



IKU
SINTEF-GRUPPEN

Håkon Magnussongt 1 B
P.O.Box 1883 Jarlesletta
N-7001 Trondheim, Norway
Tel.: +47 7 92 06 11

REG. NO.
85.033

ACCESSIBILITY
Confidential

REPORT TITLE/TITTEL FINAL REPORT			
SOURCE ROCK ANALYSIS OF WELL 34/7-4. PART 1. SCREENING ANALYSES.			
CLIENT/ OPPDRAGSGIVER Saga Petroleum a.s.			
PROJECT MANAGER/ PROSJEKTANSVARLIG Susannah Betts			
AUTHORS/ FORFATTERE S. Betts, F. Bessessen and L. Husvik			
DATE/ DATO	REPORT NO./ RAPPORT NR.	NO. OF PAGES/ ANT. SIDER	NO. OF ENCLOSURES/ ANT. BILAG
28.2.85	22.1767.00/01/85	49	3

SUMMARY/ SAMMENDRAG

See inside.

KEY WORDS

34/7-4

Source rock

Screening analyses

STIKKORD

CONTENTS

	Page
SUMMARY	3
1. INTRODUCTION	5
2. EXPERIMENTAL METHODS AND DESCRIPTION OF INTERPRETATION LEVELS	6
3. RESULTS AND DISCUSSION	8
3.1 Light hydrocarbon analyses	8
3.2 Lithology and total organic carbon analyses	11
4. CONCLUSIONS	14
Table 1a: Headspace gas analysis results	18
Table 1b: Occluded gas analysis results	23
Table 1c: Combined headspace and occluded gas analysis results	28
Table 2: Lithological description and TOC content	33
Enclosures.	
1) Light hydrocarbons	
2) Lithology and TOC	
3) Interpretation diagram based on TOC/light hydrocarbon abundance	

SUMMARY

Nordland Group (1033-1187m)Utsira Fm.

Predominantly glauconitic sand and lithic clastics with small amounts of claystone (fair to good source potential present) overall potential poor. Good to rich abundances of methane. Very low wetness. Probably mainly biogenic gas.

Hordaland Group (1187-1685m)

Predominantly light grey claystone variable richness. Poor to rich decreasing with depth. Good to rich hydrocarbon abundances predominantly methane. Probably mainly biogenic.

Rogaland Group (1685-1847.5m)Balder Fm. (1685-1711)

Light olive grey claystone with poor source potential. Rich abundance of methane. Poor abundances of C₂⁺ hydrocarbons.

Lista/Sele Fms. (1711-1847.5m)

Light olive grey claystone with fair hydrocarbon source potential. Good methane abundances. Poor C₂⁺ abundances.

CretaceousShetland Group (1847-2495.5)

1847-1940m

Light olive grey claystone.

1946-2495.5m

Medium grey claystone with sand increasing with depth below 2243m. Minor amounts of limestone and dolomite. Source potential fair (to 2297m) to good (below 2297m). 1842-1946m fair to good C₁ abundances below this good-rich wetness increasing with depth (2% top to 40% at base). iC₄/nC₄ ratios indicate presence of mature hydrocarbons probably, migrated.

Cromer Knoll Group (2495.5-2517m)

Predominantly redbrown/dark grey marl. Poor hydrocarbon potential. Rich abundance of C₁ and C₂+ hydrocarbons. Wetness, high 54%. iC₄/nC₄ mature hydrocarbons.

JurassicDunlin Group (2517-2535m)

Claystones. Fair to good claystone source potential. Rich abundances of C₁, C₂-C₄ and C₅+. Wetness very high, 87%.

Statfjord Fm. (2535-2627.5)

Predominantly sand. Poor to non existent source potential. Poor to fair C₁ abundances. Higher abundances of C₅+ hydrocarbons.

TriassicHegre Group (U. Lunde Fm.) (2627.5-3116m (TD))

Poor source potential. Light hydrocarbon abundance. 2627.5-2738m fair to good abundance. (Mainly C₅+); 2738-TD poor abundance. Predominantly methane.

1. INTRODUCTION

1.1 Screening analyses on well 34/7-4 (Saga Petroleum)

Analyses requested by Saga Petroleum were light hydrocarbon analyses (headspace and occluded gas), lithology and total organic carbon content. As requested every third sample in the Tertiary was analysed and every other sample in the Cretaceous and Jurassic section. In total 100 samples were analysed. The results are presented in the following report.

The following formation tops, as supplied by Saga Petroleum, were used in the report.

	Depth (m)
Nordland Group Utsira Fm.	1033.5
Hordaland Group	1187.0
Rogaland Group Balder Fm.	1685.0
Lista/Sele Fm.	1711.5
Shetland Group	1847.5
Cromer Knoll Group	2495.5
Dunlin Group	2517.0
Statfjord Fm.	2535.5
Hegre Group U. Lunde Fm.	2627.5
TD	3115.5

2. EXPERIMENTAL METHODS AND DESCRIPTION OF INTERPRETATION LEVELS

2.1 Gas analyses

A septum was attached to the can, a sample of the headspace gas was taken and analysed for C_1 , C_2 , C_3 , $i-C_4$, nC_4 and C_5+ (conditions: see below). If any C_5+ was detected a second sample was taken and analysed for C_4-C_{10} compounds (conditions: see below).

The can was opened, headspace volume, water volume and sample weight were measured. The canned samples were washed with tempered water on 4, 2 and 0.125 mm sieves to remove drilling mud and thereafter dried at 35°C.

For occluded gas analysis an aliquot of the 2-4 mm fraction of each sample before drying was crushed in water using an airtight ball mill. The evolved gas was analysed as described for headspace gas.

GC conditions:

C_1-C_5+ analysis

This analysis was performed on Carlo Erba Fractovap 2150 and 2350 gas chromatographs equipped with 2m x 1/8" stainless steel columns filled with Porapack Q on Chromosorb using nitrogen as carrier gas. The oven temperature was 150°C. After elution of n-butane the column was back-flushed and C_5+ was recorded. A standard gas containing methane, ethane, propane, n-butane, n-pentane and n-hexane was used for quantitation.

2.2 Lithological descriptions

Lithological examinations are normally carried out using a binocular microscope (maximum 50x magnification). Colour descriptions are in accordance with "Rock Colour Chart" published in 1979 by the Geology Society of America. Boulder, Colorado. The clients have a choice of three different levels of description from a simple identification of the lithologies to a full examination of the sample (more detailed description in this report). Handpicking of the cuttings for organic geochemical analyses is based on these descriptions.

2.3 Total Organic Carbon

Bulk samples were crushed in a mortar. Aliquots of the samples were then weighed into Leco crucibles and treated three times with hot 10% HCl to remove carbonate, and washed 4 times with distilled water to remove traces of HCl. The crucibles were then placed on a hot plate and dried for 24 hours. The total organic carbon (TOC) content of the dried samples was determined using a Leco CR12 carbon analyser.

3. RESULTS AND DISCUSSION

3.1 Light hydrocarbon analyses

Utsira Fm. (1033-1187m)

The samples analysed show good to rich abundances of light hydrocarbons, predominantly methane. The average wetness is low, 1.83% however, the lowest sample B-9314 (1180m) shows an increased wetness (7%). The reason for this is not clear as samples from the underlying Hordaland Group are also very dry. The gas present in the Utsira Fm. is probably largely of biogenic origin. (There is no correlation of variations in wetness with variations in lithology).

Hordaland Group (1187-1685m)

The upper part of the Hordaland Group, down to 1330m, shows a good to rich abundance of light hydrocarbons, almost entirely methane and therefore probably biogenic (it is noticeable however that this zone also corresponds with a zone of fairly high TOC claystone. However the wetness of the gas remains very low). Below 1330m there is a zone of poor light hydrocarbon abundance with some increase in total C_1-C_4 towards the base of the Hordaland Group. Wetness throughout the Hordaland Group is very low (too low to measure iC_4/nC_4 ratios). Average wetness: 0.76%.

