IKU

Confidential

INSTITUTT FOR KONTINENTALSOKKELUNDERSØKELSER

CONTINENTAL SHELF INSTITUTE

REPORT TITLE	
SOURCE ROCK ANALYSES OF WELL 30/3-2	
CLIENT	
STATOIL	
CLIENT's REF.:	REPORT NO.: O-284

AUTHOR (S)	DATE.	PROJECT NO
P.B. Hall, M. Bjorøy, J. Vigran	4.2.81	
	NO OF PAGES	NO. OF ENCLOSURE
DEPARTMENT: Organic Geochemistry	RESPONSIBLE SCIENTIST. P.B. Hall	

SUMMARY

See next page

KEY WORDS

Source rock

SUMMARY

The analysed sequence of the well was divided into zones:

Zone A; 1490-1820 m: The whole zone which consists of claystones with siltstones, is immature with a fair potential as a source rock for gas (particularly the grey-brown claystones).

Zone B; 1820-2000 m: This zone is immature. There are some TOC poor red-brown claystones in this zone, but there is a fair potential as a source rock for gas from grey and grey-brown claystones.

Zone C; 2000-2120 m: This zone is immature to moderate mature, and consists mostly of claystone with some sandstone, and also some siltstone and limestone and dolomite. Fair potential as a source rock for gas from claystones.

Zone D; 2120-2350 m: This zone is immature to moderate mature, and consists of claystones with some limestones and/or dolomites. There is a fair potential as a source rock for gas and oil.

Zone E; 2350-2695 m: This zone which consists mostly of claystone with some limestones is moderate mature. The interval has only a poor to fair potential for gas and oil. Cavings and large quantities of mud additives make interpretation difficult.

Zone F; 2695-2770 m: This zone is moderate mature and comprises some dark grey and brown-black claystones which have a rich potential as a source rock for oil and gas.

Zone G; 2770-2860 m: This zone is moderate mature to mature and includes some dark grey claystones and silty brown claystones towards the top of the interval and coal and carbonaceous claystones below. The dark grey claystones have a rich potential as a source rock for oil and gas. The carbonaceous claystones and coals have a good to rich potential as a source rock for gas and heavy oil.

Zone H; 2860-3115 m: This zone is mature and comprises mixed sandstone/claystone lithologies. It has a good to rich potential as a source rock for oil and gas in the interval from 2860-2950 metres (approximately), and a fair to rich potential as a source rock for gas and oil below this interval.

Zone I; 3115-3205 m: Mixed sandstone and claystone lithologies. This zone is mature. The claystones have a fair to good potential as a source rock for gas and oil.

Zones J, K, L, M; 3205-3565 m: Mixed sandstone and claystone (claystones only minor). This zone is mature with a fair potential as a source rock for gas.

EXPERIMENTAL AND DESCRIPTION OF INTERPRETATION LEVELS

Headspace gas analyses

One ml. of the headspace gas from each of the cans was analysed gas chromatographically for light hydrocarbons. The results are shown in Table 1a. The canned samples were washed with temperated water on 4, 2, 1 and 0.125 mm sieves to remove drilling mud and thereafter dried at 35°C.

Occluded gas

An aliquot of the 1-2 mm fraction of each sample before drying was crushed in water using an airtight ball mill, and one ml. of the headspace analysed chromatographically. The results are shown in Table 1b.

Total Organic Carbon (TOC).

Picked cuttings of the various lithologies in each sample were crushed in a centrifugal mill. Aliquots of the samples were then weighed into Leco crucibles and treated with hot 2N HCl to remove carbonate and washed twice with distilled water to remove traces of HCl. The crucibles were then placed in a vacuum oven at 50°C and evacuated to 20 mm Hg for 12 hrs. The samples were then analysed on a Leco E C 12 carbon analyser, 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 in a flow through system (Radke et al., 1978 (Anal. chem. 49, 663-665)) for 10 min. using dichloromethane (DCM) as solvent. The DCM used as solvent was distilled in an all glass apparatus to remove contaminants.

Activated copper filings were used 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 into saturated fraction, aromatic fraction and non hydrocarbon fraction using a MPLC system with hexane as eluant (Radke et al., Anal. Chem, 1980). The various fractions were evaporated on a Buchi Rotavapor and transferred to glassvials and dried in a stream of nitrogen. The various results are given in Table III-VI.

Gas chromatographic analyses.

The saturated fraction was diluted with n-hexane and analysed on a HP 5730 A gaschromatograph, fitted with a 25 m OV101 glass capillary column and an automatic injection system. Hydrogen (0.7 ml/min.) was used as carrier gas and the injection was performed in the split mode (1:20).

Vitrinite Reflectance.

Samples, taken at various intervals, were sent for vitrinite reflectance measurements to 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°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 samples were also analysed in UV light, and the colour of the fluorescing material determined. Below, a scale comparing the vitrinite reflectance measurements and the fluorescence measurements are given.

VITRINITE REFLECTANCE R. AVER. 546 nm 1516	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10
% CARBON CONTENT DAF.	57	62	70	73	76	79	80.5	82.5	84	85.5
LIPTINITE FLUOR nm	725	750	790	820	840		860	890	940	
EXC. 400 nm BAR. 530 nm colour	G	$G/_Y$	Y	$Y/_O$	L.O.		M.O.	D.O.	$O/_R$	R
zone	1	2	3	4	5		6	7	8	9

NOTE LIPTINITE NM = NUMERICAL MEASUREMENTS OF OVERALL SPORE COLOUR AND NOT PEAK FLUORESCENCE WAVELENGTH

RELATIONSHIP BETWEEN LIPTINITE FLUORESCENCE COLOUR, VITRINITE REFLECTANCE AND CARBON CONTENT IS VARIABLE WITH DEPOSITIONAL ENVIRONMENT AND CATAGENIC HISTORY. THE ABOVE IS ONLY A GUIDE. LIPTINITE WILL OFTEN APPEAR TO PROCESS TO DEEP ORANCE COLOUR AND THEN FADE RATHER THAN DEVELOP O/R RED SHADE. TERMINATION OF FLUORESCENCE IS ALSO VARIABLE.

Processing of Samples and Evaluation of Visual Kerogen

Crushed rock samples were treated with hydrochloric and hydrofluoric acids to remove the minerals. A series of microscopic slides contain strew mounts of the residue:

T-slide represents the total acid insoluble residue.
N-slide represents a screened residue (15 µmeshes).
O-slide contains palynodebris remaining after flotation ($ZnBr_2$) to remove disturbing heavy minerals.
X-slides contain oxidized residues, (oxidizing may be required due to sapropel which embeds palynomorphs, or to high coalification preventing the identification of the various groups).

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

Screened or oxidized residues are normally required to concentrate the larger fragments, and to study palynomorphs (pollen, spores and dinoflagellates) and cuticles 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 x63 objectives. By x63 magnification it is possible to distinguish single particles of diameters about 2 and, if wanted, to make a more refined classification of the screened residues (particles >15 µ).

The colour evaluation is based on colour tones of spores and pollen (preferably) with support from other types of kerogen (woody material, cuticles and sapropel). These colours are dependant upon the maturity, but also are under influence of the paleo-environment (lithology of the rock, oxidation and decay processes). The colours and the estimated colour index of an individual sample may therefore deviate from those of the neighbouring samples. The techniques in visual kerogen studies are adopted from (Staplin 1969 and Burgess 1974).

In interpretation of the maturity from the estimated colour indices we follow a general scheme that is calibrated against vitrinite reflectance values (R_o).

Ro	0.45	0.6	0.9	1.0	1.3
colour	2-	2	2+	3-	3
3+					
index					
Maturity	Moderate	Mature (oil window)			Condensate
intervals	mature				window

Rock-Eval Pyrolyses

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

RESULTS AND DISCUSSION

LIGHT HYDROCARBON ANALYSIS AND LITHOLOGY

On the basis of light hydrocarbon analysis and lithology the sequence analysed (1490-3565 metres) was divided into 13 zones which are:

A: 1490 - 1820 m
B: 1820 - 2000 m
C: 2000 - 2120 m
D: 2120 - 2350 m
E: 2350 - 2695 m
F: 2695 - 2770 m
G: 2770 - 2860 m
H: 2860 - 3115 m
I: 3115 - 3205 m
J: 3205 - 3250 m
K: 3250 - 3325 m
L: 3325 - 3490 m
M: 3490 - 3565 m

Zone A; 1490-1820 m: This zone comprises mostly claystones (grey and green-grey, silty) with minor carbonates. C_1 is abundant and dominates the C_1 - C_7 hydrocarbons and is probably what is termed diagenetic gas. Both C_1 - C_4 and C_5+ abundances vary considerably, but, are generally good and poor respectively. The wetness of the gas is low, while the isobutane/ n-butane ratio (iC_4/nC_4) is high. All the data indicate low maturity.

Zone B; 1820-2000 m: Again this zone consists mostly of claystones. This interval is, however, characterised by the presence of red-brown claystones. There is a fair abundance of C_1 to C_4 hydrocarbons and wetness increases particularly in one zone (1910-1940 m) with a fair abundance of C_5+ hydrocarbons associated with a change in lithology from claystones to mixed claystone and sandstone. The iC_4/nC_4 ratio shows a gentle decrease with increasing depth.

Zone C; 2000-2120 m: The abundance of C_1 - C_4 hydrocarbons is similar to the lower part of zone C while the abundance of C_5+ hydrocarbons and the wetness of the gas show a sharp increase. The iC_4/nC_4 ratio is markedly

lower in this zone compared to the zones above. These results indicate an influx of heavy, migrated hydrocarbons into the sandstone/siltstone interval in this zone.

Zone D; 2120-2350 m: This zone consists mostly of claystones with carbonates (dolomites and cream-white chalk) and minor sandstones. The abundance of the C_5+ hydrocarbons and the wetness of the gas drop sharply in this zone while the abundance of the C_1 - C_4 hydrocarbons and the iC_4/nC_4 ratio increase slightly. The changes are probably due to the changes noted in the lithology. The main lithology in this zone is claystone, but some carbonate lithologies develop towards the base of this zone.

Zone E; 2350-2695 m: This zone consists mostly of claystone with minor carbonates and some sandstone. Mostly fair gas abundances with wetness slowly increasing and iC_4/nC_4 gradually decreasing. The jump in wetness at 2350 metres is perhaps due in part to the state of the samples. The quality of the samples from this zone was very poor. Below 2350 metres a number of samples consist mostly of cement and mud additive, while others had such a low quantity of cuttings that accurate analysis was not possible.

Zone F; 2695-2770 m: This interval is characterised by the development of dark grey and brown-black fissile claystones. This zone has rich C_1 - C_7 gas abundances, wetness is high and the iC_4/nC_4 ratio is at a minimum. The very high gas abundances in association with high wetness and low iC_4/nC_4 indicate the presence of migrated hydrocarbons.

Zone G; 2770-2860 m: This interval contains some coal and carbonaceous claystones, as well as grey claystones and some fine grained silty sandstones. C_1 - C_7 gas abundances are again high but falling off the maxima obtained in zone D. Wetness also decreases from the maxima in zone D and the iC_4/nC_4 ratio increases sharply around 2770 metres and is generally greater than in zone D. The coal interval is probably the main source of the gas.

Zone H; 2860-3115 m: This consists of a mixed claystone (mostly grey) and sandstone sequence, with some silty dark grey and brown-black claystones. C_1 - C_4 gas abundances are high, but fall throughout this zone which mirrors the increase in sandstone lithologies. Cuttings gas contents are

negligible; iC_4/nC_4 remain stable and C_5+ hydrocarbon abundance is high and remains stable throughout the zone. This, together with the high wetness indicates that the zone contains migrated hydrocarbons.

Zone I; 3115-3205 m: The abundance of both $C_1 - C_4$ and C_5+ hydrocarbons drops sharply in this zone compared with the zone above. This zone consists mostly of sandstone with some claystone. Wetness and iC_4/nC_4 ratios are relatively stable. This could indicate that the zone contains some migrated hydrocarbons.

Zone J; 3205-3250 m: The abundance of $C_1 - C_4$ hydrocarbons is relatively constant and similar to zone J while the abundance of C_5+ hydrocarbons shows a steady decrease with increasing depth. The wetness of the gas is also found to drop sharply compared to zone J. The zone consists mainly of sandstone and it does not show any signs of migrated hydrocarbons.

Zone K; 3250-3325 m: The abundance of $C_1 - C_4$ hydrocarbons is markedly higher than in zone I and J, but is very irregular. Similar irregularity is also found in the other parameters. The zone consists of some claystone and sandstone and it is believed that the irregularity is caused by the claystone.

Zone L; 3325-3490 m: The abundance of both the $C_1 - C_4$ and C_5+ hydrocarbons are very low (from poor to fair). This together with a very low gas wetness indicates that the sandstone does not contain any migrated hydrocarbons.

Zone M; 3490-3565 m: This zone is characterised by the development of mostly brown to red-brown and green-grey, silty claystones within a sandstone sequence. The abundance of both $C_1 - C_4$ and C_5+ hydrocarbons increases sharply at 3510 m then to decrease while the wetness of the gas shows a steady increase throughout the zone. This could indicate migrated hydrocarbons from a sand lense in the claystone sequence from 3510 m. The samples contain claystone and sandstone and it is possible that a small sandstone lense would contain some migrated hydrocarbons.

TOTAL ORGANIC CARBON (TOC)

Zone A: In the interval from 1490 to 1620 metres silty claystones are common, and some coal fragments occur. The TOC values are greatest in this

part of the zone, varying from 1 to 2% (fair to good). In the rest of the zone generally less than 1% TOC (fair). Grey-brown claystones and the occasional band of dark grey claystone are richest in TOC with values up to 2%. Green-grey claystones average around 0.6%, and grey 0.6 to 1%.

Zone B: Contains mixed claystone lithologies with colours varying from red-brown, cream-white, grey, green-grey and grey-brown. Generally grey claystone dominates and TOC values are less than 1% (poor to fair). The red-brown claystones are very low in TOC (< 0.3%) while grey-brown claystones contain up to 1.5% TOC.

Zone C: Contains variable claystone types. TOC values are less than 1%.

Zone D: Similar to zone C. Limestones contain less than 1% TOC.

Zone E: Similar values to zone C, except for two samples with values greater than 1% TOC, which probably consist mostly of caved material.

Zone F: Dark grey and brown-black fissile claystones are rich in organic carbon with values up to 11% (good to rich) recorded. Grey claystones associated with these claystones generally average less than 1% (fair).

Zone G: Includes dark grey, silty brown-black, carbonaceous, brown silty, waxy grey-brown, and grey claystones and coals, and silty sandstones. The dark grey, silty brown-black claystones and waxy grey-brown claystones have similar (combined) TOC values to those of zone D, i.e. good to rich. The TOC values of the carbonaceous claystones vary considerably depending on the amount of coal present, i.e. from 10-60% TOC.

