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Source rock analyses of well 31/4-2	
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SUMMARY

See next page.

KEY WORDS

Source rock

SUMMARY

Based on the various analyses the analysed sequence is given the following rating.

A: 1400 - 1810 m: Immature, poor potential as a source rock for oil and gas.

B: 1810 - 1975 m: Immature, poor potential as a source rock for gas.

C: 1975 - 2125 m: As zone B.

D: 2125 - 2325 m: Immature, good potential as a source rock for oil and gas. Probably migrated HC in lower part of the zone.

E: 2325 - 2475 m: Immature, good potential as a source rock for oil and gas.

F: 2475 - 2625 m: Moderate mature, good potential as a source rock for oil and gas.

G: 2675 - 2685 m: Moderate mature. Claystone has a good potential as a source rock for gas.

H: 2685 - 2770 m: Moderate mature. Upper part as zone G, lower part has a good potential as a source rock for oil and gas.

I: 2770 - 2900 m: Moderate mature. Claystone has a poor potential as a source rock for gas.

EXPERIMENTAL

One ml. of the headspace gas from each of the cans was analysed gas chromatographically for light hydrocarbons. The results are shown in Table Ia. 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.

Total Organic Carbon (TOC)

The various selected samples were crushed on a centrifugal mill and sieved. The portions with a particle size between 0.125 mm and 0.063 mm were used in the further work. Aliquotes of the samples were treated with hot 6N HCl to remove carbonate and washed twice with distilled water to remove traces of HCl, then placed in a vacuum oven at 50^{o}C, evacuated to 20 mm Hg for 12 hrs. The samples were then analysed on a Leco E C 12 carbon determinator, to determine the total organic carbon (TOC).

Extractable Organic Matter (EOM)

From the TOC results samples were selected for extraction. Of the selected samples, approximately 100 gm of each was extracted on soxhlet apparatus for 48 hrs using dichloromethane (DCM) as solvent. The DCM used as solvent was distilled in an all glass apparatus to remove contaminants. The paper thimbles used in the soxhlet apparatus were previously washed with DCM on a large soxhlet apparatus for 48 hrs. to remove any soluble components.

Activated copper foil was used in the flasks to remove any free sulphur from the samples.

After extraction, the solvent was removed on a Buchi Rotavapor and transferred to a 50 ml flask. The rest of the solvent was then removed and the amount of extractable organic matter (EOM) determined.

Chromatographic Separation

The extractable organic matter (EOM) was separated on chromatographic columns, packed with silica, Riedel & Hähn, 0.063 mm, using the slurry method with hexane as solvent. On top of the silica, small amounts of alumina, approximately 2 cm, was added. The EOM, after it was "taken up" on alumina, was transferred to the top of the columns, which were then eluted with predistilled hexane, benzene and methanol using a ratio of 200 ml of each solvent pr. gm of EOM.

The various eluants were removed on a Buchi Rotavapor and the samples transferred to vials and dried at 40^{o}C in a stream of dry nitrogen, and the amount of the various fractions, saturated, aromatic and NSO fraction (Nitrogen, Sulphur, Oxygen), determined. The saturated fractions were analysed gas chromatographically on a 25 m OV 101 glass capillary column with He as carrier gas (0.7 ml/min.) using the splitless injection technique. The glass capillary column was mounted in a Carlo Erba F V 2150 gas chromatograph.

Vitrinite Reflectance

Samples, taken at various intervals, were sent for vitrinite reflectance measurements at Geoconsultants, Newcastle-upon-Tyne. The samples were mounted in Bakelite resin blocks; care being taken during the setting of the plastic to avoid temperatures in excess of 100^{o}C. The samples where 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.

Processing of Samples for Evaluation of Visual Kerogen

The rock samples were crushed and afterwards treated with hydrochloric and hydrofluoric acids to remove the minerals. A series of microscopic slides was mounted in glycerine jelly:

T-slide represents the total acid insoluble residue.
O-slide represents the residue screened through 15 sieves.
N-1,2,3 slides contain palynodebris remaining after flotation (Zn Br_2) to remove disturbing heavy minerals.
X-1,2,3 slides contain oxidized residues, when oxidizing is required due to high coalification or much sapropel.

T & O slides are necessary to evaluate kerogen composition/palynofacies which is closely related to sample lithology.

Screened slides are normally required to consentrate the larger fragments, and to study palynomorphs (pollen, spores and dinoflagellates) for paleodating and colour evaluation.

So far visual evaluations of kerogen have been undertaken from residues mounted in glycerine jelly, and studied by Leitz Dialux in normal light (halogene) using x10 and x40 objectives.

Rock-Eval Pyrolyses

100 mg crushed sample was put into a boat whose bottom and cover are made of sintered steal and analysed on a Rock-Eval pyrolyser.

RESULTS AND DISCUSSION

Light hydrocarbons

On the basis of the light hydrocarbon results, the analysed sequence of the well will be divided into nine zones:

A:	1400 - 1810 m	Cret. 2073-2146
B:	1810 - 1975 m	Kim. Cl. Fm 2146-2171
C:	1975 - 2125 m	Heather Fm 2171-2325
D:	2125 - 2350 m	Brent Fm 2325-2353
E:	2350 - 2475 m	Dunlin Fm 2353-2632
F:	2475 - 2625 m	Statfj. Fm 2632-2786
G:	2625 - 2685 m	Corm. Fm 2786-2900
H:	2685 - 2760 m	
I:	2760 - 2900 m.	

The analysis shows a large variation in abundance of light hydrocarbons, wetness of the gas and in the $iC_4/n\text{-}C_4$ ratio throughout the analysed sequence.

A: 1400 - 1810 m: This zone shows a fair and good abundance of C_1 - C_4 hydrocarbons, while the abundance of C_5 - C_7 hydrocarbons is poor throughout the zone. The gas is dry throughout the whole zone while the $iC_4/n\text{-}C_4$ ratio is very high. All this indicates an immature zone.

B: 1810 - 1975 m: At 1810 m the abundance of C_5 - C_7 hydrocarbons shows a sharp increase and is found to be fair to good in this zone. The abundance of C_1 - C_4 hydrocarbons and the wetness of the gas are similar to the zone above, while the $iC_4/n\text{-}C_4$ ratio drops sharply. These changes occur in the same interval as coal is found, and this might be the reason for these changes.

C: 1975 - 2125 m: At 1975 m almost all parametres change compared with higher up in the well. Both the C_1 - C_4 and C_5 - C_7 hydrocarbon abundance drop to fair and poor abundances respectively. The wetness of the gas increases slowly throughout the zone, while the $iC_4/n\text{-}C_4$ ratio shows a steady decrease. The lithological examination shows this zone to contain limestone, and this might be the reason for the decrease of light hydrocarbon abundance.

D: 2125 - 2350 m: At 2125 m a very sharp increase both in the C_1 - C_4 and the C_5 - C_7 abundance are found at the same level as a very sharp increase in the wetness of the gas. The zone contains a fair amount of coal and this is possibly the reason for these sharp changes.

E: 2350 - 2475 m: In the same manner as a sharp increase in the various parametres were found at 2125 m a similar decrease is seen at 2350 m. The abundance of C_1 - C_4 hydrocarbons is relatively steady, showing a fair/good abundance while the abundance of the C_5 -C_7 hydrocarbons is very erratic varying from poor to good. This could be due to a variation in the lithology in this zone.

F: 2475 - 2625 m: The abundance of C_1 - C_4 hydrocarbons in this zone is similar to the zone above, while the wetness of the gas increases sharply, and the gas is found to be wet throughout the zone. The abundance of C_5 - C_7 is poor at the top of the zone, increasing to good towards the lower part. This zone is found to contain a large amount of sandstone, and the large abundance of C_5 - C_7 hydrocarbons together with the gas being very wet indicate that there might be migrated hydrocarbons in this zone.

G: 2625 - 2685 m: The results are very erratic in this zone, with some sampling showing high abundance of C_1 - C_4 hydrocarbons, while others only show a fair abundance. The wetness of the gas is relatively constant, approximately 50 %, while the $iC_4/n\text{-}C_4$ ratio vary considerably. The large variation found in this zone is probably due to the large variation of the lithology.

H: 2685 - 2760 m: Most of the parametres in this zone also vary considerably. The $iC_4/n\text{-}C_4$ ratio is, however, constant and is found to be very high. The reason for the large variation in the abundance of light hydrocarbons is probably due to the variation in lithology.

G: 2760 - 2900 m: The $iC_4/n\text{-}C_4$ ratio drops sharply at 2760 m at the same time as the abundance of C_1 - C_4 hydrocarbons is found to level out, showing a fair abundance, and the wetness of the gas increases approximately 90 %. The abundance of the C_5 - C_7 hydrocarbons increases with increasing depth and is found to show a fair abundance towards the lower part of the zone.

Total Organic Carbon (TOC)

A: The Toc values show a steady decrease with increasing depth in this zone from 2 % at 1450 m to 0.6 % at 1800 m.

B: The TOC values level out in this zone at approximately 0.8 %, i.e. the whole zone is found to have a fair abundance of organic carbon.

C: The TOC values of the claystone is fairly similar in this zone to the zone above, while the limestone is found to have TOC values at approximately 0.2 %.

D: The TOC values increase sharply at the top of this zone compared to the zones above, then to decrease with increasing depth leveling out at approximately 1.3 % at 2300 m.

E: The TOC values are rather erratic in this zone, but all the claystone samples are found to have a good or rich abundance of organic carbon.

F: The upper part of this zone shows a steady increase of the TOC values with increasing depth, while the lower part of the zone vary considerably. This variation could be due to contamination from other lithologies. The upper half of the zone is found to have a good abundance of organic carbon, while the lower part has a rich abundance.

G: Again a zone with considerable variation in the TOC values, but on the whole this zone has a good abundance of organic carbon.

H: As the zone above.

I: The TOC values drop sharply at 2700 m, and the whole zone is found to have a fair abundance of organic carbon.

Extraction and Chromatographic Separation

Zone A: Three samples from this zone, 1495 - 1510, 1660-75 and 1750-65 m, where extracted. Samples 1495 - 1510 m and 1660-75 m have very poor abundances of extractable hydrocarbons, while the sample from 1750-65 m has a good abundance. The gas chromatograms of the saturated hydrocarbon fractions vary considerably on various areas for the two samples. The sample from 1495 - 1510 m has an unidentified peak between n-C_{19} and n-C_{20} A peak in this region has been found in various samples from the North Sea earlier and is believed to be a diterpane. The pristane peak is considerably larger than both the n-C_{17} and the phytane peak giving large pristane/n-C_{17} and pristane/phytane ratios. The carbon preferance index is, however, low for a tertiary sample, and the amount of heavy n-alkanes is low compared to the medium weight n-alkanes. The amount of steranes and triterpanes is also found to be relatively low. These results indicate an input of mainly marine origin under a non reducing environment condition.

The gas chromatogram of the saturated hydrocarbon fraction from sample 1660-75 m varies only slightly from the sample above. The most noticeable difference is the disappearance of the peak between n-C_{19} and n-C_{20}.

The gas chromatogram of the saturated hydrocarbon fraction of the sample from 1750-65 m does not show any sign of the peak between n-C_{19} and n-C_{20}, while n-C_{14} is very abundant compared to n-C_{13} and n-C_{15}. The pristane/n-C_{17} ratio is in the same magnitude of order as the sample above, while the pristane/phytane ratio is much larger. The CPI is much larger for this sample than for the sample above, and the sterane/triterpanes are very pronounced, indicating a larger input of terrestric material than in the sample above, and a low maturity.

Zone B: Two samples from this zone, 1885 - 1900 m and 1945-60 m, were analysed, showing a poor and fair abundance of extractable hydrocarbons, respectively. The gas chromatogram of the saturated hydrocarbon fraction of the sample from 1885 -1900 m is very similar to the one from 1750-65 m in the zone above, except that the n-C_{14} is of a more normal abundance in this sample. The gas chromatogram of the saturated hydrocarbon fraction of the sample from 1945-60 m is very much different. The pristane/phytane ratio is almost equal to 1.0, and the steranes and triterpanes are very pronounced. the latter indicates an input of terrestric material. The peak between n-C_{19} and n-C_{20}, seen in the sample from 1495 -1510 m is again recognized in this sample.

Zone C: One sample from this zone, 2035-50 m, was extracted, showing a poor abundance of extractable hydrocarbons. The gas chromatogram of the saturated hydrocarbon fraction shows the major peak to be the unknown peak between n-$C_1$9 and n-$C_2$0 found in earlier samples. The pristane/n-C_{17} ratio has dropped slightly from the uppermost samples in this well, while the pristane/phytane ratio has dropped more. The CPI value is similar to those samples above, and the steranes/triterpanes are very pronounced.

Zone D: Four samples from this zone were extracted. The uppermost sample, 2155-70 m has a rich abundance of extractable hydrocarbons, while the three other samples have a good abundance of extractable hydrocarbons. The gas chromatograms of the saturated hydrocarbon fractions of the four samples vary slightly from sample to sample. The variation is mainly in the pristane - phytane area with a decrease in the pristane/n-C_{17} ratio with increasing depth. One sample, 2200-75 m shows a larger variation than the others. In this sample the above mentioned peak between n-C_{17} and n-C_{20} is again very pronounced, and the CPI value is larger than in the other samples. The small variation seen in three samples is probably caused by a slight increase in maturation combined with small variations in the environments of deposition rather than a change in type of organic matter.

E: Two samples, 2380-95 m and 2455-70 m from this zone were extracted and are found to have a good and rich abundance of extractable hydrocarbons respectively. The gas chromatograms of the saturated hydrocarbon fractions of the two samples are very similar, with a large pristane/n-C_{17} ratio and relatively high CPI values. They also show a large input of steranes and triterpanes, indicating terrestric origin.

Zone F: Two samples, 2530-45 m, and 2590 - 2605 m, from this zone were extracted, both showing a good abundance of extractable hydrocarbons. The gas chromatograms of the saturated hydrocarbon fractions are very similar to those from the zone above.