Rogaland Group (1685-1847.5m)

Balder Fm. (1685-1711.5m)

Only one sample from the Balder Fm. has been analysed B-9365 (1690m). This shows a rich abundance of methane but very low amounts of C_2-C_5 hydrocarbons (wetness 0.57%).

Lista/Sele Fm.s (1711.5-1847.5m)

Samples from this section show variable abundances of C_1 , generally good but with one sample from 1830m showing a poor C_1 content. There is an increase in wetness with depth although the overall content of C_2+ hydrocarbons is low. The average wetness is 1.67%. Butane abundances are too low to measure iC_4/nC_4 ratios.

Shetland Group (1847.5-2495.5m)

There are considerable variations in light hydrocarbon abundances within the Shetland Group. The upper zone 1847-1946m shows fair to rich methane abundances but a very low content of C₂+ hydrocarbons. Below this there is zone from 1946m-2090m where the overall hydrocarbon abundance is rich. The wetness here is higher than above (5-7% as opposed to 2%) but still relatively low (this is not associated with any lithological or TOC change). Below this zone total light hydrocarbon abundances fall again by an order of magnitude however the overall wetness is higher. It is noticeable that there is a steady increase in wetness from 2% to over 40% near the base of the Shetland Group indicating increasing production of thermogenic light hydrocarbons with depth. This may also be affected by the increasing TOC content with depth of the Shetland Group Claystones (0.5-1.12% TOC). Below 2180m abundances are variable, good to rich. Wetness is moderate, over 20%. iC₄/nC₄ ratios indicate increasing maturity with depth (the zero values should be ignored as they arise from lack of data). Towards the base, in last 30m, the high abundance of C₅+ hydrocarbons may indicate the presence of free liquid hydrocarbons. The low iC₄/nC₄ ratios indicate that mature hydrocarbons are present.

Cromer Knoll Group (2495.5-2517m)

Only one sample was analysed from this section B-9479 (2504m). It shows a rich abundance of methane and of C₂+ hydrocarbons. The wetness is high; 54%, and the iC₄/nC₄ ratio indicates the presence of mature hydrocarbons.

Dunlin Group (2517-2535m)

Again only one sample from this section was analysed B-9481; 2522m. This sample shows rich abundances of C₁, C₂-C₄ and C₅+ hydrocarbons. The wetness is very high, 87% and may indicate the presence of migrated liquid hydrocarbons. The iC₄/nC₄ ratio is low 0.26% indicating the presence of mature hydrocarbons.

Statfjord Fm. (2535-2627.5m)

Overall light hydrocarbon abundances are lower in the Statfjord Fm. than in the overlying Dunlin and Cromer Knoll Groups. Only poor to fair

abundances of methane are recorded except in the lower two samples which show good abundances. However there are much greater amounts of C_2-C_4 and C_5+ this fit well with the very high wetness recorded; 80-89% (the reason for the lower value in sample B-9487; 2576m could be the more abundant claystone in this sample) and possibly indicates the presence of migrated hydrocarbons as does the high maturity of the hydrocarbons indicated by the low iC_4/nC_4 ratios.

Hegre Group (only Upper Lunde Formation penetrated) 2627.5-3116m)

The Hegre Group can be subdivided into two on the basis of the light hydrocarbon analyses. In the upper section 2627.5-2738m there is a fair to good hydrocarbon abundance predominantly C_5+ hydrocarbons with a consequently high total wetness. Wetness decreases with depth. iC_4/nC_4 ratios are low indicating presence of hydrocarbons from a mature source. The lower part of the Hegre Group (from 2738-TD) shows light hydrocarbon abundances with methane predominant. The wetness drops sharply from 50% in the section above to 7%. Concentrations were too low for iC_4/nC_4 ratios to be measured.

3.2 Lithology and total organic carbon analyses

Nordland Group (1033.5-1187m)

Utsira Fm.

This formation consists predominantly of sand and crystalline rock fragments. (Remains of ill sorted clastics?) and, in addition, varying amounts, (10-30%) of light olive grey claystone are present in the upper samples. The TOC content of this claystone varies from 0.62-2.10%. Large amounts of glauconite are found, up to 50%, in the lower samples. It is not clear whether the claystone is caved or indigenous to the formation, however it appears to occur in relatively minor amounts, and to be of variable source potential. The high organic content, 2.10%, is unusual for a pale claystone. In summary the Utsira formation shows very little source potential.

Hordaland Group (1187-1685m)

All of the Hordaland Group samples from this well consist of a light olive grey silty claystone of variable organic carbon content. The TOC content varies between 2.29% and 0.55 decreasing in richness with depth. Traces of glauconite appear throughout and towards the base small amounts of sandstone are present. The lowest sample is predominantly tuff. The upper part of the Hordaland group shows rich hydrocarbon potential with fair to good potential in the lower section. However the claystones are probably not yet thermally mature due to shallow depth of burial.

Rogaland Group (1685-1847.5m)

Balder Fm. (1685-1711m)

Only one sample from this formation was analysed (B-9368m). It consisted entirely of light olive grey claystone with TOC content 0.54% (poor source potential).

Lista/Sele Fm. 81711-1847.5m)

The samples from this formation also consist of 100% light olive grey claystone with TOC content ranging from 0.45-0.75%.

In summary the Rogaland group samples are very homogenous and show an uniform poor to fair source potential. It is not possible, based on the information IKU has, to establish whether this homogeneity is real or the effect of caving.

Shetland Group (1847-2495.5m)

The upper part of the Shetland group, down to 1946m, consists predominantly of light olive grey claystone with 0.15 to 0.81% TOC. Below 1946m a medium grey claystone becomes predominant. This shows TOC contents between 0.7% and 1% tending to increase in richness with depth. Sample quality is variable with several samples containing over 30% drilling mud and casing cement. Below 2243m varying amounts of sand appear in the samples reaching a maximum of 30%. Minor amounts of limestone and dolomite also appear. Below 2243m the claystone also becomes darker in colour and an increase in TOC content is observed. Below 2387m to the base of the Shetland Group, a dark grey TOC rich marl appears reaching a maximum of 30% in the lower samples. In summary the source potential of the Shetland group increases with depth from fair to 2297m to good below 2297m. Again the maturity of the samples is not known.

Cromer Knoll Group (2495.5-2517m)

Only one sample from this group has been analysed. It consists predominantly of a red brown to dark grey marl with low (0.91%) TOC content. A medium grey claystone (TOC 0.97%) is also present but this may represent caved material from the overlying Shetland group. On the basis of this sample the source potential of the Cromer Knoll group appears to be poor.

Dunlin Group (2517-2535m)

Again because of the thin Dunlin section present in this well and the requested sample interval only 2 samples have been analysed. The first consists of three different lithologies: A low TOC (0.4%) marl (caved from Cromer Knoll Group above?), a medium grey claystone (0.87% TOC) and a TOC rich (6.72%) grey black silty claystone. The lower sample is comprised of medium grey claystone (0.81% TOC) and a poorly sorted sand. It is hard to assess the source potential of the Dunlin group. If

the zone of very rich TOC claystone is extensive then at least part of the group shows excellent hydrocarbon potential. Overall it shows a fair to good source potential. The Dunlin Group sequence seems very condensed and large parts are probably entirely missing due to erosion.

Statfjord Fm. (2535-2627.5)

The samples from the Statfjord Fm. consist predominantly of sand although variable amounts of mixed claystone types appear in the lower samples. The TOC content of the claystones ranges from 0.27 to 0.98 but they are always the subordinate lithology. In summary poor to fair source potential for the claystone show a poor to fair source potential with an overall poor potential because of the low claystone content.

Triassic

Hegre Group (U. Lunde Fm.) (2627.5-3115.0 (TD))

The upper part of the U. Lunde Fm. consists of varicoloured claystones, predominantly red brown, with minor amounts of sand. The TOC content is low. Below 2801m sand becomes the dominant lithology accompanied by minor claystone and red brown marl (also of low TOC content). The Hegre Group in this well shows poor to non existent hydrocarbon source potential.

4. CONCLUSIONS

The conclusions are based on lithology, TOC and light hydrocarbon analyses with formation tops as supplied by Saga Petroleum.

