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SUMMARY

See page 1

KEY WORDS

Source rock

middle - only Dogger.
1782 - 1939

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SUMMARY

On the basis of the light hydrocarbon data, the analysed section is devided into nine zones; A: 1290 - 1500 m, B: 1500 - 1650 m, C: 1650 - 1680 m, D: 1680 - 1770 m, E: 1770 - 1930 m, F: 1930 - 2000 m, G: 2000 - 2225 m, H: 2225 - 2385 m and I: 2385 - 2462 m. Zone H is separated from zone G in that there was a lack of results, especially for absorbed gases, for zone H. However, other data show only minor differences between the two zones.

Zone A is a immature source rock for oil with a fair to good potential. Zone B is a rich source rock for oil, immature/moderate mature. Zone C and D contain migrated hydrocarbons. Zone E is mainly sand, signes of migrated napthenic oil. Zone F is a good source rock for oil and gas, moderate mature. Zone G and H have a good potential as a source rock for gas, moderate mature. Zone I is a fair source rock for oil, moderate mature.

EXPERIMENTAL

One ml of the headspace gas from each of the cans was analysed gaschromatographically for light hydrocarbons. The results are shown in Table I.a. The canned samples were washed with temperated water on a 0.125 mm sieve to remove drilling mud and thereafter dried at 35^{o}C.

Light Hydrocarbons

Aliquotes of the samples were dried at room temperature after washing and sieving. The cuttings with a grain size between 1 and 2 mm were used for light hydrocarbon determination. These were treated with 6N HCl in a closed evacuated system, thereafter flushed with water and the released gas analysed gaschromatographically. The results are shown in Table I.b.

Total Organic Carbon (TOC)

Aliquotes of the samples were treated with hot 6N HCl to remove carbonates, and then analysed on a Leco EC 12 carbon determinator, to determine the total organic carbon (TOC). Table II.

Extractable Organic Matter (EOM)

From the TOC results, samples were selected and extracted with DCM in soxhlet apparatus for 48 h., and the amount of extractable organic matter was determined. Table III.

Chromatographic Separation

The extracts were separated on columns packed with 2/3 silica and 1/3 alumina, by eluting with hexane, benzene and methanol. Table III. The saturated fractions were analysed gaschromatographically on a 25 mm glass capillary column, using a Carlo Erba FV 2150 Chromatograph. The measurements from the gaschromatograms are shown in Table VII.

Vitrinite Reflectance

Samples, taken at various intervals, were sent for vitrinite reflectance measurements at Geoconsultants, Newcastle upon Tyne. Upon receipt, the samples were soaked in warm water and sieved through 72 mesh to remove drilling mud. After oven drying of 40°C, they were mounted in Bakelite resin blocks; care being taken during the setting in the plastic to avoid temperatures in excess of 100°C. The samples were then ground, initially on a diamond lap followed by two grades of corundum paper. All grinding and subsequent polishing stages in the preparation were carried out using isopropyl alcohol as lubricant, since water leads to the swelling and disintegration of the clay fraction of the samples.

Polishing of the samples was performed on Selvyt cloths using three grades of alumina, 5/20, 3/50 and Gamma, followed by careful cleaning of the surface.

Reflectance determinations were carried out on a leitz M.P.V. microphotometer under oil immersion, R.I. 1.516 at a wavelength of 546 nm. The field measured was varied to suit the size of the organic particle, but was usually of the order of 2 micron diameter.

The surface of the polished block was searched by the operator for suitable areas of vitrinitic material in the sediment. The reflectance of the organic particle was determined relative to optical glass standards of known reflectance. Where possible, a minimum of twenty individual particles of vitrinite was measured, although in many cases this number could not be achieved. The search for vitrinitic material was maintained for approximately 45 minutes on each sample before termination, if the operator considered that no more vitrinitic particles were likely to be located.

Visual Kerogen

Samples for visual kerogen were picked from the screening analyses. The samples were crushed, treated with HCl and HF to remove the rock matrix, centrifuged and mounted on slides.

Maturity of the individual samples was determined by visual estimation of the colours of pollen, spores, cuticles, wood remains, and finely dispersed organic matter.

The colour tones are given according to Burgess' index (Burgess, J.D., 1974. Geol. Soc. Amer. Spec. Paper, 153, 19-30).

RESULTS AND DISCUSSION

Light Hydrocarbons

On the basis of the abundance of the C_1 - C_4 and the C_5 - C_7 hydrocarbons, together with the wetness of the gas and iso butane/n butane (iC_4/nC_4) ratio, the analysed sequence 1290 - 2462 m will be divided into nine different zones:

A: 1290 - 1500 m
B: 1500 - 1650 m
C: 1650 - 1680 m
D: 1680 - 1770 m
E: 1770 - 1930 m
F: 1930 - 2000 m
G: 2000 - 2225 m
H: 2225 - 2385 m
I: 2385 - 2462 m (T.D.)

A: 1290 - 1500 m: The C_1 - C_4 hydrocarbons show a fair abundance while the C_5 - C_7 hydrocarbons show a poor abundance. The gas is very dry, and the iC_4/nC_4 ratio is rather high.

B: 1500 - 1650 m: At 1500 m the abundance of C_1 - C_4 hydrocarbons show a marked increase, and all the samples in this zone show a good abundance. At the same level an increase in the C_5 - C_7 hydrocarbon abundance is found. The gas is still rather dry.

C: 1650 - 1680 m: This zone consists of only one sample and is separated out because of the marked drop,both in the C_1 - C_4 and the C_5 - C_7 hydrocarbon abundances.

D: 1680 - 1770 m: Again we find a marked jump in the hydrocarbon abundances,both for the C_1 - C_4 and the C_5 - C_7 hydrocarbons. However, the main reason for separating this zone from the two above is the marked jump in the wetness of the gas to approximately 45 % for the most of the zone.

E: 1770 - 1930 m: This zone shows a large variation in the light hydrocarbon abundances, while the wetness of the gas and the iC_4/nC_4 ratio are constant. The top of the zone shows a fair abundance of C_1 - C_4 hydrocarbons, increasing to a good abundance towards the lower end of the zone. The C_5 - C_7 hydrocarbons show a fair abundance for most of the zone.

F: 1930 - 2000: A zone with a very high abundance of C_1 - C_4 and C_5 - C_7 hydrocarbons, the highest abundance found for the whole analysed sequence.

G: 2000 - 2225 m: Again a zone with a large variation in the C_1 - C_4 and C_5 - C_7 hydrocarbon abundances. The C_1 - C_4 hydrocarbons show a fair abundance for the whole zone, while the C_5 - C_7 hydrocarbons vary between poor and fair abundances. Both the wetness of the gas, and the iC_4/nC_4 show a decrease with increasing depth. The large variation in the light hydrocarbon abundances, both for this zone and zone E could be caused by a large variation in the lighology of the analysed cuttings.

H: 2225 - 2385 m: This zone is separated out from the zone above, due to lack of measurements. The analysed samples mainly consisted of sandstone cuttings smaller that 1 mm and no readings on absorbed gas was available, also there were no samples available between 2240 and 2270 m. However, the wetness of the gas is somewhat larger than the lower part of the zone above, while the iC_4/nC_4 ratio is of a similar value.

I: 2385 2462 m: This zone is separated from the zone above in that results now are available again. The C_1 - C_4 hydrocarbon abundance is decreasing with increasing depth. Both the C_1 - C_4 and the C_5 - C_7 hydrocarbons show a poor abundance and the wetness of the gas is decreasing with increasing depth.

Total Organic Carbon (TOC)

Total organic carbon (TOC) was measured on all the samples. Where significant amounts of different lithologies were found, TOC was measured on the different lithologies.

A: 1290 - 1500 m: This zone consists mainly of claystone with small amounts of limestone in parts. The limestone has a rather low TOC value of 0.15 - 0.2 while the claystone shows an increase with increasing depth. The top part of the zone has a fair potential increasing to a good potential towards the lower end.

B: 1500 - 1650 m: Mainly claystone is found in this zone, and the TOC value drop sharply at the top part of the zone compared to the lower end of the zone above, showing a fair potential. However, the lower part of the zone, from 1620 m shows a sharp increase in the TOC value, and a rich potential is recorded.

C: 1650 - 1680 m: Only one sample in this zone, which consists of claystone and limestone. The limestone has a low TOC value while the claystone shows a rich potential.

D: 1680 - 1770 m: Again a zone with mixed lithology, limestone and claystone. Most of the limestone show a fair potential. However, the limestone in sample 1680 - 1710 m shows a rather high TOC value of approximately 1.0 %. The claystone in the zone shows a rich potential.

E: 1770 - 1930 m: This zone consists mainly of sandstone with coalseams. TOC values were measured on the sandstone in some of the samples, and these show very erratic values. Most of the TOC values are rather high for sandstone, and this might have been caused either by migrated hydrocarbons or coalparticles.

F: 1930 - 2000 m: This zone consists mainly of claystone, sandstone and coal. The claystone shows a good to rich potential while the TOC values for the sandstone are much lower than for the zone above.

G: 2000 - 2225 m: Again a zone with mixed lithology, sandstone, claystone and coal. The TOC values were for most of the sandstone and claystone samples. The TOC values for the claystone show a good potential while the TOC values for the sandstone vary a lot with a sharp increase in the middle part of the zone. This could have been caused either by coalparticles or migrated hydrocarbons. However, during washing of the samples, oilstains were recorded for some of the samples, especially sample 2150 - 2165 m, and this sample shows a rather high TOC value. This information would then suggest migrated hydrocarbons.

H: 2225 - 2385 m: Again a zone with mixed lithology, sandstone and claystone. The sandstone again showing rather high TOC values together with low TOC values for the claystone samples. The TOC values for the claystone decreases with increasing depth.

I: 2385 - 2462 m (T.D.) A zone with only claystone. The TOC values indicate a fair to poor potential.