Zone G: One sample, 2650-65 m, from this zone was extracted, showing a good abundance of extractable hydrocarbons. The saturated/aromatic ratio is much lower for this sample compared to those from the zone above, and the gas chromatogram of the saturated hydrocarbon fraction varies considerably. the pristane/n-C_{17} and pristane/phytane ratios are much larger, and the

CPI value is also increased compared to those from the zone above. These changes are probably caused by a change both in the organic matter and the environment of deposition.

Zone H: No samples from this zone were extracted.

Zone I: One sample, 2860-75 m, was extracted showing a poor abundance of extractable hydrocarbons. The gas chromatogram of the saturated hydrocarbons shows a distinct maximum in the heavy n-alkane area, indicating an input of terrestric material.

Vitrinite Reflectance

Twenty samples were analysed for vitrinite reflectance. Together with the vitrinite reflectance data, other information is recorded. This is given for the individual samples in the following.

1450 m: Calcareous siltstone, R_o = 0.31(21).

The sample has a low to moderate organic content. Bitumen wisps and wispy particles of vitrinite with about an equal proportion of reworked material and inertinite. UV light shows a yellow fluorescence from spores and a low exinite content.

1630 m: Calcareous shale, R_o = 0.37(8).

The sample has a low organic content with variable bitumen staining. Very occasional particles, mostly of inertinite and reworked material. A few of poor vitrinite. UV light shows a yellow fluorescence from spores and a low exinite content.

1705 m: Calcareous shale and carbonate, R_o = 0.37(20).

The sample has a low to moderate organic content, mostly bitumen wisps and staining. A few wisps and particles of vitrinite with subordinate inertinite and reworked material. UV light shows a yellow fluorescence from spores and a low exinite content.

1810 m: Shale and lignite, R_o = 0.30(23).

The shale, which shows iron oxide staining, has very little bitumen, almost wholly particles of inertinite and reworked material. The lignite contains normal vitrinite and resin globules, no inertinite. All the readings are on lignite. UV light shows a yellow/orange and light orange fluorescence from spores and a low to moderate exinite content.

1885 m: Calcareous shale and carbonate, R_o = 0.38 (20).

The sample, which is rather pyritic, has a low to moderate organic content. Bitumen wisps with plentiful staining. A low content of vitrinite wispy particles and inertinite. UV light shows a yellow and light orange fluorescence from spores together with a low to moderate exinite content.

1960 m: Mixed shale lithologies, R_o = 0.37(4).

The sample has a low organic content, most cuttings are barren. A few contain bitumen wisps and particles of reworked material and inertinite. Only a trace of vitrinite wisps. UV light shows a yellow/orange fluorescence from spore specks and a trace of exinite.

2063 m: Calcareous sandstone, R_o = 0.40(3).

The organic material in this sample is restricted to occasional shaly wisps containing bitumen and iron oxide staining. A few particles of vitrinite and inertinite. UV light shows an overall carbonate fluorescence.

2126 m: Shale, R_o = 0.35(20).

The sample is moderate to rich in organic material, full of small particles of inertinite and reworked material. Only a low content of particles and wispy particles of vitrinite. Differentation between reworked and true material is difficult, and this might have resulted in a slight elevation of values. UV light shows a light to mid-orange fluorescence from spores and a moderate exinite content.

2173 m: Shale and calcareous shale, R_o = 0.44(16).

The sample has a low to moderate organic content with variable bitumen staining. Particles of inertinite and reworked material are dominant. A few wispy particles and particles of vitrinite. UV light shows a light orange fluorescence from spores and a low exinite content.

2230 m: Siltstone, R_o = 0.31(20).

The sample has a low organic content apart from an overall bitumen staining. a few particles of reworked material and inertinite, but mostly small particles and wisps of vitrinite. UV light shows a light and mid-orange fluorescence from spores and hydrocarbon traces together with a trace of exinite.

2290 m: Calcareous siltstone, R_o = 0.35(20).

The sample has a low to moderate organic content with bitumen staining, good particles and wispy particles of vitrinite and only a trace of particles of inertinite. UV light shows a light orange fluorescence from spore fragments and a trace of exinite.

2348 m: Shale, R_o = 0.35(3).

The sample is virtually barren with a few very high reflectance vitrinite, particles of inertinite and reworked material. Three particles of low reflectance vitrinite located. UV light shows a light orange fluorescence from spores and a trace of exinite.

2477 m: Calcareous, silty shale, R_o = 0.46(20).

The sample has a low to moderate organic content with some good wisps and particles of vitrinite. About equal proportion of inertinite and low reflectance reworked material. Some bitumen wisps. UV light shows a light orange fluorescence from spores and a moderate exinite content.

2539 m: Calcareous siltstone, R_o = 0.37(20).

The sample has a low organic content with bitumen staining. Particles of inertinite and reworked material are dominant, but good content of particles and wispy particles of vitrinite. UV light shows a mid orange fluorescence from spores and a moderate exinite content.

2598 m: Silty shale, R_o = 0.48(20).

The sample has a moderate organic content with some good wisps and wispy particles of vitrinite, particles of inertinite and bitumen wisps. UV light shows a yellow to orange and mid-orange fluorescence from spores together with a moderate exinite content.

2686 m: Siltstone, R_0 = 0.37(18).

The sample showing an iron oxide staining, has a few vitrinite particles in occasional less-stained cuttings and very little inertinite or reworked material. UV light shows a light to mid-orange fluorescence from spores and a trace of exinite.

2743 m: Red micaceous silty shale. No determination possible since no organic material was located.

2799 m: Shale with iron oxide staining. No determination possible since no organic material was located.

2851-55 m: Calcareous siltstone, R_0 = 0.44(9).

The sample, showing a trace of iron oxides, has only a trace of organic material. A few particles of inertinite and reworked material with a similar content of vitrinite particles. Some bitumen wisps. UV light shows a light orange fluorescence from spore specks and a trace of exinite.

2884 m: Micaceous siltstone, R_0 = 0.36(21).

The sample has a moderate to rich organic content. Bitumen staining and plentiful of good particles of inertinite and reworked material. Good wisps of vitrinite and bitumen. UV light shows a mid-orange fluorescence from spores and hydrocarbon traces together with a low to moderate exinite content.

Visual Kerogen

Twentyfive samples were processed for analysis of kerogen in this well, the interval 1440 m down to 2884 m at approximate intervals of about 50 m.

Most residues are finely dispersed, and the general colour tone of the kerogen/exinite in frownish yellow to yellow brown down to about 2628 m swe, indicating that the deposits are immature to moderately mature.

Description of material.

1440 m: The residue consists mainly of sapropel with a minor element of terrestric material also sapropelized and with signs of fungal activity.

Colour index: -2/2 for a formation with potential for oil and gas formation.

1695 m: The residue is dominated by sapropel as above, but there are also aggregates of finely dispersed particles. Small spherical black particles adhere to palynomorphs, which are otherwise well preserved.

Colour index: -2/2 or 2 probably increased due to influence from carbonate. Potential for oil and gas formation.

1800 m: The residue consists mostly of coaly (fairly coarse) particles. Beside those a small part of finely dispersed material suggested as sapropel and some dinoflagellate cysts.

Colour index: 2 probably increased due to oxidation, and too high as a maturation index.

1880 m to 1960 m: The residues seem to consist of equal parts land derived and marine material. Acid insoluble minerals remain and the residues are fairly small indicating deposits poor in organic material deposited in a fairly high energy area with presence of carbonate.

Colour index: -2/2 or 2 potential for oil and gas.

2063 m swc: The residue consists of finely dispersed material suggested to be derived mainly from landplants. Acid insoluble minerals are present and support fairly high energy condition during the deposition.

Colour index: 2 may be too high as a maturation index, because it is controlled by lithology.

2126 m swc: Terrestric material dominates and includes a major part of woody material/coal fragments beside indeterminate herbaceous remains. About one third is sapropel and includes well preserved dinoflagellate cysts which are fairly dark and could be reworked.

Colour index: 2/2+ probably a too high estimate based in oxidized material. Potential for gas and oil.

2173 m to 2290 m: Residues are finely disperse and consist mostly of amorphous material. Terrestric remains are in low quantities. Cysts are fairly common.
At 2230 m increased terrestric material, and the particles are recorded in aggregates which could indicate a carbonatic lithology.

Colour index: 2 for a formation with potential for oil and gas.

2348 m: The residue consists of dominantly terrestric material, ?reworked coal particles and woody fragments.

Colour index: ?2 for a formation with potential mainly for gas.

2390 m swc to 2477 m swc: Sapropel dominates the interval, but there is also about 30 to 40 per cent of land derived material. The indeterminate finely disseminated terrestric material of 2390 m swc embeds fungal hyphae. The residues of 2430 m swc and 2477 m swc contain varied assemblages of coarser terrestric particles.

Colour index: 2 or 2/2+ for a formation with potential for oil and gas formation.

2529 m swc: The residue is dominated by a varied terrestric assemblage, half of which is woody/coaly material. About 20 per cent is amorphous material. Otherwise this residue resembles those above.

Colour index: 2 for a formation with potential for gas and oil.

2581 m swc, 2605 m swc, and 2628 m swc: Residues composed by a major part of terrestric material and 20 to 50 per cent of amorphous material. The residue of 2581 m swc contains undissolved minerals and aggregates which may be derived from a carbonatic lithology. The residue of 2605 m swc is heavily disturbed by undissolved minerals, and cuticular fragments are prominent. The residue of 2628 m swc resembles those above, but also includes fungal spores and hyphae suggesting fungal growth on the organic remains.

Colour index: 2/2+. There may be lithologic changes within this interval of changing water energy.

2633 m swc: Barren. Only undissolved minerals remain and were recorded as aggregates as if derived from a ?calcareous lithology.

Colour index: Indeterminate.

2676 m swc: Finely dispersed indeterminate herbaceous material dominates. Undissolved minerals are remaining as very small particles.

Colour index: 2/2+ for a formation with potential for gas and oil formation.

2743 m swc: A finely dispersed residue, suggested to consist mostly of amorphous material. Undissolved minerals are remaining and the lithology seems very poor in organic matters.

Colour index: 3- may be under lithological control, and too high as a maturation parametre.

2776 m swc, 2790.5 m swc, 2886 m: The residues are practically barren in organic matter of value for kerogen analyses.

Rock-Eval Pyrolysis

A total of thirty samples were pyrolysed using the Rock-Eval method.

Most of the samples are found to have a T_{max} value of less than 430°C and will therefore be classified as immature. The lowermost samples have T_{max} values slightly above 430°C, and this indicates moderate mature samples.

The hydrogen index is low on most of the samples which indicate type III kerogen. The few exceptions are the samples from approximately 2150 - 2230 m and 2380 - 2650 m. The sample from 2725-40 m is also found to have a high hydrogen index and a low oxygen index which indicates type II kerogen.

Conclusion

Based on the light hydrocarbon data the analysed sequence of the well was divided into nine zones, A: 1400 - 1810 m, B: 1810 - 1975 m, C: 1975 - 2125 m, D: 2125 - 2350 m, E: 2350 - 2475 m, F: 2475 - 2625 m, G: 2625 - 2685 m, H: 2685 - 2760 m, and I: 2760 - 2900 m.

In our evaluation of the well, the richness rating is based on the abundance of light hydrocarbons, total organic carbon and extractable hydrocarbons.

The maturity rating is based on the vitrinite reflectance, the colour of the kerogen and the T_{max} from the Rock-Eval pyrolysis, while the type of source rock estimation is based on the type of kerogen found both by the visual estimation and by Rock-Eval pyrolysis.

A: 1400 - 1810 m: This zone has a good abundance of C_1 - C_4 hydrocarbons and a poor abundance of C_5 - C_7 hydrocarbons. The gas is very dry, and the $iC_4/n\text{-}C_4$ ratio is low. The abundance of extractable hydrocarbons is poor for the whole zone, except sample 1750-65 m. The visual kerogen examination shows this zone to contain mainly amorphous material, while the Rock-Eval pyrolysis shows this zone to contain kerogen type III. Vitrinite reflectance measurements show, however, the samples from this zone to contain large proportions of reworked material. Reworked particles might often be completely hidden by the voluminous sapropelic material, and therefore not show up as well in the visual kerogen examination. These results fit in well with the total organic carbon (TOC) values which are rather high, and probably mainly caused by reworked particles.

Based on the various analyses, this zone is found to be immature with a poor potential as a source rock for gas and oil.

B: 1810 - 1975 m: This zone shows a large increase in the abundance of C_5 - C_7 hydrocarbons, while the extractability of C_{15}^+ hydrocarbons is still poor. Visual kerogen and Rock-Eval pyrolysis show this zone to contain mainly terrestric material. Based on the various analyses, this zone is found to be immature with a poor potential as a source rock for gas.

C: 1975 - 2125 m: Same rating as the zone above.

D: 2125 - 2350 m: Both the abundance of light hydrocarbons and C_{15}^+ hydrocarbons increase sharply in this zone compared to the zones above, at the same time as the visual kerogen and the Rock-Eval pyrolysis show this zone to contain mainly amorphous kerogen. Fluorescence in UV light indicates migrated hydrocarbons in parts of this zone. Based on these analyses, the zone is found to be immature with a good potential as a source rock for oil and gas. Probably migrated hydrocarbons at the lower part of the zone.

E: 2350 - 2475 m: Parts of this zone contain sandstone, and our analyses are undertaken only on the claystone. The abundance of C_1 - C_4 hydrocarbons drops sharply in this zone compared tp the zone above, while the abundance C_5 - C_7 hydrocarbons is very erratic. The extractability of C_{15}^+ hydrocarbons is still good. The erratic values of C_5^+ hydrocarbons could indicate that parts of this zone contain migrated hydrocarbons, but our analysis does not give any direct evidence for such. This zone is found to be immature with a good potential as a source rock for oil and gas.

F: 2475 - 2628 m: The maturity increases slightly in this zone to moderate mature, while the richness and the type of kerogen is fairly similar to the zone above. The zone is rated to be moderate mature with a good potential as a source rock for oil and gas.