Nordland Group (Utsira Fm. (1033.5-1187m))

This formation consists predominantly of poorly sorted sandstone. Variable amounts of claystone are present (up to 30% in some samples) showing poor to rich source potential. However as the main lithology is sand the overall source potential is poor. The light hydrocarbon analyses indicate good to rich abundances of dry gas. Probably of biogenic origin.

Hordaland Group (1187-1685m)

The dominant lithology in this group is a light olive grey claystone of variable TOC content 0.55% to 2.29%. The upper part of the group shows rich hydrocarbon potential and the lower part fair to good hydrocarbon potential. The light hydrocarbon analyses indicate a good to rich abundance of gas predominantly methane in the upper part of the group. Wetness is low. There is no estimation of maturity as iC_4 and nC_4 abundances were too low to measure. Probably immature.

Rogaland Group (1685-1847.5m)

Balder Fm. (1685-1711.5)

This formation (based on one sample) consists of light olive grey TOC poor claystone with poor hydrocarbon source potential. The gas results show a rich abundance of methane. The gas wetness is low, 0.57%.

Lista/Sele Fm.s (1711.5-1847.5m)

Samples from this section are very homogenous and consist of a light olive grey claystone of poor to fair TOC content. Light hydrocarbon abundances are fair to good. The wetness is low but shows an increase with depth. Total butane abundances are still too low to measure iC_4/nC_4 ratios.

Shetland Group (1847-2495.5m)

The Shetland group can be subdivided into two. An upper part above 1946m where the dominant lithology is a light olive grey claystone with

variable (0.15-0.81%) TOC content and poor to fair hydrocarbon source potential. Source potential is lower below 1946m where a medium grey claystone of 0.17% TOC content predominates. The TOC content generally increases with depth. This section shows fair to good source potential. Light hydrocarbon abundances are variable; generally fair to good with a zone of rich abundance between 1946m and 2090m. The wetness increases in this zone. Over the whole of the Shetland group there is a steady increase in wetness from 2% at the top to over 40% near the base. iC_4/nC_4 ratios indicate the presence of mature hydrocarbons. The high abundance of C_5+ hydrocarbons in the lower 30m may indicate the presence of migrated liquid hydrocarbons.

Cromer Knoll Group (2495.5-2517m)

Only one sample from this section was analysed from 2504m. The main lithology is a red brown marl with low 0.31% TOC content indicating poor potential for this group. The gas analyses show a rich abundance of C_1 and C_2+ hydrocarbons. The wetness is high, 54%, and the iC_4/nC_4 ratio indicates the presence of mature hydrocarbons. Given the probable immaturity and poor source potential of the Cromer Knoll Group these are probably migrated hydrocarbons.

Jurassic

Dunlin Group (2517-2535m)

Two samples were analysed, the dominant lithology appears to be a medium grey claystone of fair source potential (TOC 0.81%) however in the upper sample a TOC rich (6.72%) dark grey black claystone is present with very high source potential. If the zone of rich claystone is extensive then the upper part of the Dunlin Group shows very rich generation potential. Overall the potential is fair to good. The Dunlin Group sequence in this well is very thin although how much of this is due to lateral thinning over a high and non deposition and how much is due to erosion is not clear from the data available to IKU.

Gas analyses shows rich abundances of C_1 , C_2-C_4 and C_5+ hydrocarbon. The wetness is very high, 87% and the iC_4/nC_4 ratio, 0.26% is low indicating hydrocarbons (probably migrated) from a mature source. The maturity of the Dunlin Group in this well is not known. It is unlikely that the very thin rich claystone zone observed was acting as the source in this location, however away from the Tampen spur such claystones may be more abundant, thicker and more mature and may be a good source rock.

Statfjord Formation (2535-2627.5m)

The samples from the Statfjord formation consist predominantly of sand with the appearance of variable amounts of claystone (near the dominant lithology). The source potential of the formation is poor although the sands may act as a reservoir. The overall light hydrocarbon abundances are lower in the Statfjord Fm. than in the overlying Dunlin and Cromer Knoll groups. However abundances of C_2-C_4 and C_5+ hydrocarbons are high, hence the very high wetness recorded 80.89%, and may indicate the presence of migrated hydrocarbons. The iC_4/nC_4 ratios indicate the presence of hydrocarbons from a mature source.

Triassic

Hegre Group (U. Lunde Fm.) (2627.5-3116m (TD))

The upper part of the U. Lunde Fm. consists of varicoloured claystones (predominantly red brown) with minor amounts of sand. The TOC content is low and source potential poor. Below 2801m sand becomes the dominant lithology accompanied by minor claystone and red brown marl (also of low TOC content). The Hegre Group shows poor to non existent hydrocarbon potential. The Group can be divided into two on the basis of the light hydrocarbon analyses. The upper section down to 2738m shows a fair to good light hydrocarbon abundance, predominantly C_5+ components, with a consequently high wetness. Wetness decreases with depth. iC_4/nC_4 ratios are low indicating hydrocarbons from a mature source.

The lower part of the group, from 2738m, (approximately corresponds to the incoming of the sand) shows poor light hydrocarbon abundances with methane predominant. The wetness drops from 54% in the section above to 7% in the sand section. Butane concentrations were too low for iC_4/nC_4 ratios to be measured.

Only the Hordaland Group and one of the claystones of the Dunlin group show any significant source potential. The Hordaland Group is likely to be immature in this well. Light hydrocarbon abundances indicate the presence of migrated hydrocarbons in the Lower Shetland Group, Cromer Knoll Group, Dunlin Group and Statfjord Fm.

Project no.: 22.1767.00
 Well ident.: 34/7-4
 DATE : 1 - 3 - 85.



TABLE I a.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN HEADSPACE

I	I	I	I	I	I	I	I	I	I	I	I	I	I
I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4	I
I	no.	m							C1-C4	C2-C4	NESS	-----	I
I											(%)	nC4	I
I	I B 9368	1720	11215	96					11312	96	0.85	*****	I
I	I B 9371	1750	4943	58					5001	58	1.17	*****	I
I	I B 9374	1780	4374	64					4438	64	1.44	*****	I
I	I B 9377	1810	6771	115	23				6909	137	1.99	*****	I
I	I B 9379	1830	592	8					600	8	1.35	*****	I
I	I B 9381	1847	3813	67					3879	67	1.72	*****	I
I	I B 9383	1865	4446	66	15				4527	81	1.79	*****	I
I	I B 9385	1883	1097	15					1112	15	1.37	*****	I
I	I B 9387	1901	2525	37					2562	37	1.45	*****	I
I	I B 9414	1919	2767	49	13				2829	62	2.18	*****	I
I	I B 9417	1946	3504	116	43				3663	159	4.35	*****	I
I	I B 9420	1973	53867	2100	795				56762	2895	5.10	*****	I
I	I B 9421	1982	16143	699	302				17143	1001	5.84	*****	I
I	I B 9423	2000	34818	1584	689				37092	2274	6.13	*****	I
I	I B 9425	2018	29800	1347	636				31783	1983	6.24	*****	I
I	I B 9427	2036	25907	1168	504	81			27661	1754	6.34	*****	I
I	I B 9429	2054	12911	643	285	44			13883	972	7.00	*****	I
I	I B 9431	2072	40793	2210	976	130			44108	3316	7.52	*****	I
I	I B 9433	2090	10235	551	268				11054	819	7.41	*****	I
I	I B 9435	2108	7015	439	265	54	37		7810	795	10.18	1.46	I
I	I B 9437	2126	395	33	43				471	76	16.16	*****	I
I	I B 9439	2144	2076	135	99				2309	233	10.11	*****	I
I	I B 9441	2162	2590	210	177			957	2977	387	12.99	*****	I
I	I B 9443	2180	4453	315	282	69		1261	5119	666	13.01	*****	I

Project no.: 22.1767.00
 Well ident.: 34/7-4
 DATE : 1 - 3 - 85.