Extractable Organic Matter (EOM) and Chromatographic Separations

A: 1290 - 1500 m: One sample from this zone, 1470 - 1500 m was extracted. The sample was found to have a rich abundance of extractable hydrocarbons. However, the gaschromatogram of the saturated fraction showed no indication of paraffins, only large napthenic humps. The very high percentage of hydrocarbons compared to total organic carbon indicate that we might have some migrated hydrocarbons in the sample. A gaschromatogram like the one of the saturated fraction of this sample, is usually found for biodegraded oils. However, without any other evidence and especially since this is not an oil but the extract of a sediment, no final conclusion can be drawn.

B: 1500 - 1650 m: Two samples were extracted from this zone with the sample from 1560 - 1590 m showing a good abundance, and 1620 - 1650 m a rich abundance of extractable hydrocarbons. The gaschromatograms of both samples show large napthenic humps with small amounts of paraffins in the lower end.

C: 1650 - 1680 m: This zone encsists of only one sample, which was extracted. The sample show a rich abundance of extractable hydrocarbons. the gaschromatogram of the saturated fraction again shows a napthenic pattern with very small amounts of n-alkanes and iso-prenoids.

D: 1680 - 1770 m: Three samples from this zone were extracted, and they all show a very rich abundance of hydrocarbons. The very high ratio of hydrocarbons to non-hydrocarbons, Table VI, and the very high hydrocarbons/total organic carbon ratios, indicate migrated hydrocarbons.

The gaschromatogram of the saturated fractions from sample 1680 - 1710 m is very similar to the sample above with a large napthenic hump and only small amount of lower end n-alkanes and isoprenoids. The next sample down the well, 1710 - 1740 m is rather different to the samples above in that the isopreniods are quite dominant with pristane being the dominating peak. The gas chromatograms indicate an input from a napthenic source for both samples. This source is most probably of animal and lower plant origin, only slightly mature. The complete loss of n-alkanes and isoprenoids in some of the samples is rather difficult to explain if we neglect the possibility of bacteriological activity. However, a complete bacteriological degradation of all the source rock is hard to imagine.

The gaschromatogram of the saturated fraction of the next sample, 1740 - 1770 m is again very different. The very large front napthenic hump in the other samples is now gone , and there is only a large sterane hump in the C_{17} - C_{30} area. However, the largest difference is the large amount of heavy n-alkanes and isoprenoids. The pristane/nC_{17} ratio is approximately 1.5 and the CPI 1.0. Alltogether, this indicate an input from two sources;
A: Lower plants and animal remains which is only slightly mature.
B: Higher plant remains of a high maturity level. The latter source is probably reworked material. The TOC measurements show a very high value for this sample, which again could indicate coal particles. These could then be reworked.

E: 1770 - 1930 m: Four samples from this zone were extracted. The samples were a sidewall core from 1780.5 m, two corechips from 1820.6 m and 1833.3 m, and cuttings from 1880 - 1890 m. All the samples show a rich abundance of extractable hydrocarbons with the core chips from 1820.6 m the richest. However, the high hydrocarbon/non hydrocarbon ratio indicate this sample and the sample from 1780.5 m to contain migrated hydrocarbons.

The gaschromatograms of the saturated hydrocarbons of the four samples are all different. The sidewall core from 1780.5 m shows very small amounts of n-alkanes and isoprenoids very similar to the samples in the higher zones with exceptance of the samples from 1710 - 40 and 1740 - 70 m.

The gaschromatogram of the saturated hydrocarbons in the next sample, the corechip from 1820.6 m shows a pattern very similar to the sample from 1710 -40 m. There is still a very large front napthenic hump, but with very large isoprenoids as well. Pristane is the dominant compound.

Going further down the well to the corechip from 1833.3 m, the gaschromatogram of the saturated fractions again change pattern. The front napthenic hump with the large isoprenoid peaks is still there. However, the higher end of the chromatogram has changed a lot. There is no evident sterane hump, but there are large quantities of heavy n-alkanes with nC_{25} as the major peak. A CPI value of 2.8 indicate this to be immature organic remains from higher plants. The total gaschromatogram of the saturated fraction then indicate an input from two sources; an immature lower plants and animal source, which give the large napthenic hump and the isoprenoids together with an immature higher plants source, which give the heavy n-alkanes.

Moving further down the well to the next analysed sample, the cuttings from 1880 - 90 m , the gaschromatogram of the saturated fraction again change pattern. The very strong front napthenic hump is not as prominent, however, there is now a very strong sterane hump in the C_{20} - C_{30} region. The isoprenoids are still the dominant compounds, but pristane is not as dominant as before. The n-alkanes from nC_{15} - nC_{20} can now be clearly seen.

F: 1930 - 2000 m: Four samples, three corechips and one cuttings sample from this zone were extracted. The core chip from 1939.58 m is found to have a good abundance of extractable hydrocarbons, while the two core chips from 1947.17 and 1951 m are found to have a fair abundance. The cutting sample from 1970 - 1985 m shows a good/rich abundance of extractable hydrocarbons.

The gaschromatograms of the saturated fractions of the three core chip samples have fairly similar shape; however, smaller differences are also seen. All three samples show a distinct front napthenic hump with large isoprenoids, as well as a fairly large amount of heavy n-alkanes with a CPI value above 1.3. However, the pristane/nC_{17} ratio, which is approximately 2.0 for the sample from 1939.8 m drop to approximately 1.0 for the two other samples, 1947.17 m and 1951 m.

When we move down the well to the sample from 1970 - 85 m, the pattern of the gaschromatogram of the saturated fraction change. The large front napthenic hump has disappeared and there is now a "not so distinct" napthenic hump over most of the chromatogram. Apart from this, the pattern is rather similar to the sample above. The only difference is the very large peak between nC_{19} and nC_{20}. This might be from a mud-additive.

G: 2000 - 2225 m: Two samples from this zone were extracted. The sample from 2000 - 2015 m show a rich abundance of extractable hydrocarbons while the sample from 2120 - 2135 m shows a good abundance.

The gaschromatogram of the saturated fraction of sample 2000 - 2015 m is very similar to the one from 1970 - 1985 m, while the gaschromatogram from sample 2120 - 2135 m only differ in that the pristane/nC_{17} ratio is slightly higher. The very front biassed gaschromatograms indicate a source of mainly lower plants and animals.

H: 2225 - 2385: Only one sample from this zone was extracted showing a rich abundance of extractable hydrocarbons. The gaschromatogram of the saturated fraction is rather different from any of the samples higher up in the well. The chromatogram shows a very dominating sterane hump from approximately C_{17} to C_{35}. Together with this, a fairly large amount of n-alkanes in the nC_{15} - nC_{25} are also seen. The large sterane hump would indicate an immature source.

I: 2385 - 2462 m (T.D.): Two samples from this zone were extracted and they show a good and fair abundance of extractable hydrocarbons. The gaschromatograms of the saturated fractions are rather similar and show a distinct sterane hump. However, this is far from as dominant as in the sample above. The n-alkanes show a unimodal distribution with nC_{17} as the most dominant. The total gaschromatograms would indicate an input of lower plants and animals of an immature/moderate mature maturity level.

Vitrinite Reflectance

Twentyfive samples, ten sidewall cores, four cores and eleven cutting samples, were analysed for vitrinite reflectance. In the following we will describe the individual samples, and together with the reflectance values, other information from the analyses will be given.

1290 - 1320 m: Mixed lithologies, limestone and calcareous shale dominant, Ro = 0.42 (11), Ro = 1.10 (3). The sample is virtually barren with a little bitumen staining and a few small reounded reworked particles. One single shale cutting contains good vitrinite particles. UV light shows a yellow fluorescence from spore specks and a low exinite content.

1410 - 1440 m: Calcareous shale and subordinate limestone, Ro = 0.42 (16). The sample is virtually barren with occasional bitumen staining and a few small vitrinite particles. UV light shows a yellow fluorescence from spores and hydrocarbon traces. A trace of exinite is also seen.

1500 - 1530 m: Calcareous shale with subordinate limestone and shale. R = 0.31 (18), 0.51 (1) and 0.89 (1). The sample has a low organic content. Most of the cuttings are barren, except for bitumen traces. Some small vitrinite particles and wispy particles and a little reworked material are seen in some of the cuttings. UV light shows a variable carbonate fluorescence and yellow to orange spores. A low exinite content is recorded.

1590 - 1620 m: Limestone and subordinate calcareous shale, Ro = 0.38 (11), Ro = 0.78 (4). The sample has a low organic content, and the cuttings are frequently barren. Some of the cuttings have a mixture of small, gnarled reworked particles and bitimen. A few small vitrinite particles and wispy particles are recorded. UV light shows a yellow to orange and orange fluorescence from spores and hydrocarbon traces. A trace of exinite is recorded.

1680 - 1710 m: Shale, limestone and lignite, Ro = 0.31 (20). The sample has a moderate overall organic content with lots of tiny lignite cuttings. The sediment is otherwise low in organic material, the most of it being reworked material and bitumen. Occasionally true vitrinite particles are recorded. UV light shows the samples to be rich in hydrocarbon droplets and a yellow fluorescence from spores in the lignite. A trace of exinite is recorded.

The lignite could be a mudadditive, however, with it having a reflectance value similar to the vitrinite particles in the cuttings, we can not exclude it from belonging to the sample.

1740 - 1770 m: Shale and lignite, Ro = 0.3 (20). The shale has a low content of small vitrinite particles, frequently reworked. Lots of tiny lignite cuttings are seen. These have a similar reflectance value to the vitrinite particles in the shale. UV light shows the sample to be rich in hydrocarbon droplets and a yellow/orange fluorescence from spores in lignite. A trace of exinite content is recorded. Again, we cannot be certain if the lignite is a mudadditive or not.

* 1782.6 m: Silty shale, Ro = 0.36 (20). The sample is moderate to rich in organic material, however, this is mostly reworked vitrinite wisps and wispy particles together with bitumen staining and wisps and a little inertinite is also recorded. UV light shows a rather dull, light-orange fluorescence from spores and algae and a moderate exinite content.