G: 2625 - 2685 m: The type of kerogen changes in this zone compared to the zone above, and is found to be mainly terrestric. The claystone in this zone is found to be moderate mature with a good potential as a source rock for gas.

H: 2685 - 2770 m: The upper part of this zone is very similar to the zone above, while a small section approximately 2720 - 2750 m is found to have a good potential as a source rock for oil and gas.

I: 2770 - 2900 m: This zone is also found to be moderate mature. The vitrinite reflectance on the lowermost sample is very low. This is a sidewall core, and examination has shown this to contain Tertiary fossils. Due to this, the measurement on this sample will be excluded. The zone is found to be moderate mature, and the claystone has a poor potential as a source rock for gas. The above mentioned sidewall core shows fluorescing hydrocarbons in UV light. If this core is from the lower end of this zone, this would indicate this part of the zone to contain migrated hydrocarbons.

TABLE Ia

CONCENTRATION µl GAS/PR. KG ROCK (Headspace)

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
K1192	1450 - 65	3399	5	23	24	18	840	3469	70	2,02	1,35
K1193	1465 - 80	8068	71	87	65	38	713	8329	261	3,13	1,69
K1194	1480 - 95	7366	69	82	62	95	1061	7674	308	4,02	0,65
K1195	1495 - 1510	13998	13	57	42	24	582	14135	137	0,97	1,72
K1196	1510 - 25	11488	19	44	27	16	411	11595	106	0,92	1,61
K1197	1525 - 40	6110	32	37	20	12	494	6210	100	1,62	1,64
K1198	1540 - 55	8645	10	22	5	14	244	8697	52	0,60	0,42
K1199	1555 - 70	8647	18	24	12	7	309	8708	62	0,71	1,69
K1200	1570 - 85	2117	14	14	8	5	237	2958	42	1,41	1,57
K1201	1585 - 1600	6150	7	15	9	5	163	6186	36	0,59	1,84
K1202	1600 - 15	16060	7	40	25	15	334	16148	88	0,55	1,62
K1203	1615 - 30	13796	9	31	8	20	528	13864	68	0,49	0,40
K1204	1630 - 45	15791	14	47	10	27	355	15890	99	0,62	0,39
K1205	1645 - 60	12867	6273	15	7	4	219	19166	6299	32,87	1,78
K1206	1660 - 75	25370	4	36	15	9	295	25435	65	0,26	1,61
K1207	1675 - 90	2091	17	12	6	4	187	2129	38	1,81	1,60
K1266	1690 - 1705	7085	108	70	36	18	351	7318	233	1,81	1,95
K1267	1705 - 20	18986	382	107	12	32	157	19520	534	2,73	0,37
K1268	1720 - 35	18591	251	94	47	29	362	19012	421	2,22	1,62
K1269	1735 - 50	31119	395	111	45	28	285	31699	580	1.83	1.64
K1270	1750 - 65	34156	458	98	33	21	228	34766	610	1.76	1.62
K1271	1765 - 80	6658	112	66	34	26	509	6896	238	3.45	1.31

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
K1272	1780 - 95	17530	243	90	38	29	626	17930	400	2.23	1.31
K1273	1795 - 1810	25708	485	212	83	84	524	26571	863	3.25	0.98
K1274	1810 - 25	22891	605	315	117	130	734	24059	1168	4.86	0.90
K1275	1825 - 40	22452	612	354	144	168	1107	23730	1278	5.39	0.86
K1276	1840 - 55	15532	594	440	197	255	1897	17019	1486	8.73	0.77
K1277	1855 - 70	21615	647	350	113	140	827	22866	1250	5.47	0.81
K1278	1870 - 85	18827	840	493	161	209	1462	20530	1703	8.30	0.77
K1279	1885 - 1900	20370	833	491	153	199	1402	22047	1677	7.60	0.77
K1280	1900 - 15	9317	369	198	64	52	743	10001	683	6.83	1.22
K1281	1915 - 30	22776	576	328	105	130	1562	23917	1141	4.77	0.81
K1282	1930 - 45	11869	421	269	94	124	1087	12778	909	7.12	0.75
K1283	1945 - 60	12276	616	516	156	234	1475	13798	1523	11.04	0.67
K1284	1960 - 75	424	17	10	0	0	0	451	27	6.09	1.00
K1285	1975 - 90	7867	398	278	79	99	733	8721	854	7.79	0.79
K1286	1990 - 2005	4679	297	210	51	70	478	5307	628	11.83	0.72
K1287	2005 - 20	6249	702	699	150	204	647	8004	1755	21.92	0.74
K1288	2020 - 35	2838	250	193	40	57	238	3378	540	15.98	0.69
K1289	2035 - 50	1638	306	272	53	63	359	2334	696	29.81	0.85
K1290	2050 - 65	2658	311	245	52	85	357	3351	694	20.70	0.62
K1291	2065 - 80	3839	438	408	77	140	314	4902	1663	21.68	0.55
K1292	2095 - 2110	4590	752	850	153	337	500	6682	2092	31.31	0.45
K1293	2110 - 25	1217	218	287	58	132	195	1913	696	36.36	0.44
K1294	2125 - 40	2680	533	674	135	330	686	4353	1673	38.44	0.41

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
K1295	2140 - 55	5634	4681	2823	350	737	792	14225	8591	60.40	0.48
K1296	2155 - 70	14576	12446	8975	1313	2983	3221	40293	25717	63.82	0.44
K1297	2170 - 85	4665	3820	2054	257	560	721	11357	6692	58.92	0.46
K1303	2185 - 2200	9791	9108	5752	765	1578	2661	26996	17205	63.75	0.48
K1304	2200 - 15	7985	8162	5606	701	1479	1654	23933	15948	66.64	0.47
K1305	2215 - 30	2489	2763	1659	200	424	438	7536	5047	66.97	0.47
K1306	2230 - 45	2889	2487	1695	270	546	1239	7887	4998	63.37	0.49
K1307	2245 - 60	12254	11497	8250	1203	2577	3319	35783	23529	65.75	0.47
K1308	2260 - 75	15397	16607	14638	2710	6312	1948	55663	40266	72.34	0.43
K1309	2275 - 90	7867	7760	6340	1164	2245	2715	25376	17509	69.00	0.52
K1310	2290 - 2305	27	31	27	5	9	6	100	73	72.58	0.53
K1311	2305 - 20	8315	11325	11605	1724	4383	6516	37353	29038	77.74	0.39
K1312	2320 - 35	4645	4017	3475	710	1579	2511	11426	9780	67.80	0.45
K1313	2335 - 50	6961	7465	4632	573	1327	2332	20958	13997	66.79	0.43
K1314	2350 - 65	2949	3160	2707	606	1356	4004	10779	7830	72.64	0.45
K1315	2365 - 80	5587	3824	2022	261	543	728	12236	6650	54.34	0.48
K1316	2380 - 95	4763	4091	2063	271	529	441	11717	6954	59.35	0.51
K1317	2395 - 2410	3103	1204	569	73	146	113	5095	1992	39.10	0.50
K1318	2410 - 25	3227	3128	1856	265	619	569	9096	5869	64.52	0.43
K1319	2425 - 40	6369	5002	4077	623	1294	1027	17266	10997	63.33	0.48
K1320	2440 - 55	7728	5085	3579	532	1078	910	18002	10274	57.07	0.49
K1321	2455 - 70	5379	4038	2705	370	754	747	13246	7866	59.39	0.49
K1322	2470 - 85	3388	2321	1727	276	482	473	8193	4806	58.36	0.57

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
K1323	2485 - 2500	530	561	403	59	116	148	1668	1138	68.24	0.51
K1324	2500 - 15	1846	1458	1015	133	211	243	4663	2817	60.40	0.63
K1325	2515 - 30	1889	1584	1177	150	255	268	5056	3166	62.63	0.59
K1326	2530 - 45	2427	2065	1598	212	381	414	6684	4256	63.68	0.56
K1389	2545 - 60	Open lid									
K1390	2560 - 75	6098	1174	1250	2392	495	463	3769	3159	83.82	0.48
K1391	2575 - 90	136	1958	2051	373	723	5693	5241	5105	97.40	0.52
K1392	2590 - 2605	107	360	578	123	271	316	1440	1333	92.58	0.45
K1393	2605 - 20	221	404	583	116	226	180	1550	1329	85.76	0.51
K1394	2620 - 35	4706	1865	847	75	152	60	7647	2941	38.46	0.49
K1395	2635 - 50	4040	1978	1395	214	526	351	8153	4114	50.45	0.41
K1396	2650 - 65	24498	10741	5123	8347	4725	497	53434	28936	54.15	1.77
K1397	2665 - 80	18307	6431	3323	2591	1556	153	32208	13901	43.16	1.67
K1398	2680 - 95	Open lid									
K1399	2695 - 2710	18318	1977	1358	1411	771	150	23836	5517	23.15	1.83
K1400	2710 - 25	6800	2346	1528	1880	1027	217	13582	6782	49.93	1.83
K1401	2725 - 40	10450	3845	2409	2928	1477	275	21109	10659	50.50	1.98
K1402	2740 - 55	45874	12327	3596	2752	1185	96	65735	19861	30.21	2.32
K1479	2755 - 70	5333	2599	1709	1806	3464	160	14921	9588	64.26	0.52
K1480	2770 - 85	369	421	367	511	1059	106	2727	2358	86.48	0.48
K1481	2785 - 2800	2052	428	386	514	1148	116	4628	2476	54.69	0.45
K1482	2800 - 15	1514	945	943	1395	3286	368	8084	6570	81.27	0.42
K1483	2815 - 30	526	620	677	989	2336	251	5147	4621	89.78	0.42
K1484	2830 - 45	237	180	239	467	1066	133	2189	1952	89.16	0.44

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
K1485	2845 - 60	1061	722	652	933	2156	228	5525	4464	80.79	0.43
K1486	2860 - 75	922	997	512	731	1671	213	4833	3911	80.91	0.44
K1487	2875 - 90	587	529	500	702	1635	196	3953	3366	85.15	0.43
K1488	2890 - 2905	758	767	866	1449	3314	590	7154	6396	89.40	0.44

Table Ib

CONCENTRATION µlGAS/PR. KG ROCK (GAS IN CUTTINGS)

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
K1192	1450 - 65	49	18	3	4	11	344	85	36	42.74	0.34
K1193	1465 - 80	45	17	4	3	4	194	75	29	39.16	0.84
K1194	1480 - 95	151	78	36	34	33	4278	332	181	54.58	1.02
K1195	1495 - 1510										
K1196	1510 - 25	13	3	2	2	2	148	22	9	40.22	1.00
K1197	1525 - 40	32	12	5	2	2	223	54	21	39.41	0.99
K1198	1540 - 55	42	15	7	5	5	267	74	32	42.82	0.99
K1199	1555 - 70	32	10	5	2	3	192	54	21	39.72	0.83
K1200	1570 - 85	39	12	5	2	2	216	59	21	35.00	1.06
K1201	1585 - 1600										
K1202	1600 - 15	59	3	5	4	3	173	75	16	21.21	1.03
K1203	1615 - 30	169	31	14	6	6	365	227	58	25.40	1.00
K1204	1630 - 45	124	5	10	7	8	281	154	31	19.85	0.97
K1205	1645 - 60	112	4	5	2	2	192	126	14	10.92	1.02
K1206	1660 - 75	99	5	7	5	4	162	120	21	17.60	1.04
K1207	1675 - 90										
K1266	1690 - 1705	37	13	13	11	4	153	79	41	52.44	2.53
K1267	1705 - 20	56	39	32	22	18	43	169	111	65.80	1.21
K1268	1720 - 35	54	9	11	10	10	102	94	40	42.90	1.03
K1269	1735 - 50	70	26	26	18	6	70	146	76	52.27	2.83
K1270	1750 - 65	39	18	16	12	8	6	92	54	58.13	1.47
K1271	1765 - 80										

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
K1272	1780 - 95										
K1273	1795 - 1810	45	18	14	11	17	131	105	60	57.17	0.68
K1274	1810 - 25	54	16	21	18	34	239	144	89	62.10	0.52
K1275	1825 - 40	81	17	27	21	38	343	183	102	55.95	0.54
K1276	1840 - 55	209	44	93	67	140	6714	553	344	62.28	0.48
K1277	1855 - 70	120	49	73	41	89	1911	373	252	67.67	0.46
K1278	1870 - 85	172	81	97	61	119	1880	530	358	67.51	0.51
K1279	1885 - 1900	212	108	140	63	138	2377	662	450	67.92	0.46
K1280	1900 - 15	116	38	37	20	43	884	254	138	54.43	0.47
K1281	1915 - 30										
K1282	1930 - 45	121	15	26	10	29	3027	201	80	39.80	0.33
K1283	1945 - 60										
K1284	1960 - 75										
K1285	1975 - 90										
K1286	1990 - 2005	24	6	11	7	9	148	57	33	57.24	0.91
K1287	2005 - 20	62	24	68	22	49	262	226	164	72.73	0.45
K1288	2020 - 35										
K1289	2035 - 50										
K1290	2050 - 65	31	9	20	8	21	1	89	58	65.42	0.38
K1291	2065 - 80	82	32	60	28	82	170	283	201	70.99	0.34
K1292	2095 - 2110										
K1293	2110 - 25										
K1294	2125 - 40	122	36	56	16	63	40	294	172	58.61	0.26

