowish brown.	10YR6/2	
		B 35% CALC CLAYSTONE - as 001A, dark grey	N3	1.32
		C 5% Limestone.		
9730-004	2537m	A 75% SAND - as 002A, occ cemented with calcite, no F, no C, pale yellowish brown.	10YR6/2	
		B 20% CALC CLAYSTONE - as 001A, dark grey	N3	0.93
		C 5% Limestone.		
9730-005	2546m	A 60% CALC CLAYSTONE - platy to blocky, firm, dark grey.	N3	1.74
		B 35% SAND - fine grained, sub-angular, common carbonate grains, no F, no C, pale yellowish brown.	10YR6/2	
		C 5% Limestone.		
9730-006	2555m	A 80% CLAYSTONE - platy, firm, sl to mod calc, dark grey.	N3	3.64
		B 20% SAND - as 005B, no F, no C, pale yellowish brown.	10YR6/2	
9730-007	2561m	A 90% CLAYSTONE - as 006A, dark grey.	N3	2.39
		B 10% SAND - as 005B, no F, no C, pale yellowish brown.	10YR6/2	
9730-008	2567m	A 95% CLAYSTONE - fissile to platy, firm, sub-vitreous, greyish black to dark grey.	N2 - N3	2.79
		B 5% Sand.		
9730-009	2573m	A 70% SAND - fine grained, sub-angular, occ cemented with calcite, no F, no C, light grey.	N7	
		B 30% CLAYSTONE - as 008A, greyish black to dark grey.	N2 - N3	2.95

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomite, Fluorescence, foraminifera fossiliferous, Lost Circulation Material, moderately, occasionally, slightly, very

JOB 9730 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY mRKB	GROSS LITHOLOGIC DESCRIPTION	G S A COLOUR CODE	TOTAL ORGANIC CARBON (Wt. %)
9730-010	2579m	A 95% CLAYSTONE - platy, firm, sl to v calc, dark grey to medium grey. B 5% Sand.	N3 - N5	2.03
9730-011	2585m	A 95% CLAYSTONE - as 010A, dark grey to medium grey. B 5% Sand.	N3 - N5	2.16
9730-012	2591m	A 70% CLAYSTONE - platy, firm, non to sl calc, dark grey. B 20% LIMESTONE - platy to blocky, hard, sandy, no F, no C, pale yellowish brown. C 10% SAND - fine grained, sub-angular, occ cemented with calcite, no F, no C, light grey.	N3 10YR6/2 N7	2.63 0.62, 0.61
9730-013	2597m	A 95% CLAYSTONE - platy to blocky, firm, sl to v calc, grades to arg limestone, dark grey to medium grey B 5% Limestone.	N3 - N5	1.83
9730-014	2603m	A 95% CLAYSTONE - as 013A, dark grey to medium grey. B 5% Limestone.	N3 - N5	1.47
9730-015	2612m	A 70% COALY CLAYSTONE - platy to blocky, firm, grades to coal, black to dark grey. B 30% SAND - fine grained, sub-angular, no F, no C, pale yellowish brown.	N1 - N3 10YR6/2	24.90
9730-016	2615m	A 80% COAL - blocky, mod soft, sub-vitreous, black. B 15% SAND - as 015B, no F, no C, pale yellowish brown. C 5% Light grey claystone.	N1 10YR6/2	73.70
9730-019	2629.58-.60m	A100% SANDSTONE - med grained, sub-angular, loosely cemented, gold F, instant blooming C, very pale orange.	10YR8/2	
9730-020	2640.42-.46m	A100% SANDSTONE - as 019A, yellow F, instant blooming C, very pale orange.	10YR8/2	
9730-017	2828m	A 80% CLAYSTONE - blocky, firm, calc, medium grey. B 20% SAND - as 015B, no F, no C, pale yellowish brown.	N5 10YR6/2	1.88

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomite, Fluorescence, foraminifera fossiliferous, Lost Circulation Material, moderately, occasionally, slightly, very

JOB 9730 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY mRKB	GROSS LITHOLOGIC DESCRIPTION	G S A COLOUR CODE	TOTAL ORGANIC CARBON (Wt. %)
9730-018	2873m	A 80% CLAYSTONE - as 017A, medium grey. B 20% SAND - as 015B, no F, no C, very pale orange.	N5 10YR8/2	1.58

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomite, Fluorescence, foraminifera fossiliferous, Lost Circulation Material, moderately, occasionally, slightly, very

JOB 9731 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY m RKB	GROSS LITHOLOGIC DESCRIPTION	G S A COLOUR CODE	TOTAL ORGANIC CARBON (Wt. %)
WELL: 34/10-37A				
9731-001	2590m	A 70% SAND - fine grained, sub-angular, common lithics, no F, no C, light grey.	N7	
		B 20% CALC CLAYSTONE - platy, mod hard, grades to arg limestone, dark grey to medium dark grey.	N3 N4	- 0.72
		C 5% Red claystone.		
		D 5% Limestone.		
9731-002	2667.65-.68m	A100% SANDSTONE - med to coarse grained, mod well cemented, sub-angular, oily odour, gold/yellow F, instant streaming C, very light grey.	N8	
9731-003	2689.50-.52m	A100% SANDSTONE - as 002A, yellow F, instant blooming C, very light grey	N8	
9731-004	2711.48-.51m	A100% SANDSTONE - med to coarse grained, sub-angular, mod well cemented, occ thin micaceous claystone laminae, yellow F, instant blooming C, very light grey.	N8	

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomite, Fluorescence, foraminifera fossiliferous, Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 3. TOC AND ROCK EVAL DATA

WELL	DEPTH m RKB	SAMPLE NO.	LITHOLOGY	SAMPLE TYPE	S1	S2	TOC	HI	PP	PI	Tmax oC
34/10-37	2519	9730-001	CLYST	CUTTINGS	0.06	0.77	0.86	90	0.83	0.07	435
34/10-37	2528	9730-002	CLYST	CUTTINGS	0.05	0.44	0.76	58	0.49	0.10	425
34/10-37	2534	9730-003	CLYST	CUTTINGS	0.08	1.51	1.32	114	1.59	0.05	436
34/10-37	2537	9730-004	CLYST	CUTTINGS	0.07	0.62	0.93	67	0.69	0.10	439
34/10-37	2546	9730-005	CLYST	CUTTINGS	0.34	2.39	1.74	137	2.73	0.12	436
34/10-37	2555	9730-006	CLYST	CUTTINGS	0.31	12.84	3.64	353	13.15	0.02	428
34/10-37	2561	9730-007	CLYST	CUTTINGS	0.17	5.36	2.39	224	5.53	0.03	435
34/10-37	2567	9730-008	CLYST	CUTTINGS	0.25	6.49	2.79	233	6.74	0.04	435
34/10-37	2573	9730-009	CLYST	CUTTINGS	0.30	8.48	2.95	287	8.78	0.03	437
34/10-37	2579	9730-010	CLYST	CUTTINGS	0.34	3.95	2.03	195	4.29	0.08	435
34/10-37	2585	9730-011	CLYST	CUTTINGS	0.23	4.90	2.16	227	5.13	0.04	439
34/10-37	2591	9730-012	CLYST	CUTTINGS	0.14	6.78	2.63	258	6.92	0.02	435
34/10-37	2597	9730-013	CLYST	CUTTINGS	0.09	3.78	1.83	207	3.87	0.02	439
34/10-37	2603	9730-014	CLYST	CUTTINGS	0.14	1.95	1.47	133	2.09	0.07	434
34/10-37	2612	9730-015	COALY CLYST	CUTTINGS	5.01	42.99	24.9	173	48.00	0.10	428
34/10-37	2615	9730-016	COAL	CUTTINGS	27.84	159.86	73.7	217	187.7	0.15	426
34/10-37	2629.6	9730-019	SST	CORE	3.17	0.86			4.03	0.79	426
34/10-37	2640.46	9730-020	SST	CORE	2.86	0.76			3.62	0.79	419
34/10-37	2828	9730-017	CLYST	CUTTINGS	0.21	2.34	1.88	124	2.55	0.08	443
34/10-37	2873	9730-018	CLYST	CUTTINGS	0.29	2.00	1.58	127	2.29	0.13	442
34/10-37A	2590	9731-001	CLYST	CUTTINGS	0.18	0.47	0.72	65	0.65	0.28	433
34/10-37A	2667.68	9731-002	SST	CORE	3.44	0.33			3.77	0.91	401
34/10-37A	2689.52	9731-003	SST	CORE	5.96	0.74			6.70	0.89	425
34/10-37A	2711.51	9731-004	SST	CORE	5.53	1.63			7.16	0.77	430
34/10-37A	2697	9808-001		DST1							

TABLE 4. PYROLYSIS-GAS CHROMATOGRAPHIC DATA

WELL	DEPTH m RKB	SAMPLE NO.	SAMPLE TYPE	C1 (%)	C2-C5 (%)	C6-C14 (%)	C15+ (%)	GOR
34/10-37	2555	9730-006	CUTTINGS	5.49	42.41	47.10	4.79	0.92
34/10-37	2567	9730-008	CUTTINGS	6.39	43.53	46.72	3.19	1.00
34/10-37	2591	9730-012	CUTTINGS	5.49	45.51	45.21	3.59	1.05
34/10-37	2612	9730-015	CUTTINGS	12.54	42.29	36.92	7.76	1.23
34/10-37	2828	9730-017	CUTTINGS	10.18	47.51	40.92	1.20	1.37

TABLE 5. KEROGEN DESCRIPTION

WELL 34/10-37

GEOCHEM SAMPLE NUMBER	DEPTH	KEROGEN COMPOSITION %				
		AM	AL	HE	WO	CO
9730-006A	2555m	← 80* →		<10	<10	10
9730-008A	2567m	5	40	15	10	30
9730-012A	2591m	5	35	15	15	30
9730-015A	2612m	-	-	15	80	5
9730-017A	2828m	-	-	10	50	40

* See remarks, - kerogen type and maturation

KEROGEN TYPE AND MATURATION

JOB 9730 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	ORGANIC MATTER DESCRIPTION					THERMAL MATURATION	
		TYPES >35%;10-35%;<10%	REMARKS	RE-WORKED (%)	PARTICLE SIZE	PRESERV-ATION	THERMAL ALTERATION INDEX	1-10 SCALE
WELL: 34/10-37								
9730-006A	2555m	(AM/AL)*;CO;WO-HE	*comprises amorphous material incompletely developed from algal organic matter		F-M	G	2-(?)	3(?)
9730-008A	2567m	AL-CO;HE-WO;AM	sapropelisation		F-M	F-G	2- max	3
9730-012A	2591m	AL-CO;HE-WO;AM			F-M	F	2-	3
9730-015A	2612m	WO;HE;CO	finely comminuted, differentiation difficult, treat data with caution		F	F	2-	3
9730-017A	2828m	WO-CO;HE;-	WO/CO differentiation difficult		F-M	F	2- to 2	3.5

Algal, Amorphous, Herbaceous, Inertinite, Resin, Wood
preservation - Poor, Fair, Good size - Fine, Medium, Coarse

TAI SCALE	1	1+ to 2-	2-	2	2 TO 2+	2+ TO 3-	3	3+	4	5
1-10 SCALE	1	2	3	4	5	6	7	8	9	10

TABLE 6A. BULK COMPOSITION, NORMALISED (WT%)

WELL	DEPTH m RKB	SAMPLE NO.	SAMPLE TYPE	EOM ppm	EOM/TOC mg/g	%sats	%arom	%pol	%asph	%hc	%non-hc
34/10-37	2555	9730-006	CUTTINGS	1238	64.47	27	2	40	31	29	71
34/10-37	2561	9730-007	CUTTINGS	881	63.86	19	3	38	40	22	78
34/10-37	2567	9730-008	CUTTINGS	995	45.65	17	2	44	37	19	81
34/10-37	2585	9730-011	CUTTINGS	795	53.7	35	1	33	31	36	64
34/10-37	2591	9730-012	CUTTINGS	635	54.74	25	2	32	41	27	73
34/10-37	2597	9730-013	CUTTINGS	737	54.97	28	2	36	34	30	70
34/10-37	2612	9730-015	CUTTINGS	10361	65.99	42	1	25	32	43	57
34/10-37	2615	9730-016	CUTTINGS	24712	70.2	44	1	15	40	45	55
34/10-37	2629.6	9730-019	CORE	6018	6686.64	93	3	0	3	96	3
34/10-37	2640.46	9730-020	CORE	5928	11855.93	88	5	3	4	93	7
34/10-37	2828	9730-017	CUTTINGS	1645	94.51	33	1	23	43	34	66
34/10-37	2873	9730-018	CUTTINGS	1166	89.72	25	1	38	36	26	74
34/10-37A	2667.68	9731-002	CORE	6552	10919.32	92	3	2	4	95	5
34/10-37A	2689.52	9731-003	CORE	7211	9013.45	96	1	1	2	97	3
34/10-37A	2711.51	9731-004	CORE	9104	1979.19	92	2	0	5	94	5
34/10-37A	2697	9808-001	DST1	56		96	1	0	3	97	3

TABLE 6B. BULK COMPOSITION (CONSENTRATION) OF EXTRACTED ORGANIC MATERIAL (C15+)