1800 - 1830 m: Lignite and shale, Ro = 0.29 (20), Ro = 1.22 (1). The sediment is barren except for a single small reworked particle. The sample is, however, rich in lignite cuttings. These could be a mudadditive. UV light shows a yellow fluorescence from spores and resin in lignite together with hydrocarbon traces in shale. A low exinite content is recorded.

\+ 1829.5 m: Silty shale, Ro = 0.32 (2), Ro = 0.73 (18). The sample has a low organic content with isolated particles of vitrinite and bitumen. All the particles are probably reworked. A trace of invertinite are recorded. UV light shows an overall carbonate fluorescence together with a yellow to orange fluorescence from spores and a low ixinite content.

1890 - 1900 m: Mixed lithologies, porcellanite*, lignite, coal, R = 0.24 (18), Ro = 0.81 (5). The organic material in the sample is restricted to the coal and lignite. The lignite is dominant, and shows a good cell structure. It is probably a mudadditive. Two high reflectance coal cuttings are found in the sample. UV light shows a yellow and yellow to orange fluorescence from spores together with some hydrocarbon droplets and a low exinite content.

* The thermonology "Porcellanite" is used on the sediment produced by turbodrilling. Usually it contains no organic material.

+ 1942.10 m: Shale, Ro = 0.28 (20), Ro = 0.52 (1). The sample has a moderate organic content with small particles and wisps of very low reflectance vitrinite. Mostly reworked particles and inertinite are recorded. UV light shows a light and mid-orange fluorescence from spores and a low to moderate exinite content.

+ 1959.5 m: Shale, Ro = 0.32 (18), Ro = 0.59 (2). The sample has a moderate organic content, mainly small particles of reworked material and occasional inertinite. Small particles and wispy particles of vitrinite and traces of bitumen are also recorded. UV light shows a yellow to orange and orange fluorescence from spores together with hydrocarbon traces and a moderate exinite content.

+ 1980 m: Shale, Ro = 0.27 (1), Ro = 0.52 (20), Ro = 0.90 (2). The sample has a moderate organic content with a lot of small angular particles of vitrinite. They are almost wholly reworked material (Ro = 0.90). A few true vitrinite and bitumen particles and a trace of inertinite are found. UV light shows a yellow to orange fluorescence from spores together with traces of hydrocarbons and a moderate exinite content. The "tru vitrinite" particles have a large spread in reflectance values (Ro = 0.40 to Ro = 0.74). The higher reflectance values could also be reworked. If we exclude these, the new reflectance value of "true vitrinite" will be : Ro = 0.43 (10). This reflectance value fit better with the yellow/orange fluorescence found in UV light.

* 2000 m: Shale, Ro = 0.34 (21). The sample has a moderate organic content, mostly reworked particles and inertinite. Some good vitrinite wisps and wispy particles and a lot of bitumen particles are also recorded. UV light shows a yellow to orange and light orange fluorescence from spores and a moderate to rich exinite content.

2075 - 2090 m: Shale and siltstone, Ro = 0.34 (20). The sample has a moderate organic content. Small particles of reworked material and inertinite are dominant. Occasional small vitrinite particles and wispy particles are recorded. UV light shows a yellow to orange and light orange fluorescence from spores and a moderate exinite content.

* 2125 m: Shale, Ro = 0.35 (21). The sample has a moderate organic content with some good vitrinite particles, wisps and stringers. It also contains a lot of reworked material and inertinite. UV light shows a light and mid-orange fluorescence from spores and a moderate to rich exinite content.

* 2150 m: Shale, Ro = 0.34. The sample has a moderate organic content with small particles of vitrinite, bitumen and reworked material. The reworked material is mainly vitrinite. UV light shows a light- and mid-orange fluorescence from spores and algea, and a moderate to rich exinite content.

2165 - 80 m: Lignite, siltstone and shale, Ro = 0.30 (24). The sample has a variable organic content. The sediment is mainly barren, occasionally bitumen and a few small vitrinite wispy particles are recorded. The lignite shows a variable Ro, 0.2 - 0.35 %. UV light shows a yellow to light orange fluorescence from spores and resin in lignite, and a low exinite content.

Assuming that the lignite is a mudadditive, especially the cuttings with low Ro value, a new vitrinite reflectance value, Ro = 0.34 (13) can be calculated. This fits in better with the core sample above.

* 2200 m: Shale, Ro = 0.39 (20). The sample has a low to moderate organic contentwith good, rounded particles and wisps of vitrinite. Some reworked material and inertinite are also recorded. UV light shows a light to mid-orange fluorescence from spores and a moderate exinite content.

* 2234 m: Siltstone, Ro = 0.34 (8). The sample has a low organic content with a few small particles of vitrinite and bitumen. Most of the organic material are reworked material together with some inertinite and bitumen. UV light shows a yellow fluorescence from spore fragments and a trace of exinite.

*
2263 m: Sandy siltstone, Ro = 0.31 8'(7), Ro = 0.66 (13). The sample has a moderate organic content with some vitrinite stringers of very low reflectance value. Some wispy particles of highreflectance together with some inertinite and bitumen staining are also recorded. UV light shows a yellow to orange and light orange fluorescence from spores, and a moderate exinite content.

* Silty shale, Ro = 0.36 (5), Ro = 0.69 (8). The sample has a low organic content with a few small particles of bitumen and vitrinite. The vitrinite is almost wholly reworked, only a trace of possibly true material and a trace of inertinite. UV light shows an overall carbonate fluorescence and yellow to orange fluorescence from spores. A trace of exinite is recorded.

* 2390 m: Sandy siltstone, Ro = 0.26 (4), Ro = 0.51 (7), Ro = 0.80 (3). The sample has a very low organic content with a few very rounded particles of bitumen and vitrinite and a trace of inertinite. Most of the organic material is reworked. UV light shows a yellow to orange fluorescence from spores together with trace of hydrocarbons and a trace of exinite.

* 2420 m: Red shale, Ro = 1.19 (13). The sample has a low organic content, only a few small particles of high reflectance, probably reworked. UV light shows traces of hydrocarbons together with yellow to orange fluorescence from spores in a few cuttings. A trace of exinite is recorded.

2445 - 62 m: Red shale, Ro = 1.24 (15). The sample has a low organic content with occasional small particles with high reflectance, these are probably reworked. UV light shows hydrocarbon specks and impregnation and no exinite.

* Sidewall cores

+ Core chips

VISUAL EVALUATION OF KEROGEN

Fourtyfive samples from cuttings were investigated for kerogen analyses and results summarized in the enclosures. The colour index of each sample was evaluated from the dominant type of kerogen (particles $> 15\mu$), and if possible on palynomorphs.

Individual results are also reported from cores/sidewall cores which were studied for palynology.

The following interpretation has been used with the qualitative colour index for organic residues from this well.

	2-	2	2+
Immature	Moderate mature	Mature	Oil window

Interpretation of individual results was complicated by the low maturation throughout the well. Caved in material as well as mud additives for this reason could not be separated on maturity alone.

The kerogen composition is expressed as percentapes of the total residue. The nonstructured group of kerogen: sapropel, indetermined herbaceous material, wood remains, as well as longranging fossils are of doubtfull value for the colour interpretation and results are controlled from cored samples.

1290 - 1300 m: A fairly rich residue dominated by sapropel and a small proportion of wood particles (coaly matter). The colour index 2- is based on sapropel and supposed indigenous dinoflagellate cysts. An immature formation with a good potential for oil generation.

1410 - 1420 m: A fairly rich residue consisting of equal amounts of kerogen, alger and wood remains (coaly matter). The colour index 2- is based on sapropel and supposed indigenous cysts. An immature formation with potential for oil and gas generation.

1470 - 1480 m: A fairly rich residue dominated by sapropel. Beside is recorded an equal proportion composed of indetermined herbaceous material, cuticles, and rounded amorphous coal fragments. The colour index 2- is based on pollen an cuticles. An immature formation with potential for oil and gas generation.

1561 - 1567 m:)
1633 - 1639 m:) Two rich to fairly rich residues consisting of amorphous sapropel, and an equal amount of herbaceous material (wood remains). The finely dispersed material seem slightly darker than in samples above probably controlled by the lithology. The estimated colour index is 2- to 2, and would suggest a slight to moderate mature formation with possibilities for oil and gas generation.

1651 - 1657 m: A fairly rich residue, originally consisting of equal amounts amorphous and woody material. The colour index 2- to 2 is estimated from sapropel. Woody material seems oxidized and is considered as reworked. A slight to moderate mature formation. With potential for oil and gas generation.

1726 - 1729 m: A very sparce organic residue, composed by equal amounts of amorphous material and woody, mainly reworked material. The estimated colour index 2- to 2 is based in colour of sapropel. A slight to moderate mature formation poor in indigenous organic matter.

1738 - 1741 m: As above, a very sparce organic residue, but herbaceous and woody material dominate. Estimated colour index 2- to 2 beeing based in pollen, spores, cuticles. Probably a poor source rock (gas) and only slight to moderate mature.

1781 m:)
1789 m:) Sidewall cores show a formation very poor in organic matter. The main part of kerogen recorded is reworked woody material.

1802 - 1804 m: The very sparce residue is dominated by woody particles and also include mud additives. The colour index is 2- to 2. A formation poor in organic matter and only slight to moderate mature.

1826 - 1828 m: A fairly rich residue dominated by coal particles/ woody matter, which also include lignite and sulfonate. The colour index is estimated as 2, an increase from the above interval (1561 m -1567 m to 1802 - 1804 m) and indicates a moderate mature stage of a possible source for gas generation.

1848 - 1850 m: A sparce residue dominated by woody material and herbaceous remains. Mud additives are present and disturbe. The colour index is 2, indicating a moderate mature formation, but poor in organic material.

1882 - 1884 m: Almost no organic residue. The sparce remains are dominated by herbaceous and woody matter. Mud additives are present. Colour index 2, a poor but moderate mature formation.

