

2.2 RFT (Repeat Formation Tester)

3 runs were completed

A total of 60 pressure tests were performed and 31 of these gave reliable results. In addition, One segregated sample was collected at 3554.0 m RKB.

The reservoir pressures obtained from RFT are shown in figure 2.2.1 and listed in table 2.2.2 - 2.2.5.

Brønn 34/10-30

Dato 06.04.86

Run nr. 7C

TRYKKMÅLINGER FRA

FORMASJONSTESTER

TAB. 2.2.4

Statoil

Max. målt temp.: 128.0 °C

Test nr.	Dyp	Tem	Hyd. trykk før	Korr. hyd trykk før	Strømnings-trykk	Oppbygg. tid	Form. trykk	Korr. form. trykk	Hyd. trykk etter	Korr. hyd. trykk etter	KOMMENTAR
	m	C	bar	bar	bar	sec	bar	bar	bar	bar	
1	3542.0	1122	525.76	523.83	-	-	-	-	524.69	523.76	tett formasjon
2	3552.1	1122	527.07	525.14	-	-	-	-	527.14	525.21	tett formasjon
3	3554.2	1122	527.14	525.21	485.70	5	510.32	508.39	527.28	525.35	god permeabilitet
4	3554.2	1122	527.28	525.35							
5											
6	3558.2	1122	528.31	526.38	280.51	84	511.49	509.56	528.17	526.24	lav permeabilitet
7	3568.1	1163	529.69	527.76	-	-	-	-	529.69	527.76	tett formasjon
8	3577.7	1163	531.00	529.07	-	-	-	-	531.00	529.07	tett formasjon, 2.fors.
9	3579.2	1163	531.07	529.14	120.76	117	513.63	511.69	530.93	529.00	
10	3581.2	1163	531.41	529.48	384.62	33	513.35	511.42	531.34	529.41	
11	3596.5	1173	533.55	531.62	30.79	122	516.11	514.18	533.55	531.62	svært lav perm, overtr?
12	3599.7	1173	533.90	531.97	409.51	6	513.69	511.76	533.76	531.83	
13	3607.2	1173	535.07	533.14	198.05	193	515.21	513.28	534.86	532.93	lav permeabilitet
14	3604.1	1173	534.31	532.38	-	-	-	-	534.31	532.38	tett formasjon
15	3625.5	1186	537.34	535.41	-	-	-	-	537.34	535.41	tett formasjon
16	3652.2	1192	541.20	539.21	448.75	12	516.38	514.45	541.14	539.20	⊖
17	3665.2	1192	542.45	540.51	9.93	375	518.38	516.45	542.45	540.51	svært lav permeabilitet
18	3672.6	1192	544.24	542.31	-	-	-	-	544.17	542.24	ustabilt
19	3683.6	1214	545.55	542.93	-	-	-	-	545.55	542.93	tett formasjon
20	3706.0	1214	549.00	547.06	-	-	-	-	548.86	546.93	tett formasjon

Brønn 34/10-30

Dato 06.04.86

Run nr. 7C

TRYKKMÅLINGER FRA

FORMASJONSTESTER

TAB. 2.2.5

Statoil

Max. målt temp.: 128.0 °C

Test nr.	Dyp	Tem	Hyd. trykk før	Korr. hyd trykk før	Strømnings-trykk	Oppbygg. tid	Form. trykk	Korr. form. trykk	Hyd. trykk etter	Korr. hyd. trykk etter	KOMMENTAR
	m	C	bar	bar	bar	sec	bar	bar	bar	bar	
21	3711.5	121.4	549.2	547.27	21.34	195	520.52	518.59	548.93	547.0	svært lav permeabilitet
22	3720.0	121.4	550.58	548.65	10.00	-	-	-	550.44	548.51	tett formasjon
23	3730.5	121.4	552.58	550.65	-	-	-	-	552.58	550.65	tett formasjon
24					målekammer	reduseres					
25	3738.5	124.4	553.82	551.89	-	-	-	-	553.75	551.82	tett formasjon
26	3752.5	124.4	555.82	553.89	-	-	-	-	555.89	553.96	tett formasjon
27	3759.0	124.4	556.30	554.37	-	-	-	-	556.37	554.44	tett formasjon
28	3763.5	124.4	557.06	555.13	-	-	-	-	557.06	555.13	tett formasjon
29	3770.0	124.4	557.89	555.96	422.48	-	527.55	525.62	558.03	556.10	lav permeabilitet
30	3769.1	124.4	557.82	555.89	374.21	-	541.34	539.41	557.68	555.75	
31	3776.6	129.3	558.72	556.79	-	-	-	-	558.72	556.79	lav permeabilitet
32	3770.0	129.3	557.89	555.96	358.42	-	527.55	525.62	557.68	555.75	

2.3 PRODUCTION TESTING
(DST)

2.3 Production Testing (DST)

3 production tests were performed in well 34/10-30.

DST no.	Perf. interval (m RKB)	Formation	Produced fluid
1	3460 - 3473		Oil
2	3297 - 3318		Oil
3	3225.1 - 3255.1		Gas w ass. condensate

The test intervals are shown on the Well Data Summary in chapter 1. Description of test operations and summary of flow data are enclosed.