WELL	DEPTH m RKB	SAMPLE NR. NO.	SAMPLE TYPE	TOC (%)	EOM	SATS	AROM	POL	ASPH	SATS AROM	HC NONHC
					<----------mg/g TOC---------->						
34/10-37	2555	9730-006	CUTTINGS	1.9	64.5	17.7	1.0	25.1	20.2	17.8	0.4
34/10-37	2561	9730-007	CUTTINGS	1.4	63.9	12.3	1.7	24.3	25.3	7.3	0.3
34/10-37	2567	9730-008	CUTTINGS	2.2	45.7	7.6	1.0	20.0	16.9	7.4	0.2
34/10-37	2585	9730-011	CUTTINGS	1.5	53.7	18.6	0.7	17.5	16.7	28.4	0.6
34/10-37	2591	9730-012	CUTTINGS	1.2	54.7	13.9	1.2	17.3	22.1	11.5	0.4
34/10-37	2597	9730-013	CUTTINGS	1.3	55.0	15.2	1.0	19.8	18.8	14.8	0.4
34/10-37	2612	9730-015	CUTTINGS	15.7	66.0	27.9	0.4	16.6	21.0	69.8	0.8
34/10-37	2615	9730-016	CUTTINGS	35.2	70.2	31.0	0.4	10.7	28.1	81.9	0.8
34/10-37	2629.6	9730-019	CORE	0.1	6686.6	6244.9	200.5	19.2	208.5	31.2	28.3
34/10-37	2640.46	9730-020	CORE	0.1	11855.9	10389.1	579.7	374.4	485.5	17.9	12.8
34/10-37	2828	9730-017	CUTTINGS	1.7	94.5	31.2	1.3	21.5	40.2	25.0	0.5
34/10-37	2873	9730-018	CUTTINGS	1.3	89.7	22.1	0.8	33.8	32.7	27.2	0.3
34/10-37A	2667.68	9731-002	CORE	0.1	10919.3	10007.3	303.7	135.4	440.0	33.0	17.9
34/10-37A	2689.52	9731-003	CORE	0.1	9013.5	8622.9	131.7	61.7	187.0	65.5	35.2
34/10-37A	2711.51	9731-004	CORE	0.5	1979.2	1822.0	48.7	1.8	102.6	37.4	17.9

TABLE 7. GC-DATA FROM SATURATED AND AROMATIC FRACTIONS

WELL	DEPTH m RKB	SAMPLE NO.	SAMPLE TYPE	Pr/nC17 A	Ph/nC18 B	A B	Pr/Ph	17/17+27	CPI	MPI1	F1	F2
34/10-37	2555	9730-006	CUTTINGS	1.00	0.64	1.6	2.02	0.71	1.2			
34/10-37	2561	9730-007	CUTTINGS	0.86	0.55	1.6	1.90	0.61	1.2			
34/10-37	2567	9730-008	CUTTINGS	0.99	0.56	1.8	2.44	0.57	1.5			
34/10-37	2585	9730-011	CUTTINGS	0.81	0.50	1.6	1.83	0.68	1.3			
34/10-37	2591	9730-012	CUTTINGS	0.86	0.45	1.9	2.21	0.60	1.2			
34/10-37	2597	9730-013	CUTTINGS	1.02	0.51	2.0	2.58	0.73	1.3			
34/10-37	2612	9730-015	CUTTINGS	0.57	0.34	1.7	1.90	0.84	1.0			
34/10-37	2615	9730-016	CUTTINGS	0.62	0.30	2.1	2.37	0.86	1.1			
34/10-37	2629.6	9730-019	CORE	0.64	0.34	1.9	2.04	0.76	1.1			
34/10-37	2640.46	9730-020	CORE	0.74	0.38	1.9	1.94	0.72	1.0			
34/10-37	2828	9730-017	CUTTINGS	0.81	0.57	1.4	1.33	0.70	1.1			
34/10-37	2873	9730-018	CUTTINGS	0.76	0.49	1.6	1.72	0.76	1.2			
34/10-37A	2667.68	9731-002	CORE	0.67	0.39	1.7	1.78	0.73	1.1			
34/10-37A	2689.52	9731-003	CORE	0.59	0.29	2.0	2.03	0.78	1.1			
34/10-37A	2711.51	9731-004	CORE	0.67	0.37	1.8	1.82	0.73	1.0			
34/10-37A	2697	9808-001	DST1	0.68	0.43	1.6	1.74	0.78	1.0	0.71	0.49	0.28

TABLE 8. CARBON ISOTOPIC COMPOSITIONS

WELL	DEPTH m RKB	SAMPLE NO.	SAMPLE TYPE	d13Ceom/ oil	d13Csats	d13Carom	d13Cpol	d13Casph	d13Cker
34/10-37	2555	9730-006	CUTTINGS	-28.53	-29.46	-28.79	-28.50	-27.81	-27.70
34/10-37	2561	9730-007	CUTTINGS	-28.12	-29.03	-28.43	-27.98	-27.04	-27.44
34/10-37	2567	9730-008	CUTTINGS	-27.83	-29.17	-28.66	-27.84	-26.57	-27.51
34/10-37	2585	9730-011	CUTTINGS	-27.88	-29.10	-28.40	-27.87	-26.95	-27.08
34/10-37	2591	9730-012	CUTTINGS	-27.74	-28.86	-28.43	-28.14	-27.24	-27.19
34/10-37	2597	9730-013	CUTTINGS	-27.61	-28.33	-28.23	-28.02	-26.75	-26.80
34/10-37	2612	9730-015	CUTTINGS	-26.37	-28.54	-26.56	-25.79	-25.53	-25.53
34/10-37	2615	9730-016	CORE	-26.22	-28.65	-26.52	-26.25	-25.72	-25.98
34/10-37	2629.6	9730-019	CORE	-28.50	-28.87	-27.71	-28.15	-28.10	
34/10-37	2640.46	9730-020	CORE	-28.41	-28.88	-27.88	-28.13	-27.55	
34/10-37	2828	9730-017	CUTTINGS	-27.09	-28.04	-27.11	-27.41	-26.47	-27.11
34/10-37	2873	9730-018	CUTTINGS	-27.52	-28.18	-27.76	-27.68	-26.68	-27.10
34/10-37A	2667.68	9731-002	CORE	-28.39	-28.70	-27.90	-28.15	-28.16	
34/10-37A	2689.52	9731-003	CORE	-28.55	-28.75	-27.76	-28.13	-28.02	
34/10-37A	2711.51	9731-004	CORE	-28.50	-28.74	-27.59	-27.94	-26.86	
34/10-37A	2697	9808-001	DST1	-28.46	-28.82	-27.83	-27.83	-27.96	

TABLE 9. BIOMARKER PARAMETERS FROM THE SATURATED FRACTION

WELL	DEPTH m RKB	SAMPLE NO.	SAMPLE TYPE	20S	bb	22S	Ts/Tm	Ttx	30D/H	30ab	%C27	%C28	%C29	C30	Dia/reg
34/10-37	2555	9730-006	CUTTINGS	0.14	0.36	0.32	0.53	0.09	0.03	0.84	24	17	30	0.07	0.68
34/10-37	2561	9730-007	CUTTINGS	0.13	0.42	0.36	0.50	0.10	0.03	0.82	32	19	36	0.08	0.98
34/10-37	2567	9730-008	CUTTINGS	0.16	0.41	0.29	0.35	0.10	0.04	0.77	30	16	39	0.09	0.91
34/10-37	2585	9730-011	CUTTINGS	0.21	0.44	0.34	0.36	0.15	0.05	0.82	36	20	36	0.08	1.22
34/10-37	2591	9730-012	CUTTINGS	0.17	0.41	0.35	0.41	0.16	0.06	0.78	36	21	35	0.08	1.14
34/10-37	2597	9730-013	CUTTINGS	0.15	0.41	0.32	0.31	0.13	0.05	0.77	33	17	36	0.07	1.06
34/10-37	2612	9730-015	CUTTINGS	0.40	0.50	0.49	0.73	1.01	0.10	0.85	40	30	46	0.06	1.75
34/10-37	2615	9730-016	CUTTINGS	0.41	0.53	0.53	1.14	1.70	0.14	0.87	44	31	45	0.09	1.69
34/10-37	2629.6	9730-019	CORE	0.53	0.56	0.57	1.43	2.77	0.16	0.92	47	34	48	0.13	3.10
34/10-37	2640.46	9730-020	CORE	0.52	0.58	0.56	1.40	2.77	0.16	0.91	45	36	49	0.11	2.94
34/10-37	2828	9730-017	CUTTINGS	0.29	0.50	0.52	0.27	0.34	0.06	0.77	42	25	44	0.07	1.62
34/10-37	2873	9730-018	CUTTINGS	0.29	0.52	0.52	0.29	0.26	0.04	0.80	44	26	42	0.06	1.44
34/10-37A	2667.68	9731-002	CORE	0.57	0.56	0.60	1.43	2.09	0.14	0.92	51	34	43	0.11	2.76
34/10-37A	2689.52	9731-003	CORE	0.51	0.62	0.57	1.76	2.30	0.16	0.91	50	32	48	0.11	2.70
34/10-37A	2711.51	9731-004	CORE	0.58	0.54	0.59	1.86	2.75	0.18	0.91	48	35	44	0.11	3.45
34/10-37A	2697	9808-001	DST1	0.60	0.60	0.54	1.67	3.50	0.19	0.90	50	34	49	0.13	3.23

TABLE 9. (cont.) BIOMARKER PARAMETERS FROM THE SATURATED FRACTION

WELL	DEPTH m RKB	SAMPLE NO.	SAMPLE TYPE	28ab/H	H/S	ppmH	ppmS	3R/H	4R/H	35/34H	29/30H	Dem/H	O/H	G/H
34/10-37	2555	9730-006	CUTTINGS	0.06				0.07	0.05	0.88	0.45	0.00	0.00	
34/10-37	2561	9730-007	CUTTINGS	0.05				0.10	0.06	0.00	0.57	0.00	0.00	0.01
34/10-37	2567	9730-008	CUTTINGS	0.02				0.04	0.04	0.47	0.55	0.00	0.00	
34/10-37	2585	9730-011	CUTTINGS	0.05				0.11	0.08	0.00	0.59	0.00	0.00	
34/10-37	2591	9730-012	CUTTINGS	0.04				0.21	0.08	0.00	0.65	0.00	0.00	
34/10-37	2597	9730-013	CUTTINGS	0.02				0.09	0.07	0.00	0.62	0.00	0.00	
34/10-37	2612	9730-015	CUTTINGS	0.11				0.07	0.07	0.48	0.48	0.00	0.00	
34/10-37	2615	9730-016	CUTTINGS	0.13				0.07	0.09	0.54	0.45	0.00	0.00	0.01
34/10-37	2629.6	9730-019	CORE	0.12				0.11	0.08	0.62	0.43	0.00	0.00	0.00
34/10-37	2640.46	9730-020	CORE	0.13				0.10	0.08	0.65	0.42	0.00	0.00	0.00
34/10-37	2828	9730-017	CUTTINGS	0.11				0.13	0.09	0.54	0.56	0.00	0.00	
34/10-37	2873	9730-018	CUTTINGS	0.11				0.16	0.10	0.54	0.58	0.00	0.00	
34/10-37A	2667.68	9731-002	CORE	0.12				0.32	0.20	0.73	0.49	0.00	0.00	0.05
34/10-37A	2689.52	9731-003	CORE	0.12				0.15	0.11	0.85	0.49	0.00	0.00	
34/10-37A	2711.51	9731-004	CORE	0.15				0.16	0.12	0.51	0.49	0.00	0.00	0.02
34/10-37A	2697	9808-001	DST1	0.12				0.11	0.06	0.77	0.42	0.00	0.00	

TABLE 10. BIOMARKER PARAMETERS FROM AROMATIC FRACTION

WELL	DEPTH m RKB	SAMPLE NO.	SAMPLE TYPE	Arom1	Arom2	Crack1	Crack2
34/10-37	2555	9730-006	CUTTINGS	1.01	0.31	0.27	0.11
34/10-37	2561	9730-007	CUTTINGS	1.00	0.61	0.50	0.23
34/10-37	2567	9730-008	CUTTINGS	0.96	0.18	0.32	0.14
34/10-37	2585	9730-011	CUTTINGS	0.94	0.29	0.41	0.20
34/10-37	2591	9730-012	CUTTINGS	1.00	0.36	0.35	0.15
34/10-37	2597	9730-013	CUTTINGS	0.98	0.39	0.37	0.21
34/10-37	2612	9730-015	CUTTINGS	1.00	0.83	0.60	0.39
34/10-37	2615	9730-016	CUTTINGS	1.00	0.80	0.79	0.57
34/10-37	2629.6	9730-019	CORE	0.98	0.68	0.56	0.31
34/10-37	2640.46	9730-020	CORE	0.99	0.79	0.44	0.25
34/10-37	2828	9730-017	CUTTINGS	0.92	0.51	0.48	0.31
34/10-37	2873	9730-018	CUTTINGS	0.92	0.38	0.41	0.23
34/10-37A	2667.68	9731-002	CORE	0.99	0.84	0.52	0.32
34/10-37A	2689.52	9731-003	CORE	0.98	0.75	0.64	0.40
34/10-37A	2711.51	9731-004	CORE	0.99	0.83	0.61	0.37
34/10-37A	2697	9808-001	DST1	0.99	0.78	0.59	0.37

TABLE 11. THOMPSON'S INDICES FOR THE DST OIL

WELL	DEPTH m RKB	SAMPLE NO.	SAMPLE TYPE	A	B	X	W	C	I	F	H	U	R	S
34/10-37A	2697	9808-001	DST1	0.25	1.26	0.77	2.37	0.67	2.11	0.54	20.61	1.69	2.19	72.10

THOMPSON'S INDICES :

AROMATICITY :