Zone H: Contains some dark grey and brown silty claystone but consists predominantly of grey claystone and sandstones. Claystone TOC values vary from 0.6 up to 8.9 (generally fair to good). A general decrease in organic carbon value is evident with increasing depth.

Zone I: The lithology of zone J is similar to zone I but the claystone in this zone is found to have markedly lower TOC values.

Zones J, K, L: Almost entirely sandstone.

Zone M: The TOC values of the claystone in this zone vary considerably, from 0.2 - 1%, but most of the samples are found to have a poor to fair abundance, with red-brown and green claystones containing less than 0.5% TOC.

EXTRACTION AND CHROMATOGRAPHIC SEPARATION

Eighteen samples were extracted and the extractable organic matter (EOM) was chromatographically analysed. The samples from each zone are described below.

Zone A & B: No samples were taken for extraction.

Zone C: One sample was analysed (K 6511, 2105-2120 metres). It has a good abundance of EOM, and a fair abundance of extractable hydrocarbons and a moderate saturated to aromatic hydrocarbon ratio. Hydrocarbons constitute a large proportion of the extractable material (46.5%) for such an immature sample (see maturation data from microscopical studies). The sample also has a low CPI for an immature sample (1.2). The normal alkane distribution from nC_{14} to nC_{35} displays a bimodal distribution with a minor maximum at nC_{18} and the major maximum around nC_{23} - nC_{25}. The normal alkanes from nC_{21} - nC_{29} dominating. The normal alkane distribution, low pristane/nC_{17} and high pristane ratio indicates an input of relatively mature hydrocarbons of terrestrial and reworked material.

Zone C: One sample was extracted from this zone (K 6523, 2285-2300 metres) consisting mostly of grey and green-grey claystones. K 6523 has a rich abundance of EOM and a high EOM/TOC for an immature - moderate mature sample. The hydrocarbon content is low (fair to good), but with a low saturated to aromatic hydrocarbon ratio. The normal alkane distribution is dominated by the higher molecular weight compounds between nC_{21} and nC_{31}, with a maximum at nC_{23} -nC_{25}. The CPI is, however, rather low for an immature sample. The EOM of this sample would appear to be essentially derived from terrestrial debris and probably some reworked material.

Zone D: No sample from zone D were analysed.

Zone E: One sample (K 6543, 2570-90 metres) was extracted and found to have a poor abundance of EOM normalized to TOC but with a high percen-

tage of hydrocarbons (H/C-TOC fair to good). High molecular weight normal alkanes from nC_{18} to nC_{31} dominate with the maximum between nC_{20} and nC_{22} and the CPI is low. This sample would also appear to be derived from terrestrial debris and probably much reworked material as indicated by the dominant hydrocarbons around C_{21} - C_{22} which often are characteristic of matured or inertinitic samples.

Zone F: Four samples were analysed from this zone (K 6552, 2695-2710 metres; K 6551, 2710-2725 metres; K 6554, 2740-2755 metres; K 6555, 2755-2770 metres). These samples show similar trends. They are all rich in EOM and the hydrocarbons normalized to TOC are also high in abundance (good to rich). The hydrocarbons constitute a large proportion of the EOM, i.e. from 40 to 81%. The last sample from this interval (K 6555, 2755-2770 metres) has a much higher EOM/TOC value than the other three, and the EOM consists almost exclusively of saturated hydrocarbons, which indicates that migration has occurred. The gas chromatograms of the saturated hydrocarbon fractions show a unimodal front biased distribution (C_{12} - C_{18} dominant) with pristane/nC_{17} ratios almost equal to 1 and low CPI's. Although the normal alkanes from nC_{18} to nC_{29} are more prominent in K 6554 (which also has the highest pristane/phytane ratio), generally the data indicate the presence of moderate mature amorphous kerogen.

Zone G: Three samples were analysed from this zone (K 6559, coal 2815-2830 metres; K 6560, 2830-2845 metres; K 6566, carbonaceous claystone, 2845-2860 metres). These three samples are rich in EOM, however, the EOM values are lower than for those samples in zone D, except for K 6566 which is a coal/carbonaceous shale. Amounts of saturated and total hydrocarbons (poor to fair) are characteristic of coals and carbonaceous claystones; they are generally lower than in sapropelic sediment. Samples K 6559 and K 6560 have low saturated to aromatic ratios while sample K 6566 has a somewhat higher value. The gas chromatograms of the saturated hydrocarbons of the last two samples show certain characteristics typical of terrestrial material; high pristane/phytane ratios and normal alkane distributions dominated by higher molecular weight compounds from nC_{19} to nC_{29}, with n-alkanes at nC_{23} and/or nC_{25} dominant. Sample K 6559 has an unusual gas chromatogram for a presumably mature coal. Bulk parameters such as EOM/TOC and saturated hydrocarbon content are similar to the other samples from this zone. However, the gas chromatogram is different to them in some respects. The higher normal alkanes from nC_{23}

to nC_{31} dominate, but the predominant normal alkanes are at nC_{27} and/or nC_{29} with a higher CPI. Pristane/phytane ratio is low and there are a number of additional hydrocarbons occuring in regions between nC_{13} - nC_{15} and nC_{18} - nC_{21}. These facts suggest either a contaminated sample, with mud additives such as lignite or, an unusual kerogen composition.

Zone H: Seven samples were taken from this zone (K 6567, 2860-2875 metres; K 6568, 2875-2890 metres; K 6569, 2890-2905 metres; K 6573, 2950-2965 metres; K 6574, 2965-2980 metres; K 6577, 3010-3025 metres; K 6579, 3040-3055 metres). The first group of samples (K 6567, 68, 69) have EOM abundances which are generally high (good-rich). The EOM/TOC values are, however, somewhat variable. The samples in this group have high saturated and total hydrocarbon concentrations (as in zone E) particularly K 6567 and 6568. The second group (K 6573, 74) have higher EOM values than the first group, but with the hydrocarbons constituting a smaller proportion of the total EOM. In the last group the first sample is comparable with those in the second group, in both EOM and percentage of hydrocarbons. The other sample has a lower EOM value. The saturated/aromatic hydrocarbon ratio varies only slightly for the samples within this zone (Table VI) except for the last, suggesting a simularity of the kerogen type. The gas chromatograms of these samples all suggest a major contribution to the EOM comes from moderate mature/mature terrestrial material with some having a slightly greater amorphous kerogen content than others. Thus, samples K 6574 and K 6577 show more front end bias (i.e. normal alkanes from nC_{12} - nC_{18} dominant). The gas chromatogram of the saturated hydrocarbon fraction of K 6579 suggests a well matured sample derived mostly from terrestrial material, i.e. with normal alkane envelopes between nC_{15} and nC_{25} with a maximum around nC_{19} - nC_{21}. This sample and the one sample immediately above also have low pristane/nC_{17} and pristane/phytane ratios.

Zone J: One sample (K 6590, 3205-20 metres) was extracted and found to have a fair/good abundance of extractable hydrocarbons, while the extractability normalized to organic carbon is poor to fair. The hydrocarbons have a moderate saturated/aromatic ratio. The gas chromatogram of the saturated fraction indicate a mixed terrestrial/ amorphous input, which is well matured.

EXAMINATION IN REFLECTED LIGHT

The vitrinite reflectance measurements indicate a relatively uniform gradient down to approximately 2650 m. From this level, down to approximately

2850 m, the reflectance values are lower than at 2650 m. These samples are all heavily stained and this will normally lower the reflectance values. The sample from 2845 m is, however, coal and the results should therefore be reliable. From 2850 m to T.D the gradient is again uniform.

Twenty-five samples were analysed in white and ultra-violet reflected light. Each sample is described and information from the analyses, i.e. vitrinite reflectance values and fluorescence colours are given.

K 6487, 1520-1550 m: Shale and carbonate, Ro = 0.35 (16)
The sample has bitumen wisps and light bitumen staining, otherwise it contains traces of vitrinite particles and wisps. UV light shows a yellow-orange fluorescence from spores and hydrocarbon specks, and a low exinite content.

K 6493, 1730-1760 m: Shale, Ro = 0.36 (4)
The sample has bitumen wisps and blebs and shows light bitumen staining. Otherwise traces only of vitrinite particles and one reworked particle. UV light shows a yellow to yellow-orange fluorescence from spores and a moderate exinite content.

K 6497, 1850-1800 m: Shale, Ro = 0.42 (5)
The sample shows light bitumen staining with bitumen wisps and blebs. Otherwise there are only traces of vitrinite. UV light shows a yellow to yellow-orange fluorescence from spores and a low exinite content.

K 6505, 2015-2030 m: Shale and carbonate, Ro = 0.38 (4)
The sample contains 50% of haematitic stained cuttings, and the red-brown cuttings and the carbonate are barren. Bitumen wisps are present in a few shale cuttings, and there are a handful of vitrinite particles. UV light shows a light orange fluorescence from spores and a low to moderate exinite content.

K 6511, 2105-2120 m: Shale, Ro = 0.45 (14)
The sample contains only traces of organic material, including bitumen wisps and blebs and a very few particles of vitrinite and reworked material. UV light shows a yellow-orange to light orange fluorescence from spores and hydrocarbon specks and a low exinite content.

K 6520, 2240-2255 m, Shale, Ro = 0.37 (4) and Ro = 0.87 (1)
The sample contains bitumen wisps and light bitumen staining, otherwise

there is only a trace of vitrinite and reworked particles. UV light shows a yellow to light orange fluorescence from spores and a low exinite content.

K 6527, 2345-2349 m: Shale, Ro = 0.51 (7)
The sample contains only traces of organic material and one coal cutting. There are a few vitrinite particles and traces of reworking, and an occasional bitumen wisp. UV light shows a light to mid-orange fluorescence from spores and a low exinite content.

K 6535, 2455-2470 m: Limestone and shale, Ro = 0.50 (2)
Organic material in this sample is restricted to the shale. There is a low content of small particles of inertinite and reworked material, and only one vitrinite particle located (2 readings). UV light shows hydrocarbons dissolving in immersion oil and hydrocarbon droplets and no exinite.

K 6541, 2545-2560 m: Shale and carbonate, Ro = 0.48 (1) and
Ro = 0.72 (2)
This sample has a low organic content with gnarled particles of inertinite and reworked material. The three lowest reflecting particles were measured (possibly true vitrinite). UV light shows a light orange fluorescence from spores and only traces of exinite.

K 6547, 2635-2650 m: Limestone and shale, Ro = 0.54 (4)
This sample has a low organic content with gnarled particles of inertinite and reworked material, and a few possible vitrinite specks. UV light shows a yellow-orange to mid-orange fluorescence from spores and a low exinite content.

K 6552, 2695-2710 m: Shale, Ro = 0.29 (5) and Ro = 0.49 (14)
The sample is pyritic, and shows bitumen staining and wisps. Otherwise there is a low to moderate content of inertinite and reworked particles with traces of true vitrinite particles. UV light shows a light to mid-orange fluorescence from spores and bitumen wisps and a moderate exinite content.

K 6551, 2710-2725 m: Shale, Ro = 0.47 (20)
The sample shows variable strong bitumen staining and bitumen wisps. Otherwise, there is a moderate content of inertinite and reworked material with subordinate vitrinite particles. UV light shows a light to mid-orange fluorescence from spores and a moderate exinite content.

K 6554, 2740-2755 m: Shale and carbonate, Ro = 0.46 (23)
The sample is pyritic and has a moderate organic content. The sample shows heavy bitumen staining and bitumen wisps. Particles of inertinite and reworked material are dominant but there are some vitrinite particles and wisps. UV light shows a light to mid-orange fluorescence from spores and a low to moderate exinite content.

K 6556, 2770-2785 m: Shale, Ro = 0.44 (20)
The sample has a moderate organic content, consisting mostly of inertinite and reworked particles. There are a few good vitrinite particles and bitumen wisps. The reflectance values are somewhat variable. UV light shows a mid-orange fluorescence from spores and traces of exinite.

K 6558, 2800-2815 m: Shale, Ro = 0.46 (18)
The sample has a low organic content with bitumen wisps. Particles of inertinite and reworked material are dominant and there are a few good wispy particles of vitrinite. UV light shows a mid-orange fluorescence from spores and a low exinite content.

K 6560, 2830-2845 m: Shale, Ro = 0.44 (22)
The sample contains some cuttings which show strong bitumen staining. Otherwise there is a low to moderate content of inertinite and reworked particles, and there are some good vitrinite wispy particles and wisps. UV light shows a light to mid-orange fluorescence from spores and a low exinite content.

K 6566, 2845-2860 m: Shale and coal, Ro = 0.65 (22) on the coal.
The coal is rather brecciated and inertinite-rich. The shale shows variable bitumen staining with inertinite particles dominant. UV light shows a mid-orange fluorescence from spores and a low to moderate exinite content.

K 6570, 2905-2920 m: Shale and coal traces, Ro = 0.56 (21)
The sample has a moderate organic content, with about equal proportions of vitrinite and inertinite. There are some good vitrinite wisps and is almost a carbargillite in some cuttings, and there are some bitumen wisps. UV light shows a mid to deep orange fluorescence from spores and a low to moderate exinite content.

K 6572, 2935-2950 m: Shale and carbonate, Ro = 0.67 (20)
The sample has a low organic content with inertinite and reworked partic-

les and the occasional particle of vitrinite. The sample shows variable bitumen staining. UV light shows a mid-orange fluorescence from spores and a low exinite content.

K 6575, 2980-2995 m: Shale and coal traces, Ro = 0.69 (21)
The sample generally has a low organic content, but is very variable from cutting to cutting. There are some good vitrinite wisps and stringers in the shales but inertinite and reworked material is dominant. There is light bitumen staining. UV light shows a mid-orange fluorescence from spores and a moderate exinite content.

K 6580, 3055-3070 m: Calcareous shale and carbonate, Ro = 0.67 (20)
The sample has a low organic content, and contains an equal proportion of wispy particles of vitrinite and inertinite and reworked particles. There are occasional bitumen wisps. UV light shows a mid-orange fluorescence from spores and a low exinite content.

K 6586, 3145-3160: Shale, Ro = 0.65 (20)
The sample has a low organic content with a few inertinite particles with subordinate vitrinite and bitumen wisps. UV light shows a mid-orange fluorescence from spores and hydrocarbon wisps and only traces of exinite.

K 6589, 3190-3205 m: Shale, Ro = 0.72 (20)
The sample has a low organic content, with a few particles of inertinite and vitrinite wisps in about equal proportions. There are some bitumen wisps. UV light shows a light to deep orange fluorescence from spores and hydrocarbon wisps and a low exinite content.

K 6598, 3325-3340 m: Calcareous shale and carbonate, Ro = 0.69 (21)
The sample has a low organic content with inertinite and vitrinite wispy particles. There is a light bitumen staining and there are a few coal cuttings. UV light shows a deep orange fluorescence from spores and hydrocarbon wisps and only traces of exinite.