FLOW DATA
34/10-30

Test no.	Perf. int. (mRKB)	Flow-period no	Dura-tion (min)	Choke (mm)	Oil rate (sm3/d)	Gas rate (1000 sm3/d)	Gor (sm3/sm3)	Oil dens (kg/m3)	Gas sp.g. (air=1)	WHP (Bar)	WHT (°C)	BHP (Bar)	Res. (1) temp. (°C)	Res. (1) press. (Bar)
1.	3460-3473	1	1736	12.70	418	60.95	146	863	0.694	76.4	44	259.1	129.0	497.0
2.	3297-	1	325	12.70	710	117.05	166	856.5	0.676	138.9	41.1	345.6	126.0	474.5
	3318	2	705	7.94	347	56.76	165	875.0	0.695	191.1	27.2	403.3		
		3	88	4.76	126	21.52	172	856.5	0.695	220.3	13.3	440.4		
		4	370	17.50	1161	117.92	102	858.6	0.662	99.3	55.5	291.8		
3.	3125.1-1		443	14.30	272	928.9	3415	790.6	0.664	319.1	61.1	464.8	118.0	467.5
	3155.1	2	659	11.10	180	581.2	3229	793.0	0.670	355.3	47.2	466.5		
		3	142	17.50	352	1151.4	3271	792.5	0.658	285.9	67.7	463.1		

(1) Pressures corrected to the middle of the perforation interval.



Daily Material Usage

Operator Statoil

Well Gullfaks 34/10-30

Date 1986	Barite	Bento- nite	Caustic Soda	Borre- well	Soda Ash											Cost		36" Hole Remarks	
						Daily	Cumulative												
Unit	MT	MT	25 kg	25 kg	50 kg														
16.01		22	9		9												5092.00	5092.00	Spud 158 m
17.01		9	3	2	4												2104.05	7196.05	Length 74 m
18.01		2															440.00	7636.05	
Totals		33	12	2	13												7636.05	7636.05	
																	Program	Actual	
																	84.43	103.19	Cost per meter
																	29.87	16.18	Cost per m ³
																		2545.46	Cost per day
Program		19	5	0	2	23											6332.85	6332.85	



Daily Material Usage

Operator Statoil

Well Gullfaks 34/10-30

Date 1986	Barite MT	Bento. MT	Caustic 25 kg	Drispac 50 lb	Insta-X 25 kg	Borewell 25 kg	Soda Ash 50 kg	KC Polymer 25 kg	Mica 25 kg	Cost		26" Hole Remarks
										Daily	Cumulative	
											7636.05	TD 325
18.01	70			8							6940.00	14576.05 Spud 232
19.01	4			4				3			1689.56	16265.61 Length 93
20.01	30				1	2			20		3104.85	19370.46
21.01	93				1						8573.85	27944.31
Totals	197	0	0	12	2	2	0	3	20		20308.26	27944.31
Program	42	29	7				4				10298.85	16631.70
											Program	Actual
											114.43	218.36 Cost per meter
											22.68	69.55 Cost per m ³
												5077.07 Cost per day



Daily Material Usage

Operator Statoil

Well Gullfaks 34/10-30

Date 1986	Barite MT	Bento. MT	Bore- well 25 kg	Caustic 25 kg	CMC LV 25 kg	Defoam 25 l.	Dextrid 25 kg	Drispac 50 lb	Drispac 50 lb	FLR 25 kg	FLR XL 25 kg	Gypsum 40 kg	Insta- vis 25 kg	Mica F 25 kg	Soda Ash 50 kg	Wellnut Fine 25 kg	XCD fo- lymer 25 kg	Cost		17 1/2" Hole Remarks
																		Daily	Cumulative	
																			27944.31	TD 1898
22.01	4	11		22		1	47	30				110			1		19	15326.05	43270.37	Spud 325
23.01	7			6			12	8				29					8	4901.66	48172.03	Length 1573
24.01				32			89	50				194					37	23197.69	71369.72	
25.01				25			63	33				90					28	16613.06	87982.78	
26.01				2			20						1				5	3129.35	91112.13	
27.01				25		1	65	36				40	1				25	15955.33	107107.46	
28.01	15			13		1	36	9		8		100	6				14	11915.05	119022.51	
29.01	25			17			28			15			4	1			12	10824.49	129847.00	
30.01	22			20			39			40		124	15					13169.50	143016.50	
31.01	35	1		10			52			2	31	86	1	2	2			11556.62	154573.12	
01.02	54			25			41			4	25	67						11628.07	166201.19	
02.02	13			11						8		22	2		1			2793.44	168994.63	
03.02	48			13			19			3	5	44	1		1			7059.29	176053.92	
04.02	17	4	15	9	15		9			1		15		49	2	16		4510.88	180564.80	
05.02																		0	180564.80	
Totals	240	16	15	230	15	3	520	166	0	81	61	921	31	52	7	16	148	152620.49	180564.80	
Program	68			251			484	150	101			992			34		87	91704.39	108336.09	
																		Program	Actual	
																		55.58	97.03	Cost per meter
																		60.13	101.34	Cost per m ³
																			10174.70	Cost per day