Benzen		Toluene		m+p xylene		Benzen*10	
A=	n-hexane	B=	n-heptane	X=	nC8	W=	sC6

PARAFINICITY :

$$C = \frac{nC6+nC7}{sC6+msC6} \qquad I = \frac{2mC6+3mC6}{1c3dmsC5+1t3dmsC5+1t2dmsC5} \qquad F = \frac{nC7}{msC6}$$

$$H = \frac{nC7*100}{sC6+2mC6+2,3dmsC5+3mC6+1c3dmsC5+1t3dmsC5+1t2dmsC5+nC7+msC6}$$

NORMALITY :

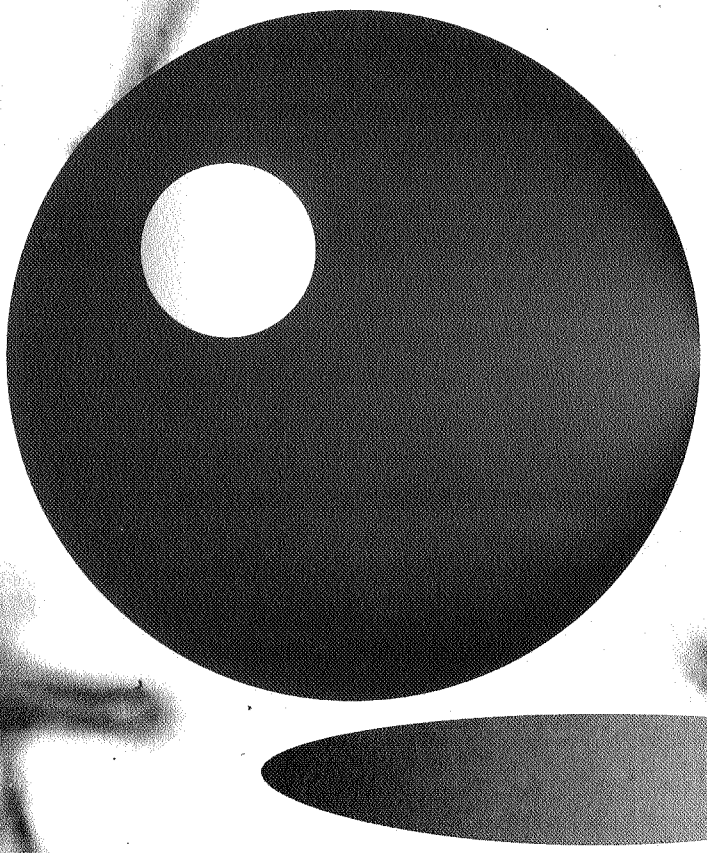
sC6		nC7		nC6	
U=	msC5	R=	2mC6	S=	2,2dmC4

TABLE 12. GAS-DATA FROM 34/10-37A

IFE - data

WELL	DEPTH m RKB	SAMPLE NO.	SAMPLE TYPE	%C1	%C2	%C3	%IC4	%nC4	%C5	%CO2	SumC1-C5	Wetness	Dryness
34/10-37A	2697	9808-001	DST1	83.7	9.7	3.9	0.51	0.69	0.33	1.1	98.9	0.15	0.85

WELL	DEPTH m RKB	SAMPLE NO.	SAMPLE TYPE	d13C C1	d13C C2	d13C C3	d13C IC4	d13C nC4	dD C1	d13C CO2	d18O CO2
34/10-37A	2697	9808-001	DST1	-43.9	-28.6	-25.4	-26.6	-26.8	-194	-13.9	-12.5



IFE/KR/F-95/147

Vitrinite reflectance well 34/10-37 offshore Norway

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1 Introduction

This report gives the result of routine vitrinite reflectance analyses on 24 samples covering the interval from 1530 to 2870 mRKB in well 34/10-37 offshore Norway.

2 Material

2.1 Samples

The material was provided from the client as 16 unwashed cuttings, 6 side wall cores and 2 core chips. The sample positions are indicated in figure 1.

2.2 Geological information and casing points

Information on stratigraphy in well 34/10-37 was not provided from the client.

3 Analytical techniques

3.1 Preparation

The cuttings samples were washed and then treated with hydrochloric and hydrofluoric acid prior to further preparation. The aim was to avoid soft and expanding mineral phases in order to ensure good polishing quality. The side wall cores and the core chips were treated as bulk material.

The sample material resulting from the acid treatment and the bulk material were embedded in an epoxy resin to make briquettes, ground flat and polished using 0.25 micron diamond paste and magnesium oxide as the two final steps.

3.2 Analysis

The analytical equipment being used was a Zeiss MPM 03 photometer microscope equipped with an Epiplan-Neofluar 40/0.90 oil objective. The sensitive measuring spot was kept constant for all measurements at about 2.5 micron in diameter. The measurements were made through a green band pass filter (546 nm) and in oil immersion (refractive index 1.515 at 18°C). The readings were made without a polarizer and using a stationary stage. This procedure is called measurement of random reflectance (%Rm). The photometer is calibrated daily against a standard of known reflectance (%Rm= 0.588) and routinely (daily) checked against two other standards of significant different reflectances (%Rm=0.879 and 1.696). A deviation from these values of less than ±0.01 and ±0.02 respectively is considered as acceptable. The calibration is routinely checked during the course of measurements at least every hour, and a deviation of less than ±0.005 is considered as acceptable.

For each sample at least 20 points were measured if possible, and quality ratings are given to various important aspects which may affect the measurements. The aspects are abundance of vitrinite, uncertainties in the identification of indigenous vitrinite, type of vitrinite, particle size, particle surface quality and abundance of pyrite.

3.3 Presentation of results

The raw data from the measurements are presented in appendix for each sample both as tabulated data and histograms. A true vitrinite population is selected among the readings based on observations made during the measurements, and arithmetic mean values are calculated for this population and other populations. A quality rating is given to the true population. The results are listed in table 1.

Table 1 Vitrinite reflectance data

Well
34/10-37

IFE no.	Depth, mRKB	Sample type	Lithology	%Rm	Std. dev.	N	Quality	Preparation
950455	1530	cut	clst	0.28	0.04	15	M	HF
950456	1610	cut	clst	0.29	0.04	16	M	HF
950457	1700	cut	clst	0.30	0.04	22	M	HF
950458	1800	cut	clst	0.32	0.03	20	M	HF
950459	1900	cut	clst	0.35	0.05	27	M	HF
950460	2000	cut	clst	0.37	0.05	5	P	HF
950461	2100	cut	clst	0.38	0.04	20	M	HF
950462	2200	cut	clst	0.43	0.03	11	M	HF
950463	2290	cut	clst	0.45	0.05	25	M	HF
950464	2400	cut	clst	0.46	0.06	21	M	HF
950465	2468	cut	clst	0.45	0.06	23	M	HF
950466	2501	cut	clst	0.48	0.06	26	M	HF
950467	2525	cut	clst	0.47	0.05	22	M	HF
950468	2540	cut	clst	0.49	0.08	20	M	HF
950469	2579.5	swc	clst/slst	0.49	0.11	12	P	HF
950470	2604.5	swc	clst/slst	0.36	0.03	20	P	HF
950471	2619	swc	clst/slst	0.51	0.06	9	M	HF
950472	2625.5	swc	clst/slst	0.50	0.07	22	M	HF
950473	2632.85-86	core	coal	0.53	0.02	21	G	HF
950474	2660.92-93	core	clst/sst	0.49	0.04	21	M	HF
950475	2717	cut	coal/clst	0.48	0.04	27	G	HF
950476	2804.5	swc	clst/slst	0.56	0.06	8	P	HF
950477	2810	swc	clst/slst	0.43	0.04	12	P	HF
950478	2870	cut	clst/coal	0.52	0.05	24	M	HF

G	Good quality	**P**	Poor quality	**st**	HC-staining	**HF**	HF-treated
M	Moderate quality	**X**	Not vitrinite	**Barren**	Barren of vitrinite	**Bulk**	Bulk rock

GEOCHEM GROUP LIMITED

REPORT 95/9730/9731/9808/001/01

GEOCHEMICAL DATA FOR SAMPLES FROM WELLS 34/10-37 AND 34/10-37A, NORTH SEA (NORWEGIAN SECTOR)

Prepared for

STATOIL

SEPTEMBER 1995

CONTENTS

TABLES

FIGURES

INTRODUCTION

This report presents geochemical data for the following samples:

- eighteen ditch cuttings samples from 2519 - 2615 metres, 2828 metres and 2873 metres in 34/10-37
- two core samples (2629.58 - 2629.60 metres and 2640.42 - 2640.46 metres) in well 34/10-37
- a single ditch cuttings samples from 2590 metres in 34/10-37A
- three core samples from the interval 2667.65 - 2711.51 metres in 34/10-37A
- a sample of the DST 1 fluid tested from the interval 2667 - 2697 metres in 34/10-37A.

ANALYTICAL

The above samples arrived at the Geochem Group's laboratories in Chester in three batches on the 19th and 20th July, 1995. The ditch cuttings samples were screened with their lithological descriptions and organic carbon contents. These data were forwarded by facsimile to Jorun Johannesen, STATOIL, Stavanger who selected samples (including core samples) for Rock-Eval pyrolysis and subsequently for C_{15+} extraction, iatroscan, GC, GC MS, stable carbon isotope, kerogen type and pyrolysis-GC analyses. Analyses on cuttings samples were performed on picked lithologies. The analytical programme for the sample of DST 1 fluid tested from 34/10-37A was also specified by the client.

The following analyses were carried out during the course of this study:

Analysis	34/10-37		34/10-37A		
	Cuttings	Core	Cuttings	Core	Fluid
Sample preparation, description and picking	18	2	1	3	-
Total organic carbon content	18	-	1	-	-
Rock-Eval pyrolysis	18	2	1	3	-

Analysis	34/10-37		34/10-37A		
	Cuttings	Core	Cuttings	Core	Fluid
Pyrolysis-GC	5	-	-	-	-
Kerogen description/spore colour	5	-	-	-	-
Carbon isotope - kerogen	5	-	-	-	-
Whole oil chromatogram	-	-	-	-	1
Separation of b.p. fraction >210°C	-	-	-	-	1
C_{15+} extraction	10	2	-	3	-
Asphaltene precipitation	10	2	-	3	1
Iatroscan	10	2	-	3	1
Liquid chromatographic separation	10	2	-	3	1
GC analysis - saturates fraction	10	2	-	3	1
GC analysis - aromatics fraction	10	2	-	3	1
GC MS - saturates fraction	10	2	-	3	1
GC MS - aromatics fraction	10	2	-	3	1
Carbon isotope - topped oil and four fractions	-	-	-	-	1
Carbon isotope - total EOM and four fractions	10	2	-	3	-

The results of these analyses are presented as tables 1 through 19 and graphically as figures 1 through 14.

PERSONNEL

The following Geochem Group personnel were involved in this project:

Project co-ordination and report preparation:	Peter Walko
Kerogen description:	Peter Walko
Sample preparation and analysis:	Supervised by Jim Jones

GENERAL INFORMATION

Three (3) copies of this report have been forwarded to Jorun Johannesen, STATOIL, Stravanger. A copy of the data has also been retained by Geochem for future

Stravanger. A copy of the data has also been retained by Geochem for future consultation with authorised STATOIL personnel.

The remaining sample material will be returned to STATOIL.

The results of this study are proprietary to STATOIL.

STATEMENT ON QUALITY

The results presented in this report have been produced under the rigorous Quality System operated by Geochem Group Limited to ensure that they meet or exceed accepted professional standards.

In the case of data generated by our Environmental (Analytical Services) and Petroleum Geochemistry Divisions, most of the analytical procedures have been accredited by NAMAS (National Measurement Accreditation Service) under Testing No. 1291. As such the laboratory also meets the requirements of EN 45001, ISO Guide 25 and the relevant requirements of the ISO 9000/EN 29000/BS 5750 series of standards.