TABLE I a.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN HEADSPACE

I	I	I	I	I	I	I	I	I	I	I	I	I	I
I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4	I
I	no.	m							C1-C4	C2-C4	NESS	-----	I
I											(%)	nC4	I
I													I
I	I B 9493	2630	150	65	242	67	262	846	786	637	80.94	0.26	I
I	I B 9494	2639	2599	391	850	274	1136	4966	5249	2650	50.49	0.24	I
I	I B 9497	2666	1843	230	377	87	295	920	2832	989	34.91	0.29	I
I	I B 9499	2684	1158	522	581	80	255	406	2595	1437	55.36	0.31	I
I	I B 9501	2702	360	59	140			530	559	199	35.63	*****	I
I	I B 9503	2720	645	63	91			466	799	154	19.31	*****	I
I	I B 9505	2738	344	87	109		56		596	252	42.24	0.00	I
I	I B 9507	2756	715	82	115				913	197	21.63	*****	I
I	I B 9509	2774	110	7	8				126	16	12.55	*****	I
I	I B 9511	2792	71						71		0.00	*****	I
I	I B 9513	2810	48						48		0.00	*****	I
I	I B 9515	2828	82						82		0.00	*****	I
I	I B 9517	2846	152	10					162	10	6.20	*****	I
I	I B 9519	2864	129	9					138	9	6.75	*****	I
I	I B 9521	2882	104	11					115	11	9.27	*****	I
I	I B 9523	2900	134	9	13				156	23	14.65	*****	I
I	I B 9525	2918	112	7					119	7	6.06	*****	I
I	I B 9527	2936	112						112		0.00	*****	I
I	I B 9529	2954	81						81		0.00	*****	I
I	I B 9531	2972	103						103		0.00	*****	I
I	I B 9532	2981	97						97		0.00	*****	I
I	I B 9535	3008	113	25	9				147	34	23.33	*****	I
I	I B 9537	3026	108	13					121	13	10.93	*****	I
I	I B 9539	3044	111		10				121	10	8.02	*****	I

Project no.: 22.1767.00
 Well ident.: 34/7-4
 DATE : 1 - 3 - 85.



TABLE I a.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN HEADSPACE

I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4	I
I	no.	m							C1-C4	C2-C4	NESS	-----	I
I											(%)	nC4	I
I	B 9541	3062	100	22					122	22	18.22	*****	I
I	B 9543	3080	68	12					80	12	15.09	*****	I
I	B 9545	3098	62	8	3				73	12	15.92	*****	I
I	B 9547	3116	86	39					125	39	31.49	*****	I

Project no.: 22.1767.00
 Well ident.: 34/7-4
 DATE : 1 - 3 - 85.



TABLE I b.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN OCLUDED

IKU no.	DEPTH m	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 nC4
I B 9493	2630	255	63	700	165	794	3342	1977	1721	87.09	0.21
I B 9494	2639	285	29	7			3715	321	35	11.06	*****
I B 9497	2666	233	37	448	136	652	3365	1507	1273	84.53	0.21
I B 9499	2684	173	87	1204	247	1118	3480	2828	2656	93.89	0.22
I B 9501	2702	147	16	82	35	159	661	439	292	66.56	0.22
I B 9503	2720	198	20	73	31	141	577	464	265	57.24	0.22
I B 9505	2738	161	19	119	36	162	599	497	336	67.59	0.22
I B 9507	2756	372	42	63			206	477	105	22.02	*****
I B 9509	2774	85						85		0.00	*****
I B 9511	2792	111	8					119	8	6.93	*****
I B 9513	2810	105	8					114	8	7.45	*****
I B 9515	2828	91	5					96	5	5.64	*****
I B 9517	2846	128	12					140	12	8.67	*****
I B 9519	2864	326	15					341	15	4.38	*****
I B 9521	2882	293	9					303	9	3.10	*****
I B 9523	2900	379	27					405	27	6.56	*****
I B 9525	2918	134	12					145	12	7.92	*****
I B 9527	2936	103	10					113	10	8.47	*****
I B 9529	2954	134	10					144	10	6.77	*****
I B 9531	2972	115	9					125	9	7.59	*****
I B 9532	2981	171	20	31				222	50	22.75	*****
I B 9535	3008	112	10					123	10	8.36	*****
I B 9537	3026	128	12	14				155	27	17.22	*****
I B 9539	3044	237	22					260	22	8.60	*****

Project no.: 22.1767.00
 Well ident.: 34/7-4
 DATE : 1 - 3 - 85.



TABLE I b.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN OCLUDED

I	I	I	I	I	I	I	I	I	I	I	I	I	I
I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4	I
I	no.	m							C1-C4	C2-C4	NESS	nC4	I
I											(%)		I
I	B 9541	3062	238	23					261	23	8.81	*****	I
I	B 9543	3080	2888	14	17				2919	31	1.07	*****	I
I	B 9545	3098	133	11					143	11	7.35	*****	I
I	B 9547	3116	444	43					486	43	8.77	*****	I

Project no.: 22.1767.00
 Well ident.: 34/7-4
 DATE : 1 - 3 - 85.



TABLE I c.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS SUMMATION

I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4	I
I	no.	m							C1-C4	C2-C4	NESS	-----	I
I											(%)	nC4	I
I	B 9541	3062	338	45					383	45	11.81	*****	I
I	B 9543	3080	2956	26	17				2999	43	1.44	*****	I
I	B 9545	3098	194	19	3				216	22	10.26	*****	I
I	B 9547	3116	529	82					611	82	13.41	*****	I



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9295	980-990	0.49	*70% <u>Claystone</u> , light olive grey, olive grey, silty; sandy, containing scattered organic fragments, slightly calcareous. 30% <u>Sand</u> , clear light grey, fine medium, some very coarse, angular-subrounded Sm.am. Rock fragments(crystalline); Shell fragments; Lignite
B-9299	1020-1030	0.62	70% <u>Sand</u> and <u>Crystalline</u> rock fragments; clear-light grey; varicoloured; fine-very coarse; angular-rounded *30% <u>Claystone</u> , light olive grey; olive grey, as above Sm.am. Shell fragments; Pyrite; Mica; Steel shavings, Pipe dope
B-9302	1050-1060		100% <u>Sand</u> and <u>Crystalline</u> rock fragments, as above Sm.am. Claystone (light olive grey); Shell fragments; Pyrite, Pipe dope
B-9305	1080-1090	2.10	90% <u>Sand</u> and <u>Crystalline</u> rock fragments as above *10% <u>Claystone</u> , light olive grey, olive grey, silty, slightly micromicaceous, non calcareous Sm.am. Shell fragments; Glauconite; Casing cement
B-9308	1110-1120		100% <u>Sand</u> , <u>Crystalline</u> rock fragments, as above Sm.am. Claystone; (light olive grey); Shell fragments, Steel shavings; Casing cement



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9311	1140-1150		80% <u>Sand</u> , light grey-clear, fine-coarse, subangular-rounded 20% <u>Glaucanite</u> , dark green Sm.am. Claystone (light olive grey); Rock fragments; Pyrite; Pipe dope
B-9314	1170-1180		50% <u>Sand</u> , as above 50% <u>Glaucanite</u> , as above Sm.am. Claystone (light olive grey); Pyrite
B-9317	1200-1210	2.00	*100% <u>Claystone</u> , light olive grey, silty, slightly micromicaceous, containing scattered organic fragments occ. slightly calcareous Sm.am. Glaucanite (abundant); Trace of Claystone (dark grey); Sand; Shell fragments
B-9320	1230-1240	2.11	*100% <u>Claystone</u> , light olive grey, as above Sm.am. Glaucanite Trace of Claystone (dark grey); Sand
B-9323	1260-1270	2.29	*100% <u>Claystone</u> , light olive grey, as above Sm.am. Glaucanite Trace of fibre
B-9326	1290-1300	1.81	*100% <u>Claystone</u> , light olive grey, as above Sm.am. Glaucanite
B-9329	1320-1330	1.21	*100% <u>Claystone</u> , light olive grey, as above Sm.am. Glaucanite Trace of Glaucanite