K 6607, 3460-2471 m: Shale, Ro = 0.56 (1)
Most cuttings in this sample show haematitic staining. The sample is virtually barren of organic material. One vitrinite wisp and two inertinite particles were found in a few unstained cuttings. UV light shows no fluorescence from organic material.

ANALYSES IN TRANSMITTED LIGHT
VISUAL KEROGEN ANALYSIS

The acid insoluble remains in this well have been studied on the basis of 24 samples. There is some uncertainty as to the interpretation of material from intervals with lithologies poor in organic matter.

The subdivision of the well is based on kerogen characterization and facies interpretations, together with a brief evaluation of the age of the dominant fossil assemblage observed. However, we have not had access to such information from logs. On the basis of kerogen composition we distinguish three main intervals: 1520 to 2710 m, which is marine and may be further subdivided in 1520 to 1730 m, immature, 1850 to 2120 m, dominantly marine and moderate mature, 2240 to 2650 m, partly very small organic residues with stronger influx from terrestrial sources and moderate mature, 2695 to 2710 m, dominantly marine sapropel, strongly sapropelized and moderate mature. The interval 2710 to 2955 m which is mature, shows marine conditions, it is variably rich in organic matter and under more deltaic influence. The lowest interval, 3055 to 3475 m again is more marine, and mature to oil window maturity.

Interval 1520 to 1730 m:
The residues contain dominantly amorphous material that is recorded mainly as aggregates. The terrestrial influx, indeterminate herbaceous and woody structures, is estimated to about 10%. Dinoflagellate cysts present are well preserved.
Colour index: 1/1+ (immature) for deposits with possibilities for oil formation.

Interval 1850 to 2120 m: The residues consist mostly of amorphous material that is recorded as aggregates. Relatively, the amount of woody reworked particles may be increased, but the terrestrial influx is estimated as 10 to 15% of the residue. Tertiary pollen and cysts dominate and are well, or fairly well preserved.
Colour index: 2-/2 (moderate mature). The reading may be somewhat too high if the colour is influenced by a carbonatic lithology. Prospects for oil generation.

Interval 2240 to 2650 m: The residues of this intervals are very small. They are dominated by amorphous material, which we suspect partly to be

derived from higher levels of the well. The terrestrial influx re-presents 20 to 50%, mainly indeterminated herbaceous and woody material together with some clearly reworked woody or coaly material. Mud additives (nut shells) are present. Dinoflagellate cysts are derived mostly from Cretaceous deposits, but there are also Tertiary pollen. The cysts are often darkly stained. Colour index: 2-/2 or 2 (moderate mature to mature). Due to the lithological control there are variations in maturation/oxidation of the individual samples of this interval. If richer there would have been good possibilities for oil and gas generation.

Sample 2695 to 2710 m: Sapropel and strongly sapropelized terrestrial material dominate this small residue and occur together in aggregates.
Colour index: 2-/2 (moderate mature).

Interval 2710 to 2755 m: Fairly large residues where terrestrial material apparently dominates, but true sapropel and sapropelized cuticular fragments are difficult to distinguish from another as they appear together in dense aggregates. There is much pyrite. Pollen are distinguished, but generally of poor preservation. Some reworked material.
Colour index: 2-/2 or 2 (moderate mature to mature). Potential for gas and oil.

Interval 2770 to 2845 m: The residues are fairly small and consist of 25 to 50% amorphous matter. The terrestrial remains are dominantly of woody nature. However, the presence of mud additives and of Tertiary pollen together with fossils of Jurassic/Cretaceous age reduce the reliability of the facies evaluation.
Colour index: 2/2+ (mature). Potential for gas and oil generation.

Interval 2845 to 2950 m: The residues are large to fairly small. Terrestrial material of woody and coaly (reworked) nature dominates above, cuticular below. The amorphous part increases from 25% on top to 50% at the base of the interval. Middle to Late Jurassic palynomorphs, but are poorly preserved.
Colour index: 2/2+ or 2+ (mature) for deposits with potential for gas and oil, more oil prone at the base of the interval.

Sample 3055-70 m: The residue contains equal amounts of amorphous and terrestrial material. Some mud additives or caved material were observed

among pollen and cysts of Early Jurassic nature.
Colour index: 2+ or 2+/3- (oil window maturity) for deposits with potential for oil and gas generation.

Interval 3145-60 m: 40-50% sapropel as for the sample above, but a large relative increase of reworked woody material in terrestrial assemblages mainly consisting of indeterminate herbaceous material. There is also material caved from higher levels. The preservation is fair to poor. There seem to have been more low energy stagnant conditions towards the lowest part of the interval where the herbaceous material is more sapropelized and includes pyrite.
Colour index: 2+/3- or 3- (oil window maturity) for deposits with possibilities for gas and oil generation.

Sample 3460-75 m: A very small residue, 50% amorphous material, the rest is a mixture of cuticles and indeterminated herbaceous particles. The residue could well be derived from above lying layers.
Colour index: 2+/3-.

ROCK-EVAL PYROLYSES

A total of 44 samples from the analysed sequence in this well were taken for Rock-Eval analysis. The results are discussed below.

Zone A: Three samples from this zone were analysed and all show a high oxygen index and a low hydrogen index characteristic for immature type 3 kerogens. However, they show slightly higher hydrogen index values than in the zone immediately below and this zone constitutes a sequence with fair potential for oil and gas.

Zones B, C, D, E: Eighteen samples were analysed from these zones, all show a high oxygen index and low hydrogen index indicating predominantly type 3 kerogens. T_{max} values suggest that these samples are moderate mature. Three intervals in this zone have samples with high production index values (1880-2015, 2240-2345 and 2545-2620 metres) suggesting that some migrated hydrocarbons are present in these zones. Generally poor to fair petroleum potential.

Zone F: Four samples were analysed from this zone. These samples show a much higher hydrogen index than in zone C, and are moderate mature from

T_{max} values suggesting that these samples contain mostly type 2 kerogens with some type 3. They have a good to rich potential for gas and oil. The production index is low for these samples indicating that they have only yielded a small part of their potential hydrocarbon content.

Zone G: Eight samples were analysed from this zone. These samples generally show a lower hydrogen index than those in zone F (except for the first sample K 6556). This indicates a larger input of type 3 kerogen. Petroleum potential is fair to good. T_{max} values indicate that these samples are moderate mature and the production index is low, except for K 6557, a TOC poor grey claystone with high production index indicating the presence of migrated hydrocarbons.

Zone H: Ten samples were analysed from this zone. Hydrogen index values are low and oxygen index high indicating predominantly type 3 kerogens, although there are exceptions notably K 6569, K 6570, K 6573, K 6574 and K 6575 which have a fair to good petroleum potential. T_{max} values indicate that these samples are moderate mature to mature. Production index values are generally low indicating only early hydrocarbon generation. There is a slight jump in production index values below 2950 metres indicating that the major generation of hydrocarbons has begun.

Zones I, J, K, L, M: One sample was analysed from this zone and was found to be of a type 3 kerogen. T_{max} and production index values indicate that the zone is mature (oil window).

CONCLUSIONS

The maturity of the analysed samples from this well 30/3-2 is mainly based on vitrinite reflectance, spore fluorescence, kerogen colour in transmitted light and T_{max} values from Rock-Eval analysis. The richness of the samples is based on TOC, Rock-Eval pyrolyses with additional evidence being supplied from light hydrocarbon concentrations and the abundance of extractable hydrocarbons. Source rock quality is based mostly on Rock-Eval pyrolyses with additional evidence coming from visual kerogen examination and from the saturated hydrocarbon gas chromatograms.

Zone A, 1490-1820 m: Consists mostly of claystones and siltstones (marine from visual kerogen). The whole zone is immature and mostly early diagenetic methane was detected. The visual kerogen consists mostly of amorphous material with only 10% terrestrial material. Rock-Eval pyrolysis suggests a predominantly type 3 kerogen. The variance in interpretation is probably due in part to the amorphous material being derived from the sapropelization of terrestrial organic matter. Based on this the zone appears to have a fair potential for gas and oil.

Zone B, 1820-2000 m and zone C, 2000-2120 m: Consists mostly of claystone (of mostly marine origin from visual kerogen) with some very low TOC red-brown and cream-white silty (kaolinitic) claystones and sandstones. These two zones are immature to moderate mature. High C_5 - C_7 gases in sandstones in zone C suggest some migration has occurred. Rock-Eval pyrolyses indicate predominantly type 3 kerogens, and the one saturated hydrocarbon gas chromatogram (K 6511) indicates a minor contribution from amorphous material. A poor potential for oil, although visual kerogen suggests some petroleum potential (perhaps mostly gas).

Zone D, 2120-2350 m and zone E, 2350-2695 m: Consists mostly of claystone with some carbonates (variable type, dolomite/chalk). Visual kerogen, vitrinite reflectance and spore fluorescence all indicate that these two zones are immature to moderate mature and moderate mature respectively. Kerogens are dominantly type 3 with much reworked material with only a poor potential for gas and oil. Although TOC values are fair around 2350 metres, cuttings samples from this interval may be mostly cavings, thus the light hydrocarbon data here will be of doubtful value.

Zone F, 2695-2770 m: Consists mostly of claystone and some siltstone. Includes a mixture of grey claystone and dark grey and brown-black fissile (silty in part) claystones (marine from visual kerogen analysis). The dark grey and brown-black claystones are rich in TOC (up to 11%). Kerogen consists of some sapropelized terrestrial material but mostly type 2 kerogen (from visual kerogen and Rock-Eval analysis). Light hydrocarbons are rich in this zone and wetness and iC_4/nC_4 ratio indicates a mature zone with indications of migrated hydrocarbons. According to visual kerogen analysis the zone is moderate mature to mature. Vitrinite reflectance records low values (moderate mature) which is probably as a result of high bitumen content which interferes with vitrinite measurements, i.e. produces lower values. Rock-Eval T_{max} values are low in this zone compared to the zone above and indicate a difference in organic matter type. Visual kerogen analysis indicates an increase in colour in this zone, probably due to sapropelization of the mixed terrestrial and marine organic matter. The extractable organic matter content, saturated hydrocarbon gas chromatograms and Rock-Eval potential indicate a good to rich potential for oil and gas.

Zone G, 2770-2860 m: Characterised by the occurence of carbonaceous claystone and a coal which, from reflected light microscopy, is rich in inertinites. Visual kerogen analysis shows that there is much woody and herbaceous material, spores, pollen and cysts, and indicates variable marine/deltaic environments. Rock-Eval analysis indicates type 3 kerogens with a good potential for gas and some heavy oil. This zone is mature.

Zone H, 2860-3115 m and Zone I, 3115-3205 m: Consists of a mixed lithology, mostly sandstones and claystones with some dark grey and brown silty claystones (probably not caved) near the top of zone H. Sandstones with oil stain and indications of free hydrocarbons in claystones were observed in the samples 3145-3160 m, 3190-3205 m (from reflected light microscopy). From visual kerogen analysis the proportion of amorphous to terrestrial material increases going down this interval from 2845 metres to 2950 metres. Gas chromatograms of the saturated hydrocarbons and Rock-Eval indicate a more erratic trend with mostly type three kerogens indicated.

The zone down to 2950 metres is mature and has a good potential for oil

and gas. The remainder of these two zones which are mostly mature (oil window) with a good/rich potential for gas generation with some oil.

Zones J, K, L, M: 3205-3250 m, 3250-3325 m, 3325-3490 m and 3490-3565 m: These zones consist mostly of sandstones, with minor amounts of low TOC claystones which are mature (oil window). In zones K and L there are indications of migrated hydrocarbons. Kerogens mostly type 3 with a fair potential for gas.

IKU

TABLE IX

ROCK EVAL PYROLYSES

IKU No.	DEPTH (m)	S1	S2	S3	TOC (%)	HYDR. INDEX	OXYGEN INDEX	OIL OF GAS CONTENT S1+S2	PROD. INDEX S1/(S1+S2)	TEMP. max (C)
K6487	1520	.21	1.85	2.98	1.83	101	163	2.06	.10	429
K6490	1640	.08	1.10	3.48	1.99	55	175	1.18	.07	435
K6493	1730	.08	1.66	2.71	1.78	93	152	1.74	.05	432
K6498	1880	.11	1.16	3.35	1.83	63	183	1.27	.09	428
K6498	1880	.05	.21	3.72	.56	38	664	.26	.20	435
K6503	1985	.15	.45	2.50	1.20	37	209	.60	.25	435
K6505	2015	.15	.31	2.38	.71	44	336	.46	.32	437
K6511	2105	.12	.68	2.04	.94	72	217	.79	.15	435
K6515	2165	.15	.52	2.02	.65	80	311	.67	.22	433
K6520	2240	.08	.13	2.71	.70	18	388	.21	.39	438
K6523	2285	.10	.38	3.17	.78	48	406	.47	.20	437
K6527	2345	.08	.09	2.31	1.49	6	155	.18	.48	433
K6529	2365	.08	.99	3.68	1.32	75	279	1.07	.07	433
K6535	2455	.15	.86	2.25	.73	117	308	1.00	.15	438
K6541	2545	.10	.09	1.68	.50	18	336	.19	.53	435
K6543	2570	.12	.31	2.46	.87	36	283	.44	.28	442
K6546	2620	.10	.08	2.44	.76	11	321	.19	.55	440
K6552	2695	2.85	28.99	3.05	7.48	388	41	31.84	.09	434
K6551	2710	5.03	47.72	2.12	10.77	443	20	52.75	.10	436
K6554	2740	2.02	19.19	2.26	6.52	294	35	21.21	.10	432
K6555	2755	3.03	25.61	2.45	8.45	303	29	28.64	.11	431
K6556	2770	2.84	25.35	2.36	7.02	361	34	28.18	.10	433
Dark-grey CLAYSTONE										
K6556	2770	1.62	14.55	9.82	10.99	132	89	16.17	.10	434
CARBONACEOUS CLAYSTONE										
K6557	2785	.13	.11	2.10	.60	18	350	.24	.53	437
K6558	2800	.74	6.32	2.17	2.72	233	80	7.06	.10	436