TABLE 1.1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

JOB 9730 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	GROSS LITHOLOGIC DESCRIPTION	G S A COLOUR CODE	TOTAL ORGANIC CARBON (Wt. %)
WELL: 34/10-37				
9730-001	2519m	A 80% CALC CLAYSTONE - platy to blocky, firm, grades to arg limestone, dark grey.	N3	0.86
		B 20% SAND - fine grained, sub-angular, no F, no C, pale yellowish brown.	10YR6/2	
9730-002	2528m	A 50% SAND - fine grained, sub-angular, abundant carbonate grains, no F, no C, pale yellowish brown.	10YR6/2	
		B 45% CALC CLAYSTONE - as 001A, dark grey	N3	0.76
		C 5% Limestone.		
9730-003	2534m	A 60% SAND - as 002A, no F, no C, pale yellowish brown.	10YR6/2	
		B 35% CALC CLAYSTONE - as 001A, dark grey	N3	1.32
		C 5% Limestone.		
9730-004	2537m	A 75% SAND - as 002A, occ cemented with calcite, no F, no C, pale yellowish brown.	10YR6/2	
		B 20% CALC CLAYSTONE - as 001A, dark grey	N3	0.93
		C 5% Limestone.		
9730-005	2546m	A 60% CALC CLAYSTONE - platy to blocky, firm, dark grey.	N3	1.74
		B 35% SAND - fine grained, sub-angular, common carbonate grains, no F, no C, pale yellowish brown.	10YR6/2	
		C 5% Limestone.		
9730-006	2555m	A 80% CLAYSTONE - platy, firm, sl to mod calc, dark grey.	N3	3.64
		B 20% SAND - as 005B, no F, no C, pale yellowish brown.	10YR6/2	
9730-007	2561m	A 90% CLAYSTONE - as 006A, dark grey.	N3	2.39
		B 10% SAND - as 005B, no F, no C, pale yellowish brown.	10YR6/2	
9730-008	2567m	A 95% CLAYSTONE - fissile to platy, firm, sub-vitreous, greyish black to dark grey.	N2 - N3	2.79
		B 5% Sand.		
9730-009	2573m	A 70% SAND - fine grained, sub-angular, occ cemented with calcite, no F, no C, light grey.	N7	
		B 30% CLAYSTONE - as 008A, greyish black to dark grey.	N2 - N3	2.95

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomite, Fluorescence, foraminifera fossiliferous, Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1.1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

JOB 9730 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	GROSS LITHOLOGIC DESCRIPTION	G S A COLOUR CODE	TOTAL ORGANIC CARBON (Wt. %)
9730-010	2579m	A 95% CLAYSTONE - platy, firm, sl to v calc, dark grey to medium grey. B 5% Sand.	N3 - N5	2.03
9730-011	2585m	A 95% CLAYSTONE - as 010A, dark grey to medium grey. B 5% Sand.	N3 - N5	2.16
9730-012	2591m	A 70% CLAYSTONE - platy, firm, non to sl calc, dark grey. B 20% LIMESTONE - platy to blocky, hard, sandy, no F, no C, pale yellowish brown. C 10% SAND - fine grained, sub-angular, occ cemented with calcite, no F, no C, light grey.	N3 10YR6/2 N7	2.63 0.62, 0.61
9730-013	2597m	A 95% CLAYSTONE - platy to blocky, firm, sl to v calc, grades to arg limestone, dark grey to medium grey B 5% Limestone.	N3 - N5	1.83
9730-014	2603m	A 95% CLAYSTONE - as 013A, dark grey to medium grey. B 5% Limestone.	N3 - N5	1.47
9730-015	2612m	A 70% COALY CLAYSTONE - platy to blocky, firm, grades to coal, black to dark grey. B 30% SAND - fine grained, sub-angular, no F, no C, pale yellowish brown.	N1 - N3 10YR6/2	24.90
9730-016	2615m	A 80% COAL - blocky, mod soft, sub-vitreous, black. B 15% SAND - as 015B, no F, no C, pale yellowish brown. C 5% Light grey claystone.	N1 10YR6/2	73.70
9730-019	2629.58-.60m	A100% SANDSTONE - med grained, sub-angular, loosely cemented, gold F, instant blooming C, very pale orange.	10YR8/2	
9730-020	2640.42-.46m	A100% SANDSTONE - as 019A, yellow F, instant blooming C, very pale orange.	10YR8/2	
9730-017	2828m	A 80% CLAYSTONE - blocky, firm, calc, medium grey. B 20% SAND - as 015B, no F, no C, pale yellowish brown.	N5 10YR6/2	1.88

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomite, Fluorescence, foraminifera fossiliferous, Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1.1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

JOB 9730 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	GROSS LITHOLOGIC DESCRIPTION	G S A COLOUR CODE	TOTAL ORGANIC CARBON (Wt. %)
9730-018	2873m	A 80% CLAYSTONE - as 017A, medium grey. B 20% SAND - as 015B, no F, no C, very pale orange.	N5 10YR8/2	1.58

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomite, Fluorescence, foraminifera fossiliferous, Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1.2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

JOB 9731 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	GROSS LITHOLOGIC DESCRIPTION	G S A COLOUR CODE	TOTAL ORGANIC CARBON (Wt. %)
WELL: 34/10-37A				
9731-001	2590m	A 70% SAND - fine grained, sub-angular, common lithics, no F, no C, light grey.	N7	
		B 20% CALC CLAYSTONE - platy, mod hard, grades to arg limestone, dark grey to medium dark grey.	N3 N4	- 0.72
		C 5% Red claystone.		
		D 5% Limestone.		
9731-002	2667.65-.68m	A100% SANDSTONE - med to coarse grained, mod well cemented, sub-angular, oily odour, gold/yellow F, instant streaming C, very light grey.	N8	
9731-003	2689.50-.52m	A100% SANDSTONE - as 002A, yellow F, instant blooming C, very light grey	N8	
9731-004	2711.48-.51m	A100% SANDSTONE - med to coarse grained, sub-angular, mod well cemented, occ thin micaceous claystone laminae, yellow F, instant blooming C, very light grey.	N8	

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomite, Fluorescence, foraminifera fossiliferous, Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 2.1
ROCKEVAL PYROLYSIS DATA

3 9730 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	TOC (%)	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	PRODUCTION INDEX	HYDROGEN INDEX	OXYGEN INDEX	TMAX (°C)
WELL: 34/10-37									
9730-001A	2519m	0.86	0.06	0.77	2.78	0.07	89.5	323.3	435
9730-002B	2528m	0.76	0.05	0.44	3.46	0.10	57.9	455.3	425
9730-003B	2534m	1.32	0.08	1.51	2.79	0.05	114.4	211.4	436
9730-004B	2537m	0.93	0.07	0.62	2.05	0.10	66.7	220.4	439
9730-005A	2546m	1.74	0.34	2.39	2.93	0.12	137.4	168.4	436
9730-006A	2555m	3.64	0.31	12.84	4.84	0.02	352.7	133.0	428
9730-007A	2561m	2.39	0.17	5.36	3.17	0.03	224.3	132.6	435
9730-008A	2567m	2.79	0.25	6.49	1.64	0.04	232.6	58.8	435
9730-009B	2573m	2.95	0.30	8.48	2.51	0.03	287.5	85.1	437
9730-010A	2579m	2.03	0.34	3.95	3.43	0.08	194.6	169.0	435
9730-011A	2585m	2.16	0.23	4.90	3.84	0.04	226.9	177.8	439
9730-012A	2591m	2.63	0.14	6.78	3.66	0.02	257.8	139.2	435
9730-013A	2597m	1.83	0.09	3.78	2.28	0.02	206.6	124.6	439
9730-014A	2603m	1.47	0.14	1.95	2.78	0.07	132.7	189.1	434
9730-015A	2612m	24.90	5.01	42.99	5.63	0.10	172.7	22.6	428
9730-016A	2615m	73.70	27.84	159.86	7.20	0.15	216.9	9.8	426
9730-019A	2629.58-.60m		3.17	0.86	0.13	0.79			426
9730-020A	2640.42-.46m		2.86	0.76	0.05	0.79			419
9730-017A	2828m	1.88	0.21	2.34	6.06	0.08	124.5	322.3	443
9730-018A	2873m	1.58	0.29	2.00	4.43	0.13	126.6	280.4	442

PRODUCTION INDEX = S1 / (S1 + S2) HYDROGEN INDEX = 100 x S2 / TOC
OXYGEN INDEX = 100 x S3 / TOC

TABLE 2.2
ROCKEVAL PYROLYSIS DATA

B 9731 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	TOC (%)	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	PRODUCTION INDEX	HYDROGEN INDEX	OXYGEN INDEX	TMAX (°C)
WELL: 34/10-37A									
9731-001B	2590m	0.72	0.18	0.47	0.27	0.28	65.3	37.5	433
9731-002A	2667.65-.68m		3.44	0.33	0.00	0.91			401
9731-003A	2689.50-.52m		5.96	0.74	0.00	0.89			425
9731-004A	2711.48-.51m		5.53	1.63	0.00	0.77			430

PRODUCTION INDEX = S1 / (S1 + S2) HYDROGEN INDEX = 100 x S2 / TOC
OXYGEN INDEX = 100 x S3 / TOC

TABLE 3
PYROLYSIS-GC GAS-OIL INDICES

JOB 9730							INDICES		
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	% C1	% C2-C5	% C6-C14	% C15+	% nC17	TOLUENE / nC8		% C1-C5
WELL: 34/10-37									
9730-006	2555m	5.49	42.41	47.10	4.79	0.22	1.45		47.90
9730-008	2567m	6.39	43.53	46.72	3.19	0.17	1.53		49.92
9730-012	2591m	5.49	45.51	45.21	3.59	0.20	2.02		51.00
9730-015	2612m	12.54	42.29	36.92	7.76	0.50	1.45		54.83
9730-017	2828m	10.18	47.51	40.92	1.20	0.20	5.62		57.69

TABLE 4
KEROGEN TYPE AND MATURATION

JOB 9730 / GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	ORGANIC MATTER DESCRIPTION					THERMAL MATURATION	
		TYPES >35%;10-35%;<10%	REMARKS	RE-WORKED (%)	PARTICLE SIZE	PRESERV-ATION	THERMAL ALTERATION INDEX	1-10 SCALE
WELL: 34/10-37								
9730-006A	2555m	(AM/AL)*;CO;WO-HE	*comprises amorphous material incompletely developed from algal organic matter		F-M	G	2-(?)	3(?)
9730-008A	2567m	AL-CO;HE-WO;AM	sapropelisation		F-M	F-G	2- max	3
9730-012A	2591m	AL-CO;HE-WO;AM			F-M	F	2-	3
9730-015A	2612m	WO;HE;CO	finely comminuted, differentiation difficult, treat data with caution		F	F	2-	3
9730-017A	2828m	WO-CO;HE;-	WO/CO differentiation difficult		F-M	F	2- to 2	3.5

Algal,Amorphous,Herbaceous,Inertinite,Resin,Wood
preservation = Poor,Fair,Good size = Fine,Medium,Coarse

TA1 SCALE	1	1+ to 2-	2-	2	2 TO 2+	2+ TO 3-	3	3+	4	5
1-10 SCALE	1	2	3	4	5	6	7	8	9	10

TABLE 5

KEROGEN COMPOSITION

WELL 34/10-37

GEOCHEM SAMPLE NUMBER	DEPTH	KEROGEN COMPOSITION %				
		AM	AL	HE	WO	CO
9730-006A	2555m	← 80* →		<10	<10	10
9730-008A	2567m	5	40	15	10	30
9730-012A	2591m	5	35	15	15	30
9730-015A	2612m	-	-	15	80	5
9730-017A	2828m	-	-	10	50	40

* See remarks, table 4 - kerogen type and maturation

TABLE 6.1
CRUDE OIL COMPOSITION - PHYSICAL

JOB 9808 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	SPECIFIC GRAVITY (g/cc)	API GRAVITY	VISCOSITY (cp)	POUR POINT (°C)	DISTILLATE TO 210°C (%)
WELL: 34/10-37A						
9808-001	DST 1 2667-97m					56.0

TABLE 6.2

COMPOSITION OF LIGHT HYDROCARBONS IN 34/10-37A DST-1 FLUID
(normalised composition)

Geochem Sample Number	9808-001
Depth	2667-2697m
isobutane	0.02
n-butane	0.13
isopentane	0.79
n-pentane	1.77
2,2-dimethylbutane*	0.1
cyclopentane	0.41
2,3-dimethylbutane	0.4
2-methylpentane	2.83
3-methylpentane	1.09
n-hexane*	7.21
methylcyclopentane*	4.48
2,2-dimethylpentane	0.27
2,4-dimethylphentane	0.04
2,2,3-trimethylbutane	0.01
benzene*	1.8
cyclohexane*	7.59
3,3-dimethylpentane	0
1,1-dimethylcylopentane	0
2-methylhexane*	3.75
2,3-dimethylpentane	0.36
3-methylhexane*	2.99
1,c,3-dimethylcyclopentane*	0.92
1-t,3-dimethylcyclopentane*	0.79
1-t,2-dimethylcyclopentane*	1.65
3-ethylpentane	0
n-heptane*	8.99
methylcyclohexane*	16.59
1,c,2-dimethylcyclopentane	0.49
toluene*	11.31
octane*	11.33
m + p xylene*	8.77

* Light hydrocarbon components specified in the Norwegian Industry Guide to Organic Geochemical Analyses

TABLE 7.1
CONCENTRATION (PPM) OF EXTRACTED C_{15+} MATERIAL IN ROCK

JOB 9730 GEOCHEM SAMPLE NUMBER	LITHO	DEPTH/ IDENTITY	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS			
				Saturates	Aromatics	TOTAL	Preciptd. Asphaltenes	Eluted NSO s (POLARS)	Non-Eluted NSO s (POLARS)	TOTAL
WELL: 34/10-37										
9730-006A		2555m	1238	340	19	360	387	482	9	878
9730-007A		2561m	881	170	23	193	349	335	4	688
9730-008A		2567m	995	165	22	187	368	436	3	808
9730-011A		2585m	795	275	10	285	248	260	3	510
9730-012A		2591m	635	161	14	175	257	200	3	459
9730-013A		2597m	737	204	14	218	252	265	2	519
9730-015A		2612m	10361	4380	63	4443	3295	2600	23	5918
9730-016A		2615m	24712	10901	133	11034	9880	3782	16	13678
9730-019A		2629.58-.60m	6018	5620	180	5801	188	17	12	217
9730-020A		2640.42-.46m	5928	5195	290	5484	243	187	18	448
9730-017A		2828m	1645	544	22	565	700	374	5	1079
9730-018A		2873m	1166	287	11	298	425	440	3	869

S-shale, SS-sandstone, L-limestone, D-dolomite, M-mixed

TABLE 7.2
CONCENTRATION (PPM) OF EXTRACTED C_{15+} MATERIAL IN ROCK

JOB 9731	LITHO			HYDROCARBONS			NON HYDROCARBONS			
GEOCHEM SAMPLE NUMBER		DEPTH/ IDENTITY	TOTAL EXTRACT	Saturates	Aromatics	TOTAL	Preciptd. Asphaltenes	Eluted NSO s (POLARS)	Non-Eluted NSO s (POLARS)	TOTAL
WELL: 34/10-37A										
9731-002A		2667.65-.68m	6552	6004	182	6187	264	81	20	365
9731-003A		2689.50-.52m	7211	6898	105	7004	150	49	8	207
9731-004A		2711.48-.51m	9104	8381	224	8605	472	8	18	499