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
K1295	2140 - 55	264	1329	2470	406	1438	1552	5906	5643	95.54	0.28
K1296	2155 - 70	338	4798	11317	2310	7502	6653	26265	25927	98.71	0.31
K1297	2170 - 85	134	1211	3230	739	2459	3070	7773	7639	98.28	0.30
K1303	2185 - 2200	77	282	1727	393	1497	25262	3976	3900	98.06	0.26
K1304	2200 - 15	13	116	517	114	412	1756	1174	1160	98.83	0.28
K1305	2215 - 30	40	76	1373	443	1657	20076	3589	3549	98.89	0.27
K1306	2230 - 45	46	66	2203	739	2800	55370	5855	5809	99.21	0.26
K1307	2245 - 60	14	116	517	114	412	7113	1174	1160	98.83	0.28
K1308	2260 - 75	1	35	1450	497	2270	57476	4253	4252	99.97	0.22
K1309	2275 - 90	6	4	87	27	147	489	272	266	97.89	0.18
K1310	2290 - 2305	68	4	97	20	133	336	322	254	78.88	0.15
K1311	2305 - 20	3	114	1186	273	1168	24285	2744	2741	99.87	0.23
K1312	2320 - 35	25	66	303	84	313	170	791	765	96.78	0.27
K1313	2335 - 50	0	0	326	71	354	726	751	751	99.98	0.20
K1314	2350 - 65	80	353	1240	292	1028	865	2994	2913	97.32	0.28
K1315	2365 - 80	12	16	302	68	301	565	699	687	98.31	0.23
K1316	2380 - 95	15	213	541	102	338	172	1209	1194	98.74	0.30
K1317	2395 - 2410	30	584	1043	185	607	630	2449	2418	98.77	0.30
K1318	2410 - 25	8	4	67	21	123	403	223	215	96.44	0.17
K1319	2425 - 40	4	5	280	85	367	593	741	737	99.48	0.23
K1320	2440 - 55	9	114	1013	254	869	10932	2260	2251	99.62	0.29
K1321	2455 - 70	17	38	769	192	702	1002	1718	1701	99.03	0.27
K1322	2470 - 85	13	29	474	103	395	54	1014	1001	98.76	0.26

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
K1323	2485 - 2500	23	13	204	32	214	322	487	464	95.27	0.15
K1324	2500 - 15	95	146	488	96	310	194	1135	1040	91.63	0.31
K1325	2515 - 30	41	35	835	194	722	11614	1827	1786	97.78	0.27
K1326	2530 - 45	96	318	784	144	458	265	1801	1704	92.62	0.31
K1389	2545 - 60	58	186	1052	263	850	1623	2410	2352	97.60	0.31
K1390	2560 - 75	81	142	784	223	782	1702	2012	1931	95.99	0.29
K1391	2575 - 90	105	111	751	183	665	1620	1815	1710	94.22	0.28
K1392	2590 - 2605	324	218	1113	338	1291	3179	3285	2961	90.14	0.26
K1393	2605 - 20	169	81	152	35	89	384	527	358	67.84	0.40
K1394	2602 - 35	1194	1317	1036	82	271	126	3899	2706	69.39	0.30
K1395	2635 - 50	26	40	105	18	55	116	244	218	89.12	0.33
K1396	2650 - 65	1269	1290	1363	182	845	724	4949	3680	74.36	0.21
K1397	2665 - 80	350	1111	1486	231	876	641	4054	3704	91.36	0.26
K1398	2680 - 95	164	632	904	97	417	346	2215	2051	92.60	0.23
K1399	2695 - 2710	109	236	468	67	263	392	1143	1034	90.49	0.26
K1400	2710 - 25	57	174	471	78	335	602	1114	1058	94.92	0.23
K1401	2725 - 40	72	232	603	98	401	677	1408	1335	94.86	0.24
K1402	2740 - 55	3565	3567	2745	258	546	146	10682	7116	66.62	0.47
K1479	2755 - 70	139	383	651	93	249	112	1515	1376	90.37	0.37
K1480	2770 - 85	136	145	187	28	117	157	614	478	77.83	0.24
K1481	2785 - 2800	21	37	69	14	54	81	195	174	88.98	0.25
K1482	2800 - 15	127	106	238	63	267	505	801	674	84.09	0.24
K1483	2815 - 30	116	68	111	28	124	245	449	332	74.04	0.23
K1484	2803 - 45	31	41	51	11	33	77	168	137	81.53	0.32
K1485	2845 - 60	71	52	122	45	191	594	482	411	85.24	0.24
K1486	2860 - 75	101	156	372	92	349	731	1070	969	90.56	0.26

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
K1487	2875 - 90	12	13	26	7	24	45	83	71	85.57	0.30
K1488	2890 - 2900	408	256	574	205	620	1414	2063	1656	80.24	0.33

Table 1c

CONCENTRATION µlGAS/PR. KG ROCK (Ia + Ib)

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
	1450 - 65	3448	23	26	28	29	1184	3554	106	2.98	0.97
	1465 - 80	8113	88	91	68	42	907	8404	290	3.45	1.62
	1480 - 95	7517	147	118	96	128	5339	8006	489	6.11	0.75
	1495 - 1510	13998	13	57	42	24	582	14135	137	0.97	1.75
	1510 - 25	11501	22	46	29	18	559	11617	115	0.99	1.61
	1525 - 40	6142	44	42	22	14	717	6264	121	1.93	1.57
	1540 - 55	8687	25	29	10	19	511	8771	74	0.84	0.53
	1555 - 70	8679	28	29	14	10	501	8762	83	0.95	1.4
	1570 - 85	2156	26	19	10	7	453	3017	63	2.09	1.43
	1585 - 1600	6150	7	15	9	5	163	6186	36	0.58	1.80
	1600 - 15	16119	10	45	29	18	507	16223	104	0.64	1.61
	1615 - 30	13855	40	45	14	26	893	14091	126	0.89	3.2
	1630 - 45	15915	19	57	17	36	636	16044	130	0.81	3.35
	1645 - 60	12979	6773	20	9	6	500	25555	6313	24.7	2.22
	1660 - 75	25469	9	43	20	13	487	19292	86	0.45	2.15
	1675 - 90	2091	17	12	6	4	187	2129	38	1.78	2.-
	1690 - 1705	7122	131	83	47	22	504	7397	274	3.70	1.77
	1705 - 20	19042	421	138	34	50	200	19689	644	3.27	4.09
	1720 - 35	18645	260	105	57	39	464	19106	461	2.41	1.46
	1735 - 50	31189	421	137	63	34	355	31845	656	2.06	1.85
	1750 - 65	34195	476	114	45	29	234	34858	664	1.90	1.55
	1765 - 80	6658	112	66	34	26	509	6896	238	3.45	1.31
	1780 - 95	17530	243	90	38	29	626	17939	400	2.23	1.31
	1795 - 1810	25753	503	2134	94	101	654	26676	923	3.46	0.93
	1810 - 25	22945	621	336	135	164	973	24203	1257	5.19	1.21

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
	1825 - 40	22522	629	381	165	206	1450	23913	1380	5.77	0.80
	1840 - 55	15741	638	533	264	395	8611	17572	1830	10.41	0.67
	1855 - 70	21735	696	423	154	229	2738	23239	1502	6.46	0.67
	1870 - 85	18999	921	590	222	328	2342	21060	2061	9.79	0.68
	1885 - 1900	20582	941	631	216	337	3779	22709	2127	9.37	0.64
	1900 - 15	9433	407	235	84	95	1627	10255	821	8.01	0.88
	1915 - 30	22776	576	328	105	130	1562	23917	1141	4.77	0.81
	1930 - 45	11990	436	295	104	153	4114	12979	989	7.62	0.68
	1945 - 60	12276	616	516	156	234	1475	13798	1523	11.04	0.67
	1960 - 75	424	17	10	0	0	0	451	27	5.99	0
	1975 - 90	7867	398	278	79	99	733	8721	854	9.79	0.80
	1990 - 2005	4699	303	222	58	78	626	5364	661	12.32	0.74
	2005 - 20	6311	726	767	72	253	909	8230	1919	23.32	0.28
	2020 - 35	2838	250	193	40	57	238	3378	540	1.60	0.70
	2035 - 50	1638	306	272	53	63	359	2334	696	29.82	0.84
	2050 - 65	2689	320	265	60	106	358	3440	752	21.86	0.57
	2065 - 80	3921	470	468	106	222	484	5185	1264	24.38	0.48
	2095 - 2110	4590	752	850	153	337	500	6682	2092	31.31	0.45
	2110 - 25	1217	218	287	58	132	195	1913	696	36.38	0.44
	2125 - 40	2802	569	730	151	393	726	4647	1845	39.70	0.38
	2140 - 55	5898	6010	5293	756	2175	2344	20131	14234	70.71	0.35
	2155 - 70	14914	17244	20292	3623	10485	9874	66558	51644	77.59	0.35
	2170 - 85	4799	5031	5284	996	3019	3791	19130	14331	74.91	0.33
	2185 - 2200	9868	9390	7479	1158	3075	27923	30972	21105	0.68	0.38

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
	2200 - 15	7998	8278	6123	815	1891	3410	25107	17108	68.14	0.43
	2215 - 30	2529	2839	3032	643	2081	20514	11125	8596	77.27	0.31
	2230 - 45	2935	2553	3898	1009	3346	56609	13742	10897	78.64	0.30
	2245 - 60	12268	11613	8767	1317	2989	10432	36957	24689	66.80	0.44
	2260 - 75	15398	16642	16088	3207	8582	69424	59916	44518	74.30	0.37
	2275 - 90	7872	7764	6427	1191	2392	3204	25648	17775	69.30	0.50
	2290 - 2305	95	35	124	25	142	495	422	327	77.49	0.18
	2305 - 20	8318	11439	12791	2892	7684	30801	40097	31779	79,26	0.38
	2320 - 35	4670	4083	4778	794	1892	2681	12217	10545	86.31	0.42
	2335 - 50	6961	7465	4958	644	1681	3058	21709	14748	67.93	0.38
	2350 - 65	3029	3513	3947	898	2384	4869	13773	10743	78.00	0.38
	2365 - 80	5599	3840	2324	329	844	1293	12935	7337	56.72	0.39
	2380 - 95	4778	4304	2604	373	867	613	12926	8148	63.04	0.43
	2395 - 2410	3133	1788	1612	258	753	743	7533	4410	58.46	0.34
	2410 - 25	3235	3132	1923	286	742	972	9319	6084	65.29	0.39
	2425 - 40	6373	5007	4357	708	1661	620	18107	11734	64.80	0.43
	2440 - 55	7737	5199	4592	786	1947	11842	20262	12525	61.82	0.40
	2455 - 70	5396	4076	3474	562	1456	1749	14964	9567	63.93	0.39
	2470 - 85	3401	2350	2201	379	877	527	9207	5807	63.07	0.43
	2485 - 2500	553	574	607	91	330	470	2155	1602	74.34	0.28
	2500 - 15	1941	1604	1503	229	521	437	5798	3857	66.52	0.44
	2515 - 30	1930	1619	2012	344	977	11882	6883	4952	71.95	0.35
	2530 - 45	2523	2383	2382	356	839	679	8485	5960	70.24	0.42
	2545 - 60	58	186	1052	263	850	1623	2410	2352	97.60	0.31

Sample	Depth (m)	C_1	C_2	C_3	iC_4	nC_4	C_5+	ΣC_1-C_4	ΣC_2-C_4	% wetness	iC_4/nC_4
	2560 - 75	6179	1316	2034	2615	1277	2165	5781	5090	88.05	2.05
	2575 - 90	241	2069	2802	556	1388	7313	7056	6815	96,58	0.40
	2590 - 2605	431	578	1691	461	1562	3495	4725	4294	90.88	0.30
	2605 - 20	390	485	735	151	315	564	2077	1687	81.22	0.48
	2620 - 35	5900	3182	1883	157	423	186	11546	5647	48.91	0.37
	2625 - 50	4066	2018	1500	232	581	467	8397	4332	51.59	0.40
	2650 - 65	25767	12031	6486	8529	5570	1221	58383	32616	55.87	1.53
	2665 - 80	18657	7542	4809	2822	2432	794	36262	17605	48.55	1.16
	2680 - 95	164	632	904	97	417	346	2215	2051	92.60	0.23
	2695 - 2710	18427	2213	1826	1478	1034	542	24979	6551	26.23	1.43
	2710 - 25	6857	2520	1999	1958	1362	819	14696	7840	53.35	1.44
	2725 - 40	10522	4077	3012	3026	1878	952	22517	11994	53.27	1.61
	2740 - 55	49439	15894	6341	3010	1731	242	76417	26977	35.30	1.74
	2755 - 70	5472	2982	2360	1899	3713	272	16436	10964	66.71	0.51
	2770 - 85	505	566	554	539	1176	263	3341	2836	84.88	0.46
	2785 - 2800	2073	465	455	528	1202	197	4723	2650	56.11	0.44
	2800 - 15	1641	1051	1181	1458	3553	873	8885	7244	81.53	0.41
	2815 - 30	642	688	788	1017	2460	496	5596	4953	88.51	0.41
	2830 - 45	268	221	290	478	1099	210	2357	2089	88.63	0.43
	2845 - 60	1132	774	774	978	2347	822	6007	4875	81.16	0.42
	2860 - 75	1023	1153	884	823	2020	944	5903	4880	82.67	0.41
	2875 - 90	599	542	526	709	1659	241	4036	3437	85.16	0.43
	2890 - 2900	1166	1023	1440	1654	3934	2004	9217	8052	87.36	0.42

TABLE II

Lithology and Total Organic Carbon (TOC)

IKU No.	Depth	TOC	Lithology
K 1192	1450 - 65	1,96	100 % claystone, grey, some slightly brownish; Sm.am. limestone, brown; Claystone, brownish light grey, slightly calcareous;
1193	1465 - 80	1,84	100 % claystone, grey; Sm. am. Marl., brownish light grey;
1194	1480 - 95	1,71	100 % claystone, grey; Obs. ?Dolomite, brown; Sand, grain, rounded, coarse; Pyrite;
1195	1495 - 1510	1,72	100 % claystone, partly sandy, grey, light brown
1196	1510 - 25	1,50	100 % claystone, partly sandy, grey, some slightly green;
1197	1525 - 40	1,44	100 % claystone, partly sandy, grey, slightly greenish; light brownish;
1198	1540 - 55	1,07	100 % claystone, partly sandy, grey; Sm. am. Marl., brownish, light grey;
1199	1555 - 70	0,87	100 % claystone, partly sandy, light grey, slightly greenish;
1200	1570 - 85	0,84	100 % claystone, partly sandy, grey, brownish, light green;
1201	1585 - 1600	0,68	100 % claystone, grey, light green;
1202	1600 - 15	0,92	100 % claystone, grey, slightly brownish and greenish; Sm. am. Marl., brownish, light grey;
1203	1615 - 30	0,81	100 % claystone, partly sandy, grey, slightly brownish; Sm. am. Marl., brownish, light grey;
1204	1630 - 45	1,03	100 % claystone, partly sandy, grey, slightly brownish and greenish; Obs.: Dolomite, brown;
1205	1645 - 60	0,68	100 % claystone, partly sandy, grey and greenish· Sm. am. Dolomite, brown, light grey;
1206	1660 - 75	0,78	100 % claystone, partly sandy, grey, slightly green;
1207	1675 - 90	0,80	100 % claystone, partly sandy, grey, light brown slightly green;
1266	1690 - 1705	1,01	100 % claystone, grey, slightly green; Sm. am. Marl., brown, light grey;
1267	1705 - 20	1,28	100 % claystone, grey, slightly green; Sm. am. Marl., brown, light grey; Sandstone, grey, light, brownish;