IKU

TABLE IX

ROCK EVAL PYROLYSES

IKU No.	DEPTH (m)	S1	S2	S3	TOC (%)	HYDR. INDEX	OXYGEN INDEX	OIL OF GAS CONTENT S1+S2	PROD. INDEX S1/(S1+S2)	TEMP. max (C)
K6559	2815	.72	5.29	1.90	2.55	207	74	6.01	.12	437
Dark-grey CLAYSTONE										
K6559	2815	.18	9.76	14.92	11.57	84	129	9.94	.02	435
CARBONACEOUS CLAYSTONE / COAL										
K6560	2830	1.37	12.20	1.95	4.65	262	42	13.57	.10	437
K6566	2845	18.24	127.36	7.65	62.84	203	12	145.60	.13	442
COAL	coal									
K6567	2860	.42	2.62	1.32	2.79	94	47	3.04	.14	445
K6568	2875	.18	.92	1.79	1.22	75	147	1.10	.17	441
K6569	2890	1.23	10.09	.97	10.05	100	10	11.32	.11	445
K6570	2905	.88	6.33	2.01	4.51	140	45	7.21	.12	442
K6572	2935	.25	1.17	2.13	1.51	77	141	1.42	.18	444
K6573	2950	.37	2.91	2.12	2.38	122	89	3.28	.11	442
K6574	2965	1.03	10.09	1.37	7.80	129	18	11.12	.09	439
K6575	2980	.50	4.10	1.62	2.40	171	67	4.60	.11	444
K6577	3010	.56	2.61	2.47	1.76	148	140	3.16	.18	442
K6579	3040	.51	1.78	2.33	1.38	129	169	2.29	.22	443
K6584	3115	.20	1.17	2.48	1.12	104	221	1.37	.15	445
K6587	3160	.21	.67	1.83	.71	94	258	.88	.24	447
K6590	3205	.14	.55	1.99	1.21	45	164	.69	.21	443
K6597	3310	.16	1.09	2.86	.92	118	310	1.25	.13	450
K6611	3520	.06	.19	1.76	.70	27	251	.25	.26	453

IKU

TABLE NO.: VIII D

VISUAL KEROGEN ANALYSIS

WELL NO.: 30/3-2

Sample	Depth	Composition of residue	Particle size	Preservation - palynomorphs	Thermal maturation index	Remarks
K 6580	3055-70	Am/He,Cut,W,P,WR!	F	fair to good	2+/3-	Mud additives suspected. Early Jurassic palynomorphs.
K 6586	3145-60	He,P,S/Am	F-M-L	fair to good	1/1+, 3-	Mud additives or caved material suspected. Reworked/oxidized material present.
K 6589	3190-3205	WR!,He,W/Am	F-M-L	fair to poor	2+/3-	Much reworked woody/coaly material.
K 6598	3325-40	Am/He,W,P	F-M	fair to poor	2+/3-	Sapropelized terrestrial material, pyrite.
K 6607	3460-75	Am/Cut,He,W	F-M	poor	2+/3-	

ABBREVATIONS

Am	amorphous	Cy	cysts, algae	W	woody material	F	fine
He	herbaceous	P	pollen grains	C	coal	M	medium
Cut	cuticles	S	spores	RI	reworked	L	large

IKU

TABLE I a.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN HEADSPACE.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6561	1490	123026	264	176	76	50	142	123592	566	.46	1.53
K6487	1520	25014	29	19	12	8	26	25081	67	.27	1.48
K6488	1550	150197	116	77	50	33	142	150473	276	.18	1.55
K6489	1580	49219	60	40	18	12	45	49350	131	.27	1.57
K6562	1610	14025	61	41	19	19	17524	14165	140	.99	1.01
K6490	1640	28489	49	33	17	16	67	28604	115	.40	1.09
K6491	1670	25384	28	18	7	4	19	25442	58	.23	1.69
K6492	1700	37442	32	21	12	7	—	37514	73	.19	1.63
K6493	1730	97735	81	54	31	20	73	97920	185	.19	1.58
K6494	1760	36416	73	49	20	11	33	36568	153	.42	1.75
K6495	1790	25808	45	30	14	7	23	25904	96	.37	1.86
K6496	1820	18537	138	92	42	23	41	18831	294	1.56	1.86
K6497	1850	4614	16	51	22	14	31	4717	103	2.18	1.57
K6498	1880	2022	15	46	20	13	24	2117	95	4.49	1.57
K6499	1910	1164	29	119	65	65	275	1442	278	19.26	1.00
K6500	1940	O P E N		L I D .							
K6501	1955	3024	18	90	52	61	245	3245	221	6.81	.84
K6502	1970	8788	13	180	91	111	402	9183	395	4.30	.81
K6503	1985	4449	29	197	98	129	587	4902	453	9.25	.76
K6504	2000	2052	24	170	115	189	643	2551	499	19.57	.61
K6505	2015	2374	76	786	647	1305	3119	5188	2814	54.25	.50
K6506	2030	9849	55	1085	955	1900	4332	13844	3995	28.86	.50
K6507	2045	18002	39	1371	1396	2880	7762	23488	5685	24.00	.48
K6508	2060	1890	84	1205	1196	752	6187	4627	2737	59.16	4.75
K6509	2075	1572	76	987	1006	2173	5680	5815	4243	72.97	.46

IKU

TABLE I a.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN HEADSPACE.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6535	2455	3435	1106	2888	1022	1366	2945	9816	6381	65.01	.75
K6536	2470	76	32	127	89	193	1011	517	441	85.37	.46
K6537	2485	447	106	397	189	249	569	1387	940	67.80	.76
K6538	2500	O P E N		L I D .							
K6539	2515	958	275	782	266	315	490	2597	1639	63.11	.84
K6540	2530	76	41	131	48	65	106	361	286	79.08	.73
K6541	2545	971	242	762	270	438	578	2683	1713	63.82	.62
K6542	2560	925	319	1190	399	779	1268	3613	2687	74.39	.51
K6543	2570	5569	1667	4245	1001	2472	2870	14954	9385	62.76	.41
K6544	2590	7821	2554	6691	1635	3788	4493	22489	14668	65.22	.43
K6545	2605	6364	2235	5832	1314	2845	3237	18590	12225	65.76	.46
K6546	2620	4128	1612	4504	1076	2446	4938	13766	9639	70.02	.44
K6547	2635	9629	3231	8626	1843	4141	6668	27471	17842	64.95	.44
K6548	2650	8167	2502	6006	1217	2651	3794	20542	12375	60.24	.46
K6549	2665	4843	1244	3007	659	1541	2337	11293	6450	57.12	.43
K6550	2680	5421	1667	3721	727	1868	3339	13404	7983	59.56	.39
K6552	2695	2557	1111	3245	650	2068	3522	9631	7074	73.45	.31
K6551	2710	87035	45133	73127	7846	27351	26215	240493	153458	63.81	.29
K6553	2725	20858	9944	18438	1892	6606	5079	57738	36880	63.87	.29
K6554	2740	98481	54976	85018	7661	25594	16723	271730	173249	63.76	.30
K6555	2755	112764	115780	184027	50463	171130	160080	633662	520899	82.20	.29
K6556	2770	78357	94642	17863	37623	121820	128106	345304	266947	77.31	.27
K6557	2785	35303	95864	165032	27585	107069	119708	390854	355551	90.97	.26
K6558	2800	4557	3899	10765	1617	5622	6156	25960	21403	82.45	.29
K6559	2815	7210	7455	18047	2963	7772	7485	42712	35502	83.12	.31

IKU

TABLE I a.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN HEADSPACE.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6560	2830	6321	2635	2837	306	898	1126	12998	6677	51.37	.34
K6566	2845	194272	77538	33644	1879	4286	2463	311619	117347	37.66	.44
K6567	2860	76019	23729	14601	1474	3960	6980	119783	43764	36.54	.37
K6568	2875	16512	4097	2253	205	570	1059	23638	7126	30.14	.36
K6569	2890	16577	3903	2325	269	777	1739	23851	7274	30.50	.35
K6570	2905	27564	3723	1903	154	343	460	33687	6123	18.18	.45
K6571	2920	5927	2317	1537	140	469	937	10389	4463	42.95	.30
K6572	2935	1258	555	612	78	236	491	2739	1481	54.06	.33
K6573	2950	29181	7772	7617	949	2788	2547	48307	19126	39.59	.34
K6574	2965	38	15	18	2	9	12	82	44	53.41	.27
K6575	2980	11312	3484	2854	305	1068	1273	19024	7712	40.54	.29
K6576	2995	5408	2998	4182	568	2267	3198	15424	10016	64.94	.25
K6577	3025	8927	3308	8120	1869	6472	9363	28696	19769	68.89	.29
K6578	3025	8927	3308	8120	1869	6472	9363	28696	19769	68.89	.29
K6579	3040	3660	2181	7679	1645	6304	9460	21469	17809	82.95	.26
K6580	3055	998	785	2075	503	1608	5552	5969	4971	83.29	.31
K6581	3070	1006	569	1100	313	969	3107	3958	2951	74.58	.32
K6582	3085	O P E N		L I D .							
K6583	3100	O P E N		L I D .							
K6584	3115	215	192	426	77	273	975	1184	968	81.81	.28
K6585	3130	1312	709	1787	341	1530	4047	5681	4368	76.90	.22
K6586	3145	672	323	706	135	617	1662	2453	1781	72.62	.22
K6587	3160	656	396	761	136	554	1304	2503	1847	73.80	.25
K6588	3175	932	494	1133	216	868	1456	3644	2712	74.42	.25
K6589	3190	597	419	1054	193	668	1462	2931	2334	79.56	.27

IKU

TABLE I a.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN HEADSPACE.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6590	3205	857	518	714	131	412	1022	2631	1774	67.44	.32
K6591	3220	9146	2021	589	78	165	926	12000	2853	23.78	.47
K6592	3235	11657	1529	445	49	96	727	13776	2119	15.38	.51
K6593	3250	1699	3431	281	37	80	560	5528	3829	69.26	.46
K6594	3265	87600	5953	1248	76	143	445	95020	7420	7.81	.53
K6595	3280	13348	1591	383	4	8	354	15335	1986	12.95	.53
K6596	3295	4404	493	135	1	4	178	5038	633	12.57	.31
K6597	3310	2612	573	429	8	28	507	3651	1039	28.46	.30
K6598	3325	2025	200	109	3	7	132	2344	319	13.61	.36
K6599	3340	30841	2143	750	13	24	228	33772	2931	8.68	.53
K6600	3355	9125	652	284	5	15	597	10082	957	9.49	.34
K6601	3370	1222	176	73	1	4	113	1477	254	17.22	.33
K6602	3385	4220	374	132	2	7	186	4735	515	10.88	.32
K6603	3400	1073	123	46	1	3	73	1246	173	13.90	.29
K6604	3415	1597	140	100	2	7	171	1846	249	13.49	.30
K6605	3430	440	107	67	1	5	130	620	180	29.05	.28
K6606	3445	272	70	40	1	3	110	386	114	29.54	.24
K6607	3460	692	54	30	1	2	122	779	88	11.24	.26
K6608	3475	531	51	27	1	2	97	612	80	13.11	.27
K6609	3490	316	29	9	1		43	355	39	10.99	
K6610	3505	3845	149	32	4	11	31	4040	195	4.83	.34
K6611	3520	461	36	17		1	110	515	54	10.58	.30
K6612	3535	55	4	2			19	62	7	11.15	.35
K6613	3550	383	35	20		1	42	440	56	12.83	.31

IKU

TABLE I b.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6561	1490	107	42	12	16	17	352	193	86	44.60	.93
K6487	1520	89	17	18		19	157	143	54	37.71	
K6488	1550	80	12	7	10	16	336	125	44	35.67	.64
K6489	1580	N O T E N O U G H M A T E R I A L									
K6562	1610	114	42	17	23	25	290	221	108	48.69	.92
K6490	1640	101	43	13	13	17	156	186	85	45.83	.80
K6491	1670	20					68	20			
K6492	1700	186	30	13	16	16	151	262	75	28.76	1.00
K6493	1730	N O T E N O U G H M A T E R I A L									
K6494	1760	136		16	15	13	145	179	43	23.92	1.14
K6495	1790	45			10	11	370	66	22	32.52	.92
K6496	1820	48		24	26	24	315	123	74	60.50	1.08
K6497	1850			23	33	32	333	88	88	99.84	1.04
K6498	1880	N O T E N O U G H M A T E R I A L									
K6499	1910		25	9	18	28	283	80	80	99.82	.65
K6500	1940	29	41	30	47	87	1007	233	204	87.57	.54
K6501	1955	80		30	26	60	1029	196	116	59.03	.43
K6502	1970	81	18	56	56	110	1741	321	240	74.72	.51
K6503	1985	38		32	34	68	573	173	135	78.13	.50
K6504	2000	50		33	48	114	1408	244	195	79.70	.42
K6505	2015	36	19	97	202	656	6945	1011	975	96.46	.31
K6506	2030	60	23	109	263	812	12822	1266	1206	95.27	.32
K6507	2045	157	95	88	201	644	11082	1184	1027	86.73	.31
K6508	2060	100	28	56	176	534	11832	893	794	88.85	.33
K6509	2075	72	23	31	94	307	10001	528	456	86.31	.31

IKU

TABLE I b.