S-shale, SS-sandstone, L-limestone, D-dolomite, M-mixed

TABLE 8.1
COMPOSITION (NORMALISED %) OF C_{15+} MATERIAL

JOB 9730 GEOCHEM SAMPLE NUMBER	LITHO	DEPTH/ IDENTITY	HYDROCARBONS		NON HYDROCARBONS		
			Saturates	Aromatics	Preciptd. Asphaltenes	Eluted NSO s (POLARS)	Non-Eluted NSO s (POLARS)
WELL: 34/10-37							
9730-006A		2555m	27.51	1.55	31.29	38.91	0.74
9730-007A		2561m	19.29	2.65	39.59	38.06	0.41
9730-008A		2567m	16.55	2.23	37.02	43.86	0.35
9730-011A		2585m	34.62	1.22	31.17	32.66	0.34
9730-012A		2591m	25.42	2.22	40.40	31.52	0.44
9730-013A		2597m	27.69	1.87	34.17	35.98	0.29
9730-015A		2612m	42.28	0.61	31.80	25.10	0.22
9730-016A		2615m	44.11	0.54	39.98	15.30	0.06
9730-019A		2629.58-.60m	93.39	3.00	3.12	0.29	0.20
9730-020A		2640.42-.46m	87.63	4.89	4.10	3.16	0.31
9730-017A		2828m	33.05	1.32	42.56	22.76	0.30
9730-018A		2873m	24.63	0.90	36.46	37.72	0.28

S-shale, SS-sandstone, L-limestone, D-dolomite, M-mixed

TABLE 8.2
COMPOSITION (NORMALISED %) OF C_{15+} MATERIAL

GEOCHEM 9731 SAMPLE NUMBER	LITHO	DEPTH/ IDENTITY	HYDROCARBONS		NON HYDROCARBONS		
			Saturates	Aromatics	Precipitd. Asphaltenes	Eluted NSO s (POLARS)	Non-Eluted NSO s (POLARS)
WELL: 34/10-37A							
9731-002A		2667.65-.68m	91.65	2.78	4.03	1.24	0.30
9731-003A		2689.50-.52m	95.67	1.46	2.07	0.68	0.11
9731-004A		2711.48-.51m	92.06	2.46	5.18	0.09	0.20

S-shale, SS-sandstone, L-limestone, D-dolomite, M-mixed

TABLE 8.3
COMPOSITION (NORMALISED %) OF C_{15+} MATERIAL

R 9808 GEOCHEM SAMPLE NUMBER	LITHO	DEPTH/ IDENTITY	HYDROCARBONS		NON HYDROCARBONS		
			Saturates	Aromatics	Precipitd. Asphaltenes	Eluted NSO s (POLARS)	Non-Eluted NSO s (POLARS)
WELL: 34/10-37A							
9808-001		DST 1 2667-97m	96.08	0.87	2.75	0.10	0.20

S-shale, SS-sandstone, L-limestone, D-dolomite, M-mixed

TABLE 9.1
SIGNIFICANT C_{15+} RATIOS

JOB 9730 / GEOCHEM SAMPLE NUMBER	LITHO	DEPTH/ IDENTITY	EXTRACTED TOC (%)	mg/g TOC						HYDROCARBONS % TOTAL EXTRACT	SATURATES / AROMATICS
				TOTAL EXTRACT	SATURATES	AROMATICS	TOTAL HYDROCARBONS	ELUTED NSO s (POLARS)	ASPHALTENES		
WELL: 34/10-37											
9730-006A		2555m	1.92	64.47	17.73	1.00	18.73	25.08	20.17	29.06	17.76
9730-007A		2561m	1.38	63.86	12.32	1.69	14.01	24.31	25.28	21.94	7.27
9730-008A		2567m	2.18	45.65	7.55	1.02	8.57	20.02	16.90	18.78	7.42
9730-011A		2585m	1.48	53.70	18.59	0.65	19.24	17.54	16.74	35.84	28.44
9730-012A		2591m	1.16	54.74	13.91	1.22	15.13	17.25	22.11	27.64	11.45
9730-013A		2597m	1.34	54.97	15.22	1.03	16.25	19.78	18.79	29.56	14.77
9730-015A		2612m	15.70	65.99	27.90	0.40	28.30	16.56	20.98	42.88	69.76
9730-016A		2615m	35.20	70.20	30.97	0.38	31.35	10.74	28.07	44.65	81.87
9730-019A		2629.58-.60m	0.09	6686.64	6244.91	200.50	6445.40	19.17	208.48	96.39	31.15
9730-020A		2640.42-.46m	0.05	11855.93	10389.11	579.69	10968.80	374.36	485.54	92.52	17.92
9730-017A		2828m	1.74	94.51	31.24	1.25	32.49	21.51	40.23	34.38	24.95
9730-018A		2873m	1.30	89.72	22.10	0.81	22.91	33.84	32.72	25.54	27.23

S-shale, SS-sandstone, L-limestone, D-dolomite, M-mixed

TABLE 9.2
SIGNIFICANT C_{15+} RATIOS

JOB 9731 / GEOCHEM SAMPLE NUMBER	LITHO	DEPTH/ IDENTITY	EXTRACTED TOC (%)	mg/g TOC						HYDROCARBONS % TOTAL EXTRACT	SATURATES / AROMATICS
				TOTAL EXTRACT	SATURATES	AROMATICS	TOTAL HYDROCARBONS	ELUTED NSO s (POLARS)	ASPHALTENES		
WELL: 34/10-37A											
9731-002A		2667.65-.68m	0.06	10919.32	10007.32	303.70	10311.01	135.38	439.99	94.43	32.95
9731-003A		2689.50-.52m	0.08	9013.45	8622.88	131.73	8754.61	61.72	186.99	97.13	65.46
9731-004A		2711.48-.51m	0.46	1979.19	1822.04	48.71	1870.76	1.81	102.61	94.52	37.40

S-shale, SS-sandstone, L-limestone, D-dolomite, M-mixed

TABLE 9.3
SIGNIFICANT C_{15+} RATIOS

JOB 9808 / GEOCHEM SAMPLE NUMBER	LITHO	DEPTH/ IDENTITY	EXTRACTED TOC (%)	mg/g TOC						HYDROCARBONS % TOTAL EXTRACT	SATURATES / AROMATICS
				TOTAL EXTRACT	SATURATES	AROMATICS	TOTAL HYDROCARBONS	ELUTED NSO s (POLARS)	ASPHALTENES		
WELL: 34/10-37A											
9808-001		DST 1 2667-97m								96.96	109.93

S-shale, SS-sandstone, L-limestone, D-dolomite, M-mixed ·

TABLE 10.1

COMPOSITION (NORMALISED %) OF C_{15+} SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	006A	007A	008A	011	012A	013
DEPTH	2555m	2561m	2567m	2585m	2591m	2597m
SA						
nC15	8.08	7.23	7.92	8.07	6.73	8.61
nC16	8.58	7.61	8.57	8.77	6.86	10.06
nC17	11.07	8.60	9.82	9.57	8.11	11.64
nC18	8.58	7.08	7.07	8.42	7.09	9.09
nC19	8.58	7.31	7.00	8.47	7.98	8.97
nC20	6.72	6.62	5.63	7.62	7.35	7.39
nC21	6.47	6.62	6.22	7.06	7.49	7.52
nC22	5.35	6.39	4.91	6.41	6.77	5.70
nC23	5.85	6.70	5.96	5.91	6.73	5.33
nC24	4.60	5.10	4.06	4.36	5.08	3.76
nC25	5.47	6.70	6.02	5.61	6.11	5.46
nC26	3.86	4.57	3.34	3.16	4.55	3.15
nC27	4.60	5.48	7.46	5.16	5.39	4.36
nC28	3.11	3.65	3.66	2.81	3.74	2.30
nC29	3.98	4.03	5.63	3.76	3.97	3.03
nC30	1.62	2.05	1.83	1.45	2.23	1.09
nC31	1.99	2.13	2.95	1.65	1.92	1.45
nC32	0.37	0.91	0.59	0.60	0.94	0.11
nC33	0.62	0.84	1.11	0.75	0.94	0.36
nC34	0.25	0.30	0.26	0.15	0.02	0.48
nC35	0.25	0.08	0.00	0.25	0.00	0.12
Paraffin	21.45	15.45	12.11	11.64	12.30	11.83
Isoprenoid	5.02	2.42	2.42	2.14	1.94	2.94
Naphthene	73.53	82.13	85.47	86.32	85.77	85.23
CPI 1 Index	1.21	1.21	1.52	1.26	1.18	1.33
CPI 2 Index	1.50	1.42	2.03	1.70	1.32	1.77
CPI 3 Index	1.32	1.33	2.13	1.73	1.30	1.60
Prist/Phytane	2.02	1.90	2.44	1.83	2.21	2.58
Prist/nC17	1.00	0.86	0.99	0.81	0.86	1.02
Phytane/nC18	0.64	0.55	0.56	0.50	0.45	0.51

Job Number : 9730

$$C.P.I.\ 1 = \frac{1}{2}\left[\frac{C21 + C23 + C25 + C27}{C20 + C22 + C24 + C26} + \frac{C21 + C23 + C25 + C27}{C22 + C24 + C26 + C28}\right]$$

$$C.P.I.\ 2 = \frac{1}{2}\left[\frac{C25 + C27 + C29 + C31}{C24 + C26 + C28 + C30} + \frac{C25 + C27 + C29 + C31}{C26 + C28 + C30 + C32}\right]$$

$$C.P.I.\ 3 = \frac{2x\ (C27)}{C26 + C28}$$

CT - ditch cuttings CO - core SWC - sidewall core

TABLE 10.1

COMPOSITION (NORMALISED %) OF C_{15+} SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	015A	016A	019A	020A	017A	018A
DEPTH	2612m	2615m	2629.58-2629.6m	2640.42-2640.46m	2828m	2873m
nC15	11.86	13.64	9.21	8.15	8.77	6.29
nC16	12.69	13.68	10.15	10.75	10.02	9.36
nC17	11.72	11.54	9.90	10.42	9.03	11.23
nC18	10.17	10.06	9.07	10.54	9.61	10.04
nC19	9.37	9.34	8.15	9.33	9.06	10.04
nC20	8.26	8.12	8.01	9.55	7.32	8.68
nC21	6.85	7.40	7.23	9.35	6.65	7.49
nC22	6.47	6.02	6.62	8.95	6.43	6.12
nC23	4.98	4.83	6.41	8.42	6.14	5.95
nC24	4.18	3.91	5.26	6.93	5.00	4.42
nC25	3.77	3.16	4.76	5.68	4.60	5.10
nC26	2.59	2.33	3.71	5.53	3.87	3.23
nC27	2.28	1.84	3.13	4.07	3.77	3.57
nC28	1.35	1.41	2.28	3.47	2.58	2.04
nC29	1.38	1.15	2.23	2.26	2.64	2.72
nC30	0.73	0.79	1.39	1.90	1.45	1.02
nC31	0.69	0.26	1.05	1.44	1.50	1.19
nC32	0.24	0.20	0.67	0.98	0.64	0.34
nC33	0.21	0.20	0.43	0.54	0.66	0.51
nC34	0.10	0.07	0.23	0.42	0.18	0.14
nC35	0.10	0.07	0.12	0.15	0.06	0.51
Paraffin	9.20	9.04	25.61	19.60	8.38	8.66
Isoprenoid	1.87	1.21	4.51	2.85	1.12	2.21
Naphthene	88.93	89.76	74.35	77.55	90.51	89.11
CPI 1 Index	1.03	1.05	1.06	1.00	1.06	1.19
CPI 2 Index	1.29	1.06	1.14	0.94	1.22	1.54
CPI 3 Index	1.16	0.98	1.05	0.90	1.17	1.35
Prist/Phytane	1.90	2.37	2.04	1.94	1.33	1.72
Prist/nC17	0.57	0.62	0.64	0.74	0.81	0.76
Phytane/nC18	0.34	0.30	0.34	0.38	0.57	0.49

Job Number : 9730

$$C.P.I.\ 1 = \frac{1}{2}\left[\frac{C21 + C23 + C25 + C27}{C20 + C22 + C24 + C26} + \frac{C21 + C23 + C25 + C27}{C22 + C24 + C26 + C28}\right]$$

$$C.P.I.\ 2 = \frac{1}{2}\left[\frac{C25 + C27 + C29 + C31}{C24 + C26 + C28 + C30} + \frac{C25 + C27 + C29 + C31}{C26 + C28 + C30 + C32}\right]$$

$$C.P.I.\ 3 = \frac{2x\ (C27)}{C26 + C28}$$

CT - ditch cuttings CO - core SWC - sidewall core

TABLE 10.2

COMPOSITION (NORMALISED %) OF C_{15+} SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	002A	003A	004A
DEPTH	2667.65-2667.68m	2689.5-2689.52m	2711.48-2711.51m
nC15	8.01	7.52	8.55
nC16	9.46	9.27	9.45
nC17	9.71	10.22	9.06
nC18	9.40	10.26	9.09
nC19	9.01	9.18	8.86
nC20	9.21	8.33	7.87
nC21	7.76	8.28	7.55
nC22	6.58	6.67	6.79
nC23	6.20	5.91	5.95
nC24	4.67	5.11	5.30
nC25	4.28	4.97	4.53
nC26	3.98	3.50	3.88
nC27	3.67	2.98	3.29
nC28	2.43	2.22	2.73
nC29	2.22	1.89	2.35
nC30	1.39	1.28	1.65
nC31	1.14	1.04	1.46
nC32	0.66	0.57	0.75
nC33	0.50	0.47	0.54
nC34	0.19	0.19	0.23
nC35	0.04	0.14	0.13
Paraffin	14.15	21.33	18.01
Isoprenoid	2.12	2.95	2.55
Naphthene	83.73	75.72	79.45
CPI 1 Index	1.07	1.10	1.02
CPI 2 Index	1.12	1.17	1.07
CPI 3 Index	1.15	1.04	1.00
Prist/Phytane	1.78	2.03	1.82
Prist/nC17	0.67	0.59	0.67
Phytane/nC18	0.39	0.29	0.37