1894 - 1896 m: A very sparce residue including as equally important amorphous, herbaceous and woody matter. Mud additives are easily recognized. Colour index 2, supporting a poor, but moderate mature, formation with potential for gas and oil.

1914 - 1916 m: A very sparce residue dominated by amorphous matter. Herbaceous remains were recorded as well as mud additives. The estimated colour index 2, is supporting a poor but moderate mature formation with potential for oil and gas.

1936 - 1938 m: As above a very sparce residue, but dominated by woody matter. Colour index 2. A poor formation with potential for gas generation only.

1953 - 1956 m: A fairly small residue dominated by woody and herbaceous matter. Colour index 2. A moderate mature formation with potential for gas generation.

1971 - 1974 m: A very sparce residue dominated by amorphous and by woody finely disperse material. Mud additives are present. If the amorphous material, colour index 2- to 2 is indigenous, a slight to moderate mature source rock with potential for oil generation. However, this residue does not fit with the neighbouring samples.

1992 - 1995 m: A small residue dominated by woody and herbaceous material. Mud additivs are present. Colour index 2. A moderate mature but poor formation with possibilities for gas generation.

2013 - 2016 m: A fairly small residue dominated by amorphous matter and with a small amount of woody fragments. Colour index 2. Moderate mature with potential for oil generation.

2031 - 2034 m: }
2052 - 2055 m: } Fairly small to sparce residues where amorphous material seems slightly more important than wood remains. Colour index 2. Moderate mature formation with potential for oil generation.

2073 - 2076 m: A sparce residue dominated by woody matter as recorded in residues 2031 - 34 m and 2052 - 55 m. The colour index 2 indicates a moderate mature formation but with potential only for gas generation.

2094 - 2097 m: A fairly small residue where amorphous material dominates. Herbaceous remains include a varied assemblage and is well preserved. Colour index 2, a moderate mature source rock with potential for oil generation.

2115 - 2118 m: A sparce residue dominated by wood fragments, amorphous sapropel, and pollen/spores. The colour index is 2. A moderate mature, but probably poor source rock, with potential for gas and oil generation.

2157 - 2160 m: A fairly small residue in which woody matter and indetermined herbaceous material are equally important. Colour index 2 suggests a moderate mature source rock with potential for gas generation.

2178 - 2181 m: A small residue completely diminated by herbaceous finely dispersed and indetermined material. Colour index 2. A potential source for gas generation but only moderate mature.

2199 - 2202 m:)
2220 - 2223 m:)
2223 - 2226 m:) Fairly small to small residues dominated by herbaceous and woody material and wood remains. Colour index 2, potential as source for gas generation, moderate mature.

2226 - 2229 m:)
2229 - 2232 m:) Sparce residues dominated by herbaceous material. Colour index 2. Probably a poor source rock with potential for gas generation.

2250 - 2253 m:)
2271 - 2274 m:)
2292 - 2295 m:)
2310 - 2312 m: Sparce residues or none. Herbaceous and woody matter equally important. Mud additives can be distinguished. Estimated colour index 2 indicates a moderate mature formation which however is very poor in organic matter.

2331 - 2334 m: A very small residue, partly dominated by mud additives. Sapropel (? additives) and herbaceous/woody matter equally important. A formation poor in organic remains. Colour index 2, moderate mature.

2352 - 2355 m: A fairly rich residue consisting of woody and herbaceous matter and sapropel. Colour index 2, a moderate mature source rock with potential of oil generation.

2373 - 2376 m: A fairly small residue dominated by amorphous material and a smaller part woody matter. Colour index 2. A potential source rock for oil generation, moderate mature.

2394 - 2397 m: A small residue where woody and herbaceous matter dominate. Amorphous material second dominant. A formation poor in organic material, moderate mature and with potential for gas and oil generation.

2415 - 2418 m:
2336 - 2339 m:
2457 - 2460 m:
2460 - 2462 m: Sparce residues or none. Suggested amorphous, finely disperse material dominates. Small amounts of wood remains are present, most of it beeing reworked. Cuticles (from leaves) pollen and spores are recorded in siewed slides. A formation poor in organic material, according to colour index ?2 in a moderate mature stage.

CONCLUSION

Based on the light hydrocarbon data, the analysed part of the well was divided into nine zones; A: 1290 - 1500 m, B: 1500 - 1650 m, C: 1650 - 1680 m, D: 1680 - 1770 m, E: 1770 - 1930 m, F: 1930 - 2000 m, G: 2000 - 2225 m, H: 2225 - 2385 m and I: 2385 - 2462 m. Zone H is separated from zone G in that there were a lack of results, especially for absorbed gases, for zone H. However, other data found very little differences between the two zones.

In our evaluation of the well, the richness rating is based on the light hydrocarbons, total organic carbon (TOC) and extractable organic matter (EOM) data. The maturation rating is mainly based on the vitrinite reflectance and visual kerogen data.

A: 1290 - 1500 m: This zone consists mainly of shale,and the C_1 - C_4 hydrocarbons show a fair abundance while the C_5 - C_7 hydrocarbons show a poor abundance. The gas is very dry, and the iC_4/nC_4 ratio is rather high which indicate immature samples. The TOC measurements indicate a fair potential at the top part of the zone, increasing to a good potential towards the lower levels. None of the samples from the top part on the zone were extracted, however, the lowermost sample in the zone was extracted and this show a rich abundance of hydrocarbons. The percentage of hydrocarbons in the extract is rather high, 57,7 % and this could indicate some input of migrated hydrocarbons. The gaschromatogram of the saturated fraction shows no signes of n-alkanes or isoprenoids, just two large napthenic lumps. A gaschromatogram like this is usually found for very heavily biodegraded oils. However, up till now, there are no reported cases of biodegradation of hydrocarbons in tight claystones. The only way this could be a case of biodegradation, would therefore be a completely biodegraded oil which after biodegradation has migrated into the claystone. However, the gaschromatogram does not show any sign of paraffinic material, which indicate that this shale would be more or less barren for organic material, except the migrated hydrocarbons. Without any further study on this particular problem it is very difficult to draw any conclusion on this problem.

From the different analyses carried out, we would rate the zone as fair for the top part with the richness increasing with increasing depth to good for the lower part. The zone must be rated as immature and at present we will not exclude the possibility of biodegraded oil migrated into the zone.

B: 1500 - 1650 m: This zone, which has a lithology similar to the zone above, has a markedly higher abundance of both C_1 - C_4 and C_5 - C_7 hydrocarbons, than zone A. However, the gas is still rather dry and the iC_4 - nC_4 ratio high. The TOC measurements show a far lower TOC value for the top part of this zone compared with the zone above. However, the TOC values increase a rich potential at the lower part of the zone.

Two of the samples from this zone was extracted. The uppermost sample 1560 - 1590 m shows a good abundance of extractable hydrocarbons, while the sample from 1620 - 1650 m shows a rich abundance. The gaschromatograms of the saturated fraction of the two samples have quite a lot of similarity, however, the shape of the gaschromatograms are rather peculiar for samples of this maturity level.

Vitrinite reflectance and visual kerogen show the zone to be immature to moderate maturity, however, a large amount of reworked material are recorded in the samples. This could again explain the gaschromatograms of the saturated fractions. The large napthenic humps are caused by immature/moderate mature organic matter from lower plants and animals remains, while the n-alkanes and isoprenoid pattern, which is normal for a more mature source of the same origin, would be mainly from the reworked material. However, even with this consideration, we feel that this is not the complete explanation. We would have expected a far more pronounsed isoprenoid pattern from the immature sediment.

C: 1650 - 1680 m: A zone consisting of one sample. The zone is divided out from the zone above bacause of a sharp drop in the light hydrocarbon abundance. However, the lithological log show this sample to contain limestone and this could easy explain the drop in the light hydrocarbon abundance. The TOC measurement shows the claystone to have a rich potential which fit well with the EOM data. The gaschromatogram of the saturated fraction of the sample is fairly similar to the samples from the zone above. The only difference being that the n-alkane pattern does not show up as well as in zone B. Vitrinite reflectance and visual kerogen show the zone to be moderate mature. On the whole, our analyses show the zone to be a rich source-rock for oil with a moderate mature maturity level.

D: 1680 - 1770 m: Again a zone with mixed lithology, claystone and limestone. The light hydrocarbon abundance show a marked increase, and both the C_1 - C_4 and the C_5 - C_5 hydrocarbons show a good abundance. The TOC measurements indicate a fair/good potential for the limestone and a rich potential for the claystone. Three of the samples from this zone were extracted, and they all show a very rich abundance of extractable hydrocarbon. However, the composition of the EOM, with the very high ratio of hydrocarbons to nonhydrocarbons and the high ratio of hydrocarbons to TOC indicate this zone to contain migrated hydrocarbons. Vitrinite reflectance and visual kerogen analyses show the zone to be a moderate mature source rock for oil. Because of the migrated hydrocarbons in the samples, it is difficult to estimate the richness. However, we would estimate this zone to be of equal richness as the zone above, i.e. rich.

As mentioned in the discussion, the gaschromatograms of the saturated fractions of the samples do show different patterns. The sample from 1680 - 1710 m is very similar to the sample above, and this is discussed above. The next sample, 1710 - 1740 m, has large quantities of isoprenoids, which would be expected of lower plants and animals remains of this maturity level. However, the next sample, 1740 - 1770 m, shows a distinct n-alkane pattern of mature higher plants. Vitrinite reflectance measurements show a lot of lignite in this sample, which could be a mud-additive. However, the lignite has a low maturity level. Visual kerogen does, however, indicate a large input of reworked material. This could then explain the n-alkane pattern in the gaschromatogram.