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IKU No.	Depth	TOC	Lithology
K 1268	1720 - 35	0,89	100 % claystone, grey, slightly green; Sm. am. Marl., red-brown; Limestone, grey;
1269	1735 - 50	1,22	100 % claystone, grey, some brown, light green, dark grey; Sm. am. Marl., brown, light grey;
1270	1750 - 65	0,68	100 % claystone, grey to brown, red brown, dark grey; Sm. am. Marl., red-brown, light grey;
1271	1765 - 80	0,58	100 % claystone, grey to light brown, greenish, red-brown; Sm. am. coal;
1272	1780 - 95	0,60	95 % claystone, grey to brown; greenish, red-brown; 5 % coal; Sm. am. claystone, brownish light, grey, some calcareous; Quartz, white slightly brownish;
1273	1795 - 1810	0,79	95 % claystone, grey to brownish, greenish, red brown; 5 % coal; Sm. am. claystone, light grey, some calcareous;
1274	1810 - 25	0,78	90 % claystone, grey, light brown, green, red brown; 10 % coal; Sm. am. Marl., red brown; claystone, light grey, some calcareous;
1275	1825 - 40	0,80	90 % claystone, grey, light brown, green; 10 % coal; Sm. am. Quartz, white, slightly brownish;
1276	1840 - 55	0,89	95 % claystone, grey, light brown, green, red - brown; 5 % coal; Sm. am. Quartz, white, slightly brownish, Marl. brown;
1277	1855 - 70	0,82	100 % claystone, grey, light green; red-brown; Sm. am. Marl., red brown; Claystone, light grey, some calcareous; Coal;
1278	1870 - 85	0,92	100 % claystone, grey, light green; Sm. am. Marl., brown;
1279	1885 - 1900	1,36	100 % claystone, grey, light green, slightly brownish; Sm. am. Marl., light grey, red-brown;

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IKU No.	Depth	TOC	Lithology
K 1280	1900 - 1915	0,71	100 % claystone, grey, light green, slightly brownish, red-brown; Sm. am. Marl., light grey;
1281	1915 - 30	0,69	100 % claystone, grey, light green, slightly brownish, red-brown; Sm. am. Marl., as above.
1282	1930 - 45	0,70	100 % claystone, grey, light green; Sm. am red brown, limestone/Marl., white, light grey; Marl., red-brown; Coal.
1283	1945 - 60	0,74	100 % claystone/Marl., grey, light green; Sm. am. limestone, white, light grey;
1284	1960 - 75	0,61	100 % claystone, grey, light green; red-brown, brown; Sm. am. limestone, white, light grey, slightly brownish;
1285	1975 - 90	0,80	100 % claystone, grey, light green; Sm. am. limestone/Marl., white, light grey, slightly brownish; Coal;
1286	1990 - 2005	0,73	100 % claystone, grey, light green; Sm. am. limestone/Marl., white, light grey; Coal;
1287	2005 - 20	0,92	95 % claystone, grey, light green; 5 % coal; Sm. am. limestone/Marl., white, light grey, slightly brownish;
1288	2020 - 35	0,83	85 % claystone, grey, light green; 15 % limestone/Marl., white, light grey; Sm. am. coal;
		clayst. 0,89 lime 0,53	Claystone, red-brown, some calcareous;
1289	2035 - 50	1,12	85 % claystone, grey, light green; brown; 15 % limestone, white, light grey;
		clayst. 0,80 limest. 0,22	Sm. am. coal;

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IKU No.	Depth	TOC	Lithology
K 1290	2050 - 65	0,96 claust. 0,79 limest. 0,12	85 % claystone, grey, light green, brown; 15 % limestone, white, light grey; Sm. am. coal; claystone, light grey, some calcareous;
1291	2065 - 80	1,07	95 % claystone, grey, light green, some brown; 5 % limestone, white, grey; Sm. am. Marl., red-brown;
1292	2095 - 2010	0,85 claust. 0,82 limest. 0,21	90 % claystone, grey, light green; 10 % limestone, white, light grey; Sm. am. Quartz, white;
1293	2010 - 2125	1,33 claust. 0,77 limest. 0,25	40 % claystone, grey, light green; 60 % limestone, white, light grey; Sm. am coal;
1294	2125 - 2140	1,75 claust. 0,72 limest. 0,17	85 % claystone, grey, light green, some brown; 15 % limestone, white, light grey; Sm. am. Marl., red-brown;
1295	2140 - 2155	0,89 claust. 1,06 limest. 0,11	90 % claystone, grey, light breen, some brown; 10 % limestone, white, light grey; Sm. am. coal; Marl., red-brown;
1296	2155 - 70	3,43	90 % claystone, grey, dark grey-black, light green, some brown, red-brown; 5 % limestone, white, light grey; 5 % coal; Sm. am. Marl., red-brown; Quarts, white;
1297	2170 - 85	2,72	80 % claystone, grey, dark grey-to black, light green; 5 % limestone, white, light grey; 15 % coal; Sm. am. Marl., red-brown;

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IKU No.	Depth	TOC	Lithology
K 1397	2185 - 200	1,43	85% Claystone, grey, dark-black, light green; redbrown 15% Coal; sm.am. Limestone, white, light grey; Marl, redbrown;
1304	2200 - 15	2.26	90% Claystone, grey, dark, light green, redbrown, 10% Coal; sm.am. Marl, redbrown
1305	2215 - 30	2,55	95% Claystone, grey, dark, light grey, redbrown; 5% Coal; sm.am. Marl, redbrown; Quartz, white;
1306	2230 - 45	1,62	90% Claystone, grey, dark, light green, redbrown; 10% Coal; sm.am. Marl, redbrown; Limestone, white light grey;
1307	2245 - 60	1,44	90% Claystone, grey, dark, light green, redbrown; 10% Coal; sm.am. Limestone, white, light grey; Marl, redbrown;
1308	2260 - 75	1,25	100% Claystone, grey, dark, light green; red-brown; sm.am. Caol; Marl, redbrown;
1309	2275 - 90	1,11	95% Claystone, grey, light green; 5% Coal; sm.am. Marl, redbrown; Limestone, white, light grey;
1310	2290 - 305	1,36	90% Claystone, grey, dark, light green,redbrown; 10% Coal; sm.am. Limestone, white, light grey; Marl, redbrown;
1311	2305 - 20	1,30	95% Claystone, grey, light green; 5% Coal; sm.am. Limestone, white, light grey; Marl, red-brown;
1312	2320 - 35	1,28	100% Claystone, grey, light green; sm.am. Limestone, white, Coal; Quartz, white;
1313	2335 - 50	1,21	100% Claystone, grey, light green; redbrown; sm.am. Limestone, white; Quartz, white; Coal;

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IKU No.	Depth	TOC	Lithology
K 1314	2350 - 65	0,59	30% Claystone, grey, light green; redbrown; 70% Sandstone, white, subangular, coarse - fine; sm.am. Coal; Marl, redbrown;
1315	2365 - 80	1,79	100% Claystone, grey, dark-black, light green; sm.am. Coal; Marl, grey; Quartz;
1316	2380 - 95	2,07	100% Claystone, grey, light green; sm.am. Coal; Marl, redbrown; Quartz, white;
1317	2395 - 410	2.22	90% Claystone, grey,dark, light green, redbrown; 10% Sandstoen, white, angular coarse; sm.am. Coal; Marl, redbrown; Limestone, white;
1318	2410 - 25	1,37	90% Claystone, grey, light green; 10% Sandstone, white, rounded, coarse; sm.am. Coal; Limestone, white, light grey; Marl, redbrown;
1319	2425 - 40	1,22	100% Claystone, grey, dark, light green; sm.am. Limestone, white; Marl, redbrown; Coal; sand grains rounded, coarse;
1320	2440 - 55	2,19	100% Claystone, partly sandy, grey, dark, light green, redbrown; sma.am. Marl, redbrown Limestone, white;
1321	2455 - 70	2,96	100% Claystone, partly sandy, grey, dark, light green; sm.am. Marl, redbrown; Quartz, white;
1322	2470 - 85	2,65	90% Claystone, grey, dark, light green, redbrown; 10% Sandstone, white, subangular, very fine - coarse; sm.am. Marl, redbrown; Coal; Limestone, white;
1323	2485 - 500	1,18	95% Claystone, grey, dark, green; redbrown; 5% Sandstone, white, rounded, very fine, some calcareous; sm.am. Marl, redbrown; Coal; sand grain, light grey, rounded coarse;
1324	2500 - 15	1,50	60% Claystone, as above; 40% Sandstone; white light grey, rounded, very fine - fine; sm.am. Marl, redbrown; Limestone, white;

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IKU No.	Depth	TOC	Lithology
K 1325	2515 - 30	1,67	50% Claystone, grey, dark, light green; 50% Sandstone, redbrown; white, subangular, very fine - fine; sm.am. Marl, redbrown; Sand grain, grey, rounded, coarse; Limestone, white;
1326	2530 - 45	2,04	50% Claystone, as above 50% Sandstone, white, rounded, very fine; sm.am. Marl, silty, light browngrey; Sand grains, light grey, subangular, coarse;
1389	2545 - 60	2,38	60% Claystone, grey, light green, redbrown; 40% Sandstone, white, rounded, very fine; sm.am. Marl, silty, light browngrey; Quartz, white; Limestone, light grey;
1390	2560 - 75	2,02	70% Claystone, grey, dark, light green, redbrown; 30% Sandstone, white, rounded , very fine - fine; sm.am. Marl, redbrown;
1391	2575 - 90	1,79	50% Claystone, grey, dark, light green, redbrown; 50% Sandstone, white, rounded, very fine - fine; sm.am. Marl, redbrown; Mica, white;
1392	2590 - 605	2,09	50% Claystone, grey, dark, light green, redbrown; 50% Sandstone, light, grey, rounded, very fine - fine; sm.am. Marl, redbrown; Coal; Mica, white;
1393	2605 - 20	2,22	70% Claystone, grey, light green; redbrown, dark grey; 30% Sandstone, light grey , angular - subangular, very fine - fine; sm.am. Marl, redbrown; Mica, white;
1394	2620 - 35	1,26	50% Claystone, grey, light green; redbrown; 43% Carb. shale, dark grey to black; 7% Coal sm.am. Limestone, white; Marl, redbrown; Sand grain, white, rounded, coarse;
1395	2635 - 50	1,49	90% Claystone, grey, light green; redbrown; 10% Sand/sandstone, white, angular/subangular, very fine, sm.am. Quartz, white; Coal; Marl, redbrown;

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IKU No.	Depth	TOC	Lithology
K 1396	2650 - 65	2,79	100% Claystone, grey, light green; redbrown; sm.am. Coal; Marl, redbrown; Sand grain, white subangular, coarse, Limestone, white to light grey;
1397	2665 - 80	1,77	30% Claystone, light grey to green; redbrown; 65% Sand/Sandstone, white to light grey; subangular/angular, coarse-medium; 5% Coal; sm.am. Marl, redbrown; Limestone, white; Mica, white;
1398	2680 - 95	1,30	70% Claystone, grey, light grey to green, red-brown; 25% Sand/Sandstone, as above; 5% Coal; sm.am. Marl, redbrown; Limestone, white;
1399	2695 - 710	1,37	85% Claystone, grey to light green; 10% Sand/Sandstone, as above; 5% Coal; sm.am. Marl, redbrown;
1400	2710 - 725	1,35 0,23	60% Claystone, grey, dark, light grey; redbrown; 10% Limestone, white; 30% Sand/Sandstone, as above; sm.am. Marl, redbrown;
1401	2725 - 40	1,82 0,23	60% Claystone, light grey to green, 30% Sandstone, white,subangular, angular, very fine - fine - coarse; 10% Limestone, white; sm.am. Coal; Marl, red-brown;
1402	2740 - 55	1,63	20% Claystone, silty, grey, light, dark, red-brown, green; 60% Sand/Sandstone, white, rounded, very fine; 20% Coal; sm.am. Limestone, white; Marl, redbrown;
1479	2755 - 70	0,99	60% Claystone, silty, medium grey, redbrown, green; 10% Sandstone, white, subangular, fine to coarse; sm.am. Coal;
1480	2770 - 85	0,93	60% Claystone, silty, light to dark grey, green, redbrown; 40% Sand/Sandstone, white, subangular/angular, fine - very coarse; sm.am. Marl; redbrown; Coal;
1481	2785 - 2800	0,92	40% Claystone, silty, light to dark grey, green; redbrown; 55% Sand/sandstone, as above 5% Limestone, white; sm.am. Coal; Marl, redbrown;