Daily Material Usage

Operator Statoil

Well Gullfaks 34/10-30

Date 1986	Barite MT	Bento. MT	Bore-well 25 kg	Caustic 25 kg	CMC LV 25 kg	Defoam 25 l.	Dextrid 25 kg	Drispac 50 lb	Drispac SL 50 lb	FLR XL 25 kg	Gypsum 40 kg	Lime 25 kg	PAC R 25 kg	Soda Ash 50 kg	Sodium Bicarb. 50 kg	XCD Polymer 25 kg	Cost		12 1/4" Hole Remarks	
																	Daily	Cumulative		
																		174038.19	ID 2845	
06.02	2														21			605.25	174643.44	Spud 1898
07.02	99				18		31				83				6			11802.85	186446.29	Length 947
08.02	93		75	27			20			3	37							11199.68	197645.97	
09.02	35		59	8			18				43	8						5212.96	202858.93	
10.02	168		152	30			5		10		46		6					18739.45	221598.38	
11.02	28		61	17							42		4					3804.05	225402.43	
12.02	22		80	19							51		9					3869.50	229271.93	
13.02	107		78	23			14				57		12					12627.75	241899.68	
14.02	40		85	20			34				40		4					7235.00	249134.68	
15.02	123					1	25						1					12754.98	261889.66	
16.01	31		16	28	7				8				4		2			4333.60	266223.26	
17.01	11																	990.00	267213.26	
18.01																		0	267213.26	
Totals	759	0	606	172	25	1	147		18	3	399	8	40	0	29	0		93175.07	267213.26	
																		Program	Actual	
																		77.78	98.39	Cost per meter
																		153.45	159.55	Cost per m ³
																			7764.59	Cost per day
Program	232	10	302	125	119	0	222	56	111	0	252	0	0	25	16	25		67671.20	176037.29	



Daily Material Usage

Operator Statoil

Well Gullfaks 34/10-30

Date 1986	Barite MT	Bento. MT	Bento. 50 kg	Bore- well 25 kg	Caustic 25 kg	CMC LV 25 kg	C. Lidg. 25 kg	Defoam 25 l.	Durenex 50 lb	EZ Spot 55 gal	FLR 25 kg	FLR XL 25 kg	Imco Spot 50 lb	PAC R 25 kg	Soda Ash 50 kg	Sod. bicarb. 50 kg	XCD Fo-lymer 25 kg	Cost		8 1/2" Hole Remarks	
																		Daily	Cumulative		
																			267213.26	TD 3500	
19.02																			0	267213.26	Spud 2845
20.02	14	2													1				1719.05	268932.31	Length 655
21.02	70			20	5						2								6800.71	275733.02	
22.02				6							2								308.96	276041.98	
23.02	7																		630.00	276671.98	
24.02				17	7						2	4		1					1066.20	277738.18	
25.02				38	16			1			1	2						1	1342.60	279080.78	
26.02	34			24	5			1				2		1				2	4438.94	283519.72	
27.02	11																		990.00	284509.70	
28.02	8				1						.							1	1065.47	285575.19	
01.03	8				1		35											2	1953.24	287528.43	
02.03	20		8		7	12	35					3							3210.07	290738.50	
03.03	16		16	9	8	22	20	1	13										3556.38	294294.88	
04.03				18	2														206.90	294501.78	
05.03		4		57	7	17	52		14						16				3913.61	298415.39	
06.03				43	7		27					2							1194.82	299610.21	
07.03	21			15	5		15				1				7				2584.83	302195.04	
08.03				20	3	20	24		17										2115.33	304310.37	
09.03			16		4		11		10				90						5091.53	309401.90	
10.03			3				8					3			2				591.87	309993.77	
11.03	29				5				8			7			1				4043.29	314037.06	
Totals	238	6	43	267	83	71	227	3	62	0	8	23	90	2	27			6	46823.80	314037.06	



Daily Material Usage

Operator Statoil

Well Gullfaks 34/10-30

Date 1986	Barite MT	Bento. MT	Bento. 50 kg	Pore- mg/l 25 kg	Caustic 25 kg	CMC LV 25 kg	C. Lig 25 kg	Defoam 25 l	Durenex 50 lb	EZ Spot 55 gal	FLR 25 kg	FLR XL 25 kg	Imco Spot 50 lb	PAC R 25 kg	Soda Ash 50 kg	Sodium Bicarb 50 kg	XCD Po lymer 25 kg	Cost		8 1/2" Hole continued Remarks	
																		Daily	Cumulative		
BF	238	6	43	267	83	71	227	3	62	0	8	23	90	2	27	0	6	46823.80	314037.06		
12.03				4	2		16		14			2							1399.48	315436.54	
13.03	11				4										4				1102.00	316538.54	
14.03					2														17.90	316556.44	
15.03					2														17.90	316574.34	
16.03					2														17.00	316592.24	
17.03							1		1	2									875.19	317467.43	
18.03	14																		1260.00	318727.43	
Totals	263	6	43	271	95	71	244	3	77	2	8	25	90	2	31	0	6	51514.17	318727.43		
																			Program	Actual	
																			76.78	78.65	Cost per meter
																			136.86	165.11	Cost per m ³
																				1561.04	Cost per day
Program	250	18	0	305	119	53	159	0	167	0	0	0	0	0	10	14	0	45301.78	221339.07		