E: 1770 - 1930 m: This zone, which has a mixed lithology of sandstone and coal, shows a lot of variation in the light hydrocarbon measurements. The cuttings in the samples from this zone, especially the sandstone, were very small at times. Because of this, a lot of the gas would have disappeared during collection on the rig, and during washing. Because of this it is not very reliable to use the light hydrocarbon data. The TOC values are rather high for sandstone, which could be caused by migrated oil or coalparticles. The extracted samples from this zone, mainly corechips and sidewall cores, show a rich abundance of extractable hydrocarbons. However, the composition of the extract indicate migrated hydrocarbons for most of the samples. The gaschromatograms of the saturated fraction of most of the samples are fairly similar to those recorded in the zones above with large napthenic humps. The samples from 1820 m shows large amounts of isoprenoids, while this is not as dominant in the samples from 1780 m and 1880 - 1890 m. The sample from 1833,3 m is completely different in that it also show a large input of higher n-alkanes with a large CPI value, which indicate immature higher plants. Vitrinite reflectance and visual kerogen show the zone to be moderate mature and the type of kerogen indicates mainly higher plants.

F: 1930 - 2000 m: A zone which mainly consists of claystone. The light hydrocarbons show very high abundances. The TOC measurements indicate the zone to have a rich potential. However, this does not fit well with the EOM data, which are mainly on corechips. These samples, which are silty claystone, show a fair/good and good abundance. However, the deepest sample analysed in this zone, the cuttings sample from 1970 - 1985 m show a good/rich abundance. None of the EOM data indicate migrated hydrocarbons.

The gaschromatograms of the saturated fractions of the core chip samples are all very similar with a large napthenic hump at the front and heavy n-alkanes with a high CPI-value. The sample from 1970 - 1985 m is different in that the large napthenic hump has disappeared.

Vitrinite reflectance and visual kerogen show the zone to be moderate mature. The composition of the kerogen vary a lot from sample to sample with various degree of herbaceous and wood remains. The different analyses indicate the zone to be moderate mature with a good potential as a source rock for gas and oil.

G: 2000 - 2225 m and H: 2225 - 2385 m: These two zones were separated due to lack of measurements on light hydrocarbon. Other analyses have shown the zones to be very similar and will be discussed as one. Due to the lack of measurements on light hydrocarbons, as mentioned above, we will not put any value into these results. The TOC measurements indicate, however, that the claystone has a good potential, while the sandstone in the top part of the intervall has rather low value, increasing with depth. The sandstone around 2300 m has a rather high TOC value. During washing,oilstains were recorded in some of the sandstone samples, which would suggest migrated hydrocarbons. This was especially noticed in the sample 2150 - 2165 m. However, due to a very small amount of sample, this was not extracted.

However, some of the samples were extracted. The claystone from 2000-2015 m shows a rich abundance, and the gaschromatogram of the saturated fraction is very similar to the lowermost sample in the zone above. The sample from 2120 - 2135 m shows a good abundance, and the gaschromatogram shows only minor differences from the sample above.

The sample from 2270 - 2285 m, which is a sandstone sample, shows a rich abundance of extractable hydrocarbons. However, the gaschromatogram of the saturated fraction is completely different to the sample above, in that a very large sterane hump is seen. The EOM data show a fairly high hydrocarbon/TOC ratio, and this could indicate some kind of migrated hydrocarbons. However, it is only an indication.

The vitrinite reflectance and visual kerogen analyses show the intervall to be moderate mature, and the composition of the kerogen show the zone to be gasprone.

The different analyses therefore show the zone to be moderate mature with a good potential as a source rock for gas. There are some small indications of migrated hydrocarbons in some of the sandstone in the zone.

I: 2385 - 2462 m: This, the lowermost zone in the well, consists mainly of reddish/brown claystone with a poor abundance of light hydrocarbons. The TOC measurements indicate a poor/fair potential for the zone, while the EOM data show a fair/good abundance of extractable hydrocarbons. The gaschromatograms of the saturated fraction of the samples show a sterane hump, which indicate a low maturity level.

The vitrinite reflectance show reflectance values in the lower end of the oil window. However, this could all be reworked material.

Visual kerogen indicate the zone to be moderate mature, however, kerogen of a far higher maturity level is also recorded. This is probably reworked. The most of the kerogen is amorphous, which indicate a source for oil.

On the whole, the different analyses indicate a moderate mature zone with a fair potential as a source rock for oil. The zone contains a lot of reworked material.

Table I A.

Concentration (µ gas/kg rock) og C_1-C_7 hydrocarbons in cuttings (Headspace)

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
1290-1320	1231	375	75	2	1	315	1279	48	3.8	2
1320-1350	2178	56	5	-	-	117	2240	62	2.8	-
1350-1380	1124	32	3	-	-	30	1159	35	3.0	-
1380-1410	1513	78	7	-	-	193	1599	86	5.36	-
1410-1440	3525	169	10	2	1	266	3706	182	4.90	2
1470-1500	70	9	3	-	-	24	83	12	15.0	-
1500-1530	32476	3387	151	26	19	297	36059	3583	9.9	1.37
1530-1560	74507	11076	476	32	43	277	86134	11627	13.5	0.76
1560-1590	35693	4470	378	88	64	865	40694	5001	12.3	1.38
1590-1620	17702	6282	886	358	266	812	25494	7792	30.6	1.35
1620-1650	133372	22434	5872	2864	2832	4473	167375	34002	20.3	1.01
1650-1680	2617	333	48	18	13	166	3029	412	13.6	1.34
1680-1710	36606	25978	12099	4693	4416	24970	83792	47186	56.3	1.06
1710-1740	15940	8053	4195	1727	1591	7017	31506	15566	49.4	1.09
1740-1770	44683	18946	8668	4461	4014	13649	80773	36090	44.7	1.11

Table I A - p. 2

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
1770-1200	1442	482	163	83	76	1027	2245	803	35.8	1.09
1800-1830	745	263	71	9	8	112	1096	351	32.0	1.17
1840-1850	2071	1076	450	73	60	2099	3730	1659	44.5	1.21
1860-1870	1288	785	233	79	61	1964	2447	1159	47.4	1.29
1870-1880	350	186	58	12	18	268	624	274	43.9	0.67
1880-1890	241	134	39	9	7	201	430	189	44.0	1.29
1890-1900	2038	878	298	221	207	2288	3642	1605	44.1	1.06
1900-1910	1112	943	501	359	231	2456	3147	2035	64.7	1.55
1910-1920	314	92	108	49	48	2767	610	296	48.6	1.02
1920-1930	171	37	82	10	9	1681	308	138	44.6	1.10
1930-1940	1138	294	80	32	30	443	1575	437	27.7	1.07
1940-1950	Loose lid									
1950-1960	344538	101777	15728	7415	6244	16295	475702	131164	27.57	1.19
1960-1970	152516	47399	9580	3774	3132	11122	216401	63885	29.5	1.20
1970-1985	5660	3410	1404	899	763	3356	12137	6476	53.4	1.18
1985-2000	210	182	134	72	56	342	654	444	68.0	1.29

Table I A - p. 3

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_1-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
2000-2015	132	111	71	48	38	165	400	268	66.9	1.28
2015-2030	68	81	52	37	25	365	263	195	74.2	1.50
2030-2045	4836	2390	559	203	141	1177	8129	3293	40.5	1.44
2045-2060	452	179	69	11	9	148	720	268	37.2	1.21
2060-2075	4920	1960	600	205	203	189	7787	2968	38.1	1.01
2075-2090	3397	2150	818	316	296	1056	6977	3579	51.3	1.07
2090-2120	3139	1431	495	173	154	721	5391	2253	41.8	1.12
2120-2135	2179	820	326	134	135	755	3596	1416	39.4	0.99
2135-2150	556	144	52	4	4	264	760	204	26.8	1.08
2150-2165	237	75	37	4	4	58	357	120	33.6	0.95
2165-2180	1370	311	212	68	77	1359	2037	667	32.8	0.89
2180-2195	9022	1636	495	136	139	487	11428	2406	21.1	0.98
2195-2210	1566	295	100	10	11	1024	1983	417	21.0	0.95
2210-2225	2118	316	96	17	18	310	2566	448	17.5	0.94
2225-2240	Loose lid									
2270-2285	102	34	30	2	3	209	171	69	40.2	0.91

Table I A - p. 4

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
2280-2295	320	116	82	9	11	626	538	218	40,1	0,88
2295-2310	842	300	142	39	50	425	1375	532	38,7	0,77
2310-2325	1089	320	110	16	25	1159	1559	470	30,2	0,64
2325-2340	463	143	56	7	9	79	678	215	31.7	0,77
2340-2355	121	31	12	2	2	373	167	46	27,5	0,83
2355-2370	46	21	9	1	1	9	78	33	41,5	0,77
2370-2385	140	43	13	2	2	15	200	60	29,9	0,85
2385-2400	72	27	32	2	3	191	136	64	46,9	0,81
2400-2415	216	47	18	3	4	89	289	72	25,0	0,79
2415-2430	58	17	31	1	2	419	110	51	46,9	0,78
2430-2445	37	10	17	1	2	57	68	30	44,8	0,88
2445-2462	75	12	9	1	1	67	98	24	24	0,80

Table I B.

Concentration (µl gas/kg rock) of C_1-C_7 hydrocarbons in cuttings. (Absorbed gas.)