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IKU No.	Depth	TOC	Lithology
K 1482	2800 - 15	0,95	50% Claystone, redbrown, medium grey, green; 50% Sandstone, white, angular/subangular, very fine. sm.am. Limestone, white; Coal
1483	2815 - 30	0,75	60% Claystone, silty, redbrown, light grey, green; 40% Sand/Sandstone, white, very fine, to fine medium, coarse; sm.am. Coal; fine stane, white;
1484	2830 - 45	0,43	95% Claystone, slilty, redbrown, light grey, green; 5% Sandstone, white rounded, coarse sm.am. Limestone, white, Coal;
1485	2845 - 60	0,79	85% Claystone, silty, redbrown, medium grey, green; 15% Sand/Sandstone, white, angular/subangular, fine to coarse sm.am. Limestone, light grey;
1486	2860 - 75	0,99	15% Claystone, redbrown, light grey, green; 85% Sand/Sandstone, white; angular/subangular, fine to coarse; sm.am. Limestone, white; Coal;
1487	2875 - 90	0,68	15% Claystone, redbrown, medium grey, green, 85% Sand/Sandstone, white, very fine to coarse sm.am. Limestone, white; Coal!
1488	2890 - 2905	0,87	50% Claystone, redbrown, grey, green 50% Sandstone, white, very fine to coarse; sm.am. Limestone, white; Coal;

Table III

Weight (mg) of EOM and chromatographic fractions

Sample	Depth(m)	Rock extracted (g)	EOM	Sat.	Aro.	HC	Non HC	TOC
K1195	1495-1510	95.2	16.9	0.9	1.4	2.3	3.6	1.72
K1206	1660-1675	71.9	9.3	0.7	1.6	2.3	2.6	0.78
K1270	1750-1765	42.8	28.3	4.9	8.6	13.5	11.1	0.68
K1279	1885-1900	76.3	7.5	0.6	1.7	2.3	2.2	1.36
K1283	1945-1960	79.8	28.2	3.4	7.0	10.4	9.7	0.74
K1289	2036-2050	86.9	14.2	0.8	2.2	3.0	0.5	1.12
K1296	2155-2170	98.3	276.7	50.0	59.3	109.3	82.3	3.43
K1303	2185-2200	41.5	32.2	3.7	7.6	11.3	6.4	1.43
K1308	2260-2275	32.7	55.0	5.6	7.2	12.8	17.6	1.25
K1311	2305-2320	40.1	32.4	6.9	6.0	12.9	5.9	1.30
K1316	2380-2395	36.7	38.7	7.2	7.7	14.9	12.8	2.07
K1321	2455-2470	45.9	70.1	16.3	15.3	31.6	18.4	2.96
K1326	2530-2545	49.9	46.0	8.7	11.1	19.8	11.2	2.04
K1392	2590-2605	36.1	41.7	7.2	9.3	16.5	12.2	2.09
K1396	2650-2565	101.4	114.9	8.3	29.0	37.3	41.4	2.79
K1484	2830-2845	63.8	10.0	0.4	1.4	1.8	2.7	0.43

Table IV

Concentration of EOM and chromatographic fractions (Weight ppm of rock)

IKU No.	Depth (m)	EOM	SAT	Aro	Total hydrocarb.	Non hydrocarb.
K1195	1495-1510	178.-	9.-	15.-	24.-	38.-
K1206	1660-1675	129.-	10.-	22.-	32.-	36.-
K1270	1750-1765	661.-	114.-	201.-	315.-	259.-
K1279	1885-1900	98.-	8.-	22.-	30.-	29.-
K1283	1945-1960	353.-	43.-	88.-	130.-	122.-
K1289	2035-2050	163.-	9.-	25.-	34.-	6.-
K1296	2155-2170	2815.-	509.-	603.-	1112.-	837.-
K1303	2185-2200	776.-	89.-	183.-	272.-	154.-
K1308	2260-2275	1682.-	171.-	220.-	391.-	538.-
K1311	2305-2320	808.-	172.-	150.-	322.-	147.-
K1316	2380-2395	1055.-	196.-	210.-	406.-	349.-
K1321	2455-2470	1527.-	355.-	333.-	688.-	401.-
K1326	2530-2545	922.-	174.-	222.-	397.-	224.-
K1392	2590-2605	1155.-	199.-	258.-	338.-	338.-
K1396	2650-2665	1133.-	82.-	286.-	368.-	408.-
K1484	2830-2845	157.-	6.-	22.-	28.-	42.-

Table V

Concentration of EOM and chromatographic fractions (mg/g TOC)

IKU No.	Depth (m)	EOM	SAT	Aro	Total hydrocarb.	Non hydrocarb.
K1195	1495-1510	10.-	1.-	1.-	2.-	2.-
K1206	1660-1675	17.-	1.-	3.-	4.-	5.-
K1270	1750-1765	97.-	17.-	30.-	46.-	38.-
K1279	1885-1900	7.-	1.-	2.-	3.-	2.-
K1283	1945-1960	48.-	6.-	12.-	18.-	16.-
K1289	2035-2050	15.-	1.-	2.-	3.-	1.-
K1296	2155-2170	82.-	15.-	18.-	33.-	24.-
K1303	2085-2200	54.-	6.-	13.-	19.-	11.-
K1308	2260-2275	135.-	14.-	18.-	31.-	43.-
K1311	2305-2320	62.-	13.-	12.-	25.-	11.-
K1316	2380-2395	51.-	9.-	10.-	20.-	17.-
K1321	2455-2460	52.-	12.-	11.-	23.-	14.-
K1326	2530-2545	45.-	9.-	11.-	19.-	11.-
K1392	2590-2605	55.-	10.-	12.-	16.-	16.-
K1396	2650-2665	41.-	3.-	10.-	13.-	15.-
K1484	2830-2845	36.-	1.-	5.-	7.-	10.-

Table VI

COMPOSITION IN % OF THE MATERIAL EXTRACTED FROM THE ROCK

IKU No.	Depth (m)	Sat/EOM	Aro/EOM	HC/EOM	Sat/Aro	Non HC/EOM	HC/Non HC
K 1195	1495-1510	5.3	8.3	13.6	64.3	21.3	63.9
K 1206	1660-1675	8.2	17.1	25.3	44.2	28.3	88.2
K 1270	1750-1765	17.3	30.4	47.7	57.0	39.2	121.6
K 1279	1885-1900	8.0	22.7	30.7	35.3	29.3	104.6
K 1283	1945-1960	12.1	24.8	36.9	48.6	34.4	107.2
K 1289	2035-2050	5.5	15.3	20.8	36.0	3.4	17.6
K 1296	2155-2170	18.1	21.4	39.5	84.3	29.7	132.8
K 1303	2185-2200	11.5	23.6	35.1	48.7	19.9	176.6
K 1308	2260-2275	10.2	13.1	23.3	77.8	32.0	72.7
K 1311	2305-2320	21.3	18.5	39.8	115.0	18.2	218.6
K 1316	2380-2395	19.0	20.0	39.0	94.0	33.0	116.0
K 1321	2455-2470	23.0	22.0	45.0	107.0	26.0	172.0
K 1326	2530-2545	19.0	24.0	43.0	78.0	24.0	177.0
K 1392	2590-2605	17.0	22.0	29.0	77.0	29.0	100.0
K 1396	2650-2665	7.0	25.0	32.0	29.0	36.0	90.0
K 1484	2830-2845	4.0	14.0	18.0	29.0	27.0	67.0

Table VII

Tabulation of data from the gas chromatograms

IKU Sample No	Depth	Pristane/nC_{17}	$\frac{\text{Pristane}}{\text{Phytane}}$	CPI
K1195	1495-1510	1.50	3.41	1.20
K1206	1660-1675	0.84	2.10	1.83
K1270	1750-1765	1.40	2.73	2.42
K1279	1855-1900	1.42	2.57	1.25
K1283	1945-1960	1.46	0.96	1.26
K1289	2035-2050	1.30	1.49	1.26
K1296	2155-2170	1.45	1.51	1.20
K1303	2185-2200	1.49	1.67	1.14
K1308	2260-2275	1.11	1.69	1.47
K1311	2305-2320	0.93	1.82	1.11
K1316	2380-2395	1.71	1.66	1.33
K1321	2455-2470	1.62	1.62	1.25
K1326	2530-2545	1.63	1.64	1.25
K1392	2590-2605	1.73	1.90	1.25
K1396	2650-2665	3.06	4.42	1.39
K1486	2860-2875	1.73	2.90	1.04

Table VIII

VITRINITE REFLECTANCE AND VISUAL KEROGEN MEASUREMENTS

Depth (m)	Vitrinite reflectance	Color index	Type of organic matter
1440	0.31(21)	-2/2	Am/He, W, Cysts
1630	0.37(8)		
1695		-2/2	Am/Cut, W, Poll-spor, Cysts
1705	0.37(20)		
1800		-2/2	W/He, Am
1810	0.30(23)		
1880			
1885	0.38(20)	-2/2	Am,Cysts/W, He, Pollen
1960	0.37(4)	2	Am, Cysts/He, Pollen
2063	0.40(3)	2	He/Am, Poll-spor, Cysts
2126	0.35(20)	2-/2+	W, He/Am
2173	0.41(16)	2	Am/Cysts, Poll-spor, He, Coal R!
2230	0.31(20)	2	Am/He, W, Poll-spor
2290	0.35(20)		Am/Cysts, He, W
2348	0.35(3)		W, Coal R!
2390		2	Am/He, Poll-spor
2430		2	Am/He, Cut,Poll-spor, W
2477	0.46(20)	2/2+ (ox)	Am/He, Cut, Poll-spor, W
2529		2	W, He, Cut, Poll-spor/Am Cysts
2539	0.37(20)		
2581		2/2+	He/Am, W, Cut, Poll-spor, Coal R!
2598	0.48(20)		
2605		2/2+	Am, He, Cut, W
2628		2/2+	Am, Cut, W, He, Poll-spor, Cysts
2633			(Barren)
2676		2/2+	He, Poll-spor/Am, Cysts

VITRINITE REFLECTANCE AND VISUAL KEROGEN MEASUREMENTS

Depth (m)	Vitrinite reflectance	Color index	Type of organic matter
2686	0.37(18)		
2743	NDP	-3 (ox)	Am/He
2790,5		-3 (ox)	Almost barren
2799	NDP		
2851,5	0.44(9)		
2864			(Barren)
2884	0.36(21)	2	Am/He, Coal R!

NDP: No determination possible

TABLE IX

ROCK EVAL PYROLYSIS

Sample	Depth	S_1	S_2	S_3	C_{org}	Hydrogen Index	Oxygen Index	Oil of gas content $(S_1 + S_2)$	Production Index $\frac{S_1}{S_1 + S_2}$	Tmax °C
K1195	1495-1510	0.64	2.48	1.84	1.72	143.90	106.40	3.12	0.21	429
K1202	1600- 15	0.16	0.37	2.04	0.92	40.11	221.74	0.53	0.30	426
K1206	1660- 75	0.12	0.35	1.60	0.78	45.39	205.39	0.47	0.25	432
K1269	1735- 50	0.27	0.79	2.71	1.22	64.92	222.20	1.06	0.25	429
K1270	1750- 65	0.14	0.66	0.73	0.68	97.50	107.65	0.80	0.17	434
K1275	1825- 40	0.14	0.90	1.51	0.80	112.5	188.75	1.04	0.14	432
K1279	1885-1900	0.32	1.23	2.18	1.36	90.44	160.29	1.55	0.21	435
K1283	1945- 60	0.20	0.53	2.17	0.74	71.62	293.24	0.74	0.27	434
K1287	2005- 20	0.52	1.38	1.47	0.92	150.00	159.78	1.90	0.26	433
K1289	2035- 50	0.28	0.67	1.44	1.12	59.82	128.57	0.95	0.30	438
K1294	2125- 40	0.29	0.53	0.88	1.75	30.29	50.29	0.82	0.35	439
K1296	2155- 70	0.74	14.74	0.78	3.43	429.74	22.74	15.48	0.05	425
K1297	2170- 85	0.43	6.34	0.89	2.72	233.09	32.72	6.77	0.06	426
K1304	2200- 15	0.21	2.41	0.93	2.26	106.64	41.15	2.62	0.08	434
K1305	2215- 30	0.58	7.59	0.78	2.55	297.65	30.59	8.17	0.07	426
K1306	2230- 45	0.30	1.35	0.90	1.62	83.33	55.56	1.65	0.18	437
K1308	2260- 75	0.30	1.58	0.81	1.25	126.4	64.80	1.88	0.16	436
K1311	2305- 20	0.28	1.64	0.76	1.30	126.15	58.46	1.92	0.15	428
K1316	2380- 95	0.24	5.54	0.68	2.07	267,63	32.85	5.78	0.04	429