Daily Material Usage

Operator Statoil

Well Gullfaks 34/10-30

Date 1986	Barite MT	Bento. MT	Bore-well 25 kg	Caustic 25 kg	C. Lig 25 kg	Dispac 50 lb	Dr. Ig. Det. 200 l	Durex 50 lb	FLR 25 kg	PAC R 25 kg	Soda Ash 50 kg	Sodium Bicarb 50 kg	Cost		6" Hole		
													Daily	Cumulative	Remarks		
															318727.43	TD	3785
19.03												2		40.50	318767.93	Spud	3500
20.03							1							396.50	319164.43	Length	285
21.03	8		12	4	11			2				12		1416.93	320581.36		
22.03	9		6	2	6	1		8			4			1617.12	322198.48		
23.03	3	5	24		24			12	4	1	2	6		3433.04	325631.53		
24.03			24		28			10	7			1		2168.51	327800.04		
25.03					2				4					523.42	328323.46		
26.03	1								2			8		497.96	328821.42		
27.03	16				5							5		1620.00	330441.42		
28.03					4					2				199.50	330640.92		
29.03					15					4		4		590.25	331231.17		
30.03	14	3	4	1	2						2	1		2060.80	333291.97		
31.03		4	1	1	24					3	2	2		1560.80	334852.77		
01.04	3		2					9		3				1030.71	335883.48		
02.04	24							12		4				3146.28	339029.76		
03.04								9		2				671.46	339701.22		
04.04	7	3	1	1	6			26		2	1	2		3145.44	342846.66		
05.04					8									126.00	342972.66		
06.04	2				3									227.25	343199.91		
Totals	97	15	74	9	138	1	1	88	17	21	11	43		24472.48	343199.91	Cost/m	\$85.87
																Cost/m ³	\$144.81
																Cost/day	\$1,529.51



Daily Material Usage

Operator Statoil

Well Gullfaks 34/10-30

Date 1986	Barite MT	Bento. MT	Bento. 50 kg	Bore-well 25 kg	Caustic 25 kg	C. Lig 25 kg	Drispac 50 lb	FLR XL 25 kg	PAC R 25 kg	Sodium Bicard 50 kg	Cost		Testing Remarks	
											Daily	Cumulative		
												343199.91		
07.04						3		1	1	5		344.46	343544.37	
08.04										9		182.25	343726.62	
09.04	13											1170.00	344896.62	
10.04	29		1	5	1				1	1		2774.83	347671.45	
11-16.04												0	347671.45	
17.04										4		81.00	347752.45	
18.04										5		101.25	347853.70	
19.04			1									14.88	347868.58	
20-21.04												0	347868.58	
22.04	8											720.00	348588.58	
23.04												0	348588.58	
24.04	5											450.00	349038.58	
25.04	12								1			1148.25	350186.83	
26.04										1		20.25	350207.08	
27.04												0	350207.08	
28.04									1	2		108.75	350315.83	
29.04			1									14.88	350330.71	
30.04												0	350330.71	
01.05									1			68.25	350398.96	
02.05	24											2160.00	352558.96	
03.05												0	352558.96	
Totals	91	0	3	5	1	3	0	1	5	27		9359.05	352558.96	

ADDRESS KJELLER HALDEN N-2007 Kjeller, Norway N-1751 Halden, Norway TELEPHONE +47 2 712560 - 713560 +47 31 83100 TELEX 74 573 energ n 76 335 energ n TELEFAX +47 2 715553		AVAILABILITY Private Confidential
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	CLIENT Statoil	REV. NO.
	CLIENT REF. T-6269, avrop nr. 73	NUMBER OF PAGES 5
		NUMBER OF ISSUES 15
SUMMARY The gas components C_1 , C_2 , and CO_2 have been separated from natural gases of well 34/10-30, and the $\delta^{13}\text{C}$ values of these components have been measured. The isotopic composition of hydrogen from CH_4 has also been measured.		DISTRIBUTION Statoil (10) Andresen, B. Brevik, E.M. Råheim, A.
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REVIEWED BY	Arne Råheim	1986-09-18
APPROVED BY		

1. INTRODUCTION

Two gas samples from well 34/10-30, DST 1 and DST 3, were received early June 1986. A third sample from the same well, DST 2, was received early September 1986.

On the samples C_1 - C_4 and CO_2 are quantified, and the $\delta^{13}C$ value is measured on methane, ethane, propane, the butanes and CO_2 . The δD value is also measured on methane.

2. ANALYTICAL PROCEDURE

The natural gases have been quantified and separated into the different gas components by a Carlo-Erba 4200 instrument. This gas chromatograph is equipped with a special injection loop in order to concentrate the samples, in the case of low concentration of the gas components. The hydrocarbon gas components were oxidized in separate CuO -ovens in order to prevent cross contamination. The combustion products CO_2 and H_2O were frozen into collection vessels and separated.

The water was reduced with zinc metal in a sealed tube to prepare hydrogen for isotopic analysis. The isotopic measurements were performed on a Finnigan Mat 251 and a Finnigan Mat delta mass spectrometer. Our $\delta^{13}C$ value on NBS 22 is $-29.77 \pm .06$ o/oo PDB.

3. RESULTS

The volume composition of the samples are given in Table 1. The results have been normalized to 100%. The stable isotope results are given in Table 2.

Our uncertainty on the $\delta^{13}C$ value is estimated to be ± 0.3 o/oo and includes all the different analysis step. The uncertainty on the δD value is likewise estimated to be ± 5 o/oo.