Job Number : 9731

$$C.P.I.\ 1 = \frac{1}{2}\left[\frac{C21 + C23 + C25 + C27}{C20 + C22 + C24 + C26} + \frac{C21 + C23 + C25 + C27}{C22 + C24 + C26 + C28}\right]$$

$$C.P.I.\ 2 = \frac{1}{2}\left[\frac{C25 + C27 + C29 + C31}{C24 + C26 + C28 + C30} + \frac{C25 + C27 + C29 + C31}{C26 + C28 + C30 + C32}\right]$$

$$C.P.I.\ 3 = \frac{2x\ (C27)}{C26 + C28}$$

CT - ditch cuttings CO - core SWC - sidewall core

TABLE 10.3

COMPOSITION (NORMALISED %) OF C_{15+} SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	001
DEPTH	2667- 2697m
SAMPLE TYPE	**DST**
nC15	11.12
nC16	11.31
nC17	10.04
nC18	9.04
nC19	8.47
nC20	8.15
nC21	6.86
nC22	6.33
nC23	5.83
nC24	4.77
nC25	4.10
nC26	3.35
nC27	2.82
nC28	2.31
nC29	1.95
nC30	1.32
nC31	0.97
nC32	0.59
nC33	0.45
nC34	0.17
nC35	0.07
Paraffin	20.45
Isoprenoid	2.65
Naphthene	76.91
CPI 1 Index	1.02
CPI 2 Index	1.07
CPI 3 Index	1.00
Prist/Phytane	1.74
Prist/nC17	0.68
Phytane/nC18	0.43

Job Number : 9808

$$C.P.I.\ 1 = \frac{1}{2}\left[\frac{C21 + C23 + C25 + C27}{C20 + C22 + C24 + C26} + \frac{C21 + C23 + C25 + C27}{C22 + C24 + C26 + C28}\right]$$

$$C.P.I.\ 2 = \frac{1}{2}\left[\frac{C25 + C27 + C29 + C31}{C24 + C26 + C28 + C30} + \frac{C25 + C27 + C29 + C31}{C26 + C28 + C30 + C32}\right]$$

$$C.P.I.\ 3 = \frac{2x\ (C27)}{C26 + C28}$$

CT - ditch cuttings CO - core SWC - sidewall core

TABLE 11.1

ADDITIONAL SATURATES RATIOS

WELL 34/10-37

GEOCHEM SAMPLE NUMBER	DEPTH (m)	SAMPLE TYPE	A/B $A = \frac{Pr}{nC_{17}}$ $B = \frac{Ph}{nC_{18}}$	$\frac{nC_{17}}{nC_{17} + nC_{27}}$
9730-006A	2555	Cuttings	1.56	0.71
9730-007A	2561	Cuttings	1.56	0.61
9730-008A	2567	Cuttings	1.77	0.57
9730-011A	2585	Cuttings	1.62	0.68
9730-012A	2591	Cuttings	1.91	0.60
9730-013A	2597	Cuttings	2.00	0.73
9730-015A	2612	Cuttings	1.67	0.84
9730-016A	2615	Cuttings	2.07	0.86
9730-019A	2629.58-2629.60	Core	1.88	0.76
9730-020A	2640.42-2640.46	Core	1.95	0.72
9730-017A	2828	Cuttings	1.42	0.70
9730-018A	2873	Cuttings	1.25	0.76

TABLE 11.2

ADDITIONAL SATURATES RATIOS

WELL 34/10-37A

GEOCHEM SAMPLE NUMBER	DEPTH (m)	SAMPLE TYPE	A/B $A = \frac{Pr}{nC_{17}}$ $B = \frac{Ph}{nC_{18}}$	$\frac{nC_{17}}{nC_{17} + nC_{27}}$
9731-002A	2667.65-2667.68	Core	1.72	0.73
9731-003A	2689.50-2689.52	Core	2.03	0.78
9731-004A	2711.48-2711.51	Core	1.81	0.73

TABLE 11.3

ADDITIONAL SATURATES RATIOS

WELL 34/10-37A

GEOCHEM SAMPLE NUMBER	DEPTH (m)	SAMPLE TYPE	A/B $A = \frac{Pr}{nC_{17}}$ $B = \frac{Ph}{nC_{18}}$	$\frac{nC_{17}}{nC_{17} + nC_{27}}$
9808-001	2667-2697	DST 1 FLUID	1.58	0.78

TABLE 12

AROMATICS RATIOS

GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	MPI 1	F1	F2
9808-001	2667-97m	DST 1	0.71	0.49	0.28

Ratios:

$$MPI\ 1 = \frac{3/2(2\text{-}MP + 3\text{-}MP)}{P + 1\text{-}MP + 9\text{-}MP}$$

$$F1 = \frac{3\text{-}MP + 2MP}{3\text{-}MP + 2\text{-}MP + 9\text{-}MP + 1\text{-}MP}$$

$$F2 = \frac{2\text{-}MP}{3\text{-}MP + 2\text{-}MP + 9\text{-}MP + 1\text{-}MP}$$

TABLE 13.1

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 217

WELL: 34/10-37

GEOCHEM SAMPLE NUMBER		9730-006A	9730-007A	9730-008A
DEPTH (m)		2555	2561	2567
SAMPLE TYPE		Cuttings	Cuttings	Cuttings
PEAK	27dβS	5652	316	4186
	27dβR	4840	246	3769
	28dαR + 27$\alpha\alpha$S	5183	147	3125
	27$\alpha\alpha$R	10179	424	5648
	29dβS + 27$\beta\beta$R	6416	318	5469
	29dβR	7362	280	4954
	28$\alpha\alpha$R (P)	6420	208	3266
	29$\alpha\alpha$S	1934	68	1411
	29$\beta\beta$R	6370	267	4498
	29$\beta\beta$S	1567	111	1876
	29$\alpha\alpha$R	12215	452	7599

TABLE 13.1

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 217

WELL: 34/10-37

GEOCHEM SAMPLE NUMBER		9730-011A	9730-012A	9730-013A
DEPTH (m)		2585	2591	2597
SAMPLE TYPE		Cuttings	Cuttings	Cuttings
PEAK	27dβS	1658	1055	845
	27dβR	1387	898	617
	28dαR + 27$\alpha\alpha$S	931	667	503
	27$\alpha\alpha$R	1568	1052	882
	29dβS + 27$\beta\beta$R	1696	1206	967
	29dβR	1678	1056	803
	28$\alpha\alpha$R (P)	740	543	436
	29$\alpha\alpha$S	456	265	218
	29$\beta\beta$R	1235	679	730
	29$\beta\beta$S	459	402	277
	29$\alpha\alpha$R	1741	1264	1245

TABLE 12.1
CARBON ISOTOPE COMPOSITIONS (‰,PDB)

JOB 9730 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	KEROGEN	PYROLYSATE (S2)
WELL: 34/10-37								
9730-006A	2555m	-28.53	-29.46	-28.79	-28.50	-27.81	-27.70	
9730-007A	2561m	-28.12	-29.03	-28.43	-27.98	-27.04	-27.44	
9730-008A	2567m	-27.83	-29.17	-28.66	-27.84	-26.57	-27.51	
9730-008A	2567m					-26.56		
9730-011A	2585m	-27.88	-29.10	-28.40	-27.87	-26.95	-27.08	
9730-012A	2591m	-27.74	-28.86	-28.43	-28.14	-27.24	-27.19	
9730-013A	2597m	-27.61	-28.33	-28.23	-28.02	-26.75	-26.80	
9730-015A	2612m	-26.37	-28.54	-26.56	-25.79	-25.53	-25.53	
9730-016A	2615m	-26.22	-28.65	-26.52	-26.25	-25.72	-25.98	
9730-019A	2629.58-.60m	-28.50	-28.87	-27.71	-28.15	-28.10		
9730-020A	2640.42-.46m	-28.41	-28.88	-27.88	-28.13	-27.55		
9730-017A	2828m	-27.09	-28.04	-27.11	-27.41	-26.47	-27.11	
9730-017A	2828m	-27.06		-27.09				
9730-018A	2873m	-27.52	-28.18	-27.76	-27.68	-26.68	-27.10	

TABLE 12.2
CARBON ISOTOPE COMPOSITIONS (‰,PDB)

JOB 9731 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	KEROGEN	PYROLYSATE (S2)
WELL: 34/10-37A								
9731-002A	2667.65-.68m	-28.39	-28.70	-27.90	-28.15	-28.16		
9731-003A	2689.50-.52m	-28.55	-28.75	-27.76	-28.13	-28.02		
9731-004A	2711.48-.51m	-28.50	-28.74	-27.59	-27.94	-26.86		
9731-004A	2711.48-.51m					-26.88		

TABLE 12.3
CARBON ISOTOPE COMPOSITIONS (‰,PDB)

JOB 9808 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	KEROGEN	PYROLYSATE (S2)
WELL: 34/10-37A								
9808-001	DST 1 2667-97m	-28.46	-28.82	-27.83	-27.83	-27.96		

TABLE 13.1

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 217

WELL: 34/10-37

GEOCHEM SAMPLE NUMBER		9730-015A	9730-016A	9730-019A
DEPTH (m)		2612m	2615m	2629.58-2629.60m
SAMPLE TYPE		Cuttings	Cuttings	Core
PEAK	27dβS	1099	1271	3258
	27dβR	780	950	2241
	28dαR + 27$\alpha\alpha$S	683	828	1040
	27$\alpha\alpha$R	393	487	733
	29dβS + 27$\beta\beta$R	1426	1652	3722
	29dβR	1099	1224	3066
	28$\alpha\alpha$R (P)	439	350	598
	29$\alpha\alpha$S	757	617	1544
	29$\beta\beta$R	1148	981	2194
	29$\beta\beta$S	762	753	1530
	29$\alpha\alpha$R	1122	901	1394

TABLE 13.1

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 217

WELL: 34/10-37

GEOCHEM SAMPLE NUMBER		9730-020A	9730-017A	9730-018A
DEPTH (m)		2640.42-2640.46m	2828m	2873m
SAMPLE TYPE		Core	Cuttings	Cuttings
PEAK	27dβS	3121	1712	900
	27dβR	2239	1190	650
	28dαR + 27$\alpha\alpha$S	1189	918	634
	27$\alpha\alpha$R	637	874	440
	29dβS + 27$\beta\beta$R	3501	2069	1246
	29dβR	2738	1634	932
	28$\alpha\alpha$R (P)	567	595	315
	29$\alpha\alpha$S	1330	657	325
	29$\beta\beta$R	2074	1451	795
	29$\beta\beta$S	1390	804	435
	29$\alpha\alpha$R	1215	1591	790

TABLE 13.2

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 217

WELL 34/10-37A

GEOCHEM SAMPLE NUMBER		9731-002A	9731-003A	9731-004A
DEPTH (m)		2667.65-2667.68m	2689.50-2689.52m	2711.48-2711.51m
SAMPLE TYPE		CORE	CORE	CORE
PEAK	27dβS	1101	1275	2949
	27dβR	782	834	1824
	28dαR + 27$\alpha\alpha$S	411	586	924
	27$\alpha\alpha$R	271	194	460
	29dβS + 27$\beta\beta$R	1198	1369	2714
	29dβR	885	1027	2421
	28$\alpha\alpha$R (P)	141	184	333
	29$\alpha\alpha$S	434	414	1171
	29$\beta\beta$R	493	674	1442
	29$\beta\beta$S	484	623	970
	29$\alpha\alpha$R	324	395	856

TABLE 13.3

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 217

WELL 34/10-37A

GEOCHEM SAMPLE NUMBER		9808-001A
DEPTH (m)		2667.65-2667.68m
SAMPLE TYPE		DST 1 FLUID
PEAK	27dβS	816
	27dβR	549
	28dαR + 27$\alpha\alpha$S	290
	27$\alpha\alpha$R	133
	29dβS + 27$\beta\beta$R	936
	29dβR	753
	28$\alpha\alpha$R (P)	120
	29$\alpha\alpha$S	356
	29$\beta\beta$R	444
	29$\beta\beta$S	443
	29$\alpha\alpha$R	241

TABLE 14.1

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 218

WELL 34/10-37

GEOCHEM SAMPLE NUMBER		9730-006A	9730-007A	9730-008A
DEPTH (m)		2555m	2561m	2567m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings
PEAK	27ββR	3164	189	2685
	27ββS	1684	104	1505
	28ββR	1656	91	1068
	28ββS	1731	86	1165
	29ββR	3715	209	3381
	29ββS	2452	119	2153
	30ββR	708	39	591
	30ββS	781	36	717

TABLE 14.1

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 218

WELL 34/10-37

GEOCHEM SAMPLE NUMBER		9730-011A	9730-012A	9730-013A
DEPTH (m)		2585m	2591m	2597m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings
PEAK	27ββR	894	619	484
	27ββS	507	425	340
	28ββR	379	301	206
	28ββS	393	321	206
	29ββR	736	548	484
	29ββS	675	465	409
	30ββR	151	92	82
	30ββS	171	130	91

TABLE 14.1

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 218

WELL 34/10-37

GEOCHEM SAMPLE NUMBER		9730-015A	9730-016A	9730-019A
DEPTH (m)		2612m	2615m	2629.58-2629.60m
SAMPLE TYPE		Cuttings	Cuttings	Core
PEAK	27ββR	863	902	1920
	27ββS	624	747	1360
	28ββR	518	576	1041
	28ββS	585	591	1335
	29ββR	923	822	1824
	29ββS	776	836	1565
	30ββR	122	157	467
	30ββS	109	174	454