TABLE IX

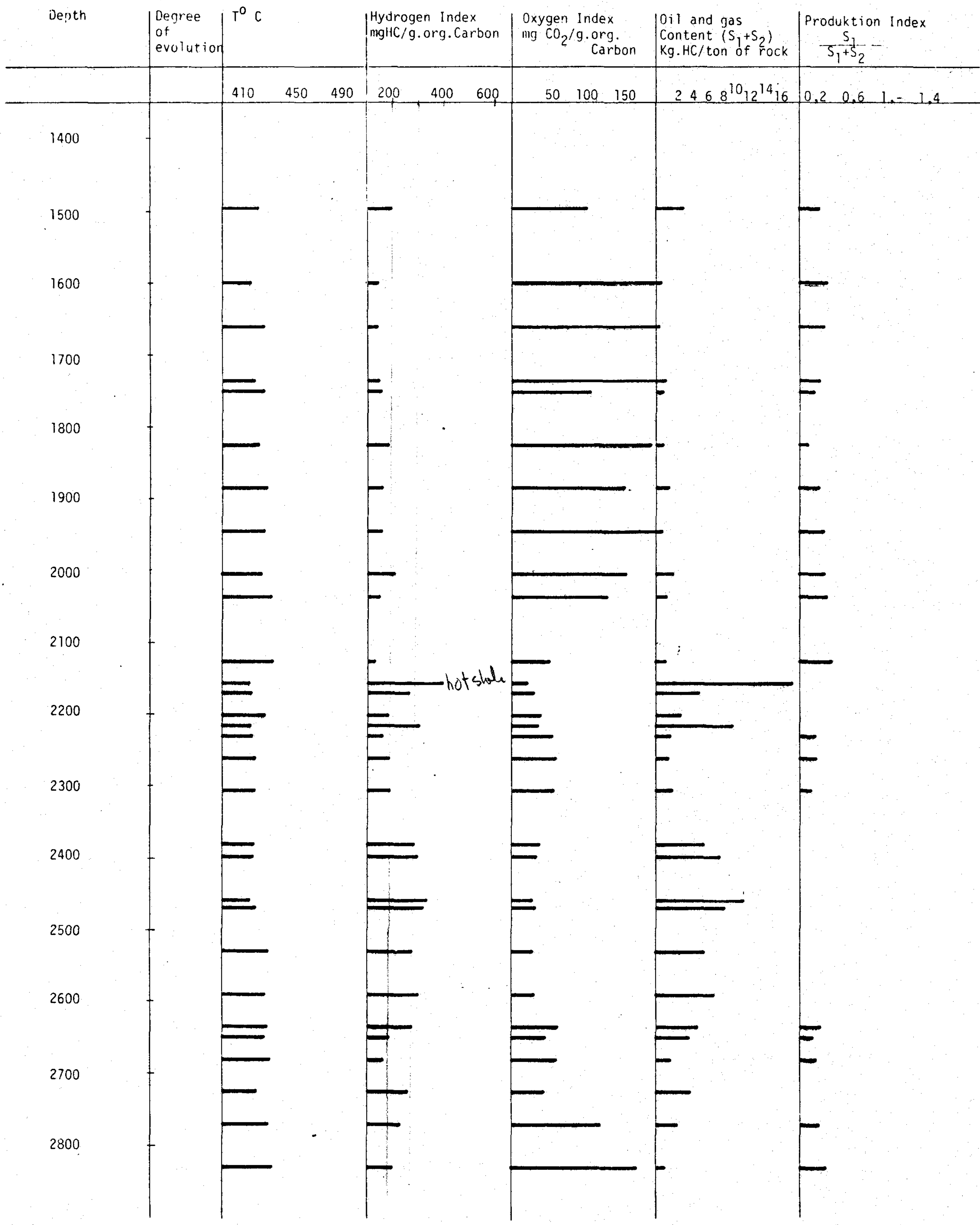
Rock Eval Pyrolysis

Sample	Depth	S_1	S_2	S_3	C_{org}	Hydrogen Index	Oxygen Index	Oil of gas content $(S_1 + S_2)$	Production Index $\frac{S_1}{S_1 + S_2}$	Tmax °C
K1317	2395-2410	0.50	6.44	0.71	2.22	290.09	31.98	6.94	0.07	427
K1321	2455- 70	0.66	9.16	0.76	2.96	309.46	25.68	9.82	0.07	424
K1322	2470- 85	0.53	7.26	0.81	2.65	273.96	30.57	7.79	0.07	429
K1326	2530- 45	0.30	4.90	0.60	2.04	240.20	29.41	5.20	0.06	435
K1392	2590-2605	0.54	5.66	0.63	2.09	270.81	30.14	6.20	0.09	433
K1395	2635- 50	0.97	3.39	0.97	1.49	227.52	65.10	4.36	0.22	435
K1396	2650- 65	0.50	3.09	1.25	2.79	110-75	44.80	3.59	0.14	434
K1398	2680- 95	0.27	1.13	0.85	1.30	86.92	65.39	1.40	0.19	437
K1401	2725- 40	0.27	3.71	0.80	1.82	203.85	43.96	3.98	0.07	428
K1480	2770- 85	0.45	1.68	1.15	0.93	180.65	123.66	2.13	0.21	435
K1484	2830- 45	0.29	0.57	0.74	0.43	132.56	172.09	0.86	0.34	437

Pröver fra 'hot sh (2146-2171) er ikke med for Ro og 'Visual Kerogen [omfatter både 'type kerogen' og 'spore coloration']. Vi bör nöye kartlegge modningsgraden for hot sh. området for å forstå dannelse/migrasjon av HC. Ro og vis. kerogen burde supplere de andre metodene i intervallet 2146-2171, særlig siden resultatene er lett anvendbare. Ro er den mest pålitelige modningsindeks.

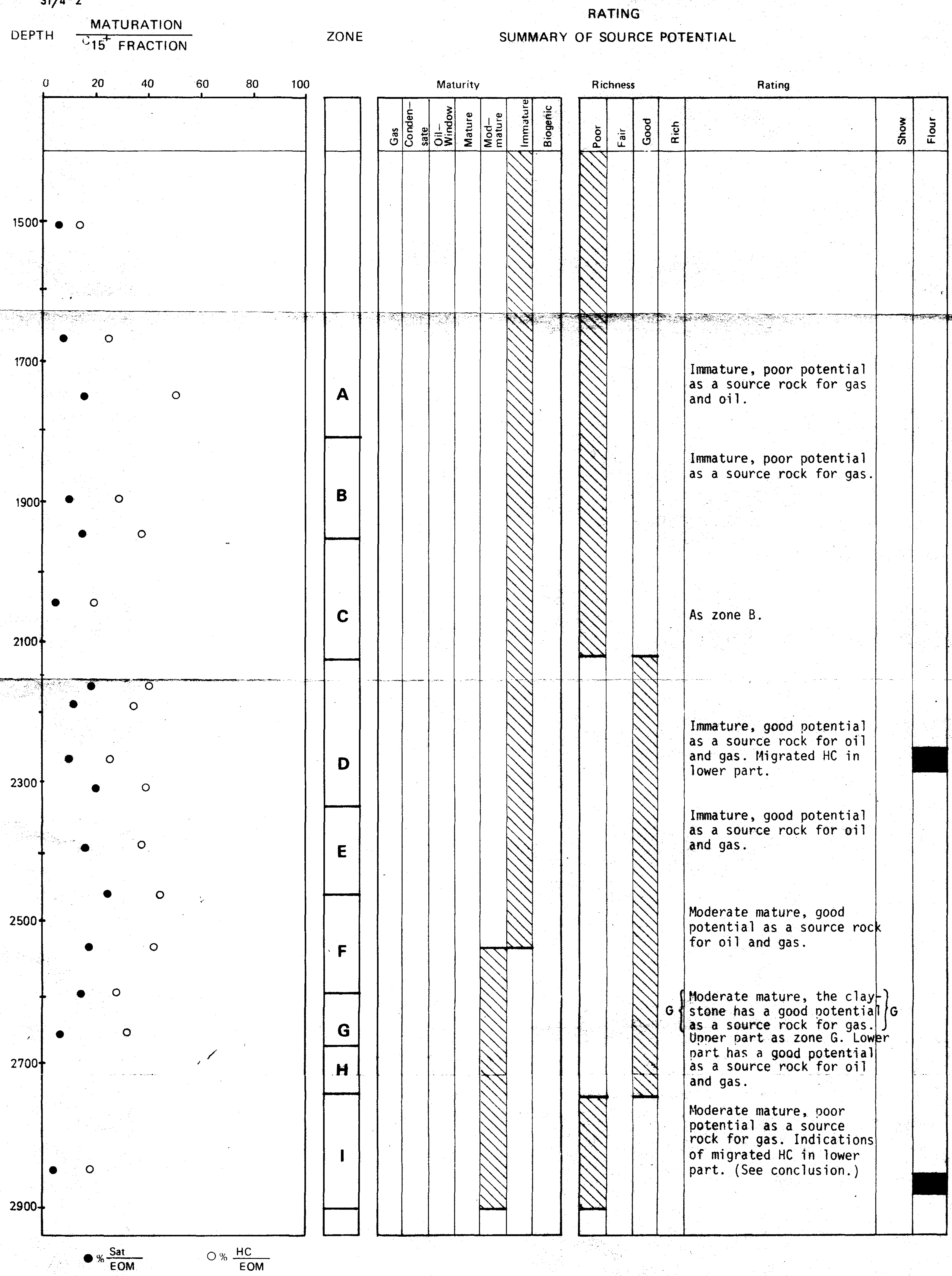
962 b.

Rock - Eval Pyrolysis



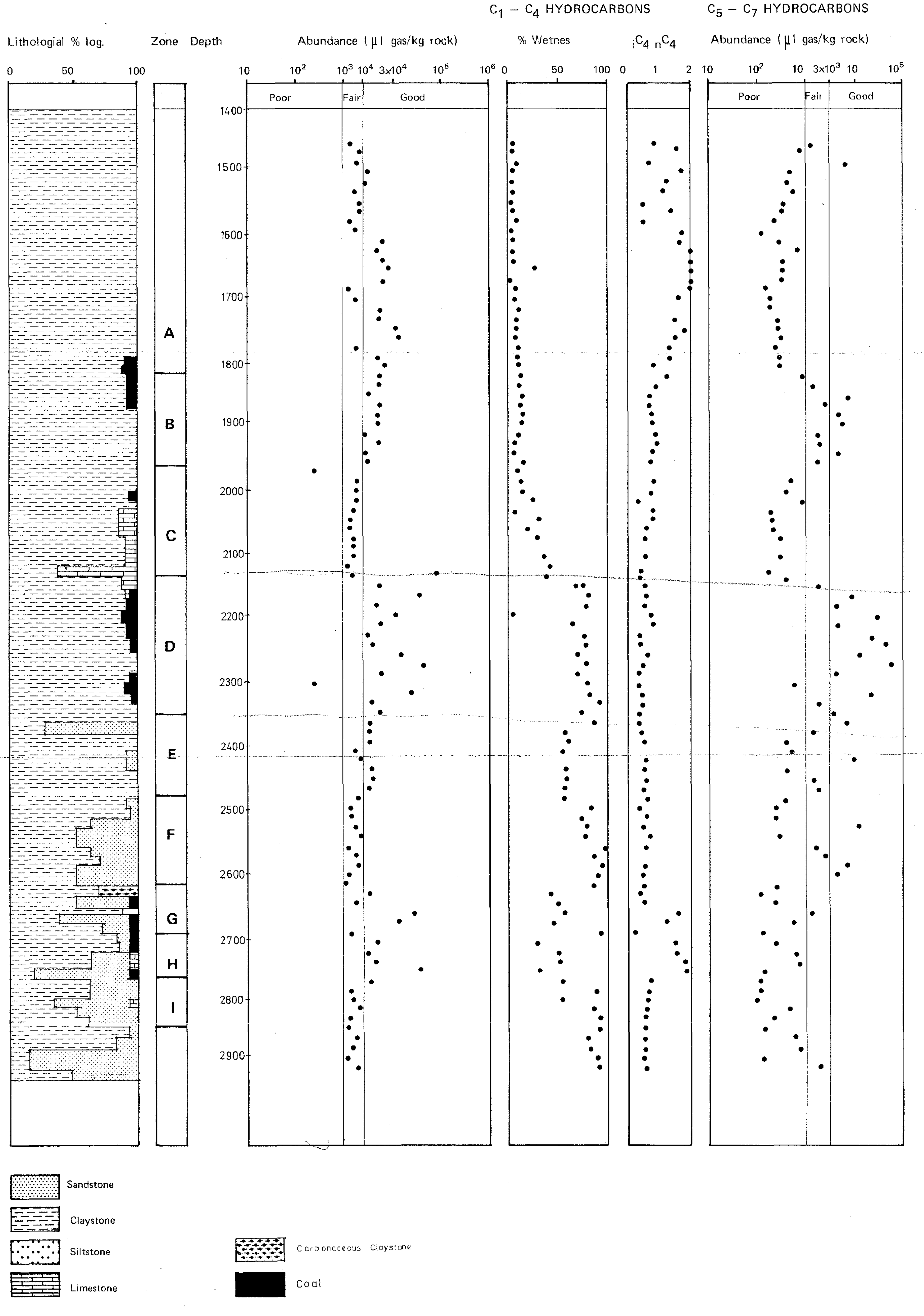
INTERPRETATION DIAGRAM

31/4-2



Sat: Saturated Hydrocarbons
HC: Hydrocarbons
EOM: Extractable Organic Matter

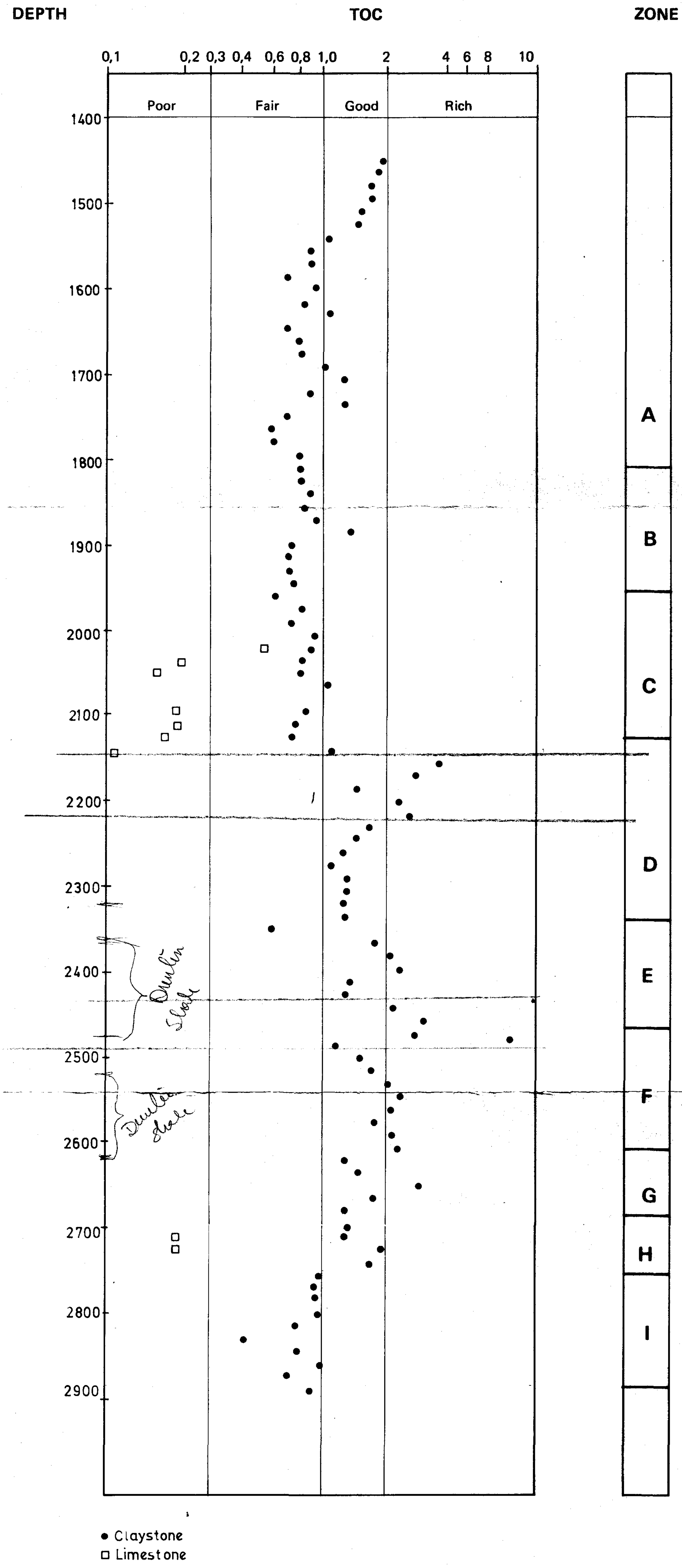
$C_1 - C_7$ HYDROCARBONS
Presentation of Analytical Data