CONCENTRATION (ml Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6510	2090	128	101	64	151	397	17129	841	713	84.77	.38
K6511	2105	70	22	33	77	216	4993	418	348	83.32	.35
K6512	2120	N O T	E N O U G H		M A T E R I A L						
K6513	2135	90	59	27	50	121	3466	348	258	74.18	.42
K6514	2150	83	35	44	78	207	7489	447	364	81.50	.38
K6515	2165	71	9	28	40	94	1138	241	170	70.66	.42
K6516	2180	23		8	11	27	380	69	46	66.82	.40
K6517	2195	23		8	12	30	747	74	51	69.03	.41
K6518	2210	67	14	18	29	76	1153	203	136	66.79	.38
K6519	2225	97	22	30	36	95	1146	280	183	65.41	.38
K6520	2240	128	43	49	49	103	3006	372	244	65.48	.48
K6521	2255	47	8	11	13	28	291	107	60	56.17	.47
K6522	2270	105		21	23	46	290	195	90	45.97	.50
K6523	2285	156		29	29	52	458	266	110	41.21	.56
K6524	2300	153		48	48	80	476	329	175	53.35	.60
K6525	2315	123	28	41	43	79	856	314	191	60.79	.55
K6526	2330	252	67	57	55	96	608	527	275	52.24	.58
K6527	2330	138	78	23	30	64		333	196	58.70	.48
K6528	2350	42	29			18	6	89	47	53.23	
K6529	2365		30				29	30	30	99.52	
K6530	2380	211	234				195	446	235	52.63	
K6531	2395	108	82				224	190	82	43.07	
K6532	2410	200	143	54	77	194	20779	669	469	70.12	.40
K6533	2425	235	134	40	41	48	397	498	263	52.82	.85
K6534	2440	266	98	152	85	305	17769	905	639	70.61	.28

IKU

TABLE I b.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
K6535	2455	N O T	E N O U G H	M A T E R I A L							
K6536	2470	N O T	E N O U G H	M A T E R I A L							
K6537	2485	N O T	E N O U G H	M A T E R I A L							
K6538	2500	88	15	73	34	101	268	310	222	71.52	.33
K6539	2515	111	22	36	21	56	232	245	134	54.74	.38
K6540	2530	72	23	113	8	42	640	258	186	72.03	.20
K6541	2545	57	15	79	8	35	377	195	138	70.62	.24
K6542	2560	134	57	52	23	100	1668	367	232	63.39	.23
K6543	2570	90	17	104	36	172	394	419	329	78.56	.21
K6544	2590	N O T	E N O U G H	M A T E R I A L							
K6545	2605	N O T	E N O U G H	M A T E R I A L							
K6546	2620	N O T	E N O U G H	M A T E R I A L							
K6547	2635	N O T	E N O U G H	M A T E R I A L							
K6548	2650	N O T	E N O U G H,	M A T E R I A L							
K6549	2665	N O T	E N O U G H	M A T E R I A L							
K6550	2680	N O T	E N O U G H	M A T E R I A L							
K6552	2695	111	92	762	231	1143	8307	2340	2229	95.25	.20
K6551	2710	1336	6293	33304	6541	25029	24947	72503	71167	98.16	.26
K6553	2725		57	177	30	135	366	399	399	99.91	.22
K6554	2740	800	3147	16477	2566	13382	14741	36373	35572	97.80	.19
K6555	2755	427	1340	10986	2718	14050	36214	29522	29095	98.55	.19
K6556	2770	425	1221	11037	3108	15223	50367	31014	30589	98.63	.20
K6557	2785	248	251	2423	674	3793	16452	7388	7140	96.64	.18
K6558	2800	O P E N	L I D .								
K6559	2815	85	104	1280	365	1868	4881	3702	3618	97.71	.20

IKU

TABLE I b.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6560	2830	549	1637	3812	713	3337	8096	10048	9499	94.54	.21
K6566	2845	61567	58482	43120	2950	7577	2904	173696	112129	64.55	.39
K6567	2860	1212	2589	2519	210	859	919	7389	6177	83.59	.25
K6568	2875	7394	10170	10883	963	4037	4569	33447	26053	77.89	.24
K6569	2890	730	1832	1920	174	705	767	5361	4631	86.39	.25
K6570	2905	18913	23919	17625	1180	4542	3194	66178	47265	71.42	.26
K6571	2920	1393	4385	5530	590	2813	4534	14711	13318	90.53	.21
K6572	2935	417	1217	5081	962	4523	8945	12200	11783	96.58	.21
K6573	2950	1425	5237	8724	1293	5153	5749	21833	20408	93.47	.25
K6574	2965	1264	3650	9134	1465	5962	7156	21474	20210	94.11	.25
K6575	2980	3623	8866	15243	2158	9280	12769	39170	35547	90.75	.23
K6576	2995	N O T E N O U G H M A T E R I A L									
K6577	3025	N O T E N O U G H M A T E R I A L									
K6578	3025	173	425	867	210	1083	3118	2758	2585	93.73	.19
K6579	3040	342	604	3375	971	5028	19158	10320	9978	96.69	.19
K6580	3055	258	430	1828	502	2625	10427	5643	5384	95.42	.19
K6581	3070	300	225	2367	839	4484	18281	8215	7915	96.35	.19
K6582	3085	N O S A M P L E S									
K6583	3100	N O S A M P L E S									
K6584	3115	832	460	6701	1771	9140	21023	18904	18072	95.60	.19
K6585	3130	N O T E N O U G H M A T E R I A L									
K6586	3145	N O T E N O U G H M A T E R I A L									
K6587	3160	N O T E N O U G H M A T E R I A L									
K6588	3175	N O T E N O U G H M A T E R I A L									
K6589	3190	N O T E N O U G H M A T E R I A L									

IKU

TABLE I b.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
K6590	3205	N O T	E N O U G H		M A T E R I A L						
K6591	3220	N O T	E N O U G H		M A T E R I A L						
K6592	3235	N O T	E N O U G H		M A T E R I A L						
K6593	3250	N O T	E N O U G H		M A T E R I A L						
K6594	3265	N O T	E N O U G H		M A T E R I A L						
K6595	3280	N O T	E N O U G H		M A T E R I A L						
K6596	3295	28045	8893	2325	224	1157	2600	40644	12599	31.00	.19
K6597	3310	3207	1265	2040	463	2189		9165	5958	65.01	.21
K6598	3325	N O T	E N O U G H		M A T E R I A L						
K6599	3340	N O T	E N O U G H		M A T E R I A L						
K6600	3355	N O T	E N O U G H		M A T E R I A L						
K6601	3370	N O T	E N O U G H		M A T E R I A L						
K6602	3385	N O T	E N O U G H		M A T E R I A L						
K6603	3400	N O T	E N O U G H		M A T E R I A L						
K6604	3415	N O T	E N O U G H		M A T E R I A L						
K6605	3430	N O T	E N O U G H		M A T E R I A L						
K6606	3445	N O T	E N O U G H		M A T E R I A L						
K6607	3460	N O T	E N O U G H		M A T E R I A L						
K6608	3475	N O T	E N O U G H		M A T E R I A L						
K6609	3490	N O T	E N O U G H		M A T E R I A L						
K6610	3505	18794	4629	518	47	244	554	24233	5439	22.44	.19
K6611	3520	880	194	187	40	220	692	1522	642	42.16	.18
K6612	3535	2418	912	300	40	213	2208	3883	1465	37.73	.19
K6613	3550	163	27	99	24	141	629	455	291	64.06	.17

IKU

TABLE I c.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS (Ia + Ib).

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6561	1490	123133	306	188	92	67	494	123785	652	.53	1.37
K6487	1520	25103	46	37	12	26	182	25224	121	.48	.44
K6488	1550	150277	128	84	60	48	479	150598	320	.21	1.25
K6489	1580	49219	60	40	18	12	45	49349	130	.26	1.50
K6562	1610	14138	104	58	42	44	17814	14386	248	1.72	.96
K6490	1640	28590	92	46	31	33	223	28790	200	.70	.94
K6491	1670	25404	28	18	7	4	86	25462	58	.23	1.69
K6492	1700	37628	62	34	28	23	151	37776	148	.39	1.20
K6493	1730	97735	81	54	31	20	73	97921	186	.19	1.55
K6494	1760	36552	73	64	34	24	178	36747	196	.53	1.43
K6495	1790	25853	45	30	24	19	393	25970	117	.45	1.30
K6496	1820	18585	138	116	68	47	356	18953	369	1.94	1.46
K6497	1850	4932	16	76	56	47	364	5128	196	3.82	1.21
K6498	1880	2022	15	46	20	13	24	2116	94	4.44	1.54
K6499	1910	1164	54	128	83	92	558	1522	357	23.48	.90
K6500	1940	29	41	30	47	87	1007	234	205	87.61	.54
K6501	1955	3104	18	120	77	121	1274	3441	337	9.78	.64
K6502	1970	8869	31	236	147	221	2143	9504	634	6.67	.66
K6503	1985	4486	29	229	132	198	1159	5074	588	11.59	.67
K6504	2000	2102	24	203	164	303	2051	2795	694	24.82	.54
K6505	2015	2410	95	883	849	1962	10064	6199	3789	61.13	.43
K6506	2030	9909	79	1193	1218	2712	17155	15110	5201	34.42	.45
K6507	2045	18160	133	1459	1596	3524	18844	24872	6713	26.99	.45
K6508	2060	1990	112	1261	1372	786	18019	5521	3531	63.96	1.75
K6509	2075	1644	99	1019	1101	2480	15882	6343	4699	74.08	.44

IKU

TABLE I c.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS (Ia + Ib).

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6535	2455	3435	1106	2888	1022	1366	2945	9817	6382	65.01	.75
K6536	2470	76	32	127	89	193	1011	517	441	85.30	.46
K6537	2485	447	106	397	189	249	569	1388	941	67.80	.76
K6538	2500	88	15	73	34	101	268	311	223	71.70	.34
K6539	2515	1069	297	817	288	371	722	2842	1773	62.38	.77
K6540	2530	148	64	244	56	107	746	619	472	76.14	.52
K6541	2545	1028	257	842	278	474	955	2879	1850	64.28	.59
K6542	2560	1059	376	1243	422	879	2937	3979	2920	73.38	.48
K6543	2570	5659	1684	4349	1037	2644	3264	15373	9714	63.19	.39
K6544	2590	7821	2554	6691	1635	3788	4493	22489	14668	65.22	.43
K6545	2605	6364	2235	5832	1314	2845	3237	18590	12226	65.77	.46
K6546	2620	4128	1612	4504	1076	2446	4938	13766	9638	70.01	.44
K6547	2635	9629	3231	8626	1843	4141	6668	27470	17841	64.95	.45
K6548	2650	8167	2502	6006	1217	2651	3794	20543	12376	60.24	.46
K6549	2665	4843	1244	3007	659	1541	2337	11294	6451	57.12	.43
K6550	2680	5421	1667	3721	727	1868	3339	13404	7983	59.56	.39
K6552	2695	2668	1203	4007	881	3211	11829	11971	9303	77.71	.27
K6551	2710	88370	51426	106431	14387	52380	51162	312996	224625	71.77	.27
K6553	2725	20859	10001	18615	1922	6740	5445	58137	37279	64.12	.29
K6554	2740	99281	58124	101495	10227	38976	31465	308103	208822	67.78	.26
K6555	2755	113190	116620	195013	53181	185180	196294	663184	549994	82.93	.29
K6556	2770	78782	95862	28900	35731	137043	178473	376318	297536	79.07	.26
K6557	2785	35551	56115	167455	28259	110862	136160	398242	362691	91.07	.25
K6558	2800	4557	3899	10265	1617	5622	6156	25960	21403	82.45	.29
K6559	2815	7295	7429	19372	2728	9590	12366	46414	39119	84.28	.28

IKU

TABLE I c.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS (Ia + Ib).

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6560	2830	6870	4272	6649	1020	4235	9222	23046	16176	70.19	.24
K6566	2845	255839	136020	76765	4829	11862	5366	485315	229476	47.28	.41
K6567	2860	77231	26317	17120	1685	4819	7899	127172	49941	39.27	.35
K6568	2875	23907	14267	13137	1168	4607	5628	57085	33179	58.12	.25
K6569	2890	17307	5735	4244	443	1482	2505	29212	11905	40.75	.30
K6570	2905	46478	27641	19528	1333	4885	3654	99865	53388	53.46	.27
K6571	2920	7319	6702	7067	730	3282	5471	25100	17781	70.84	.22
K6572	2935	1675	1772	5692	1040	4759	9435	14939	13264	88.78	.22
K6573	2950	30606	13009	16342	2242	7941	8296	70140	39534	56.36	.28
K6574	2965	1303	3664	9152	1467	5971	7167	21557	20254	93.96	.25
K6575	2980	14935	12351	18097	2463	10348	14042	58194	43259	74.34	.24
K6576	2995	5408	2998	4182	568	2267	3198	15423	10015	64.94	.25
K6577	3025	8927	3308	8120	1869	6472	9363	28696	19769	68.89	.29
K6578	3025	9100	3733	8987	2079	7555	12481	31454	22354	71.07	.28
K6579	3040	4002	2785	11053	2616	11333	28618	31789	27787	87.41	.23
K6580	3055	1256	1214	3903	1005	4233	15979	11611	10355	89.18	.24
K6581	3070	1306	794	3467	1152	5453	21388	12172	10867	89.27	.21
K6582	3085	N O	S A M P L E S								
K6583	3100	N O	S A M P L E S								
K6584	3115	1048	652	7128	1847	9413	21998	20088	19041	94.79	.20
K6585	3130	1312	709	1787	341	1530	4047	5679	4367	76.90	.22
K6586	3145	672	323	706	135	617	1662	2453	1781	72.60	.22
K6587	3160	656	396	761	136	554	1304	2503	1847	73.79	.25
K6588	3175	932	494	1133	216	868	1456	3643	2711	74.42	.25
K6589	3190	597	419	1054	183	668	1462	2921	2324	79.56	.27

IKU

TABLE I c.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS (Ia + Ib).

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K6590	3205	857	518	714	131	412	1022	2632	1775	67.44	.32
K6591	3220	9146	2021	589	78	165	926	11999	2853	23.78	.47
K6592	3235	11657	1529	445	49	96	727	13776	2119	15.38	.51
K6593	3250	1699	3431	281	37	80	560	5528	3829	69.27	.46
K6594	3265	87600	5953	1248	76	143	445	95020	7420	7.81	.53
K6595	3280	13348	1591	383	4	8	354	15334	1986	12.95	.50
K6596	3295	32449	9386	2460	226	1161	2778	45682	13232	28.97	.19
K6597	3310	5819	1838	2469	472	2217	507	12815	6997	54.60	.21
K6598	3325	2025	200	109	3	7	132	2344	319	13.61	.43
K6599	3340	30841	2143	750	13	24	228	33771	2930	8.68	.54
K6600	3355	9125	652	284	5	15	597	10081	956	9.48	.33
K6601	3370	1222	176	73	1	4	113	1476	254	17.21	.25
K6602	3385	4220	374	132	2	7	186	4735	515	10.88	.29
K6603	3400	1073	123	46	1	3	73	1246	173	13.88	.33
K6604	3415	1597	140	100	2	7	171	1846	249	13.49	.29
K6605	3430	440	107	67	1	5	130	620	180	29.03	.20
K6606	3445	272	70	40	1	3	110	386	114	29.53	.33
K6607	3460	692	54	30	1	2	122	779	87	11.17	.50
K6608	3475	531	51	27	1	2	97	612	81	13.24	.50
K6609	3490	316	29	9	1	1	43	356	40	11.24	1.00
K6610	3505	22639	4778	550	51	256	585	28273	5634	19.93	.20
K6611	3520	1341	230	204	41	221	802	2037	696	34.18	.18
K6612	3535	2473	916	303	40	213	2227	3945	1472	37.31	.19
K6613	3550	547	62	119	25	142	671	894	348	38.87	.17

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6561	1490-1520		85% Claystone, grey, pale grey, grey-brown, silty, grades to siltstone 10% Mud additive 5% Limestone, brown
K 6487	1520-1550	1.83	75% Claystone, grey, grey-brown, pale grey, green-grey, silty 5% Limestone 20% Mud additive Sm.am. Pyrite, glauconite, coal, volcanic glass.
K 6488	1550-1580	1.79	75% Claystone 5% Limestone 20% Mud additive
K 6489	1580-1610	0.97	90% Claystone, grey, green-grey, grey brown, calcareous in part, silty in part 10% Mud additive Sm.am. Pyrite
K 6562	1610-1640		90% Claystone 10% Mud additive
K 6490	1640-1670	0.44 1.99 1.98	40% Claystone, grey, green-grey, silty 30% Claystone, grey-brown, brown, silty 20% Claystone, dark grey 10% Mud additive
K 6491	1670-1700	0.96	90% Claystone, green-grey, silty, glauconitic, grey, grey-brown 10% Mud additive