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
1290-1320	118	13	1	—	—	—	132	14	10.6	—
1320-1350	264	36	2	—	—	—	302	38	12.6	—
1350-1380	2018	384	116	37	39	415	2594	577	22.2	0.93
1380-1410	1810	336	90	27	31	117	2293	483	21.1	0.86
1410-1440	3223	600	157	54	58	204	4092	869	21.2	0.93
1470-1500	1200	202	36	3	3	17	1444	244	16.9	0.98
1500-1530	1244	204	38	3	3	100	1491	248	16.6	0.96
1530-1560	911	206	38	9	8	55	1173	262	22.3	1.08
1560-1590	853	267	50	11	10	155	1191	338	28.4	1.06
1590-1620	1736	254	48	12	12	128	2061	325	15.8	1.03
1620-1650	857	113	29	9	8	260	1016	159	15.7	1.01
1650-1680	1918	251	73	37	26	259	2306	388	16.8	1.41
1680-1710	2327	328	100	46	40	381	2841	515	18.1	1.14
1710-1740	5728	828	193	74	71	467	6893	1166	16.9	1.03

Table I B - p. 2

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
1740-1770	7350	1145	274	84	90	807	8942	1592	17.8	0.94
1770-1800	1102	558	568	38	37	40	2300	1199	52.1	1.07
1800-1830	154	62	53	3	3	110	274	120	43.9	1.07
1840-1850	6081	5211	4742	4300	1064	4810	18398	12317	67.0	1.22
1860-1870	5327	4624	4581	1268	1013	4103	16812	11486	68.3	1.25
1870-1880	268	149	124	12	10	117	562	294	52.4	1.25
1880-1890	17636	8170	5469	1139	1007	1661	33421	15785	47.2	1.13
1890-1900	36812	18421	7242	1651	1300	3794	65426	28614	44.1	1.27
1900-1910	27742	11493	5816	1351	1067	3062	47469	19727	41.56	1.27
1910-1920	1379	1008	1014	160	137	321	3699	2319	62.7	1.17
1920-1930	2492	735	793	164	141	412	4326	1834	42.4	1.15
1930-1940	24917	12047	7929	1640	1427	2759	47961	23044	48.1	1.15
1940-1950	32923	15077	9238	1748	1643	5592	60628	27706	45.7	1.06
1950-1960	1251	312	180	18	13	192	1772	522	29.4	1.42
1960-1970	1120	296	172	16	12	126	1616	496	30.9	1.33

Table I B - p. 3

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
1970-1985	876	124	59	8	6	86	1071	196	18.3	1.35
1985-2000	1496	229	93	6	6	856	1829	334	18.2	1.11
2000-2015	1075	157	62	4	4	511	1302	227	17.4	1.04
2015-2030	1296	317	189	45	39	650	1881	586	31.1	1.29
2030-2045	490	63	36	2	2	54	596	102	17.2	0.86
2045-2060	841	118	81	16	15	252	1071	229	21.4	1.03
2060-2075	496	66	37	2	2	34	603	107	17.7	0.88
2075-2090	978	107	58	18	12	1652	1173	195	16.6	1.50
2090-2120	1088	110	32	11	10	642	1250	162	13.0	1.07
2120-2135	740	96	52	17	15	518	920	180	19.3	1.13
2135-2150	1255	227	106	39	34	414	1660	405	24.4	1.14
2150-2165	1712	391	216	48	48	462	2416	704	25.8	1.02
2165-2180	1545	262	135	42	40	640	2025	479	23.7	1.03
2180-2195	712	76	21	10	10	652	829	117	14.1	1.01
2195-2210	727	78	23	11	12	542	851	125	14.7	0.92

Table I B - p. 4

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
2210-2225	902	228	170	34	43	760	1378	476	34.5	0.75
2225-2240	525	79	36	4	4	1756	648	123	19.0	0.88
2270-2285	579	139	84	17	18	256	836	257	30.8	0.95
2280-2295	264	45	38	1	1	642	348	84	24.2	0.80
2295-2310	427	103	53	6	8	97	596	170	28.5	0.81
2310-2325										
2325-2340										
2340-2355	No readings.									
2355-2370										
2379-2385										
2385-2400	1198	132	36	4	5	1040	1375	177	12.9	0.73
2400-2415	489	53	19	5	5	324	571	82	14.4	0.85
2415-2430	567	63	9	2	2	3020	643	76	11.8	0.80
2430-2445	588	60	10	2	2	403	660	72	11.0	0.81
2445-2462	680	63	10	2	2	472	756	77	10.1	0.80

Table I C.

Concentration (µl gas/kg rock) of C_1-C_7 hydrocarbons in cuttings. (Headspace + Absorbed gas).

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
1290-1320	1349	388	76	2	1	315	1411	62	4.4	2
1320-1350	2442	92	7	—	—	117	2742	100	3.7	—
1350-1380	3142	416	119	37	39	445	3753	612	16.3	0.93
1380-1410	3323	416	97	27	31	310	3892	569	14.6	0.87
1410-1440	6748	769	169	56	59	470	7798	1051	13.5	0.97
1470-1500	1270	211	39	3	3	41	1527	256	16.8	0.96
1500-1530	33720	3591	189	29	22	397	37550	3831	10.2	1.32
1530-1560	75418	11282	514	41	51	332	87307	11889	13.6	0.81
1560-1590	36546	4737	428	99	74	1010	41885	5339	12.8	1.34
1590-1620	19438	6536	934	370	278	940	27555	8117	29.5	1.33
1620-1650	134229	22547	5901	2873	2840	4733	168391	34161	20.3	1.01
1650-1680	4535	584	121	55	39	425	5335	800	15.0	1.41
1680-1710	38935	26306	12199	4739	4456	25351	86633	47701	55.1	1.06
1710-1740	21668	8881	4388	1801	1662	7481	38399	16732	43.6	1.08

Table I C - p. 2

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
1740-1770	52033	20091	8861	4545	4104	14456	89715	37682	42.0	1.11
1770-1800	2544	1040	721	121	113	1067	4545	2002	44.0	1.07
1800-1830	899	325	124	12	11	222	1370	471	34.4	1.09
1840-1850	8152	6287	5192	1373	1124	6909	22128	13976	63.2	1.22
1860-1870	6615	5409	4814	1347	1074	6067	19259	12645	65.7	1.25
1870-1880	618	335	182	24	28	385	1186	568	47.9	0.86
1880-1890	17877	8304	5508	1148	1014	1862	33851	15974	47.2	1.13
1890-1900	38850	19298	7540	1872	1507	6082	69068	35456	51.3	1.24
1900-1910	28854	12436	6317	1710	1298	5518	50616	21762	43.0	1.32
1910-1920	1693	1100	1122	209	186	3088	4309	2615	61.0	1.12
1920-1930	2662	772	875	174	150	2093	4634	1972	42.5	1.16
1930-1940	26055	12341	8009	1672	1457	3202	49536	23481	47.4	1.15
1940-1950	32923	15077	9238	1748	1643	3592	60628	27706	45.7	1.06
1950-1960	345789	102089	15908	7433	6257	16487	477474	131686	27.6	1.20
1960-1970	153636	47695	9752	3790	3144	11248	218017	64381	29.5	1.21

Table I C - p. 3

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
1970-1985	6536	3534	1463	907	769	3442	13108	6672	50.9	1.18
1985-2000	1706	411	227	78	62	1198	2483	778	31.3	1.26
2000-2015	1107	368	133	52	42	676	1702	495	29.1	1.24
2015-2030	558	144	88	39	27	1015	2144	781	36.4	1.44
2030-2045	5326	2453	595	205	143	1131	8725	3395	38.9	1.43
2045-2060	1293	297	150	27	24	400	1791	497	27.8	1.13
2060-2075	5416	2022	637	207	205	223	8390	3076	36.7	1.01
2075-2090	4375	2257	876	334	308	2708	8150	3774	46.3	1.08
2090-2120	4227	1541	527	184	164	1363	6641	2415	36.4	1.12
2120-2135	2919	916	378	151	150	1273	3516	1596	45.4	1.00
2135-2150	1811	371	158	43	38	678	1420	609	42.9	1.13
2150-2165	1949	476	253	52	52	520	2773	824	29.7	1.00
2165-2180	2915	573	347	110	117	1999	4062	1146	28.2	0.94
2180-2195	9734	1712	516	146	149	1139	12267	2523	20.57	0.98
2195-2210	2293	372	123	21	23	1566	2834	542	19.1	0.91

Table I C - p. 4

Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5^+	ΣC_1-C_4	ΣC_2-C_4	% Gas wetness	$\frac{iC_4}{nC_4}$
2210-2225	3020	544	266	51	61	1070	3944	924	23.4	0.84
2225-2240	525	79	36	4	4	1756	648	123	19.0	0.88
2270-2285	681	173	144	21	21	465	1007	326	32.4	1.00
2280-2295	584	161	120	10	12	1268	886	302	34.1	0.83
2295-2310	1269	403	195	45	58	523	1981	702	35.4	0.78
2310-2325	1089	320	110	16	25	1159	1559	470	30.2	0.64
2325-2340	463	143	56	7	9	79	678	215	31.7	0.77
2340-2355	121	31	12	2	2	373	167	46	27.5	0.83
2355-2370	46	21	9	1	1	9	78	33	41.5	0.77
2370-2385	140	43	13	2	2	15	200	60	29.9	0.85
2385-2400	1270	160	68	6	8	1231	1511	241	16.0	0.75
2400-2415	705	100	37	8	9	413	860	154	17.9	0.89
2415-2430	625	80	40	3	4	3439	753	127	16.9	0.79
2430-2445	625	70	27	3	4	460	728	102	14.0	0.82
2445-2462	755	75	19	3	3	539	854	101	11.8	0.80

Table II

Lithology and Total Organic Carbon (TOC) Measurements.

Depth (m)	TOC		Lithology
1290-1320	0.36	75%	Claystone, greengrey to grey.
		24%	Quartz Sand, coarse to very coarse, subangular to rounded, moderate sorted, clear to light grey.
		1%	Pyrite.
		Obs.	Fossil fragments (tubes); Glauconite.
1320-50	0.44	100%	Claystone, greengrey to grey, brownish grey.
		Sm.am.	Quartz Sand; Limestone, white/light grey; Pyrite.
1350-80	0.63	93%	Claystone, grey to greengrey and brownish grey.
		7%	Limestone, grey, some light.
		Sm.am.	Pyrite.
		Obs.	Quartz Sand.
1380-1410	1.11	65%	Claystone, greengrey to grey and some brownish.
	0.19	35%	Limestone, grey, light.
		Obs.	Pyrite.
1410-40	0.81	75%	Claystone, greygreen to grey and some brownish.
	0.15	25%	Limestone, grey, light.
		Obs.	Pyrite; Sandstone.