Table 1 Volume composition of gas samples from well 34/10-30

Sample	IFE no.	C ₁ %	C ₂ %	C ₃ %	i-C ₄ %	n-C ₄ %	CO ₂ %	ΣC _{1-C₄}	$\frac{\Sigma C_2-C_4}{\Sigma C_1-C_4}$	$\frac{i-C_4}{n-C_4}$
DST 1 3460-3473 m RKB 84B00703	5060	87.4	7.2	2.5	0.35	0.63	1.9	98.1	0.11	0.56
DST 2 3297-3318 m RKB 83B00886	5282	86.2	7.3	2.9	0.42	0.92	2.3	97.7	0.12	0.46
DST 3 3125-3155 m RKB 84B00701	5062	89.7	5.7	2.1	0.27	0.55	1.8	98.2	0.09	0.49

Table 2 Isotopic composition of gas samples from well 34/10-30

Sample	IFE no.	C ₁ $\delta^{13}C_{PDB}$	C ₁ δD_{SMOW}	C ₂ $\delta^{13}C_{PDB}$	C ₃ $\delta^{13}C_{PDB}$	i-C ₄ $\delta^{13}C_{PDB}$	n-C ₄ $\delta^{13}C_{PDB}$	CO ₂ $\delta^{13}C_{PDB}$	$\delta^{18}O_{PDB}$
DST 1 3460-3473 m RKB 84B00703	5060	-37.3	-170	-28.6	-25.7	-26.1	-27.4	-14.6	-10.9
DST 2 3297-3318 m RKB 83B00886	5282	-41.4	-195	-28.9	-27.0	-21.8	-27.8	-14.1	-10.0
DST 3 3125-3155 m RKB 84B00701	5062	-35.8	-160	-28.3	-25.4	-26.3	-26.8	-11.4	-14.4

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PETROLEUM TECHNOLOGY

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Grading

Title Correlation study involving migrated hydrocarbons and potential source rocks from the 34/10-23; 34/10-21 and 34/10-30 wells		
Requested by Ivar Morvik	Project	
Date 05.05.87	Number of pages 134	No. of encs. 2

Key words
34/10-23, 34/10-21, 34/10-30, geochemical correlation, migrated hydrocarbons, accumulated hydrocarbons, isotopes, biomarkers.

Abstract Source rock cores and cuttings, reservoir cores and accumulated hydrocarbons (test-samples) have been investigated

Prepared by

GEOCHEM (Chester)
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Approved by

5/6-87 *Trigve Meyer*
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Snorre Olausen



INTRODUCTION

This report presents a partial geochemical evaluation of selected Jurassic sediments from the 34/10-23 and 34/10-30 wells, a correlation study involving these sediments and shows plus tested hydrocarbons from both wells and a re-appraisal of the hydrocarbons data from the 34/10-21 well geochemical evaluation.

The study was designed to investigate the source of the "second" crude and of the "condensate" described in the 34/10-23 well geochemical evaluation (Geochem February 1986).

This project was approved by S. Ulvoen, Statoil, Stavanger.

ANALYTICAL

A suite of thirteen (13) core samples from 4106.8-4247.2 metres in 34/10-23 and five (5) core samples from 2942.65-3197.1 metres in 34/10-30 were received and assigned the Geochem job number 1474. Eleven ditch cuttings samples from the 3955-4480 metre interval in 34/10-23 were re-assigned to job 1474 from the original study. The samples are listed in table 1.

The samples were analysed in accordance with a scheme approved by Statoil (telexes 23/09/86).

Analyses performed in this study are as follows:-

ANALYSIS	NUMBER OF ANALYSES
Sample preparation	18
Total organic carbon	14
Pyrolysis	18
C ₁₅₊ extraction and chromatography	10
Capillary GC - paraffin-naphthenes	5
Capillary GC - aromatics	5
Pyrolysis-GC	20
Carbon isotopes - extract fractions	50
Carbon isotopes - pyrolysate	20
Carbon isotopes - kerogen	20
GC-MS biomarker analysis	10



CARBON ISOTOPES KEY

WELL 34/10-21

DEPTH

1. 2920-2935m
2. 2950-2965m
3. 2995-3010m
4. 3040-3055m
5. 3055-3070m
6. 3115-3130m
7. 3160-3175m
8. 3205-3219m
9. 3264-3279m
10. 3399-3414m
11. 3639-3654m
12. 3924-3939m

WELL 34/10-23

DEPTH

14. 3865-3880m
15. 3910-3925m
45. 3955-3970m
13. 3970-3985m
16. 4000-4015m
17. 4015-4030m
18. 4045-4060m
19. 4060-4075m
20. 4085-4095m
21. 4106.08m
22. 4110.10m
23. 4120.50m
24. 4136.60m
25. 4143.15m
26. 4148.70m
27. 4154.60m
28. 4164.10m
29. 4172.25m
30. 4206.65m
31. 4212-4225m
32. 4220.00m
33. 4235.60m
34. 4247.20m
35. 4360-4375m
36. 4390-4405m
37. 4465-4480m
38. 4480-4495m