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6492	1700-1730	1.02	90% Claystone 10% Mud additive
K 6493	1730-1760	0.84 1.78	80% Claystone, green-grey, silty 10% Claystone, grey, grey-brown 10% Mud additive Sm.am. coal (bright), pyrite, glauconite
K 6494	1760-1790	0.75	90% Claystone, green-grey, grey, grey-brown 10% Mud additive Sm. am. Limestone
K 6495	1790-1820	0.68	95% Claystone as above, occasional fragment of red-brown claystone 5% Mud additive
K 6496	1820-1850	0.82	95% Claystone as above 5% Limestone, brown, dolomitic, crystalline and cream-white, chalky
K 6497	1850-1800	0.78	95% Claystone, grey, grey-green, red-brown, light brown. 5% Limestone, brown
K 6498	1880-1910	0.56 0.21 1.83	65% Claystone, green-grey, grey 20% Claystone, red-brown, purple-brown 10% Claystone, grey-brown 5% Limestone
K 6499	1910-1940	0.54	100% Claystone, green-grey, grey, red-brown, brown, creamy white, silty Sm.am. Limestone

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6500	1940-1955	0.68	100% Claystone, as above
K 6501	1955-1970	0.61	100% Claystone, creamy-white (40%), silty, sandy, green-grey, 30% red-brown, brown (30%)
K 6502	1970-1985	0.78 0.47	45% Claystone, cream-white, silty 30% Claystone, green-grey, red-brown 20% Sandstone/siltstone, cream, buff, very fine-fine grained, some medium-coarse, silty 5% Limestone, brown, crystalline, and cream-white, chalky
K 6503	1985-2000	1.2	90% Claystone, green-grey, cream-white, silty, red-brown, sandy 5% Limestone, as above
K 6504	2000-2015	0.77	90% Claystone, as above 10% Limestone, as above
K 6505	2015-2030	0.71	95% Claystone, as above 5% Sandstone, as above Sm.am. Limestone, variable, brown, crystalline, dolomitic, fine chalky and grey crystalline
K 6506	2030-2045	0.76	90% Claystone, grey, green-grey, grey-brown, pale grey, kaolinitic, silty, sandy in part, pyritic. Sm.am. red brown 10% Sandstone, green-grey, pale grey, very fine grained. Sm.am. limestone, as above

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6507	2045-2060	0.77	90% Claystone, as above 10% Sandstone, as above
K 6508	2060-2075	0.74	90% Claystone, as above 10% Sandstone, as above
K 6509	2075-2090	0.79	100% Claystone, green-grey, grey, creamy-white, silty, sandy, trace red-brown
K 6510	2090-2105	0.65	100% Claystone, as above
K 6511	2105-2120	0.94	100% Claystone, as above
K 6512	2120-2135	0.87	95% Claystone, as above 5% Sandstone, as above Sm.am. limestone, brown, crystalline
K 6513	2135-2150	0.73	95% Claystone, grey, pale grey, cream-white, brown, silty in part 5% Sandstone, brown, grey, very fine grained, silty, argillaceous Sm.am. limestone
K 6514	2150-2165	0.78	90% Claystone, as above 10% Sandstone, as above 5% Limestone, dolomitic, brown, crystalline and cream, chalky
K 6515	2165-2180	0.65	90% Claystone, as above 5% Sandstone, as above 5% Limestone, as above

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6516	2180-2195	0.74	95% Claystone, green-grey, grey, silty, brown
		0.81	5% Limestone, brown, crystalline, dolomitic
K 6517	2195-2210	0.69	95% Claystone, as above
			5% Limestone, as above
K 6518	2210-2225	0.69	95% Claystone, green-grey, grey-brown, silty, 5% of red brown
			5% Limestone, as above
K 6519	2225-2240	0.76	95% Claystone, as above
			5% Limestone, as above
K 6520	2240-2255	0.47	85% Claystone, grey, green-grey, silty, sandy
		0.70	15% Limestone, cream, chalky and dark brown , 2-3% pyrite
K 6521	2255-2270	0.61	90% Claystone, as above
		0.49	10% Limestone, variable, white, chalky, dark brown, crystalline, fibrous calcite, grey, crystalline
K 6522	2270-2285	0.64	80% Claystone, as above
			20% Limestone, as above
K 6523	2285-2300	0.78	80% Claystone, grey, green-grey, silty, sandy
			10% Claystone, grey-brown, silty, sandy
			10% Limestone, as above
K 6524	2300-2315	0.71	100% Claystone, as above
			Sm.am. limestone, as above

017/D/5/mk

IKU

TABLE NO.: II

WELL NO.:30/3-2

Sample	Depth	TOC	Lithology
K 6525	2315-2330	0.63	95% Claystone, grey, green-grey, silty, glauconitic and pyritic 5% Limestone, as above
K 6526	2330-2345	0.68	95% Claystone, grey, green-grey 5% Limestone, as above
K 6527	2345-2349	1.49	95% Claystone, grey, green-grey, grading to siltstone 5% Limestone, as above
K 6528	2349-2365	0.67	50% Cement 50% Claystone, as above
K 6529	2365-2380	1.32	85% Claystone, as above 15% Cement
K 6530	2380-2395		95% Mud additive 5% Claystone, as above
K 6531	2395-2410		90% Mud additive 10% Claystone, as above
K 6532	2410-2425	0.69	80% Mud additive 20% Claystone, as above
K 6533	2425-2440	0.67	90% Claystone, green-grey, grey, silty in part 10% Mud additive
K 6534	2440-2455	0.73	90% Claystone 5% Mud additive 5% Limestone, cream-white, chalky

017/D/6/mk

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6535	2455-2470	0.73	85% Claystone 10% Mud additive 5% Limestone, white, cream-white, chalky
K 6536	2470-2485		80% Mud additive 20% Claystone, green-grey, grey, red-brown, cream, marly
K 6537	2485-2500	0.65 0.38	90% Claystone, grey, green-grey, dark grey 10% Limestone, chalky, cream, white, sandy in part, glauconitic in part
K 6538	2500-2515	0.51	95% Claystone, mostly grey, fissile 5% Limestone, as above
K 6539	2515-2530	0.52	90% Claystone, as above 10% Limestone, as above
K 6540	2530-2545	0.50	100% Claystone, as above
K 6541	2545-2560	0.50	95% Claystone 5% Limestone, cream, brown, sandy in part, very fine-fine grained
K 6542	2560-2575	0.53	80% Claystone 20% Mud contaminants (iron filings) Sm.am. sandstone, very fine grained, quartzose
K 6543	2575-2590	0.87	60% Mud additive 40% Claystone

017/D/7/mk

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6544	2540-2605	0.53	70% Claystone 10% Sandstone, cream, brown, very fine-fine grained 20% Mud additive and contaminants (iron filings)
K 6545	2605-2620	0.82	70% Claystone, grey, pale grey, dark grey, some dark grey-brown 10% Sandstone, as above 20% Mud additive and contaminants (iron filings)
K 6546	2620-2635	0.67	70% Claystone, as above 15% Sandstone, as above 15% Mud additive and contaminants (iron filings)
K 6547	2635-2650	0.60	60% Claystone, as above 30% Sandstone/siltstone, brown 10% Mud additive and contaminants (iron filings)
K 6548	2650-2665	0.55	50% Claystone, as above 25% Sandstone/siltstone, as above 25% Mud additive and contaminants (iron filings)
K 6549	2665-2680	0.53	80% Claystone, grey, green-grey, silty in part 15% Sandstone, as above 5% Mud contaminants Sm.am. limestone, brown, crystalline, dolomite

017/D/8/mk

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC		Lithology
K 6550	2680-2695	0.60	80%	Claystone, as above
			15%	Sandstone, as above
			5%	Mud contaminants
K 6552	2695-2710	7.48	70%	Claystone, grading to sandy siltstone, dark grey, medium to dark brown, black, fissile, laminated, pyritic, coal fragments in siltstone, bitumen blebs, micaceous, rare sand laminae
		0.62	25%	Claystone, grey, green-grey
			5%	Limestone, brown
K 6551	2710-2725	0.58	55%	Claystone, grey, green-grey
		10.77	45%	Claystone, dark grey, dark grey-brown to black, fissile, laminated, bitumen blebs, veinlets, micaceous, silty
K 6553	2725-2740	0.61	100%	Claystone, grey (90%), trace green-grey and dark grey
K 6554	2740-2755	6.52	70%	Claystone/siltstone, partly sandy, dark grey, black, brown, coalified plant remains in siltstone, pyritic, some micaceous
		0.59	30%	Claystone, grey, green-grey
K 6555	2755-2770	8.46	60%	Claystone/siltstone, sandy in part, dark grey, black, brown, coalified plant fragments
		0.58	20%	Claystone, grey
			10%	Sand/sandstone, light brown, dark grey-brown, brown, silty, very fine-fine grained, pyrite rich
			10%	Limestone, brown, very fine crystalline, siderite, dolomitic

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6556	2770-2785	0.6 7.02	40% Claystone, grey 30% Claystone/siltstone, partly sandy, dark grey, dark grey-brown, brown, micaceous, pyritic, coalified plant fragments 15% Coal, black, bright, conchoidal fracture 10% Sand, loose, white quartz, fine grained, subangular 5% Limestone, brownish, sideritic-dolomitic
K 6557	2785-2800	0.6 16.8	85% Claystone, grey 10% Carbonaceous claystone, dark grey, black, claystone and coal, sandy 5% Limestone, yellow-brown, sideritic/dolomitic
K 6558	2800-2815	0.58 2.72	55% Claystone, grey 25% Claystone, silty/sandy, grey-brown, dark grey, micaceous 10% Coal 5% Sand 5% Limestone, as above
K 6559	2815-2830	0.51 2.55	30% Claystone, grey 25% Claystone grading to siltstone, brown-grey, some dark grey, brown, black, micaceous 30% Coal 5% Sand, as above 10% Limestone/calcareous sandstone, white, brown, dark brown

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6560	2830-2845	0.59	55% Claystone, grey
		4.65	25% Claystone, dark brown to dark grey, brown-grey, silty, sandy in part, micaceous in part
			5% Sand, as above
			15% Coal, as above
			Sm.am. Limestone, as above
K 6566	2845-2860	62.84	50% Carbonaceous claystone/coal, dark grey to black, bitumen veins (?)
		0.88	30% Claystone, grey, light grey, brown-grey (waxy)
		0.89	15% Claystone, pale grey, calcareous
			5% Sandstone, white, quartz, fine-medium grained, subangular, calcite cement
K 6567	2860-2875	2.79	70% Claystone, mostly grey, grey-brown (waxy, coal stringers), dark grey, brown, black, silty, pale grey
			10% Coal
			20% Sand, loose, white quartz grains, fine-medium grained, subangular to sub-rounded
K 6568	2875-2890	1.22	90% Claystone, mostly grey, some dark grey (10%), grey-brown (waxy), brown (silty), cream-white, silty, sandy
			10% Sand
			Sm.am. siderite/dolomite, yellow-brown

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6559	2890-2905	0.6	50% Claystone, grey
			30% Claystone, dark grey, brown, black, silty, micaceous coal stringers and veins
			20% Sand, as above
K 6570	2905-2920		70% Sand/sandstone, white, calcite cement in part, medium-coarse grained, angular to subangular
		4.51	20% Claystone, grey, green-grey, dark grey, brown (waxy)
			5% Coal
K 6571	2920-2935		70% Sand/sandstone, as above
		2.87	30% Claystone, as above
K 6572	2935-2950		80% Sand/sandstone, as above
		1.51	20% Claystone, as above
			Sm.am. limestone, brown dolomitic
K 6573	2950-2965	2.38	80% Claystone/siltstone, dark grey, brown, black, also brown, grey-brown, silty, micaceous
			20% Sandstone, as above
K 6574	2965-2980	3.65	45% Claystone/siltstone, brown, grey-brown, silty, micaceous, sandy
		8.91	25% Claystone, dark grey, black, coal stringers, coalified plant material
		0.65	20% Claystone, grey
			10% Sandstone, as above

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6575	2980-2995		70% Sand/sandstone, white, medium-coarse grain, angular to subangular, quartz grains mostly loose, some calcite cement, sandstone
		2.4	30% Claystone
K 6576	2995-3010		70% Sandstone, white, medium-coarse grained, angular-subangular, quartz, calcareous in part, loose quartz grains
		1.87	30% Claystone, grey, grey-brown, dark brown, silty, grading to siltstone (ca. 10%)
K 6577	3010-3025	1.76	90% Claystone/siltstone, grey, brown, dark brown, coal stringers as above (brown micaceous etc.)
			10% Sandstone, fine-medium grained, micaceous
K 6578	3025-3040	1.93	80% Claystone/siltstone, as above
			20% Sandstone, very fine-fine grained
K 6579	3040-3095		50% Sandstone, brown, calcareous, silty grades to siltstone, glauconitic, very fine to fine grained, micaceous, bitumen blebs
		1.38	50% Claystone, grey, dark grey, brown, silty grades to siltstone (20%)
K 6580	3055-3070		70% Sandstone, white, brown, fine to coarse grain, angular to subangular
		1.0	30% Claystone, grey, dark grey, silty, micaceous
			Sm.am. limestone, brown dolomitic, sucrosic

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6581	3070-3085	0.9	70% Sandstone, as above 20% Claystone, as above 10% Mud contaminant (iron filings)
K 6582	3085-3100		No sample
K 6583	3100-3115		No sample
K 6584	3115-3130	1.12	40% Claystone, grey, brown-black, silty 40% Sandstone, brown, very fine-fine grain, silty, argillaceous 20% Mud contaminant (iron filings)
K 6585	3130-3145	1.28	60% Sandstone, as above 30% Claystone/siltstone, as above 10% Mud contaminant (iron filings)
K 6586	3145-3160	1.40	50% Sandstone, white, fine-medium grained, brown, very fine-fine grain, micaceous 40% Claystone/siltstone, as above 10% Mud contaminant (iron filings)
K 6587	3160-3175	0.71	60% Sandstone, as above 40% Claystone/siltstone, as above Sm.am. limestone, brown, dolomitic
K 6588	3175-3190	0.56	80% Sandstone, as above 20% Claystone/siltstone, light-grey, grey, grey-brown, sandy
K 6589	3190-3205	0.16	70% Sandstone, as above 20% Claystone, as above 10% Mud additive - (fibrous)