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9332	1350-1360	1.36	* 90% <u>Claystone</u> , olive grey, occ. (dark)greenish grey, slightly micromicaceous, non calcareous
		0.79	* 10% <u>Claystone</u> , light olive grey as above Trace; Siderite
B-9335	1380-1390	0.93	*100% <u>Claystone</u> , olive grey, slightly micromicaceous non calcareous Sm.am. Claystone (light olive grey)
B-9338	1410-1420	1.01	*100% <u>Claystone</u> , olive grey, as above Sm.am. Claystone (light olive grey)
B-9341	1440-1450	0.97	*100 <u>Claystone</u> , olive grey as above Sm.am. Claystone (light olive grey)
B-9344	1470-1480	0.94	*100% <u>Claystone</u> , olive grey, as above' Trace of Claystone (light olive grey)
B-9347	1500-1510	0.97	*100% <u>Claystone</u> , olive grey as above Trace of Claystone (light olive grey)
B-9350	1530-1540	0.83	*100% <u>Claystone</u> , olive grey, as above
B-9353	1560-1570	1.02	*100% <u>Claystone</u> , olive grey, as above
B-9356	1590-1600	1.03	*100% <u>Claystone</u> , olive grey (dark olive grey), as above



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9359	1620-1630	0.90	*100% <u>Claystone</u> , olive grey-dark olive grey, slightly micromicaceous, non calcareous
B-9362	1650-1660	0.68	* 80% <u>Claystone</u> , olive grey-dark olive grey, slightly micromicaceous, non calcareous 20% <u>Sandstone</u> , fine-medium, clear, light grey, subangular, subrounded, glauconitic, partly calcite cemented
B-9365	1680-1690	0.55	50% <u>Tuff</u> , light olive grey - olive black, mottled, grading to tuffaceous claystone * 20% <u>Claystone</u> , olive grey - dark olive grey, as above
		0.66	* 20 <u>Claystone</u> , moderate-reddish brown, calcareous Sm.am. Sandstone; Limestone (white); ?Pyrite
B-9368	1710-1720	0.54	*100% <u>Claystone</u> , light olive grey - olive grey, greenish grey, slightly micromicaceous, non calcareous, occ. micropyritic, occ.? tuffaceous Sm.am. Claystone (olive black- moderate brown); Tuff
B-9371	1740-1750	0.45	*100% <u>Claystone</u> , (light) olive grey - olive grey, greenish grey, as above
B-9374	1770-1780	0.57	*100% <u>Claystone</u> , (light) olive grey - greenish grey as above
B-9377	1802-1811	0.59	*100% <u>Claystone</u> , olive grey - greenish grey, as above Sm.am. Limestone; Claystone (bluish grey)



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9379	1811-1820	0.72	*100% <u>Claystone</u> , olive grey - greenish grey, slightly micromicaceous, non calcareous, occ. tuffaceous Sm.am. Claystone (moderate brown)
B-9381	1838-1847	0.75	*100% <u>Claystone</u> , olive grey - greenish grey, as above Sm.am. Claystone (moderate brown)
B-9383	1856-1865	0.56	*100% <u>Claystone</u> , olive grey - greenish grey, as above Sm.am. Claystone (moderate brown)
B-9385	1874-1883	0.88	*100% <u>Claystone</u> , olive grey - greenish grey, as above Sm.am. Limestone (light grey, white)
B-9387	1892-1901	0.81	*100% <u>Claystone</u> , olive grey - greenish grey, as above
B-9414	1912-1919	0.15	*100% <u>Claystone</u> , olive grey - greenish grey, as above Sm.am. Limestone (light grey, white)
B-9417	1937-1946	0.74 0.67	* 60% <u>Claystone</u> , medium grey, slightly micromicaceous, calcareous * 20% <u>Claystone</u> , olive grey, medium grey, slightly micromicaceous, calcareous 20% <u>Casing Cement</u> , white - light brown, containing minute black specks Sm.am. Glauconite (dark grey); Limestone; Pyrite; Claystone (olive black)



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9429	1964-1973	0.67	* 90% <u>Claystone</u> , medium grey, as above 10% Glauconite, dark green Sm.am. Claystone (olive grey); Pyrite; Limestone; Steel shavings
B-9421	1973-1982	0.63	* 90% Claystone, medium grey as above 10% Glauconite, dark green Sm.am. Claystone (olive grey); Pyrite; Limestone; Steel shavings, Casing cement
B-9423	1991-2000	0.70	* 90% <u>Claystone</u> , medium grey as above 10% Glauconite, dark green Sm.am. Claystone (olive grey); Pyrite; Limestone; Steel shavings
B-9425	2009-2018	0.81	*100% <u>Claystone</u> , medium grey, as above Sm.am. Glauconite; Claystone (dark olive grey); Pyrite, Additives (Casing cement, Steel shavings, Paint, Mica)
B-9427	2027-2036	0.81	*100% <u>Claystone</u> , medium grey, as above Sm.am. Glauconite, Claystone (dark olive grey); Pyrite, Additives (Casing cement, Steel shavings, Paint, Mica)
B-9429	2045-2054	0.72	*100% <u>Claystone</u> , medium grey, as above Sm.am. Glauconite, Claystone (olive grey); Pyrite; Additives (Casing cement, Steel shavings, Paint)



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9431	2063-72	0.77	*100% <u>Claystone</u> , medium grey, slightly silty, slightly micromicaceous, slightly calcareous-very calcareous grading to Marl Sm.am. Glauconite, Claystone (olive grey); Pyrite; Additives (Casing cement, Steel Steel shavings, Paint)
B-9433	2081-90	0.69	*100% <u>Claystone</u> , medium grey, as above Sm.am. Claystone (moderate-reddish brown, olive grey); Glauconite; Limestone/Siderite/-Dolomite; Sand; Pyrite; Additives (Casing cement, Pipe dope, Paint, Steel)
B-9435	2099-2108	0.82	*100% <u>Claystone</u> , medium grey, as above Sm.am. Claystone (moderate-reddish brown) (olive grey); Glauconite; Limestone/Siderite/-Dolomite; Sand; Pyrite; Additives (Casing cement, Pipe dope; Paint; Steel)
B-9437	2117-26	0.76	*100% <u>Claystone</u> , medium grey, slightly silty, slightly micromicaceous, non calcareous-calcareous Sm.am. Claystone (moderate-reddish brown) (olive grey); Glauconite; Limestone/Siderite/-Dolomite; Sand; Pyrite; Additives (Casing cement, Pipe dope, Paint, Steel)



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9439	2135-44	0.85	*90% <u>Claystone</u> , medium grey, slightly silty, slightly micromicaceous, non calcareous-calcareous 10% Dolomite, calcitic Sm.am. Claystone (moderate-reddish brown) (olive grey); Glauconite; Limestone/Siderite/Sand; Pyrite; Additives (Casing cement, Pipe dope, Paint, Steel)
B-9441	2153-63	0.83	*100% <u>Claystone</u> , medium grey, as above Sm.am. Limestone/Dolomite; Pyrite; Glauconite; Claystone (moderate brown); Gypsum; Contaminants (Drilling fluid deposits, Steel, Fibre)
B-9443	2170-80	0.99	*100% <u>Claystone</u> , medium grey, as above Sm.am. Limestone/Dolomite; Pyrite; Glauconite; Claystone (moderate brown); Gypsum; Contaminants (Drilling fluid deposits, Steel, Fibre)
B-9445	2189-98	0.91	*100% <u>Claystone</u> , medium grey, as above Sm.am. Limestone/Dolomite; Pyrite; Sand; Glauconite; Gypsum; Contaminants (Drilling fluid deposits)
B-9447	2207-16	0.92	*90% <u>Claystone</u> , medium grey, as above 10% Drilling fluid deposits Sm.am. Limestone/Dolomite; Steel; Fibre
B-9449	2225-34	0.85	*100% <u>Claystone</u> , medium grey, as above Sm.am. Limestone/Dolomite; Sand; Contaminants (Drilling fluid deposits, Fibre, Paint)