TABLE 14.1

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 218

WELL 34/10-37

GEOCHEM SAMPLE NUMBER		9730-020A	9730-017A	9730-018A
DEPTH (m)		2640.42-2640.46m	2828m	2873m
SAMPLE TYPE		Core	Cuttings	Cuttings
PEAK	27ββR	1724	1147	724
	27ββS	1231	862	466
	28ββR	953	562	308
	28ββS	1381	650	400
	29ββR	1685	994	544
	29ββS	1473	1108	589
	30ββR	379	120	79
	30ββS	325	205	70

TABLE 14.2

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 218

WELL 34/10-37A

GEOCHEM SAMPLE NUMBER		9731-002A	9731-003A	9731-004A
DEPTH (m)		2667.65-2667.68m	2689.50-2689.52m	2711.48-2711.51m
SAMPLE TYPE		CORE	CORE	CORE
PEAK	27ββR	606	641	1379
	27ββS	449	491	1101
	28ββR	321	331	729
	28ββS	385	393	1084
	29ββR	426	524	1160
	29ββS	469	562	1088
	30ββR	89	106	294
	30ββS	148	149	261

TABLE 14.3

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 218

WELL 34/10-37A

GEOCHEM SAMPLE NUMBER		9808-001A
DEPTH (m)		2667-2697m
SAMPLE TYPE		DST 1 FLUID
PEAK	27ββR	467
	27ββS	292
	28ββR	237
	28ββS	288
	29ββR	347
	29ββS	399
	30ββR	108
	30ββS	92

TABLE 15.1

BIOMARKER ABUNDANCES - TRITERPANES (PEAK AREAS)

WELL 34/10-37

GEOCHEM SAMPLE NUMBER		9730-006A	9730-007A	9730-008A	9730-011A	9730-012A
DEPTH (m)		2555m	2561m	2567m	2585m	2591m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings	Cuttings	Cuttings
M/Z 191	23/3	1277	116	1111	753	842
	24/3	184	73	713	451	584
	25/3	985	76	703	491	642
	24/4	821	62	1108	540	326
	26/3	813	64	853	365	475
	27Ts	1636	129	2239	717	511
	27Tm	3105	259	6456	1992	1258
	28$\alpha\beta$	1034	52	566	333	154
	25 nor 30$\alpha\beta$	0	0	0	0	0
	29$\alpha\beta$	7745	633	14084	4021	2638
	29Ts	3308	242	4201	1429	860
	30d	438	37	897	371	227
	29$\beta\alpha$	4699	353	8860	2491	1459
	Oleanane 30 O	0	0	0	0	0
	30$\alpha\beta$	17027	1108	25377	6814	4064
	30$\beta\alpha$	3267	247	7595	1461	1129
	30G	808	39	838	208	140
	31$\alpha\beta$S	5554	364	8694	2785	1525
	31$\alpha\beta$R	10168	665	18141	5036	2769
	32$\alpha\beta$S/32$\alpha\beta$R	1262 2626	88 159	1764 4307	539 1026	332 628
	33$\alpha\beta$S/33$\alpha\beta$R	938 1800	77 93	826 1676	242 370	167 237
	34$\alpha\beta$S/34$\alpha\beta$R	666 1146	26 71	561 984	181 237	74 97
	35$\alpha\beta$S/35$\alpha\beta$R	606 995	0 0	293 440	0 0	0 0
M/Z 177	25 nor 28$\alpha\beta$	0	0	0	0	0
	25 nor 30$\alpha\beta$	0	0	0	0	0

TABLE 15.1

BIOMARKER ABUNDANCES - TRITERPANES (PEAK AREAS)

WELL 34/10-37

GEOCHEM SAMPLE NUMBER		9730-013A	9730-015A	9730-016A	9730-019A	9730-020A
DEPTH (m)		2597m	2612m	2615m	2629.58-2629.60m	2640.42-2640.46m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings	Core	Core
M/Z 191	23/3	407	677	667	984	965
	24/3	238	450	507	791	792
	25/3	309	463	441	782	753
	24/4	306	733	775	783	772
	26/3	274	325	304	921	809
	27Ts	423	2238	2765	2319	2150
	27Tm	1366	3061	2431	1624	1532
	28$\alpha\beta$	101	1133	1194	1143	1256
	25 nor 30$\alpha\beta$	0	0	0	0	0
	29$\alpha\beta$	2848	4878	4074	4008	3961
	29Ts	785	1563	1813	1716	1861
	30d	214	1022	1252	1464	1464
	29$\beta\alpha$	1654	1007	737	529	529
	Oleanane 30 O	0	0	0	0	0
	30$\alpha\beta$	4559	10104	9083	9253	9329
	30$\beta\alpha$	1383	1775	1332	826	951
	30G	234	194	265	125	178
	31$\alpha\beta$S	2081	3061	2790	2900	2967
	31$\alpha\beta$R	3846	3199	2523	2229	2364
	32$\alpha\beta$S/32$\alpha\beta$R	397 854	1319 1381	1413 1249	1786 1362	1789 1420
	33$\alpha\beta$S/33$\alpha\beta$R	188 274	477 508	618 464	981 589	1014 700
	34$\alpha\beta$S/34$\alpha\beta$R	71 137	286 232	367 230	545 363	517 326
	35$\alpha\beta$S/35$\alpha\beta$R	0 0	123 127	178 145	333 227	336 211
M/Z 177	25 nor 28$\alpha\beta$	0	0	0	0	0
	25 nor 30$\alpha\beta$	0	0	0	0	0

TABLE 15.1

BIOMARKER ABUNDANCES - TRITERPANES (PEAK AREAS)

WELL 34/10-37

GEOCHEM SAMPLE NUMBER		9730-017A	9730-018A
DEPTH (m)		2828m	2873m
SAMPLE TYPE		Cuttings	Cuttings
M/Z 191	23/3	1235	752
	24/3	762	482
	25/3	809	553
	24/4	796	483
	26/3	708	415
	27Ts	961	562
	27Tm	3569	1950
	28*αβ*	995	527
	25 nor 30*αβ*	0	0
	29*αβ*	5155	2765
	29Ts	1031	522
	30d	547	200
	29*βα*	1586	772
	Oleanane 30 O	0	0
	30*αβ*	9161	4751
	30*βα*	2763	1221
	30G	214	157
	31*αβ*S	4430	2396
	31*αβ*R	4013	2065
	32*αβ*S/32*αβ*R	1591 1478	661 610
	33*αβ*S/33*αβ*R	799 699	264 269
	34*αβ*S/34*αβ*R	400 339	108 141
	35*αβ*S/35*αβ*R	249 152	95 40
M/Z 177	25 nor 28*αβ*	0	0
	25 nor 30*αβ*	0	0

TABLE 15.2

BIOMARKER ABUNDANCES - TRITERPANES (PEAK AREAS)

WELL 34/10-37A

GEOCHEM SAMPLE NUMBER		9731-002A	9731-003A	9731-004A
DEPTH (m)		2667.65-2667.68	2689.50-2689.52	2711.48-2711.51
SAMPLE TYPE		Core	Core	Core
M/Z 191	23/3	853	494	932
	24/3	500	298	773
	25/3	484	320	772
	24/4	531	344	711
	26/3	428	342	857
	27Ts	742	885	1911
	27Tm	518	502	1026
	28$\alpha\beta$	315	375	881
	25 nor 30$\alpha\beta$	0	0	0
	29$\alpha\beta$	1310	1581	2894
	29Ts	679	635	1461
	30d	376	508	1050
	29$\beta\alpha$	180	221	382
	Oleanane 30 O	0	0	0
	30$\alpha\beta$	2680	3259	5875
	30$\beta\alpha$	248	324	591
	30G	57	109	68
	31$\alpha\beta$S	961	1311	1864
	31$\alpha\beta$R	787	965	1437
	32$\alpha\beta$S/32$\alpha\beta$R	588/400	800/601	1123/779
	33$\alpha\beta$S/33$\alpha\beta$R	374/232	463/298	535/383
	34$\alpha\beta$S/34$\alpha\beta$R	174/117	281/179	381/205
	35$\alpha\beta$S/35$\alpha\beta$R	141/72	229/161	190/111
M/Z 177	25 nor 28$\alpha\beta$	0	0	0
	25 nor 30$\alpha\beta$	0	0	0

TABLE 15.3

BIOMARKER ABUNDANCES - TRITERPANES (PEAK AREAS)

WELL 34/10-37A

GEOCHEM SAMPLE NUMBER		9808-001
DEPTH (m)		2667 - 2697
SAMPLE TYPE		DST 1 FLUID
M/Z 191	23/3	246
	24/3	154
	25/3	158
	24/4	136
	26/3	213
	27Ts	570
	27Tm	342
	28*αβ*	281
	25 nor 30*αβ*	0
	29*αβ*	970
	29Ts	552
	30d	434
	29*βα*	124
	Oleanane 30 O	0
	30*αβ*	2301
	30*βα*	250
	30G	40
	31*αβ*S	809
	31*αβ*R	679
	32*αβ*S/32*αβ*R	534/449
	33*αβ*S/33*αβ*R	296/206
	34*αβ*S/34*αβ*R	181/131
	35*αβ*S/35*αβ*R	153/86
M/Z 177	25 nor 28*αβ*	0
	25 nor 30*αβ*	0

TABLE 16.1

BIOMARKER ABUNDANCES (PEAK AREAS) - MONOAROMATIC STERANES (M/Z 253)

WELL 34/10-37

GEOCHEM SAMPLE NUMBER		9730-006A	9730-007A	9730-008A	9730-011A	9730-012A	9730-013A	9730-015A	9730-016A	9730-019A	9730-020A	9730-017A	9730-018A
DEPTH (m)		2555m	2561m	2567m	2585m	2591m	2597m	2612m	2615m	2629.58-2629.60m	2640.42-2640.46m	2828m	2873m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Core	Core	Cuttings	Cuttings
PEAK	A1	274	172	2386	3012	1071	673	745	746	969	0	1191	216
	B1	740	83	1527	1609	582	607	615	503	781	0	935	278
	C1	1933	223	4192	2674	1167	1515	244	434	522	256	1443	400
	D1	3325	310	7021	4520	1725	2418	263	148	285	194	1748	459
	E1	4283	567	8686	6636	2404	3453	652	650	610	393	3474	1342
	F1	347	45	987	771	214	400	194	130	267	172	913	243
	G1	9050	1006	17049	12680	4154	6659	1696	2776	1754	1160	7012	3560
	H1	12467	801	19211	11532	4947	7215	1383	1850	1262	892	6040	1210
	I1	567	26	880	710	293	331	0	0	171	106	748	255

TABLE 16.2

BIOMARKER ABUNDANCES (PEAK AREAS) - MONOAROMATIC STERANES (M/Z 253)

GEOCHEM SAMPLE NUMBER		9731-002A	9731-003A	9731-004A
DEPTH (m)		2667.65-2667.68m	2689.50-2689.52m	2711.48-2711.51m
SAMPLE TYPE		CORE	CORE	CORE
PEAK	A1	97	587	121
	B1	78	304	169
	C1	120	220	175
	D1	14	130	120
	E1	114	297	234
	F1	25	108	66
	G1	199	593	524
	H1	110	484	360
	I1	30	87	62

TABLE 16.3

BIOMARKER ABUNDANCES (PEAK AREAS) - MONOAROMATIC STERANES (M/Z 253)

GEOCHEM SAMPLE NUMBER		9808-001A
DEPTH (m)		2667-2697m
SAMPLE TYPE		DST 1 FLUID
PEAK	A1	133
	B1	173
	C1	194
	D1	98
	E1	243
	F1	70
	G1	450
	H1	366
	I1	22

TABLE 17.1

BIOMARKER ABUNDANCES (PEAK AREAS) - TRIAROMATIC STERANES (M/Z 231)

WELL 34/10-37

GEOCHEM SAMPLE NUMBER		9730-006A	9730-007A	9730-008A	9730-011A	9730-012A	9730-013A	9730-015A	9730-016A	9730-019A	9730-020A	9730-017A	9730-018A
DEPTH (m)		2555m	2561m	2567m	2585m	2591m	2597m	2612m	2615m	2629.58-2629.60m	2640.42-2640.46m	2828m	2873m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Core	Core	Cuttings	Cuttings
PEAK	a1	817	587	963	1795	733	1151	4991	8085	2125	1410	3001	501
	b1	746	550	993	1660	662	1959	5684	8581	1958	1462	4288	601
	c1	1576	553	1695	2010	1042	1752	1578	1247	870	829	1908	450
	d1	4678	1341	4115	4775	2588	3789	4887	4172	2793	2364	5033	1164
	e1	2484	702	2191	2651	1354	2199	4041	3036	2493	2320	3702	824
	f1	2276	601	1837	1938	1343	1689	2706	1988	1307	1388	2007	540
	g1	2192	598	2033	2594	1335	1981	3365	2104	1684	1768	3216	735

TABLE 17.2

BIOMARKER ABUNDANCES (PEAK AREAS) - TRIAROMATIC STERANES (M/Z 231)

GEOCHEM SAMPLE NUMBER		9731-002A	9731-003A	9731-004A
DEPTH (m)		2667.65-2667.68m	2689.50-2689.52m	2711.48-2711.51m
SAMPLE TYPE		CORE	CORE	CORE
PEAK	a1	610	1556	1643
	b1	697	1626	1543
	c1	233	505	470
	d1	790	1439	1584
	e1	733	1237	1463
	f1	407	709	792
	g1	561	876	1036