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology	
K 6590	3205-3220		60%	Sandstone
		0.93	40%	Claystone, grey, dark grey, brown, buff
K 6591	3220-3235		95%	Sandstone, white, fine to coarse quartz grains, angular to subangular with calcite cement in part
			5%	Claystone, as above
K 6592	3235-3250		100%	Sandstone, as above, oil stained
K 6593	3250-3265		100%	Sandstone, as above
K 6594	3265-3280		100%	Sandstone, as above
K 6595	3280-3295		100%	Sandstone, as above
K 6596	3295-3310		90%	Sandstone, as above
			10%	Claystone, grey, green-grey
K 6597	3310-3325		80%	Sandstone, as above
		0.92	20%	Claystone, grey, dark grey, green-grey, red-brown to brown, silty and sandy in part
K 6598	3325-3340		90%	Sandstone, as above
			10%	Claystone, grey, grey-brown, green-grey, red-brown, silty, sandy in part
K 6569	3340-3370		90%	Sandstone, as above
			10%	Claystone
K 6601	3370-3385		100%	Sandstone, as above
K 6602	3385-3400		100%	Sandstone, as above

IKU

TABLE NO.: II

WELL NO.: 30/3-2

Sample	Depth	TOC	Lithology
K 6603	3400-3445		90% Sandstone, as above
			10% Claystone, red-brown, red
K 6604	3415-3430		70% Sandstone
		0.37	30% Claystone, red-brown, red, silty, sandy in part, green-grey
K 6605	3430-3445		80% Sandstone, as above
			20% Claystone, as above
K 6606	3445-3460		85% Sandstone, as above
			15% Claystone, as above
K 6607	3460-3475		90% Sandstone, as above
			10% Claystone, as above
K 6608	3475-3490		80% Sandstone, as above
			20% Claystone, as above
K 6609	3490-3505		80% Sandstone, as above
		0.25	20% Claystone
K 6610	3505-3520		70% Sandstone, as above
		0.99	30% Claystone, as above
K 6611	3520-3535		70% Sandstone, as above
		0.10	15% Claystone, red-brown, brown
		0.47	10% Claystone, grey
		0.78	5% Claystone, green, green-grey
K 6612	3535-3550		90% Sandstone, as above
			10% Claystone, as above
K 6613	3550-3565		95% Sandstone, as above
			5% Claystone, as above

IKU

T A B L E : III

WEIGHT OF EOM AND CHROMATOGRAPHIC FRACTIONS

IKU-No	DEPTH (m)	Rock Extr. (g)	EOM (mg)	Sat. (mg)	Aro. (mg)	HC (mg)	Non HC (mg)	TOC (%)
K-6511	2105	24.2	9.3	2.5	1.8	4.3	5.0	.9
K-6523	2285	7.5	8.0	.5	1.0	1.5	6.5	1.0
K-6543	2570	16.6	2.6	1.2	.1	1.3	1.3	.9
K-6552	2695	22.4	51.2	12.7	7.8	20.5	30.7	4.3
K-6551	2710	19.6	62.9	17.5	9.4	26.9	36.0	5.9
K-6554	2740	16.4	31.2	20.4	4.8	25.2	6.0	3.5
K-6555	2755	18.7	59.0	52.2	5.8	58.0	1.0	2.6
K-6559	2815	12.5	10.3	1.3	2.2	3.5	6.8	5.4
K-6560	2830	4.0	4.4	.6	1.1	1.7	2.7	3.8
K-6566	2845	7.5	193.8	15.2	7.6	22.8	171.0	45.8
K-6567	2860	42.2	34.9	14.2	6.6	20.8	14.1	1.6
K-6568	2875	100.0	86.0	47.5	14.3	61.8	24.2	1.2
K-6569	2890	59.7	40.9	10.0	9.5	19.5	21.4	3.3
K-6573	2950	108.0	88.7	22.2	9.5	31.7	57.0	.9
K-6574	2965	11.9	51.0	7.4	6.7	14.1	36.9	4.5
K-6577	3010	9.6	19.1	4.7	3.2	7.9	11.2	1.5
K-6579	3040	47.0	59.3	4.8	.7	5.5	53.8	1.8
K-6590	3205	99.8	53.6	14.5	6.7	21.2	32.4	2.3

IKU

TABLE : IV

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(Weight ppm of rock)

IKU-No	DEPTH (m)	EOM	Sat.	Aro.	HC	Non HC
K-6511	2105	384	103	74	178	207
K-6523	2285	1067	67	133	200	867
K-6543	2570	157	72	6	78	78
K-6552	2695	2286	567	348	915	1371
K-6551	2710	3209	893	480	1372	1837
K-6554	2740	1902	1244	293	1537	366
K-6555	2755	3155	2791	310	3102	53
K-6559	2815	824	104	176	280	544
K-6560	2830	1100	150	275	425	675
K-6566	2845	25840	2027	1013	3040	22800
K-6567	2860	827	336	156	493	334
K-6568	2875	860	475	143	618	242
K-6569	2890	685	168	159	327	358
K-6573	2950	821	206	88	294	528
K-6574	2965	4286	622	563	1185	3101
K-6577	3010	1990	490	333	823	1167
K-6579	3040	1262	102	15	117	1145
K-6590	3205	537	145	67	212	325

IKU

T A B L E : V

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(mg/g TOC)

IKU-No	DEPTH (m)	EOM	Sat.	Aro.	HC	Non HC
K-6511	2105	42.7	11.5	8.3	19.7	23.0
K-6523	2285	106.7	6.7	13.3	20.0	86.7
K-6543	2570	17.4	8.0	.7	8.7	8.7
K-6552	2695	53.2	13.2	8.1	21.3	31.9
K-6551	2710	54.4	15.1	8.1	23.3	31.1
K-6554	2740	54.4	35.5	8.4	43.9	10.5
K-6555	2755	121.3	107.4	11.9	119.3	2.1
K-6559	2815	15.3	1.9	3.3	5.2	10.1
K-6560	2830	28.9	3.9	7.2	11.2	17.8
K-6566	2845	56.4	4.4	2.2	6.6	49.8
K-6567	2860	51.7	21.0	9.8	30.8	20.9
K-6568	2875	70.5	38.9	11.7	50.7	19.8
K-6569	2890	20.8	5.1	4.8	9.9	10.9
K-6573	2950	91.3	22.8	9.8	32.6	58.6
K-6574	2965	95.2	13.8	12.5	26.3	68.9
K-6577	3010	132.6	32.6	22.2	54.9	77.8
K-6579	3040	70.1	5.7	.8	6.5	63.6
K-6590	3205	23.4	6.3	2.9	9.2	14.1

IKU

T A B L E : 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-6511	2105	26.9	19.4	46.2	138.9	53.8	86.0
K-6523	2285	6.3	12.5	18.7	50.0	81.3	23.1
K-6543	2570	46.2	3.8	50.0	1200.0	50.0	100.0
K-6552	2695	24.8	15.2	40.0	162.8	60.0	66.8
K-6551	2710	27.8	14.9	42.8	186.2	57.2	74.7
K-6554	2740	65.4	15.4	80.8	425.0	19.2	420.0
K-6555	2755	88.5	9.8	98.3	900.0	1.7	5800.0
K-6559	2815	12.6	21.4	34.0	59.1	66.0	51.5
K-6560	2830	13.6	25.0	38.6	54.5	61.4	63.0
K-6566	2845	7.8	3.9	11.8	200.0	88.2	13.3
K-6567	2860	40.7	18.9	59.6	215.2	40.4	147.5
K-6568	2875	55.2	16.6	71.9	332.2	28.1	255.4
K-6569	2890	24.4	23.2	47.7	105.3	52.3	91.1
K-6573	2950	25.0	10.7	35.7	233.7	64.3	55.6
K-6574	2965	14.5	13.1	27.6	110.4	72.4	38.2
K-6577	3010	24.6	16.8	41.4	146.9	58.6	70.5
K-6579	3040	8.1	1.2	9.3	685.7	90.7	10.2
K-6590	3205	27.1	12.5	39.6	216.4	60.4	65.4

IKU

TABLE VII

TABULATION OF DATAS FROM THE GASCHROMATOGRAMS

IKU No.	DEPTH (m)	PRISTANE / n-C17	PRISTANE / PHYTANE	CPI
K6511	2105	.7	2.0	1.2
K6523	2285	1.0	.6	1.3
K6543	2570	.6	1.2	1.1
K6552	2695	1.1	2.0	1.1
K6551	2710	1.0	1.6	1.0
K6554	2740	1.3	2.7	1.2
K6555	2755	.8	1.9	1.1
K6559	2815	.5	1.0	1.7
K6560	2830	1.1	2.5	1.2
K6566	2845	1.7	6.3	1.2
K6567	2860	1.2	3.8	1.2
K6568	2875	1.0	2.8	1.2
K6569	2890	1.0	3.0	1.2
K6573	2950	.9	2.7	1.2
K6574	2965	1.2	2.3	1.2
K6577	3010	.7	2.1	1.1
K6579	3040	.5	1.5	1.0
K6590	3205	.3	2.3	1.2

IKU

TABLE NO.: VIII

VITRINITE REFLECTANCE MEASUREMENTS

WELL NO.: 30/3-2

Sample	Depth	Vitrinite reflectance	Fluorescence in UV light	Exinite content
K 6487	1520-50	0.35(16)	Yellow and yellow/orange	Low
K 6493	1730-60	0.36(4)	Yellow and yellow/orange	Moderate
K 6497	1850-80	0.42(5)	Yellow and yellow/orange	Low
K 6505	2015-30	0.38(4)	Light orange	Low-Moderate
K 6511	2105-120	0.45(14)	Yellow/orange and light orange	Low
K 6520	2240-55	0.37(4), 0.87(1)	Yellow and light orange	Low
K 6527	2345-49	0.51(7)	Light and mid. orange	Low
K 6535	2455-70	0.50(2)		Nil
K 6541	2545-60	0.48(1), 0.72(2)	Light orange	Trace
K 6547	2635-50	0.54(4)	Yellow/orange - mid. orange	Low
K 6551	2695-710	0.29(5), 0.49(14)	Light/mid. orange	Moderate
K 6552	2710-25	0.47(20)	Light and mid. orange	Moderate
K 6554	2740-55	0.46(23)	Light/mid. orange	Low-Moderate
K 6556	2770-85	0.44(20)	Mid. orange	Trace
K 6558	2800-15	0.46(18)	Mid. orange	Low
K 6560	2830-45	0.44(22)	Light and mid. orange	Low
K 6566	2845-60	0.65(22)	Mid. orange	Low-Moderate
K 6570	2905-20	0.56(21)	Mid. - deep orange	Low-Moderate
K 6572	2935-50	0.67(20)	Mid. orange	Low
K 6575	2980-95	0.69(21)	Mid. orange	Moderate
K 6580	3055-70	0.67(20)	Mid. orange	Low
K 6586	3145-60	0.65(20)	Mid. orange	Trace
K 6589	3190-205	0.72(20)	Light - deep orange	Low
K 6598	3325-40	0.69(21)	Deep orange	Trace
K 6607	3460-75	0.56(1)		Nil

IKU

TABLE NO.: VIII A

VISUAL KEROGEN ANALYSIS

WELL NO.: 30/3-2

Sample	Depth	Composition of residue	Particle size	Preservation - palynomorphs	Thermal maturation index	Remarks
K 6487	1520-50	Am,Cy/He,W	F-M	good	1/1+	Pyrite is abundant in all samples. Sapropel as aggregates was recorded from 1520-2120 m.
K 6493	1700-30	Am,Cy/He,W,WR!	F-M	good	1/1+	
K 6497	1850-80	Am,Cy/He,WR!,W	F-M	good	1/1+, 2-/2	Large proportions of inorganic aggregates derived from limestone.
K 6505	2015-30	Am,Cy/He,P,W,WR!	F-M	good	1/1+, 2-/2	Tertiary pollen dominate, if indigenous there is also reworked material in abundance.
K 6511	2105-20	Am,Cy/He,P,WR!	F-M	good	2-/2	Aggregates (organic and inorganic) are a striking feature of this small residue.
K 6520	2240-55	Am,Cy/He,W,P,WR!	F-M	fair to good	2	Considerable amounts either of reworked or of caved material Late Cret./Tertiary dark coloured cy.

ABBREVATIONS

Am	amorphous	Cy	cysts, algae	W	woody material	F	fine
He	herbaceous	P	pollen grains	C	coal	M	medium
Cut	cuticles	S	spores	RI	reworked	L	large

IKU

TABLE NO.: VIII B

VISUAL KEROGEN ANALYSIS

WELL NO.: 30/3-2

Sample	Depth	Composition of residue	Particle size	Preservation - palynomorphs	Thermal maturation index	Remarks
K 6527	2345-49	Am,Cy/He,W,WR!	F-M	fair	2-/2	Pyrite, aggregates. Nut shells, Radiolaria. Rich in caved organic material. Middle Jurassic ?reworked material observed.
K 6535	2455-70	Am,Cy/He,W,WR!	F	fair	2	Small residue. Early Cretaceous material and Radiolaria. Pyrite.
K 6547	2635-50	W,WR!,He/Am,Cy	F-M	fair	2/2+	As above. Probably some oxidation.
K 6552	2965-2710	Am,Cy/He,W,WR!,P	F-M	poor	2-/2?	Pyrite. Strongly sapropelized material, aggregates.
K 6551	2710-25	He,Cut,W,P,S/Am	F-M-L	poor	2-/2, 2+/3-	Pyrite. Strongly sapropelized material in aggregates.
K 6554	2740-55	He,W,Cut,P/Am	F-M	poor	2	Pyrite. Strongly sapropelized material in aggregates.

ABBREVATIONS

Am	amorphous	Cy	cysts, algae	W	woody material	F	fine
He	herbaceous	P	pollen grains	C	coal	M	medium
Cut	cuticles	S	spores	RI	reworked	L	large

IKU

TABLE NO.: VIII C

VISUAL KEROGEN ANALYSIS

WELL NO.: 30/3-2

Sample	Depth	Composition of residue	Particle size	Preservation - palynomorphs	Thermal maturation index	Remarks
K 6554	2770-85	W,He,WR!/Am	F-M	poor to fair	2/2+	Mud additives suspected. Pyrite. Late Jurassic/Cretaceous dominate.
K 6558	2800-15	Am/W,He,WR!	F-M	good to fair	2/2+	Mud add. or caved mat. suspected (Tertiary pollen) in Jurassic sed.
K 6560	2830-45	Am/He,W,WR,P	F-M-L	poor	2/2+, 2+	Increase in colour due to ?oxidation. Fungi are present.
K 6566	2845-60	WR!,W,He,P,S/Am,Cy	F-M	fair	2/2+	Middle or Late Jurassic.
K 6570	2905-20	WR!,Cut,W,He/Am	F-M-L	poor	2/2+, 2+	Mixed indigenous and caved material. Fungi are present.
K 6572	2935-50	Am/He,Cut,WR!	F-M-L	poor	2/2+	Pyrite.