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9451	2243-52	0.94	*70% <u>Claystone</u> , medium (dark) grey, as above 20% <u>Drilling fluid deposits</u> 10% <u>Sandstone</u> , light grey-white, very fine, slightly glauconitic, occ. calcite cemented Sm.am. Limestone/Dolomite; Sand; Steel
B-9453	2261-70	0.98	*50% <u>Claystone</u> , medium grey-medium dark grey, partly silty, occ, sandy, slightly micro-micaceous, occ. calcareous 30% <u>Drilling fluid deposits</u> , light grey-grey, occ. mixed lithologies 20% <u>Sandstone</u> , as above Sm.am. Limestone/Dolomite; Sand; Steel
B-9455	2279-88	0.98	*50% <u>Claystone</u> , medium grey-medium dark grey, as above 30% <u>Drilling fluid deposits</u> , as above 20% <u>Sandstone</u> , as above Sm.am. Limestone/Dolomite; Sand; Steel
B-9457	2297-2306	1.05	*70% <u>Claystone</u> , medium grey-medium dark grey, as above 20% <u>Sandstone</u> , as above 10% <u>Drilling fluid deposits</u> , as above Sm.am. Limestone/Dolomite; Pyrite; Steel; Pipe dope
B-9459	2315-24	0.98	*60% <u>Claystone</u> , medium grey-medium dark grey, as above 30% <u>Sandstone</u> , as above 10% <u>Drilling fluid deposits</u> , as above Sm.am. Limestone/Dolomite; Pyrite; Steel



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9461	2333-42	1.13	*50% <u>Claystone</u> , medium grey-medium dark grey, as above 30% <u>Sandstone</u> , as above 10% <u>Drilling fluid deposits</u> , as above Sm.am. Limestone/Dolomite; Sand; Steel; Pyrite
B-9463	2351-60	1.02	*90% <u>Claystone</u> , medium grey-medium dark grey, as above 10% <u>Sandstone</u> , as above Sm.am. Limestone/Dolomite; Sand; Pyrite; Steel
B-9465	2371-78	0.95	*90% <u>Claystone</u> , medium grey-medium dark grey, as above 10% <u>Sandstone/Sand</u> , as above Sm.am. Limestone/Dolomite; Sand; Pyrite; Steel
B-9467	2387-96	0.86 1.13	*80% <u>Claystone</u> , medium grey-medium dark grey, as above *10% <u>Marl</u> , dark grey Sm.am. Pyrite; Drilling fluid deposits; Steel; Paint
B-9469	2405-14	1.02	*90% <u>Claystone</u> , medium grey-medium dark grey, as above 10% <u>Sandstone/Sand</u> , as above Sm.am. Dolomite; Pyrite; Marl (dark grey); Drilling fluid deposits
B-9471	2423-32	1.00 1.16	*70% <u>Claystone</u> , medium grey-medium dark grey, as above *30% <u>Marl</u> , dark grey Sm.am. Sand; Drilling fluid deposits; Steel



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9473	2441-56	1.00	*60% <u>Claystone</u> , medium grey-medium dark grey, as above
		1.13	*30% <u>Marl</u> , dark grey 10% <u>Sand</u> , very fine-fine Sm.am. Sand; Drilling fluid deposits; Steel
B-9475	2459-68	0.81	*100% <u>Claystone</u> , medium grey-medium dark grey, as above Sm.am. Sand; Dolomite; Pyrite; Steel; Marl (dark grey)
B-9477	2477-86	0.91	*90% <u>Claystone</u> , medium grey-medium dark grey, as above 10% <u>Drilling fluid deposits</u> Sm.am. Claystone (moderate-reddish brown); Sand; Dolomite
B-9479	2495-2504	0.31	*60% <u>Marl</u> , moderate-reddish brown, dark grey
		0.97	*40% <u>Claystone</u> , medium grey, various silty, slightly micromicaceous, non calcareous Sm.am. Dolomite; Sand; Claystone (greyish black)
B-9481	2513-22	0.30	*40% <u>Marl</u> (moderate-reddish brown)
		0.87	*30% <u>Claystone</u> , medium grey, as above
		6.72	*20% <u>Claystone</u> , greyish black, silty, slightly micromicaceous, slightly micropyrritic 10% <u>Limestone</u> , white Sm.am. Sand; Pyrite
B-9483	2531-40	0.99	*50% <u>Claystone</u> , medium grey, as above 50% <u>Sand</u> , clear-light grey, fine-very coarse, angular-subrounded Sm.am. Marl (reddish brown)



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9485	2549-58	0.98	90% <u>Sand</u> , as above *10% <u>Claystone</u> , medium grey, as above Sm.am. Marl (reddish brown)
B-9487	2567-76	0.36	70% <u>Sand</u> , as above *30% <u>Claystone</u> , varicoloured, greyish red, greyish olive, medium dark grey, olive grey, brownish grey, occ. micaceous, occ. calcareous Sm.am. Limestone
B-9489	2585-94	0.61	90% <u>Sand</u> , as above *10% <u>Claystone</u> , varicoloured, as above
B-9491	2603-12	0.34	80% <u>Sand</u> , as above *20% <u>Claystone</u> , varicoloured, moderate-reddish brown, greyish olive, olive grey, medium (dark) grey
B-9493	2621-30	0.27	80% <u>Sand</u> , as above *20% <u>Claystone</u> , varicoloured, as above
B-9494	2630-39	0.26	*70% <u>Claystone</u> , varicoloured, moderate-reddish brown, greyish olive, olive grey, greenish grey, medium (dark) grey 30% <u>Sand</u> Sm.am. Limestone
B-9497	2657-66	0.61	*90% <u>Claystone</u> , varicoloured, as above 10% <u>Sand</u> , as above Sm.am. Limestone



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9499	2675-84	0.83	*90% <u>Claystone</u> , varicoloured, as above 10% <u>Sand</u> , as above Sm.am. Limestone
B-9501	2693-2702	0.41	*70% <u>Claystone</u> , varicoloured, as above 30% <u>Sand</u> , as above
B-9503	2711-20	0.06	*90% <u>Claystone</u> , varicoloured, as above 10% <u>Sand</u> , clear-brown, fine-medium, occ. coarse, angular-subrounded
B-9505	2729-38	0.30	*70% <u>Claystone</u> , moderate-dark reddish brown, occ. varicoloured, silty, slightly micro-micaceous, partly calcareous, grading to Marl 20% <u>Sand</u> , as above 10% <u>Limestone</u> , white-red brown
B-9507	2747-56	0.26	*90% <u>Claystone</u> , moderate-dark reddish brown, occ. varicoloured, as above 10% <u>Sand</u> , as above Sm.am. Limestone (white-red brown)
B-9509	2765-74	0.19	60% Casing cement, light brown with minute black specks *30% <u>Claystone</u> , moderate-dark reddish brown, occ. varicoloured, as above 10% <u>Sand</u> , as above Sm.am. Limestone (white-red brown)



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9511	2783-92	0.24	*70% <u>Claystone</u> , moderate-dark reddish brown, silty, slightly micromicaceous, partly calcareous grading to Marl 10% <u>Sand</u> , clear-light grey-light brown, subangular-subrounded 10% <u>Limestone</u> , light grey-light brown 10% Casing cement Sm.am. Claystone (greenish grey-medium grey)
B-9513	2801-10	0.11	60% <u>Sand</u> , as above *40% <u>Claystone</u> , moderate-dark reddish brown, as above Sm.am. Limestone; Claystone (greenish grey-medium grey)
B-9515	2819-28	0.23 0.18	*40% <u>Claystone</u> , moderate-dark reddish brown, as above *40% <u>Marl</u> , moderate-reddish brown 10% <u>Sand</u> , as above 10% Casing cement Sm.am. Limestone; Claystone (greenish grey-medium grey)
B-9517	2837-46	0.16	90% <u>Sand</u> , as above *10% <u>Claystone</u> , grading to Marl, moderate-(dark) reddish brown, silty Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Casing cement; Steel