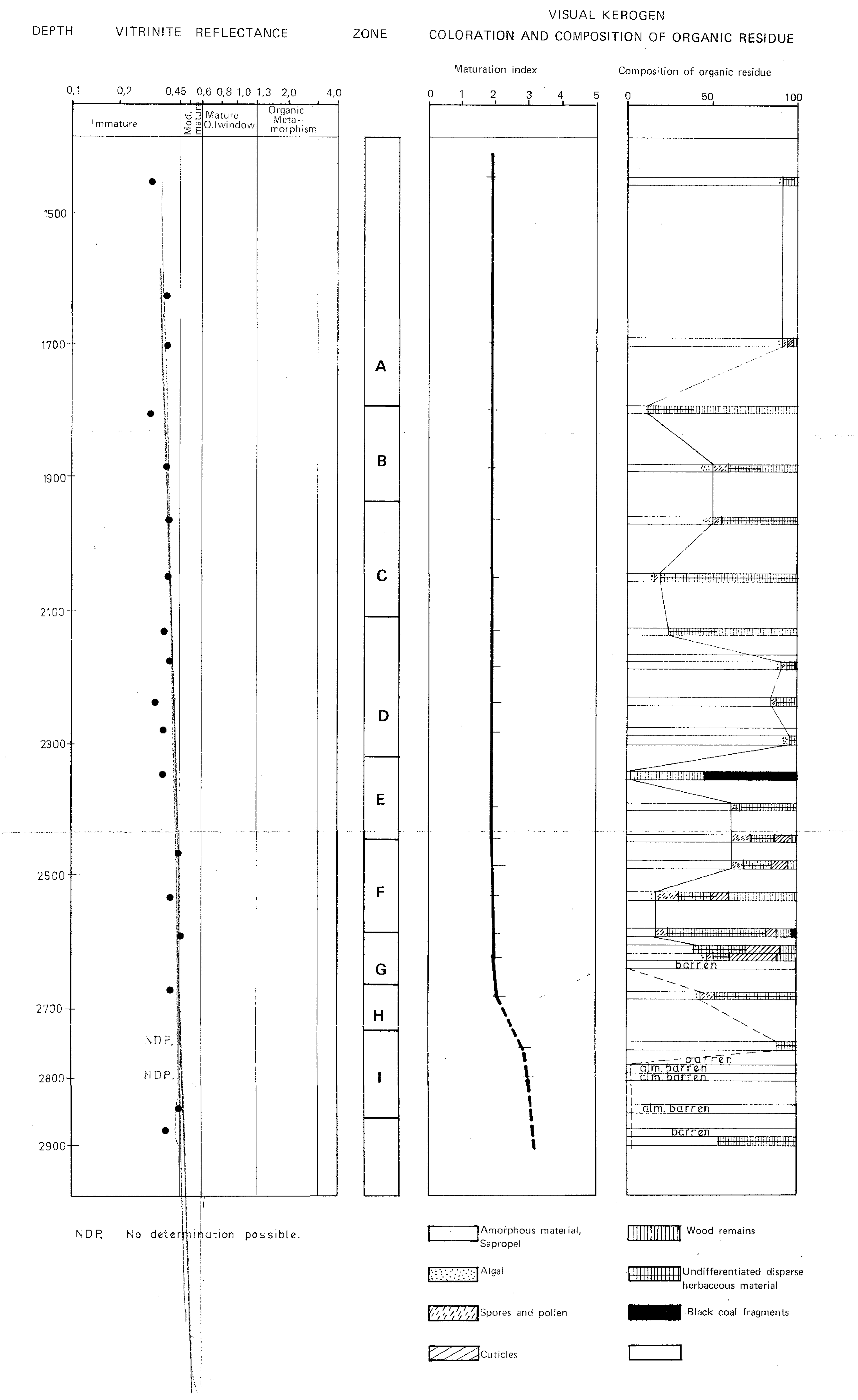
TOTAL ORGANIC CARBON (TOC)

Presentation of Analytical Data

Norsk Hydro 31/4-2



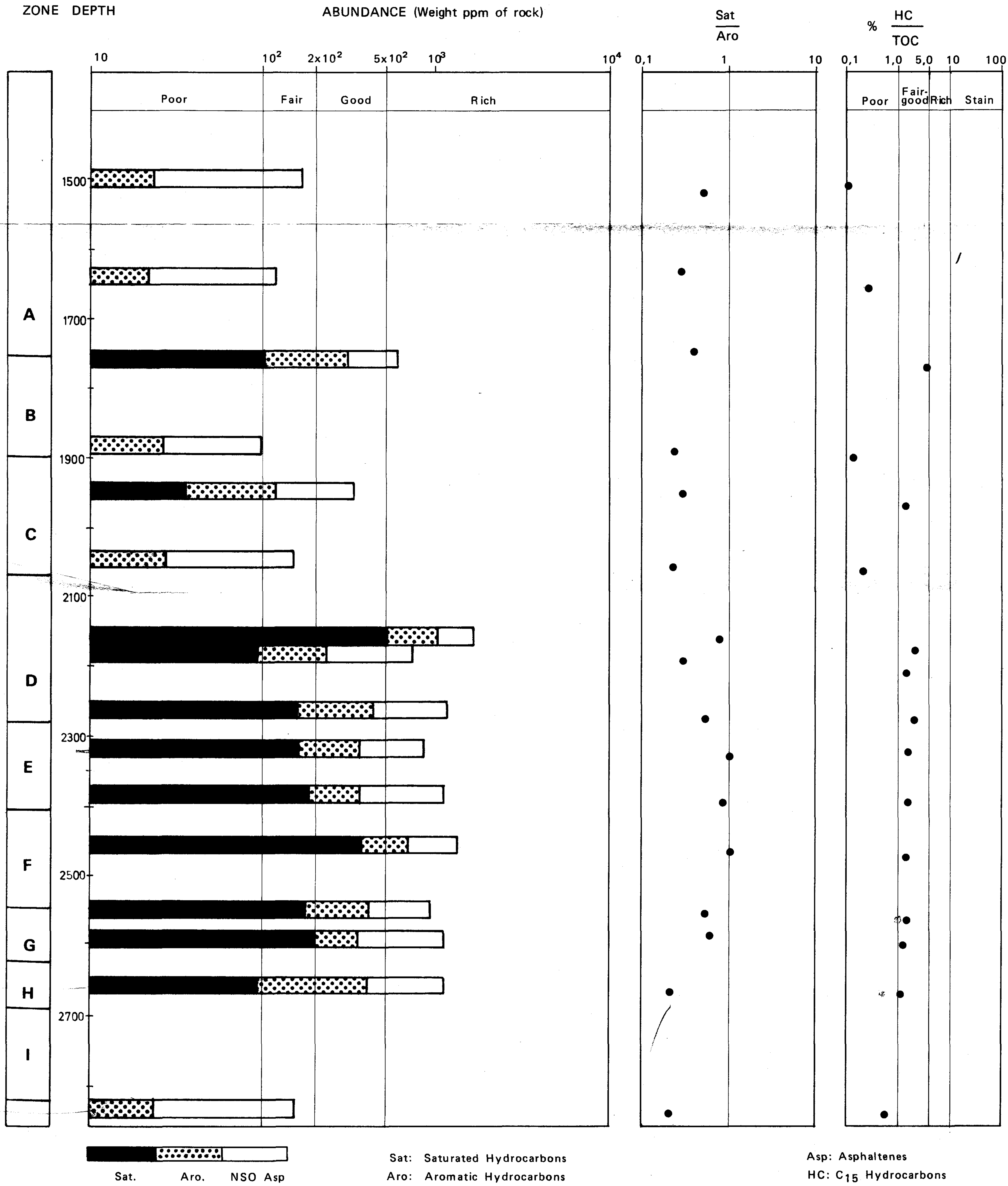
MATURATION



DEPTH
VITRINITE REFLECTANCE
ZONE
VISUAL KEROGEN
COLORATION AND COMPOSITION OF ORGANIC RESIDUE
Maturation index
Composition of organic residue
0,1 0,2 0,45 0,6 0,8 1,0 1,3 2,0 4,0
Immature
Mod. mature
Mature Oilwindow
Organic Meta-morphism
0 1 2 3 4 5
0 50 100
1500
1700
1900
2100
2300
2500
2700
2800
2900
A
B
C
D
E
F
G
H
I
NDP.
NDP.
barren
barren
alm. barren
alm. barren
alm. barren
barren
NDP. No determination possible.
Amorphous material, Sapropel
Algai
Spores and pollen
Cuticles
Wood remains
Undifferentiated disperse herbaceous material
Black coal fragments

C_{15}^{+} HYDROCARBONS

Presentation of Analytical Data

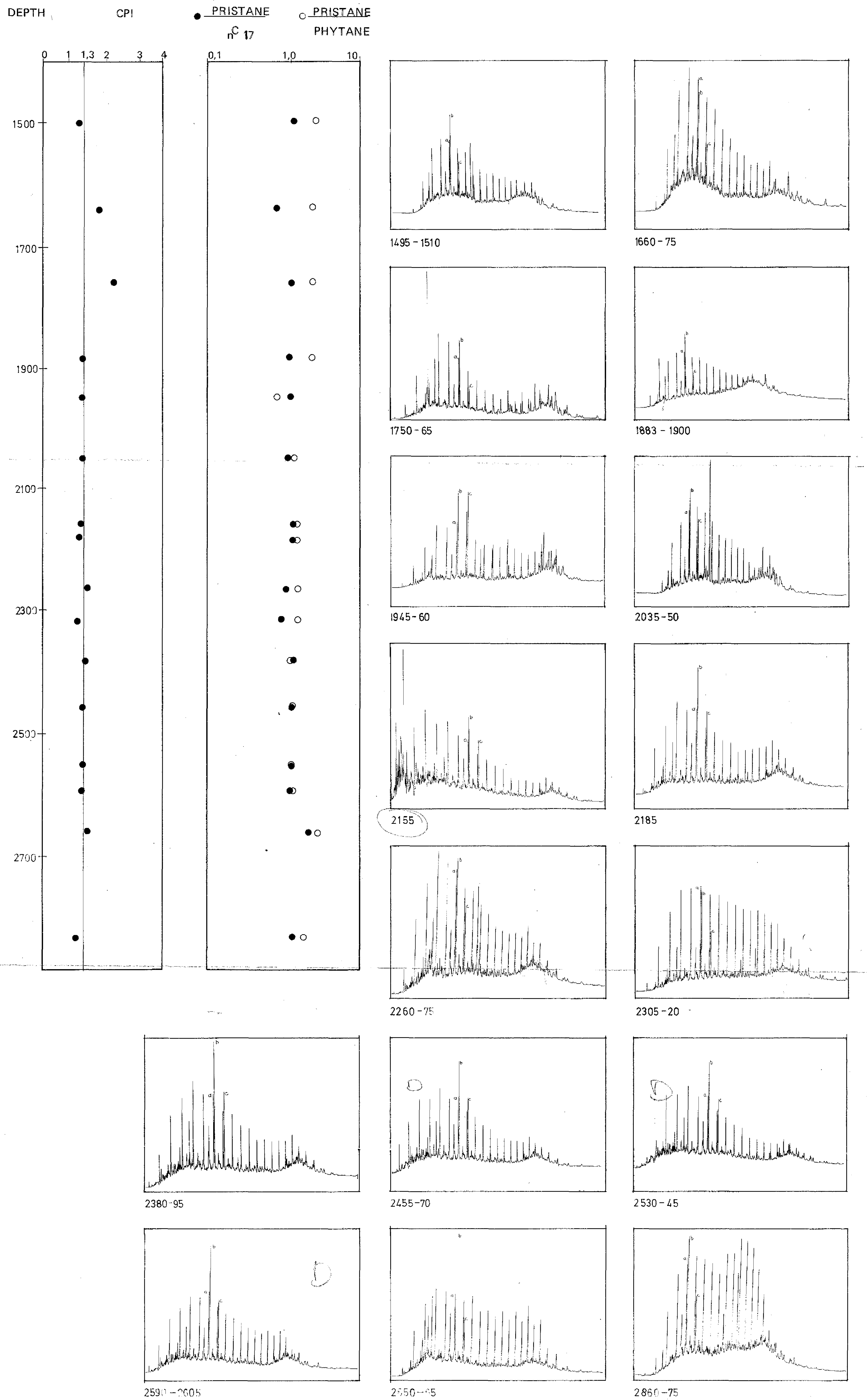


Sat: Saturated Hydrocarbons
Aro: Aromatic Hydrocarbons
NSO: Nitrogen, Sulphur and Oxygen containing compounds

Asp: Asphaltenes
HC: C_{15} Hydrocarbons
TOC: Total Organic Carbon

31/4-2

C_{15}^{+} SATURATED HYDROCARBONS



a = nC17
b = Pristane
c = Phytane