WELL-34/10-30

DEPTH

39. 2942.65m
40. 2945.00m
41. 3178.24m
42. 3178.30m
43. 3178.30m
44. 3197.80m

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
<u>34/10-23 WELL</u>				
1474-019 1189-162	3955-3970m	A 60% Mudstone, blocky, soft, v. sl. calc., minor cavings, medium dark grey to olive grey B 40% LCM - lignite Minor shale	N4- 5YR4/1	2.40
1474-027 1189-163	3970-3985m	A 50% Mudstone, as 1474-019A, minor cavings B 50% LCM - lignite and cement Minor other mudstone and sand	N4-5YR4/1	3.64
1474-020 1189-164	3983-4000m	A 70% Mudstone, as 1474-019A B 30% LCM - lignite and cement	N4-5YR4/1	2.29
1474-021 1189-165	4000-4015m	A 75% Mudstone, as 1474-019A, minor cavings B 25% LCM - lignite and cement	N4-5YR4/1	2.61
1474-029 1189-166	4015-4030m	A 85% Mudstone, blocky, soft, non-calc., B 15% LCM - cement and lignite minor cavings, medium dark grey to olive grey B 15% LCM - cement and lignite	N4-5YR4/1	2.51
1474-022 1189-167	4030-4045m	A 70% Mudstone, as 1474-019A, minor cavings B 30% LCM - lignite and cement	N4-5YR4/1	2.96
1474-028 1189-168	4045-4060m	A 80% Mudstone, as 1474-019A, minor cavings B 20% LCM - lignite and cement	N4-5YR4/1	2.93, 2.91
1474-023 1189-169	4060-4075m	A 80% Mudstone, as 1474-029A, minor cavings B 20% LCM - lignite and cement	N4-5YR4/1	3.15
1474-001 CORE	4106.2	A 98% Coaly, shale platy to subfissile, brittle, micaceous, dark grey to greyish black	N3-2	59.9
1474-002 CORE	4110.10	A 98% Coal, blocky, brittle, greyish black	N2	73.7
1474-003 CORE	4121.50	A 98% Coal, blocky, brittle, greyish black	N2	84.7
1474-004 CORE	4136.60	A 98% Sandstone, blocky, fine grained, micaceous laminane, cross bedded pinkish grey to pale orange V. pale milky cut	5YR8/1- 10YR7/2	
1474-005 CORE	4143.15	A 98% Shale, subfissile to platy, mod. hard, non-calc., medium dark grey	N4	3.23, 3.34
1474-006 CORE	4148.70	A 98% Sandstone, blocky, fine grained, well sorted, sl. micaceous, V. rare coal, V. pale milky cut, pinkish grey to pale orange	5YR8/1- 10YR7/2	

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

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1474-007 CORE	4154.60	A 98% Shale, subfissile, mod. hard, non-calc., medium dark grey to medium grey Minor carbonaceous inclusions	N4-5	2.30
1474-008 CORE	4164.10	A 98% Coal, blocky, hard, argillaceous? dark grey	N3	51.9
1474-009 CORE	4172.25	A 98% Sandstone, blocky, medium grained subangular, fairly well sorted, grain - supported, V. pale milky cut, pale orange	10YR7/2	
1474-010 CORE	4206.65	A 98% Sandstone, blocky, medium grained, subangular, fairly well sorted, "Sulphurous" smell, strong milky cut, pale orange	10YR7/2	
1474-011 CORE	4220.00	A 98% Coaly shale, subfissile, hard, non-calc., "soapy" texture, dark grey to medium brownish black	N3-5YR3/1	13.5
1474-012 CORE	4235.60	A 98% Coal, blocky, brittle, dark grey to to greyish black	N3-2	80.6
1474-013 CORE	4247.20	A 98% Sandstone, blocky, medium grained, fairly well sorted, V. pale milky cut, white	N9	
1474-024 1189-188	4360-4375m	A 95% Claystone, blocky, soft, non-calc., minor cavings, medium grey to medium brownish grey B 5% LCM - lignite	N5-5YR5/1	2.20, 2.23
1474-025 1189-190	4390-4405m	A 95% Claystone, as 1474-024A B 5% LCM - lignite	N5-5YR5/1	1.50
1474-026 1189-195	4465-480m	A 40% Sand, as 1189-194A B 30% Shale, as 1189-194C, sig. cavings C 15% Claystone, as 1189-194B minor cavings D15% LCM - lignite	N9 N4 N5- 5YR5/1	 3.93, 3.89 1.64

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

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
<u>34/10-30 WELL</u>				
1474-014 CORE	2942.65	A 98% Shale, subfissile, soft to mod. hard, non-calc., medium dark grey	N4	2.00
1474-015 CORE	2945.00	A 98% Shaly claystone, blocky to subfissile, mod. hard, non-calc., Coal inclusive, medium dark grey to brownish grey	N4-5YR4/1	9.28, 9.70
1474-016 CORE	3178.24	A 98% Carbonaceous shale, blocky, mod. hard, non-calc., greyish black to dark grey	N2-3	19.7
1474-017 CORE	3178.30	A 60% Shale, subfissile, mod. hard, non-calc., brownish grey B 40% Coaly shale, blocky to subfissile, mod. hard, non-calc., dark grey	5YR4/1 N3	2.55 23.0
1474-018 CORE	3197.10	A 98% Shale, platy, mod. hard, non-calc., 'Satin' luste, medium dark grey	N4	2.11