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9519	2855-64	0.17	80% <u>Sand</u> , as above *10% <u>Claystone</u> , grading to Marl, moderate-(dark) reddish brown, silty Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Casing cement; Steel
B-9521	2873-82	0.23	*50% <u>Claystone</u> , grading to Marl, moderate-(dark) reddish brown, silty 50% <u>Sand</u> , clear, light grey-light brown, fine-very coarse Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Casing cement; Steel
B-9523	2891-2900		100% <u>Sand</u> , clear-light grey-light brown, fine-coarse Sm.am. Claystone/Marl (moderate-(dark) reddish brown); Limestone (white-light brown); Claystone (greenish-medium grey); Casing cement; Steel
B-9525	2909-18	0.30	90% <u>Sand</u> , as above *10% <u>Claystone</u> , partly grading to Marl, moderate to (dark) reddish brown, silty Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey)
B-9527	2927-36	0.15	*80% <u>Claystone</u> , partly grading to Marl, moderate to (dark) reddish brown, silty 20% <u>Sand</u> , as above Sm.am. Limestone (white-brown); Claystone (greenish-medium grey); Kaolinite; Steel



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9529	2945-54		100% <u>Sand</u> , fine-medium, as above Sm.am. Claystone/Marl (moderate-dark reddish brown); Limestone (white-light brown); Kaolinite
B-9531	2963-72	0.05	60% <u>Sand/Sandstone</u> , light grey-clear, light brown, fine medium, partly calcite cemented *40% <u>Claystone</u> , moderate-dark reddish brown, partly grading to Marl; as above Sm.am. Limestone (white-light brown); Steel; Claystone (greenish-medium grey)
B-9532	2972-81	0.15	*60% <u>Claystone</u> , moderate-dark reddish brown, silty, partly grading to Marl 40% <u>Sand</u> , as above Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Kaolinite
B-9535	2999-3008	0.18	90% <u>Sand</u> , as above *10% <u>Claystone</u> , moderate-dark reddish brown, silty, partly grading to Marl Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Kaolinite
B-9537	3017-26	0.19	90% <u>Sand</u> , as above *10% <u>Claystone</u> , moderate-dark reddish brown, silty, partly grading to Marl Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Kaolinite



Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 34/7-4

Sample	Depth (m)	TOC	Lithology
B-9539	3035-44	0.27	90% <u>Sand</u> , as above *10% <u>Claystone</u> , moderate-dark reddish brown, silty, partly grading to Marl Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Kaolinite
B-9541	3053-62	0.19	90% <u>Sand</u> , as above *10% <u>Claystone</u> , moderate-dark reddish brown, silty, partly grading to Marl Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Kaolinite
B-9543	3071-80	0.22	90% <u>Sand</u> , as above *10% <u>Claystone</u> , moderate-dark reddish brown, silty, partly grading to Marl Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Kaolinite
B-9545	3089-98	0.23	90% <u>Sand</u> , clear-light grey, occ. light brown, very fine-medium *10% <u>Claystone</u> , moderate-dark reddish brown, silty, partly grading to Marl Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Kaolinite
B-9547	3107-16	0.23	90% <u>Sand</u> , as above *10% <u>Claystone</u> , moderate-dark reddish brown, silty, partly grading to Marl Sm.am. Limestone (white-light brown); Claystone (greenish-medium grey); Kaolinite

34/7-4

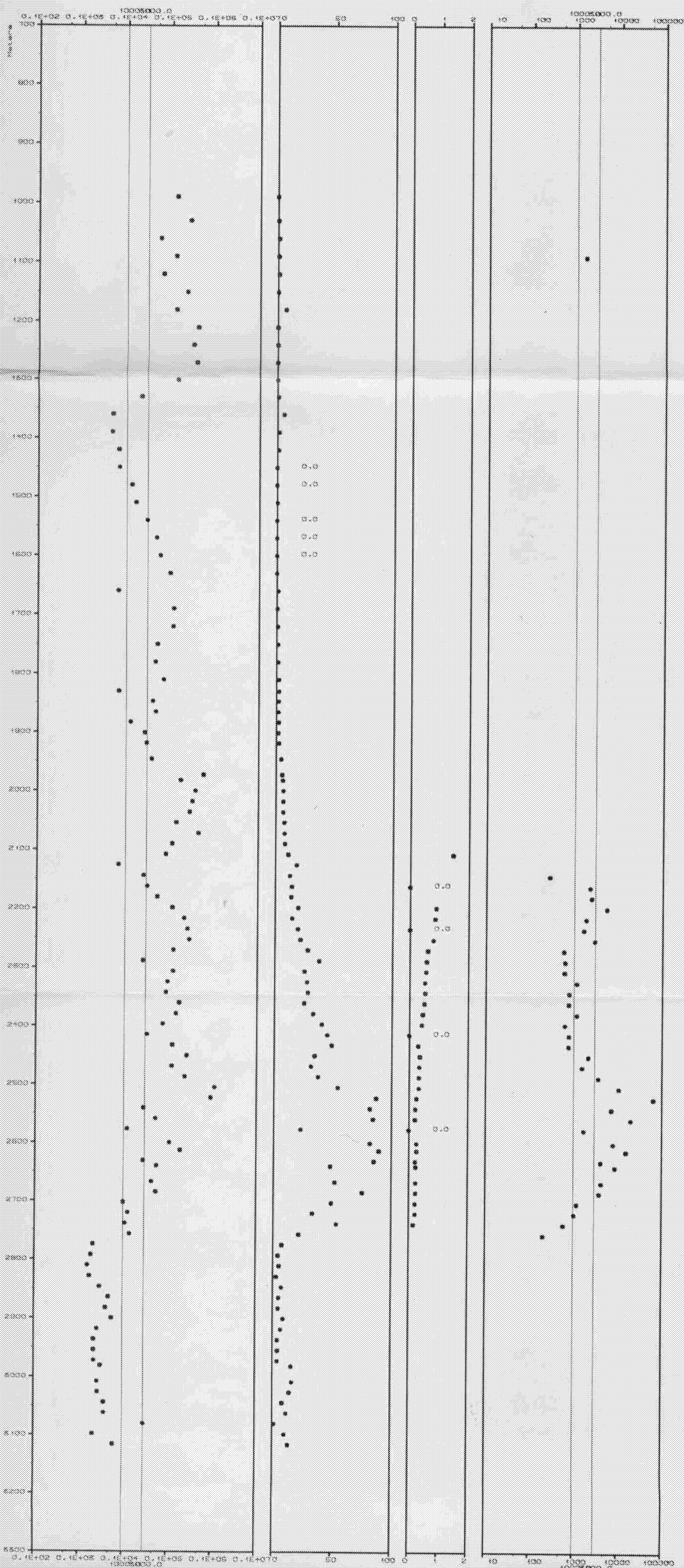
C1-C4 HYDROCARBONS

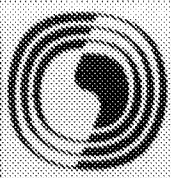
C5-C7 HYDROCARBONS

Abundance (uL gas/kg rock)