Table II - p. 2

Depth (m)	TOC		Lithology
1470-1500	1.38	85%	Claystone, greengrey to grey and brownish, some green fragments.
	0.22	15%	Limestone, grey, light, brownish.
1500-30	0.76	97%	Claystone, grey, greenish grey, green, brownish grey, brownish.
		3%	Limestone, grey, light.
		Obs.	Pyrite; Marchasite; Quartz; Sandstone.
1530-60	0.59	100%	Claystone, partly silty, grey to greengrey.
		Obs.	Limestone; Quartz.
1560-90	0.97	100%	Claystone, partly silty, grey, some greenish fragments.
		Obs.	Limestone, grey, browngrey, light grey; Pyrite; fossil fragments (tube).
1590-1620	0.63	100%	Claystone, grey, some green fragments.
		Sm.am.	Limestone.
		Obs.	Silt/Sandstone; Pyrite; Pyritized tube fossil.
1620-50	3.94	100%	Claystone, grey, some greenish and green fragments.
		Sm.am.	Sand/Siltstone, brownish light grey, grey.
		Obs.	Pyrite.
1650-80	0.28	54%	Limestone, light grey, grey.
	5.05	45%	Claystone, grey to light grey, some greenish and green fragments.
		1%	Coal.
		Obs.	Pyrite.

Table II - p. 3

Depth (m)	TOC		Lithology
1680-1710	0.98	67%	Limestone, light grey, brownish, grey.
	3.80	30%	Claystone, partly silty, light grey to grey, some green fragments.
		2%	Coal.
		1%	Quartz.
		Sm.am.	Pyrite.
1710-40	0.40	94%	Limestone, light grey, grey, brownish light grey.
	3.63	5%	Claystone.
		1%	Coal.
		Sm.am.	Sand/Siltstone; Claystone.
		Obs.	Pyrite.
1740-70		50%	Coal.
	0.39	25%	Limestone.
	8.90	25%	Claystone.
1770-1800	1.46	98%	Quartz Sand, medium to coarse, moderate sorted, angular to subrounded, light to clear.
		2%	Claystone, light grey, grey.
1800-30		50%	Quartz Sand, as above.
		50%	Coal.
1840-50	3.40	85%	Quartz Sand, medium to fine, some coarse, moderate sorted, angular to subangular, light to clear.
		15%	Coal.
1860-70	0.79	100%	Quartz Sand, as above.
		Sm.am.	Claystone.
		Obs.	Coal.

Table II - p. 4

Depth (m)	TOC		Lithology
1870-80	1.85	100%	Quartz Sand, fine to coarse, poorly sorted, subangular to very angular, light to clear.
1880-90	1.85	100%	Quartz Sand, medium to coarse, poorly sorted, subangular to very angular, light to clear.
		Sm.am.	Claystone.
1890-1900		76%	Coal.
		18%	Claystone, grey.
		6%	Quartz Sand, as above.
1900-10		80%	Coal.
		20%	Claystone, grey.
1910-20	0.56	97%	Quartz Sand, fine to very fine, well-sorted, subangular to angular, light to clear.
		3%	Pyrite.
		Obs.	Claystone; Coal.
1920-30	0.43	99%	Quartz Sand, as above.
		1%	Pyrite.
1930-40	0.41	100%	Quartz Sand, coarse to medium, some very coarse, poorly sorted, angular/subangular, light to clear.
		Sm.am.	Coal.
		Obs.	Claystone.
1940-50	1.36	85%	Quartz Sand, as above.
		15%	Coal.
		Sm.am.	Claystone.

Table II - p. 5

Depth (m)	TOC		Lithology
1950-60	0.93	85%	Silty Claystone and Claystone, grey.
		15%	Coal.
		Sm.am.	Pyrite; Siltstone.
		Obs.	Quartz.
1960-70	3.12	96%	Claystone, silty, grey, brownish grey, pyritized.
		3%	Pyrite.
		1%	Coal.
		Sm.am.	Limestone, brown.
1970-85	[illegible]	100%	Coal.
		Sm.am.	Claystone, grey.
1985-2000	1.76	70%	Silty Claystone, grey.
		30%	Coal.
2000-15	2.30	99%	Claystone, silty, grey.
		1%	Coal.
		Obs.	Pyrite; Glauconite.
2015-30	2.21	50%	Claystone, silty, grey.
	0.39	48%	Quartz Sand, medium to coarse, angular/sub-angular, moderate sorted, light to clear.
		2%	Coal.
		Obs.	Pyrite; Limestone, light.
2030-45	0.18	78%	Quartz Sand/Sandstone, fine to coarse, light to clear.
		15%	Coal.
		7%	Silty Claystone, grey.
		2%	Limestone, light.
		Obs.	Pyrite.

Table II - p. 6

Depth (m)	TOC		Lithology
2045-60	0.15	75%	Quartz Sand/Sandstone, fine to coarse, light to clear.
		15%	Coal.
		5%	Limestone, light.
		5%	Silty Claystone, grey.
		Obs.	Pyrite.
2060-75	0.25	95%	Quartz Sandstone, fine to very fine, some medium to coarse Sand, light to clear.
	1.50	5%	Claystone, silty, grey.
		Sm.am.	Limestone; Coal; Pyrite.
2075-90	1.65	50%	Claystone, grey.
	0.21	50%	Quartz Sandstone, fine to very fine, light grey, and some medium to coarse Sand, light to clear.
		Sm.am.	Limestone.
		Obs.	Pyrite.
2090-2120	0.41	75%	Quartz Sand, medium to fine, moderate sorted, angular/subangular, light grey to clear.
	1.21	25%	Claystone, grey.
		Sm.am.	Pyrite.
2120-35	1.32	50%	Claystone, grey.
	0.91	50%	Quartz Sand, as above, and small amounts Sandstone, light grey.
		Sm.am.	Limestone; Coal.
2135-50		70%	Coal.
		20%	Sand/Sandstone.
		10%	Claystone.
		Sm.am.	Pyrite.

Table II - p. 7

Depth (m)	TOC	Lithology	
2150-65		90%	Coal.
		5%	Sand/Sandstone.
		5%	Claystone.
		Sm.am.	Limestone; Pyrite.
2165-80		70%	Coal.
		15%	Sand/Sandstone.
	1.62	15%	Claystone, silty, grey.
		Sm.am.	Limestone; Pyrite.
2180-95	1.42	40%	Silty Claystone, grey.
		33%	Quartz Sand, fine to medium, moderate sorted, angular/subangular, light to clear, and some very fine Sandstone, light grey.
		25%	Coal.
		2%	Pyrite.
		Sm.am.	Limestone.
2195-2210		100%	Coal.
		Sm.am.	Sand/Sandstone; Claystone; Pyrite.
2210-25		75%	Coal
		20%	Sand/Sandstone.
		5%	Silty Claystone.
		Sm.am.	Pyrite.
2225-40		55%	Quartz Sand, medium to fine, moderate sorted, angular to subrounded, light to clear, and sm. am. very fine/fine Sandstone, light grey.
		25%	Coal.
	1.62	20%	Silty Claystone.
		Sm.am.	Limestone; Pyrite.

Table II - p. 8

Depth (m)	TOC		Lithology
2255-70	0.43	90%	Claystone, grey, greenish grey, redbrown.
		10%	Sand/Sandstone
		Obs.	Limestone; Pyrite.
2270-85	1.40	95%	Quartz Sand, medium to coarse, some very coarse grains, poorly sorted, angular/sub-angular, light to clear.
		3%	Claystone.
		2%	Coal.
2280-95	1.14	98%	Quartz Sand, as above.
		1%	Silty Claystone.
		1%	Coal.
2295-2310		92%	Quartz Sand, as above.
		7%	Claystone, grey.
		1%	Coal.
2310-25	1.25	92%	Quartz Sand, as above.
		6%	Claystone, grey.
		2%	Coal.
		Obs.	Pyrite.
2325-40		87%	Quartz Sand, as above.
	1.34	12%	Claystone.
		1%	Coal.
2340-55		88%	Quartz Sand, as above.
	0.88	12%	Claystone.
		Obs.	Coal; Pyrite.
2370-85	0.55	100%	Claystone, grey, redbrown.
		Sm.am.	Sand/Sandstone.

Table II - p. 9

Depth (m)	TOC		Lithology
2385-2400	0.58	100%	Claystone, grey, redbrown.
		Sm.am.	Sand/Sandstone.
		Obs.	Pyrite.
2400-15	0.63	70%	Claystone, redbrown, grey, yellowish.
		30%	Quartz Sand, medium to coarse, moderate sorted, angular, light to clear.
2415-30	0.49	100%	Claystone, redbrown, grey, yellowish, greenish grey.
2430-45	0.55	93%	Claystone, redbrown, grey, yellowish.
		7%	Quartz Sand.
2445-62	0.30	50%	Claystone, redbrown, grey, yellowish.
		50%	Quartz Sand, medium to fine, moderate sorted, angular, light to clear.

Table II - p. 10

Core samples 34/10 - 1

Depth (m)	TOC	Lithology
1780.5	1.03	Claystone, grey, with muscovite and very small amounts of coal and pyrite.
1820.6	4.23	Laminations of silty claystone, brownish dark grey, very micaceous, with sm. am. coal and sandstone, coarse to medium with very fine sand and coarse silt as matrix.
1833.3	5.03	Silty claystone, grey, with muscovite and sm. am. coal.
1939.58	1.43	Silty claystone, grey, with muscovite, coal (at 1941.05), pyrite observed.
1947.15	1.74	Silty claystone, grey, very rich in muscovite, with coal, pyrite observed.
1951	1.90	Silty claystone, dark grey, with muscovite and coal.