S17

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



TABLE 2

ROCKEVAL PYROLYSIS DATA (34/10-23 Well)

GEOCHEM SAMPLE NUMBER	DEPTH	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Production INDEX	Hydrogen INDEX	Oxygen INDEX	Tmax (%C)
1474-019A	3955-3970	1.48	4.67	0.47	0.24	165.0	16.6	449
1474-020A	3985-4000	1.35	2.59	0.63	0.34	113.1	27.5	444
1474-021A	4000-4015	1.04	2.85	0.56	0.27	109.2	21.5	446
1474-022A	4030-4045	1.55	3.13	0.57	0.33	105.7	19.3	446
1474-023	4060-4075	1.50	3.30	0.46	0.31	104.8	14.6	446
1474-001A	4106.80	6.66	162.53	2.73	0.04	271.3	4.6	455
1474-005A	4143.15	0.66	3.17	1.22	0.17	98.1	37.8	457
1474-007A	4154.60	0.51	2.14	2.52	0.19	93.0	109.6	461
1474-011A	4220.00	2.61	15.63	0.47	0.14	115.8	3.5	465
1474-024	4360-4375	0.49	0.68	0.19	0.42	43.9	12.3	443
1474-025	4390-4405	0.46	0.60	0.14	0.43	40.0	9.3	441
1474-026	4465-4480	3.04	7.29	0.71	0.29	186.4	18.2	442



TABLE 2

ROCKEVAL PYROLYSIS DATA (34/10-30 Well)

GEOCHEM SAMPLE NUMBER	DEPTH	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Production INDEX	Hydrogen INDEX	Oxygen INDEX	Tmax (%C)
1474-014A	2942.65	0.61	2.09	1.07	0.23	104.5	53.5	435
1474-015A	2945.00	4.26	26.87	2.28	0.14	289.5	24.6	427
1474-016A	3178.24	4.42	46.69	0.97	0.09	237.0	4.9	434
1474-017A	3178.30	0.77	6.80	0.49	0.10	266.7	19.2	438
1474-017B	3178.30	8.06	89.90	1.96	0.08	390.9	8.5	436
1474-018A	3197.10	0.34	0.88	0.85	0.28	41.7	40.3	489

TABLE 3
GAS - OIL INDEX



GEOCHEM SAMPLE NUMBER	DEPTH	DRY GAS	WET GAS	GASOLINES KEROSENES	GAS OIL DISTILLATE	GAS-OIL INDEX
		% C ₁	% C ₂ - C ₅	% C ₆ - C ₁₄	% C ₁₅₊	$\frac{\% C_1 - C_5}{\text{TOTAL}}$

34/10-23

1474-019A	3955-3970	21.39	42.86	35.24	0.52	64.25
1474-021A	4000-4015	20.71	38.41	40.60	0.28	59.12
1474-023A	4060-4075	32.24	29.28	38.22	0.26	61.51
1474-001A	4106.80	53.46	12.04	27.57	6.93	65.50
1474-002A	4110.10	55.99	10.29	23.91	9.81	66.28
1474-003A	4121.50	51.96	8.17	27.86	12.01	60.13
1474-005A	4143.15	49.02	24.69	24.98	1.30	73.71
1474-007A	4154.60	60.80	9.19	24.84	5.17	69.98
1474-008A	4164.10	59.20	15.32	21.30	4.19	74.51
1474-011A	4220.00	62.36	9.45	23.05	5.14	71.81
1474-012A	4235.60	60.26	8.77	22.21	8.76	69.03
1474-024A	4360-4375	25.13	32.35	42.27	0.26	57.48
1474-025A	4390-4405	28.45	41.33	29.87	0.36	69.78
1474-026B	4465-4480	25.02	32.98	41.78	0.22	58.00

TABLE 3
GAS - OIL INDEX



GEOCHEM SAMPLE NUMBER	DEPTH	DRY GAS	WET GAS	GASOLINES KEROSENES	GAS OIL DISTILLATE	GAS-OIL INDEX
		% C ₁	% C ₂ - C ₅	% C ₆ - C ₁₄	% C ₁₅ +	$\frac{\% C_1 - C_5}{\text{TOTAL}}$

34/10-30

1474-014A	2942.65	28.55	26.72	36.25	8.48	55.27
1474-015A	2945.00	38.04	19.86	36.61	5.49	57.90
1474-016A	3178.24	35.68	23.98	32.64	7.70	59.66
1474-017A	3178.30	37.01	28.41	29.51	5.07	65.41
1474-017B	3178.30	14.77	9.29	54.05	21.90	24.06
1474-018A	3197.10	44.18	20.93	27.87	7.02	65.11



TABLE 4

METHYL PHENANTHRENE INDEX (1) AND (2)

<u>34/10-23 WELL</u>					
<u>SAMPLE</u>		<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>
<u>NUMBER</u>	<u>DEPTH</u>	<u>AREA</u>	<u>HEIGHT</u>	<u>AREA</u>	<u>HEIGHT</u>
1474-004A	4136.60	2.42	2.25	0.79	0.98
1474-006A	4148.70	1.21	1.29	2.23	2.36
1474-009A	4172.25	1.51	1.46	0.76	0.86
1474-010A	4206.65	1.31	1.32	2.08	1.90
1474-013A	4247.20	0.71	0.73	0.48	0.56