TABLE 17.3

BIOMARKER ABUNDANCES (PEAK AREAS) - TRIAROMATIC STERANES (M/Z 231)

GEOCHEM SAMPLE NUMBER		9808-001A
DEPTH (m)		2667-2697m
SAMPLE TYPE		DST 1 FLUID
PEAK	a1	1073
	b1	1185
	c1	331
	d1	1197
	e1	1057
	f1	519
	g1	739

TABLE 18.1

BIOMARKER MOLECULAR RATIOS

WELL 34/10-37

GEOCHEM SAMPLE NUMBER			9730-006A	9730-007A	9730-008A	9730-011A	9730-012A	9730-013A	9730-015A	9730-016A	9730-019A	9730-020A	9730-017A	9730-018A
DEPTH			2555m	2561m	2567m	2585m	2591m	2597m	2612m	2615m	2629.58-2629.60m	2640.42-2640.46m	2828m	2873m
SAMPLE TYPE			Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Core	Core	Cuttings	Cuttings
M/Z	PEAKS	IDENTITY												
191	27 Tm/27 Ts		1.90	2.01	2.88	2.78	2.46	3.23	1.37	0.88	0.70	0.71	3.71	3.47
191	32 $\alpha\beta$S/(31$\alpha\beta$S+31$\alpha\beta$R)	C_{31}hH-S/R	0.35	0.35	0.32	0.36	0.36	0.35	0.49	0.53	0.57	0.56	0.52	0.54
178 192	MPI 1	MP Index	0.77	0.79	0.96	1.00	0.70	0.80	0.89	0.63	0.77	0.74	0.85	1.91
178 192	MPI 2	MP Index	0.79	0.85	0.95	1.07	0.79	1.01	0.90	0.66	0.77	0.74	0.97	2.31
217	29$\alpha\alpha\alpha$S/29$\beta\beta$R	C_{29} $\alpha\alpha$ St	0.16	0.15	0.19	0.26	0.21	0.18	0.67	0.68	1.11	1.09	0.41	0.41
217	29$\beta\beta$/(29$\alpha\alpha$+29$\beta\beta$)	C_{29} St	0.36	0.42	0.41	0.44	0.41	0.41	0.50	0.53	0.56	0.58	0.50	0.52
191	29$\alpha\beta$/30$\alpha\beta$	NorH	0.45	0.57	0.55	0.59	0.65	0.62	0.48	0.45	0.43	0.42	0.56	0.58
191	28$\alpha\beta$/30$\alpha\beta$	Bisnorh	0.06	0.05	0.02	0.05	0.04	0.02	0.11	0.13	0.12	0.13	0.11	0.12
191	hH/(27Ts, 27Tm,29$\alpha\beta$, 30$\alpha\beta$)	hH/H	0.87	0.72	0.78	0.77	0.69	0.85	0.53	0.54	0.66	0.69	0.75	0.66
191	Tricyclic Terpanes/ (27Ts,27Tm,29$\alpha\beta$,30$\alpha\beta$)		0.16	0.18	0.09	0.19	0.34	0.17	0.13	0.15	0.25	0.24	0.23	0.27
191	24/4:23/3	C_{24}/C_{23}	0.64	0.53	1.00	0.72	0.39	0.75	1.08	1.16	0.80	0.80	0.64	0.64
191	35$\alpha\beta$/34$\alpha\beta$	35/34 hH	0.88	0.00	0.47	0.00	0.00	0.00	0.48	0.54	0.62	0.65	0.54	0.54
218	27$\beta\beta$:28$\beta\beta$:29$\beta\beta$	$\beta\beta$ St	34:24:43	37:22:41	35:19:46	39:22:39	39:23:38	39:19:42	35:26:40	37:26:37	36:26:37	35:28:37	38:23:39	39:23:37
191 217	(27Ts,27Tm,29$\alpha\beta$,30$\alpha\beta$) 27$\alpha\beta$→30$\alpha\alpha$R	H/St	0.43	0.75	1.05	1.00	0.93	1.22	2.09	1.83	0.81	0.85	1.40	1.34

hH = Homohopanes H = Hopanes St = Steranes MP = Methylphenanthrene

TABLE 18.2

BIOMARKER MOLECULAR RATIOS

GEOCHEM SAMPLE NUMBER			9731-002A	9731-003A	9731-004A
DEPTH			2667.65 - 2667.68m	2689.50- 2689.52m	2711.48- 2711.51m
SAMPLE TYPE			Core	Core	Core
M/Z	PEAKS	IDENTITY			
191	27 Tm/27 Ts		0.70	0.57	0.54
191	32 $\alpha\beta$S/(31$\alpha\beta$S+31$\alpha\beta$R)	C_{31}hH-S/R	0.55	0.58	0.56
178 192	MPI 1	MP Index	0.91	0.82	0.97
178 192	MPI 2	MP Index	0.95	0.83	1.01
217	29$\alpha\alpha\alpha$S/29$\beta\beta\beta$R	C_{29} $\alpha\alpha$ St	1.34	1.05	1.37
217	29$\beta\beta\beta$/(29$\alpha\alpha$+29$\beta\beta\beta$)	C_{29} St	0.56	0.62	0.54
191	29$\alpha\beta$/30$\alpha\beta$	NorH	0.49	0.49	0.49
191	28$\alpha\beta$/30$\alpha\beta$	Bisnorh	0.12	0.12	0.15
191	hH/(27Ts, 27Tm,29$\alpha\beta$, 30$\alpha\beta$)	hH/H	0.73	0.85	0.60
191	Tricyclic Terpanes/ (27Ts,27Tm,29$\alpha\beta$,30$\alpha\beta$)		0.53	0.29	0.35
191	24/4:23/3	C_{24}/C_{23}	0.62	0.70	0.76
191	35$\alpha\beta$/34$\alpha\beta$	35/34 hH	0.73	0.85	0.51
218	27$\alpha\beta\beta$:28$\beta\beta$:29$\beta\beta$	$\beta\beta$ St	39:27:34	38:25:37	38:28:34
191 217	(27Ts,27Tm,29$\alpha\beta$,30$\alpha\beta$) 27$\alpha\beta$→30$\alpha\alpha$R	H/St	0.80	0.82	0.73

hH = Homohopanes H = Hopanes St = steranes
MP = methylphenanthrene

TABLE 18.3

BIOMARKER MOLECULAR RATIOS

GEOCHEM SAMPLE NUMBER			9808-001A
DEPTH			2667-2697m
SAMPLE TYPE			DST 1 FLUID
M/Z	PEAKS	IDENTITY	
191	27 Tm/27 Ts		0.60
191	32 $\alpha\beta$S/(31$\alpha\beta$S+31$\alpha\beta$R)	C_{31}hH-S/R	0.54
178 192	MPI 1	MP Index	0.83
178 192	MPI 2	MP Index	0.80
217	29$\alpha\alpha$S/29$\beta\beta$R	C_{29} $\alpha\alpha$ St	1.48
217	29$\beta\beta$/(29$\alpha\alpha$+29$\beta\beta$)	C_{29} St	0.60
191	29$\alpha\beta$/30$\alpha\beta$	NorH	0.42
191	28$\alpha\beta$/30$\alpha\beta$	Bisnorh	0.12
191	hH/(27Ts, 27Tm,29$\alpha\beta$,30$\alpha\beta$)	hH/H	0.84
191	Tricyclic Terpanes/ (27Ts,27Tm,29$\alpha\beta$,30$\alpha\beta$)		0.22
191	24/4:23/3	C_{24}/C_{23}	0.55
191	35$\alpha\beta$/34$\alpha\beta$	35/34 hH	0.77
218	27$\alpha\beta\beta$:28$\beta\beta$:29$\beta\beta$	$\beta\beta$ St	37:26:37
191 217	(27Ts,27Tm,29$\alpha\beta$,30$\alpha\beta$) 27$\alpha\beta$→30$\alpha\alpha$R	H/St	0.82

hH = Homohopanes H = Hopanes St = Steranes
MP = Methylphenanthrene

TABLE 19.1
CARBON ISOTOPE COMPOSITIONS (‰,PDB)

JOB 9730 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	KEROGEN	PYROLYSATE (S2)
WELL: 34/10-37								
9730-006A	2555m	-28.53	-29.46	-28.79	-28.50	-27.81	-27.70	
9730-007A	2561m	-28.12	-29.03	-28.43	-27.98	-27.04	-27.44	
9730-008A	2567m	-27.83	-29.17	-28.66	-27.84	-26.57	-27.51	
9730-008A	2567m					-26.56		
9730-011A	2585m	-27.88	-29.10	-28.40	-27.87	-26.95	-27.08	
9730-012A	2591m	-27.74	-28.86	-28.43	-28.14	-27.24	-27.19	
9730-013A	2597m	-27.61	-28.33	-28.23	-28.02	-26.75	-26.80	
9730-015A	2612m	-26.37	-28.54	-26.56	-25.79	-25.53	-25.53	
9730-016A	2615m	-26.22	-28.65	-26.52	-26.25	-25.72	-25.98	
9730-019A	2629.58-.60m	-28.50	-28.87	-27.71	-28.15	-28.10		
9730-020A	2640.42-.46m	-28.41	-28.88	-27.88	-28.13	-27.55		
9730-017A	2828m	-27.09	-28.04	-27.11	-27.41	-26.47	-27.11	
9730-017A	2828m	-27.06		-27.09				
9730-018A	2873m	-27.52	-28.18	-27.76	-27.68	-26.68	-27.10	

TABLE 19.2
CARBON ISOTOPE COMPOSITIONS (‰,PDB)

JOB 9731 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	KEROGEN	PYROLYSATE (S2)
WELL: 34/10-37A								
9731-002A	2667.65-.68m	-28.39	-28.70	-27.90	-28.15	-28.16		
9731-003A	2689.50-.52m	-28.55	-28.75	-27.76	-28.13	-28.02		
9731-004A	2711.48-.51m	-28.50	-28.74	-27.59	-27.94	-26.86		
9731-004A	2711.48-.51m					-26.88		

TABLE 19.3
CARBON ISOTOPE COMPOSITIONS (‰,PDB)

JOB 9808 GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	KEROGEN	PYROLYSATE (S2)
WELL: 34/10-37A								
9808-001	DST 1 2667-97m	-28.46	-28.82	-27.83	-27.83	-27.96		

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SUMMARY

One gas sample from well 34/10-37A, A-18107, is analysed for gas and isotopic composition.

On the sample C_1 - C_5 and CO_2 are quantified. The ^{13}C value is measured on methane, ethane, propane, the butanes and CO_2. In addition the δD value is measured on methane.

The work is done in accordance with the "The Norwegian Industry Guide to Organic Geochemical Analyses", Third Edition 1993.

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1 Introduction

One gas sample from well 34/10-37A , bottle A-18107, was received for isotope analysis August/September 1995.

On the gas sample C_1 - C_5 and CO_2 are quantified. The $\delta\ ^{13}C$ value is measured on methane, ethane, propane, the butanes and CO_2. In addition the δ D value is measured on methane.

2 Analytical procedures

Aliquots of the gas is sampled from the gas bottle with a syringe after reduction to atmospheric pressure.

The gas composition is determined on a Carlo Erba Mega gas chromatograph equipped with a Porapak Q column and thermal conductivity- (TCD) and flame ionisation- (FID) detectors.

For isotopic determination the different gas components are separated by a Carlo Erba 4200 gas chromatograph, and then oxidised in separate CuO-ovens at 850°C. Separate ovens are used in order to prevent cross contamination. The combustion products CO_2 and H_2O are frozen into collection vessels and separated.

The combustion water is reduced with zinc metal in sealed quarts tubes at 900°C to prepare hydrogen for isotope 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 ± .06‰ PDB.

3 Results

The volume composition of the gas sample is given in Table 1. The results have been normalised to 100%. The stable isotope composition of the gas samples is given in Table 2.

For the gas sample the uncertainty on the $\delta^{13}C$ value is estimated to be ± 0.3‰ PDB and includes all the different analytical steps. The estimate is based on repeated analysis of a laboratory standard gas mixture. The uncertainty in the δD value is likewise estimated to be ± 10‰.

Table 1 Volume composition of a gas sample from well 34/10-37A

Sample no.	IFE no GEO	C_1 %	C_2 %	C_3 %	iC_4 %	nC_4 %	iC_5 %	nC_5 %	CO_2 %	ΣC_1-C_5 %	Wet-ness	iC_4/ nC_4/
34/10-37A, A-18107	950584	83.7	9.7	3.9	0.51	0.69	0.16	0.17	1.1	98.9	0.15	0.75

Table 2 Isotopic composition of a gas sample from well 34/10-37A

Sample no.	IFE no GEO	C_1 $\delta^{13}C$ ‰ PDB	C_1 δ D ‰ SMOW	C_2 $\delta^{13}C$ ‰ PDB	C_3 $\delta^{13}C$ ‰ PDB	iC_4 $\delta^{13}C$ ‰ PDB	nC_4 $\delta^{13}C$ ‰ PDB	CO_2 $\delta^{13}C$ ‰ PDB	CO_2 $\delta^{18}O$ ‰ PDB
34/10-37A, A-18107	950584	-43.9	-194	-28.6	-25.4	-26.6	-26.8	-13.9	-12.5

4 References

James, A.T. (1983). Correlation of natural gas by use of carbon isotopic distribution between hydrocarbon components. *The American Association of Petroleum Geologists Bulletin,* **67**, 1176-1191.

Robert, P. (1985). Methods and means of paleothermal analysis. *Organic Methamorphism and Geothermal History,* Elf-Aquitaine and D. Reidel Publishing Company.

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