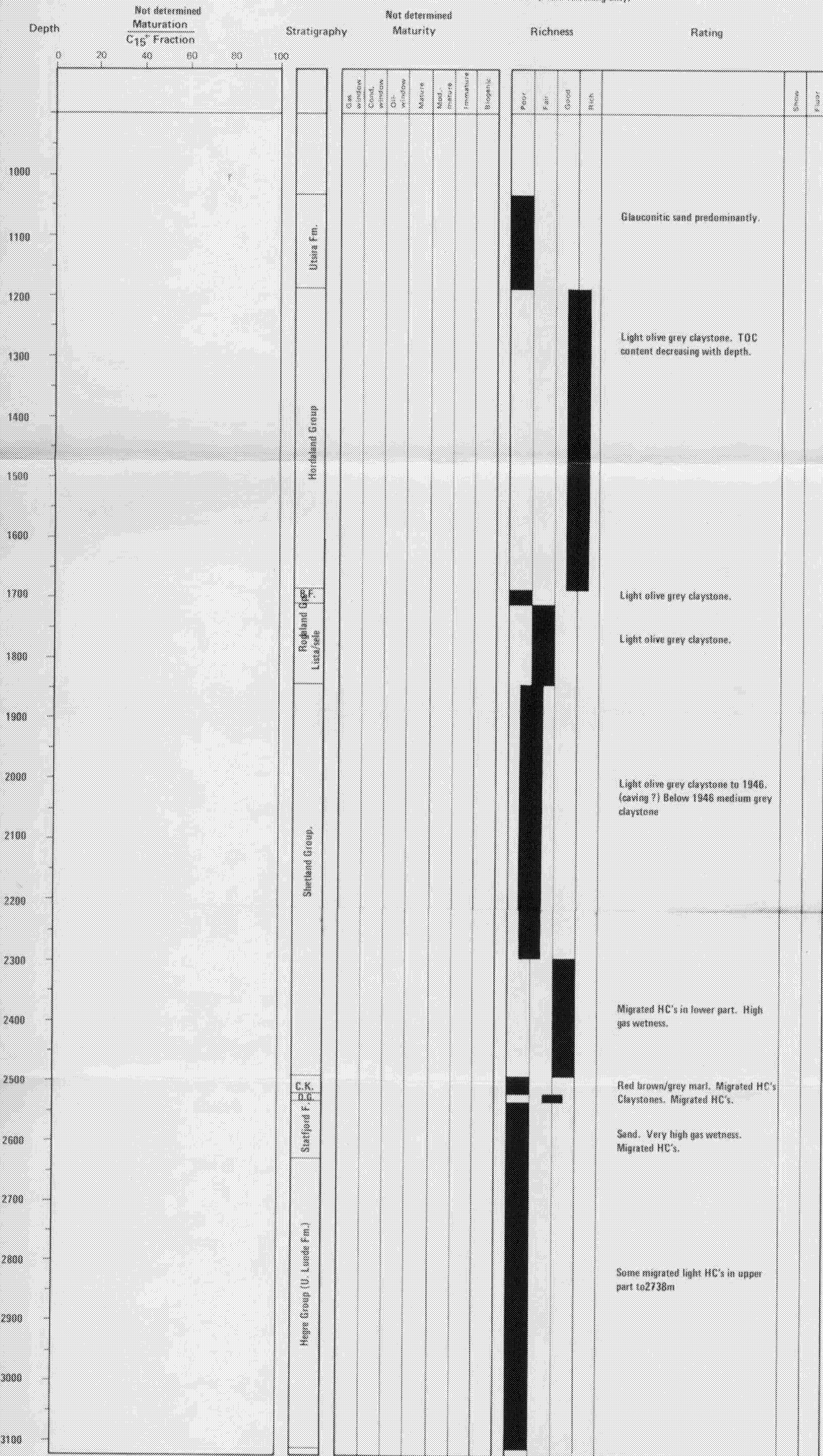
Wetness

(C4 nC4) Abundance (uL gas/kg rock)





SUMMARY OF SOURCE POTENTIAL (From screening only)



● * $\frac{\text{Sat.}}{\text{EOM}}$ ○ * $\frac{\text{HC}}{\text{EOM}}$
 Sat: Saturated Hydrocarbons.
 HC: Hydrocarbons.
 EOM: Extractable Organic Matter.

B.F. = Balder Formation
 C.K. = Cromer Knoll Group
 D.S. = Dunlin Group

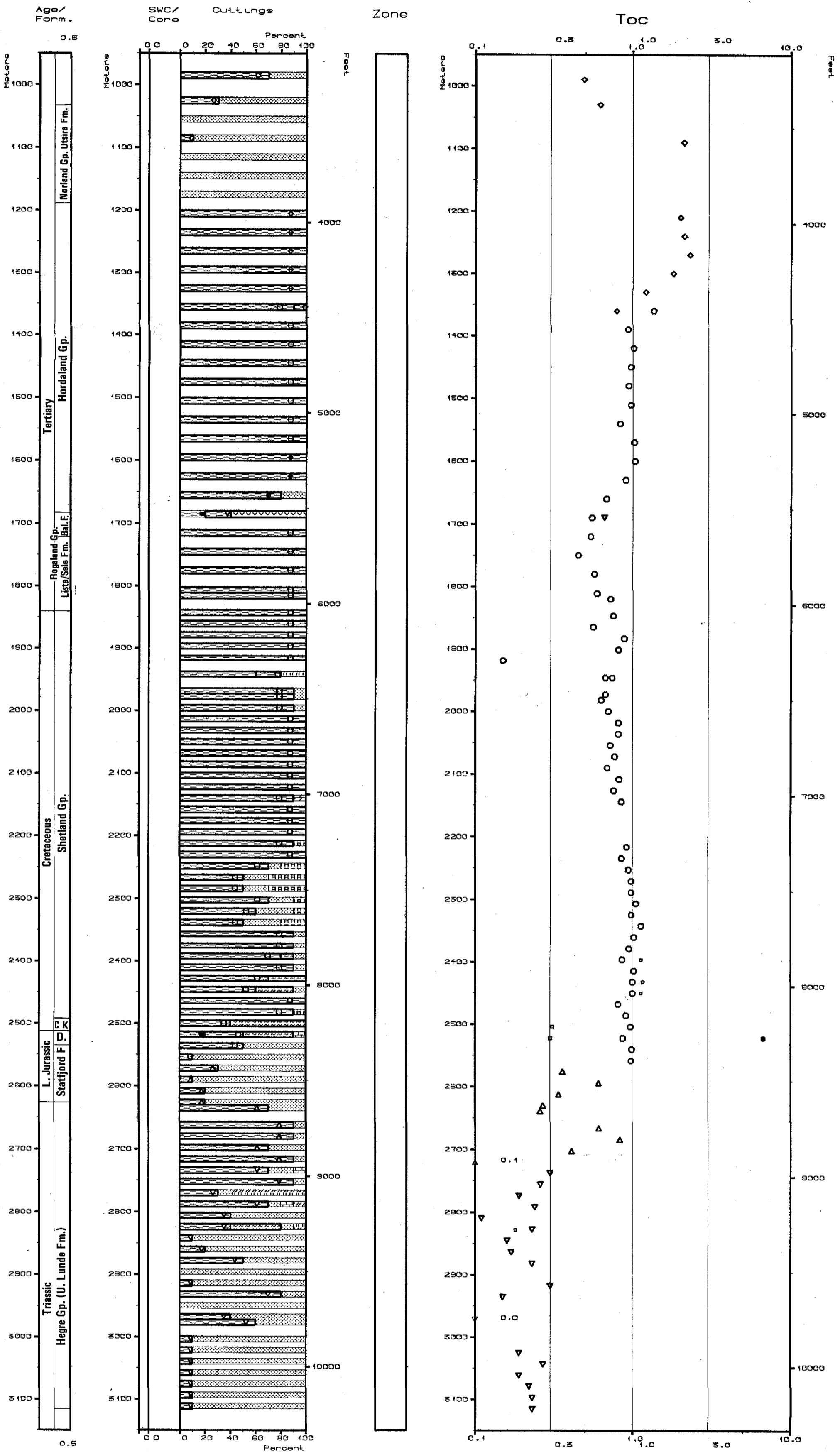


IKU
SINTEF-GRUPPEN

TOC AND LITHOLOGY

WELL 34/7-4

Lithology



C K = Cromer Knoll Group
 D = Dunlin Group
 Bal. F. = Balder Formation

- A Coal
- B Claystone/Mudstone
- C Claystone/Mudstone, dark coloured
- D Claystone/Mudstone, medium coloured
- E Claystone/Mudstone, light coloured
- F Claystone/Mudstone, red-brown coloured
- G Claystone/Mudstone, varicoloured
- H Marl
- I Siltstone
- J Sandstone
- K Limestone
- L Dolomite
- M Siderite
- N Evaporites
- O Tuff
- P Metamorphic/Igneous rocks
- Q Cuttings affected by turbodrilling
- R Additives, Contaminants
- S Casing cement

- Claystone/Mudstone, dark coloured
- Claystone/Mudstone, medium coloured
- ◇ Claystone/Mudstone, light coloured
- ▽ Claystone/Mudstone, red-brown coloured
- △ Claystone/Mudstone, varicoloured
- × Siltstone
- * Sandstone
- Carbonates
- + Coal
- o Marl
- ⊕ Bulk
- ↙ Sidewall core/core

The lithologies analysed for TOC are enclosed by a bold border. The symbols indicating claystone/mudstone colour are used on both the TOC log and the lithological log.