TABLE 5a
CONCENTRATION (PPM) OF EXTRACTED C₁₅₊ MATERIAL IN ROCK

JOB	LITHO	DEPTH	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS			
				Saturates	Aromatics	TOTAL	Preciptd. Asphaltenes	Eluted NSO's	Non-eluted NSO's	TOTAL

34/10-23 WELL

1474-019		3955-70	4900	2581	657	3238	908	745	8	1661
1474-023		4060-75	3569	2106	653	2759	127	674	10	810
1474-004A		4136.60	126	15	6	21	92	13	0	105
1474-006A		4148.70	440	12	3	15	405	18	1	425
1474-009A		4172.25	126	7	6	14	105	7	0	112
1474-010A		4206.65	333	22	6	28	290	14	0	304
1474-013A		4247.20	161	26	4	30	93	38	1	131
1474-026		4465-80	5913	3270	836	4106	965	836	6	1807

S - shale, SS - sandstone, L - limestone, D - dolomite, M - mixed, see Table 1.



TABLE 5a
CONCENTRATION (PPM) OF EXTRACTED C₁₅₊ MATERIAL IN ROCK

JOB	LITHO	DEPTH	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS			
				Saturates	Aromatics	TOTAL	Preciptd. Asphaltenes	Eluted NSO's	Non-eluted NSO's	TOTAL

34/10-30 WELL

1474-015A		2945.0	2996	1452	583	2035	369	586	6	961
1474-017B		3178.30	6323	3216	1190	4406	937	969	12	1917

S - shale, SS - sandstone, L - limestone, D - dolomite, M - mixed, see Table 1.



TABLE 5b
COMPOSITION (NORMALISED %) OF C₁₅₊ MATERIAL

JOB	LITHO	DEPTH	HYDROCARBONS		NON HYDROCARBONS		
GEOCHEM SAMPLE NUMBER			Saturates	Aromatics	Preciptd. Asphaltenes	Eluted NSO's	Non eluted NSO's

34/10-23 WELL

1474-019		3955-70	52.68	13.42	18.53	15.21	0.16
1474-023		4060-75	59.01	18.29	3.55	18.87	0.27
1474-004A		4136.60	11.85	4.53	73.17	10.10	0.35
1474-006A		4148.70	2.80	0.67	92.14	4.13	0.27
1474-009A		4172.25	5.88	4.90	83.66	5.23	0.33
1474-010A		4206.65	6.67	1.89	87.11	4.22	0.11
1474-013A		4247.20	15.93	2.65	57.52	23.45	0.44
1474-026		4465-80	55.31	14.14	16.32	14.14	0.11

S - shale, SS - sandstone, L - limestone, D - dolomite, M - mixed, see Table 1.



TABLE 5b
COMPOSITION (NORMALISED %) OF C₁₅₊ MATERIAL

JOB	LITHO	DEPTH	HYDROCARBONS		NON HYDROCARBONS		
GEOCHEM SAMPLE NUMBER			Saturates	Aromatics	Preciptd. Asphaltenes	Eluted NSO's	Non eluted NSO's

34/10-30 WELL

1474-015A		2945.0	48.47	19.46	12.33	19.55	0.19
1474-017B		3178.30	50.86	18.83	14.81	15.32	0.18

S – shale, SS – sandstone, L – limestone, D – dolomite, M – mixed, see Table 1.



TABLE 6
SIGNIFICANT RATIOS (%) OF C₁₅₊ FRACTIONS AND ORGANIC CARBON

JOB	LITHO	DEPTH	ORGANIC CARBON (wt. %)	HYDROCARBONS	HYDROCARBONS	TOTAL EXTRACT	SATURATES
GEOCHEM SAMPLE NUMBER				TOTAL EXTRACT	ORG. CARBON	ORG. CARBON	AROMATICS

34/10-23 WELL

1474-019		3955-70	3.07	66.09	10.55	15.96	3.93
1474-023		4060-75	3.31	77.31	8.34	10.78	3.23
1474-004A		4136.60	0.34	16.38	0.61	3.71	2.62
1474-006A		4148.70	0.12	3.46	1.27	36.66	4.20
1474-009A		4172.25	0.16	10.78	0.85	7.88	1.20
1474-010A		4206.65	0.19	8.56	1.50	17.52	3.53
1474-013A		4247.20	0.08	18.58	3.75	20.16	6.00
1474-026		4465-80	3.27	69.44	12.56	18.08	3.91

S - shale, SS - sandstone, L - limestone, D - dolomite, M - mixed, see Table 1.



TABLE 6
SIGNIFICANT RATIOS (%) OF C₁₅₊ FRACTIONS AND ORGANIC CARBON

JOB	LITHO	DEPTH	ORGANIC CARBON (wt. %)	HYDROCARBONS	HYDROCARBONS	TOTAL EXTRACT	SATURATES
GEOCHEM SAMPLE NUMBER				TOTAL EXTRACT	ORG. CARBON	ORG. CARBON	AROMATICS

34/10-30 WELL

1474-015A		2945.0	8.47	67.93	2.40	3.54	2.49
1474-017B		3178.30	25.00	69.68	1.76	2.53	2.70

S - shale, SS - sandstone, L - limestone, D - dolomite, M - mixed, see Table 1.