TABLE III

Weight (mg) of EOM and chromatographic fractions

Depth (m)	Rock extracted (g)	EOM	Sat	Aro	Hydrocarbons HC	Non Hydrocarbons	TOC
1470-1500	100.000	237.1	64.7	72.1	136.8	96.9	1.33
1560-1590	65.690	87.3	15.9	17.3	33.2	43.6	0.97
1620-1650	37.190	141.0	16.8	14.9	31.7	106.2	3.94
1650-1680	100.000	564.6	148.4	163.1	311.5	240.5	5.05
1680-1710	107.632	1104.9	538.3	475.0	1013.3	190.1	3.80
1710-1730	100.000	1207.5	510.7	408.2	918.9	282.2	3.63
1740-1770	30.360	763.2	328.4	139.6	467.8	283.5	8.90
1780.5*	40.290	99.3	32.5	26.8	59.3	38.4	1.03
1820.6+	35.220	658.9	226.0	279.5	504.5	150.2	4.23
1833.3+	33.610	91.2	9.8	31.5	41.3	48.4	5.03
1880-1890	39.127	265.8	116.6	73.9	190.5	71.2	1.85
1939.58+	33.420	30.3	4.9	4.0	8.9	20.5	1.43
1947.17+	35.740	36.6	2.3	2.0	4.3	32.2	1.74
1951.00+	39.100	33.0	2.7	1.6	4.3	28.0	1.90
1970-1985	55.070	123.6	15.3	38.8	54.1	68.0	1.76
2000-2015	78.888	183.2	36.6	61.8	98.4	82.0	2.30
2120-2135	55.916	41.5	6.8	8.4	15.2	25.1	1.32
2270-2285	33.919	122.0	15.3	40.3	55.6	60.3	1.85
2400-2415	65.995	90.1	16.1	29.4	45.5	42.1	0.63
2445-2462	100.000	58.6	9.2	18.6	27.8	30.0	0.30

* Sidewall core

\+ core ships

TABLE IV

Concentration of EOM and chromatographic fracions (Weight ppm of fock)

Depth (m)	EOM	Sat	Aro	Total hydrocarb.	Non hydrocarb.
1470-1500	2371	647	721	1368	969
1560-1590	1329	242	263	505	664
1620-1650	3791	451	401	852	2856
1650-1680	5646	1484	1631	3115	2405
1680-1710	10266	5001	4413	9414	837
1710-1740	12075	5107	4082	9189	2829
1740-1770	25138	10817	4598	15408	9338
1780.5*	2465	807	665	1472	953
1820.6+	18708	6417	7036	14325	4265
1833.3+	2713	292	937	1229	1440
1880-1890	6793	2980	1889	4879	1820
1939.58+	907	147	120	267	613
1947.17+	1024	64	56	120	901
1951.00+	843	69	41	110	716
1970-1985	2244	278	705	983	1235
2000-2015	2322	464	783	1247	1039
2120-2135	742	122	150	272	449
2270-2285	3597	451	1188	1639	1778
2400-2415	1365	244	445	689	638
2445-2462	586	92	186	278	300

TABLE V

Concentration of EOM chromatographic (mg/ TOC)

Depth (m)	EOM	SAT	ARO	Total hydrocarb.	Non hydrocarb.
1470-1500	178.27	48.65	54.21	102.86	72.86
1560-1590	137.01	24.95	27.15	52.10	68.43
1620-1650	96.23	11.47	10.17	21.63	72.48
1650-1680	111.80	29.39	32.30	61.68	47.62
1680-1710	270.15	131.61	116.14	247.75	22.03
1710-1740	332.64	140.69	112.45	253.14	77.93
1740-1770	282.45	121.54	51.66	173.13	104.92
1780.5*	239.28	78.32	64.58	142.90	92.53
1820.6+	442.27	151.70	187.61	338.63	100.82
1833.3+	53.95	5.80	18.63	24.43	28.63
1880-1890+	367.20	161.08	102.09	263.18	98.36
1939.58+	63.40	10.25	8.37	18.62	42.90
1947.17+	58.85	3.70	3.22	6.91	51.78
1951.00+	44.42	3.63	2.15	5.79	37.69
1970-1985	127.52	15.79	40.03	55.82	70.16
2000-2015	100.97	20.17	34.06	54.23	45.19
2120-2135	56.23	9.21	11.38	20.59	34.01
2270-2285	194.42	24.38	64.22	88.61	96.10
2400-2415	216.71	38.72	70.71	109.44	101.26
2445-2462	195.33	30.62	62.00	92.67	100.00

TABLE VI

Composition in % of the material extracted from the rock

Depth (m)	Sat EOM	Aro EOM	HC EOM	Sat Aro	Non HC EOM	HC Non HC
1470-1500	27.29	30.41	57.70	89.74	40.87	141.18
1560-1590	18.21	19.82	38.03	91.91	49.94	76.15
1620-1650	11.91	10.57	22.48	112.75	75.32	29.85
1650-1680	26.28	28.89	55.17	90.99	42.60	129.52
1680-1710	48.72	42.99	91.71	113.33	8.15	1124.64
1710-1740	42.29	33.81	76.10	125.11	23.42	324.81
1740-1770	43.03	18.29	61.29	235.24	37.15	165.01
1780.5*	32.73	26.99	59.72	121.27	38.67	154.43
1820.6+	34.30	42.42	76.57	80.86	22.80	335.89
1833.3+	10.75	34.54	45.29	34.41	53.07	85.33
1880-1890	43.87	27.80	91.67	157.78	26.79	267.56
1939.58	16.17	13.20	29.37	122.50	67.66	43.41
1947.17	6.28	5.46	11.75	115.00	87.98	13.35
1951.00	8.18	4.85	13.03	168.75	84.85	15.36
1970-1985	12.38	31.39	43.77	39.43	55.02	79.56
2000-2015	19.98	33.73	53.71	59.22	44.76	120.00
2120-2135	16.39	20.24	36.63	80.95	60.48	60.56
2270-2285	12.54	33.03	45.57	37.97	49.43	92.21
2400-2415	17.87	32.63	50.50	54.76	46.73	108.08
2445-2462	15.70	31.74	47.44	49.46	51.19	92.67

TABLE VII

Tabulation of datas from the gaschromatograms.

Depth (m)	Pristane/nC_{17}	Pristane/Phytane	CPI
1470-1500	NDP	NDP	NDP
1560-1590	0.48	0.70	NDP
1620-1650	0.31	0.80	NDP
1650-1680	0.45	1.11	NDP
1680-1710	1.05	1.22	NDP
1710-1740	4.24	1.42	NDP
1740-1770	1.78	1.32	1.00
1780.5*	1.49	1.33	NDP
1820.6+	5.17	1.63	NDP
1833.3+	2.90	1.83	2.77
1880-1890	2.84	1.39	NDP
1939.58+	1.66	1.24	1.38
1947.17+	0.83	1.70	2.42
1951.00+	0.70	1.44	1.70
1970-1985	1.14	1.35	2.23
2000-2015	1.19	1.21	1.90
2120-2135	1.48	1.39	2.00
2270-2285	0.50	0.83	1.34
2400-2415	0.61	1.01	1.58
2445-2462	0.73	0.98	1.59

NDP No determination possible

TABLE VIII

Vitrinite Reflection and Visual Kerogen Estimation

Depth (m)		Vitrinite reflectance					Colour index	Type of Organic Matter
1290-1320			0.42 (11)			1.10 (3)	2-	Am/W
1410-1440	(1410-1420)		0.42 (6)				2-	Am/W
	(1470-1480)						2-	Am/W/He
1500-1530	(1470-1480)	0.31 (18)		0.51 (1)	0.89 (1)		-	-
	(1561-1567)						2- to 2	Am/W/He
1590-1620			0.38 (11)		0.78 (4)		-	-
1633-1639	(1633-1639)						2- to 2	Am/W/He
1651-1657	(1651-1657)						2- to 2	W/Am
1680-1710		0.31 (20) lignite					-	-
	(1726-1729)						2- to 2	W/Am
1740-1770	(1738-1741)	0.31 (20) lignite					2- to 2	W/He/Am
1782.6 core	(core 1781)	0.36 (20)					2- to 2	W
1800-1830	(1802-1804)	0.29 (20)				1.22 (1)	2- to 2	W/? Am
	(1826-1828)						2	W
1829.5 core		0.32 (2)			0.73 (18)		2	? Am/He
	(1848-1850)						2	W/He/Am
	(1882-1884)						2	He/W/Am
1890-1900	(1894-1896)	0.24 (18)			0.81 (5)		2	Am/He/W
	(1914-1916)						2	Am/He
1942.1 core	(1936-1938)	0.28 (20)		0.52 (1)			2	W/Am
1959.5 sw	(1953-1956)	0.32 (18)		0.59 (2)			2	W/He/Am
1980.0 sw	(1971-1974)	0.27 (1)	0.32 (20)		0.90 (2)		2- to 2	Am/He
2000 sw	(1992-1995)	0.34 (21)					2	W/He/Am
	(2013-2016)						2	Am/W
	(2031-2034)						2	Am/W
	(2052-2055)						2	Am/W

2075-2090		(2073-2076)	0.34 (20)				2	W/Am
		(2094-2097)					2	Am/W
2125	sw	(2115-2118)	0.35 (21) lignite				2	W/He/Pollen-spores
2150	sw	(2157-2160)	0.34 (20)				2	W/He/Am
2165-2180		(2178-2181)	0.30				2	He
2200	sw	(2199-2202)	0.39 (20)				2	He/W
2234	core	(2229-2232)	0.34 (8)				2	He
2263	sw	(2271-2271)	0.31 (7)	0.66 (13)			2	W/He
		(2292-2295)					2	W/He
		(2310-2312)					2	He/W
2325	sw	(2331-2334)	0.36 (5)	0.69 (8)			2	?Am/He/W
		(2352-2355)					2	W/He/Am
		(2373-2376)					2	Am/He
2390	sw	(2394-2397)	0.26 (4)	0.51 (7)	0.80 (3)		2	W/Am/He
2420	sw	(2415-2415				1.19 (13)	2	?Am/W
2430		(2436-2439)				1.24 (15)	2	?Am/W
		(2457-2460)					2	?Am/W
		(2460-2462)					2	?Am/W

( ) Depths in brackets indicates Kerogen samples