ABBREVATIONS

Am	amorphous	Cy	cysts, algae	W	woody material	F	fine
He	herbaceous	P	pollen grains	C	coal	M	medium
Cut	cuticles	S	spores	RI	reworked	L	large

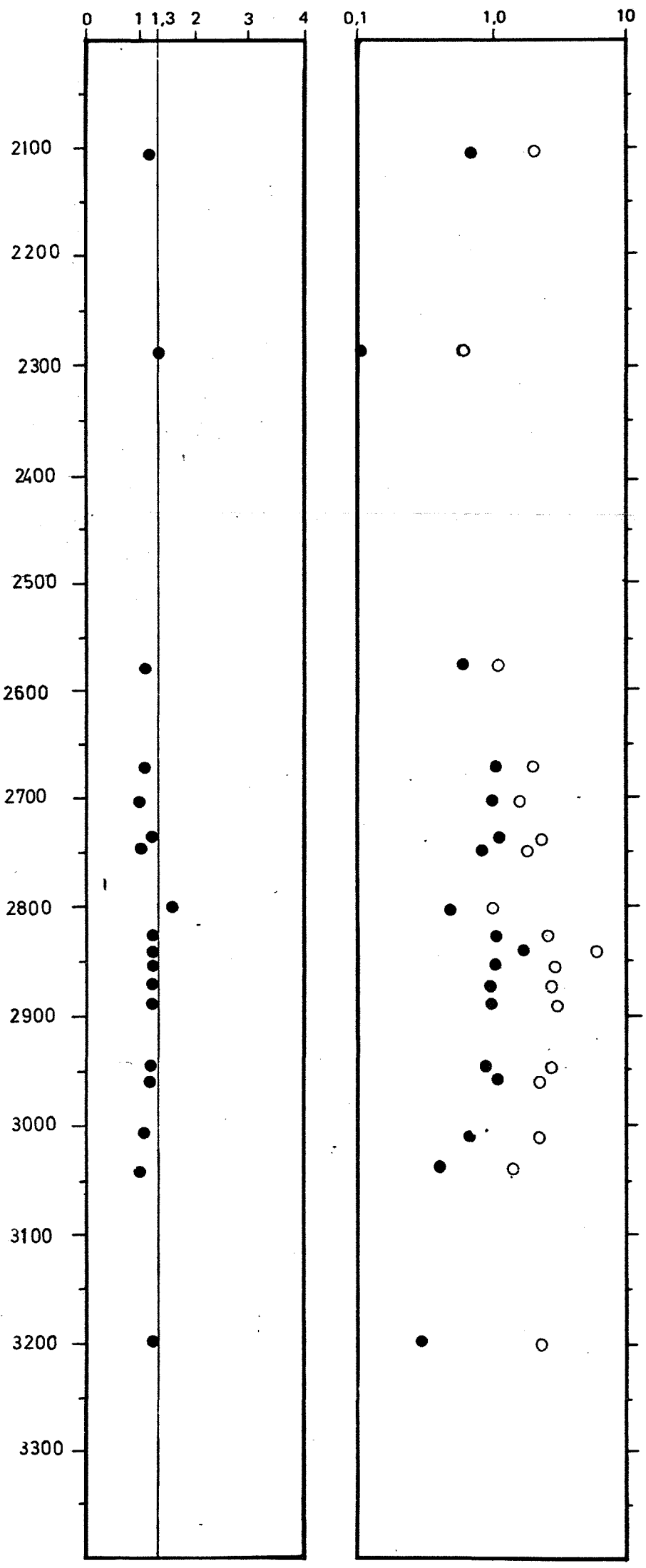
IKU

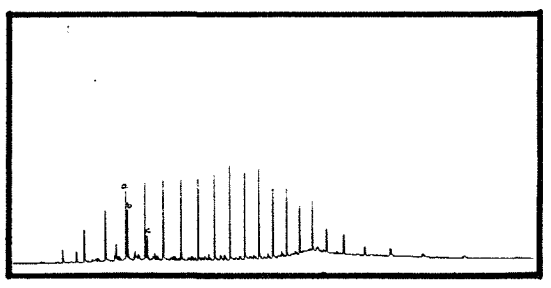
Organic Geochemistry Department

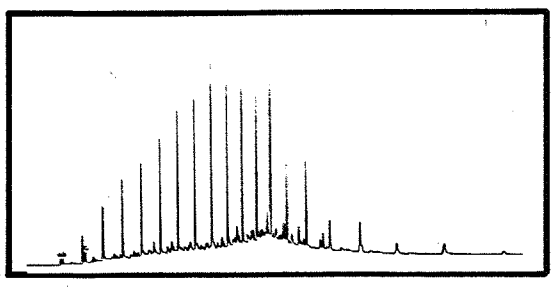
C_{15}^{+} SATURATED HYDROCARBONS
Presentation of Analytical Data

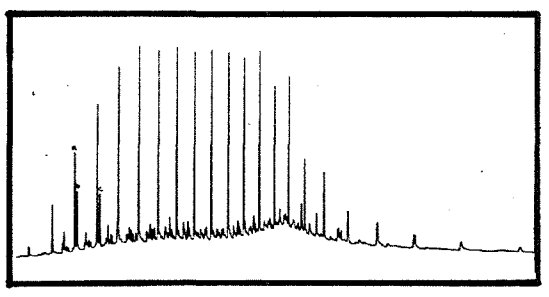
Well no:

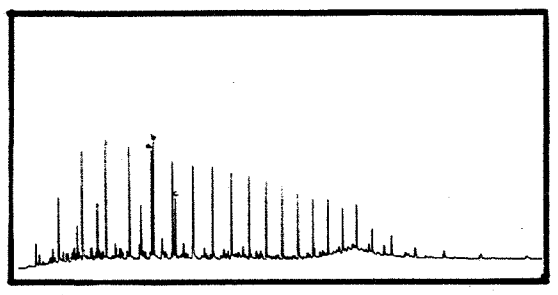
Company:

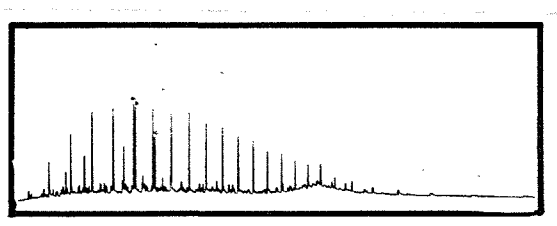


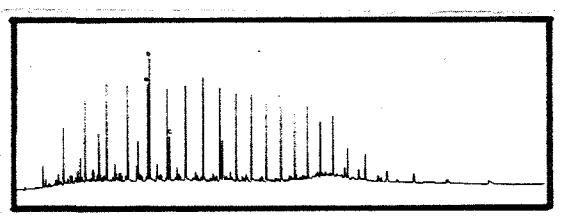

2105-20m

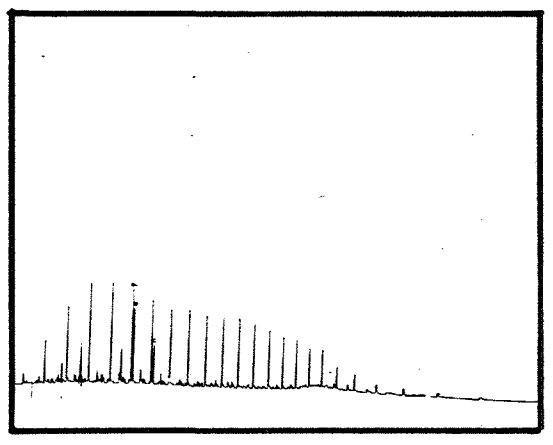

2285-2300m

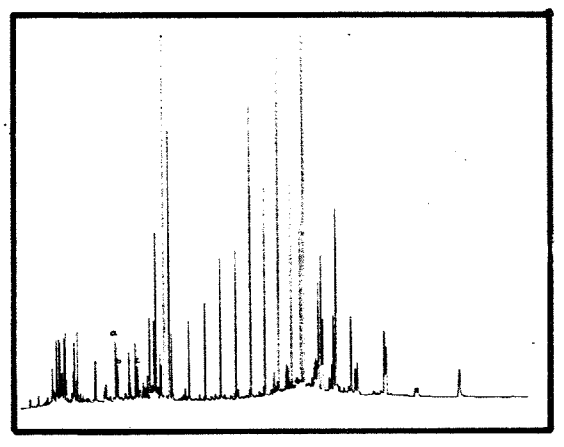

2570-85m

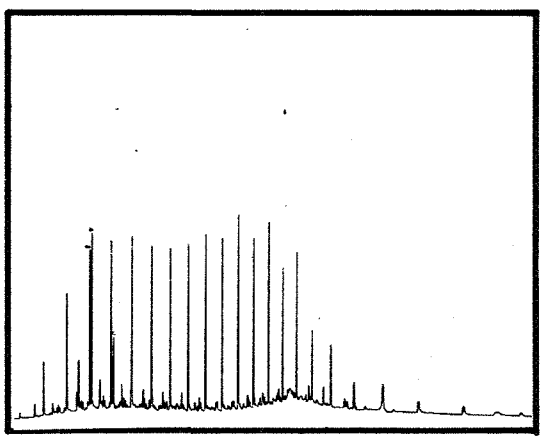

2695-2710m

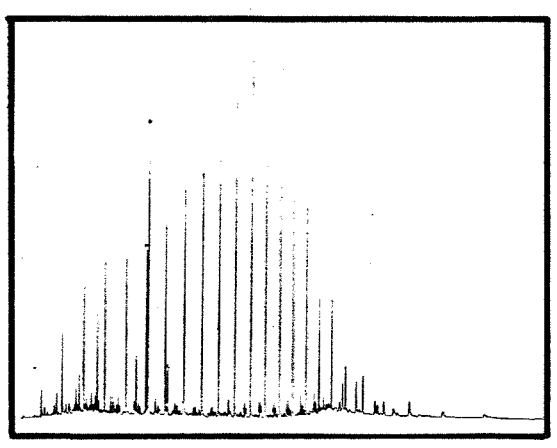

2710-25m

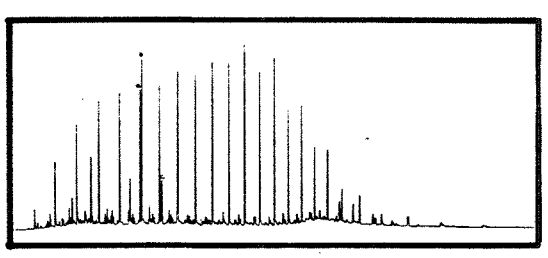

2740-55m

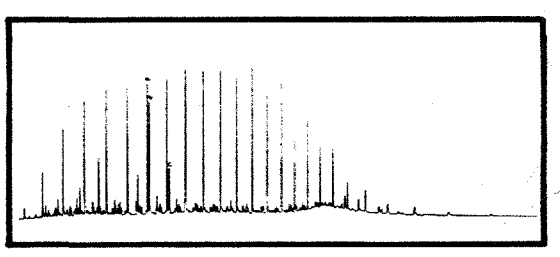

2755-70m

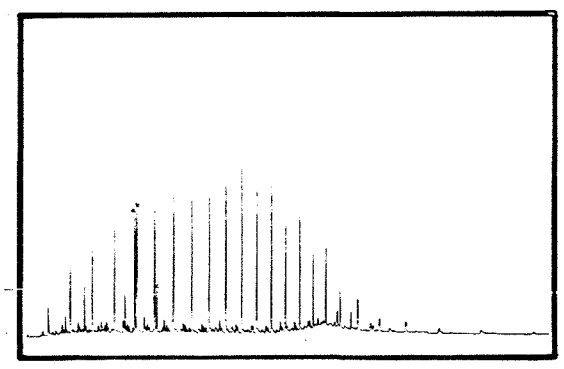

2815-30m

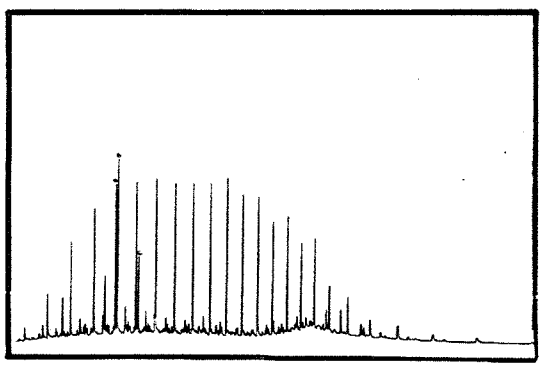

2830-45m

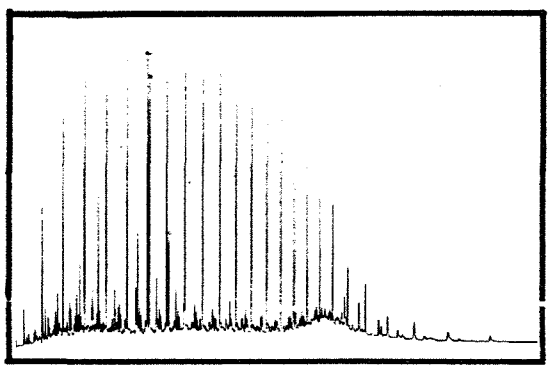

2845-60m

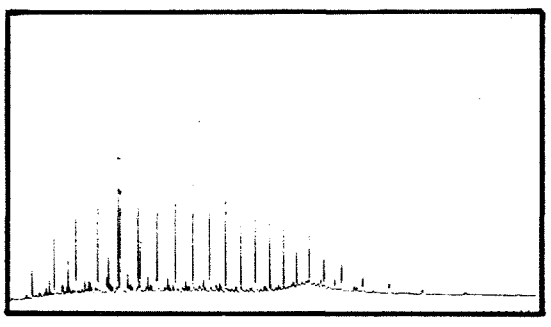

2860-75m

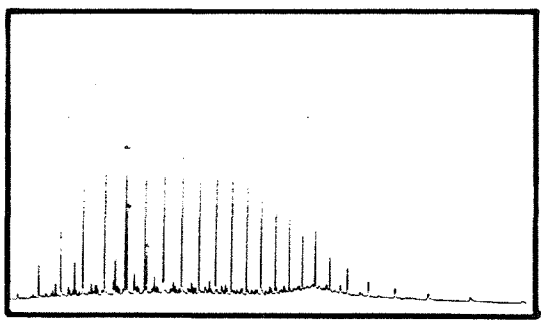

2875-90m

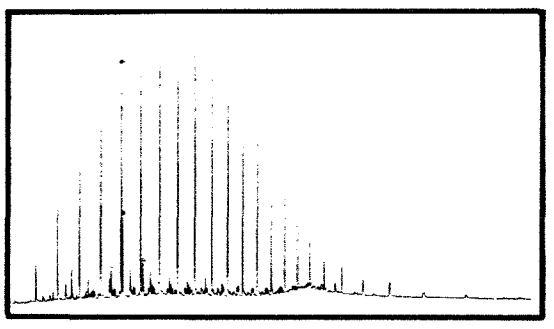

2890-2905m


2950-65m


2965-80m

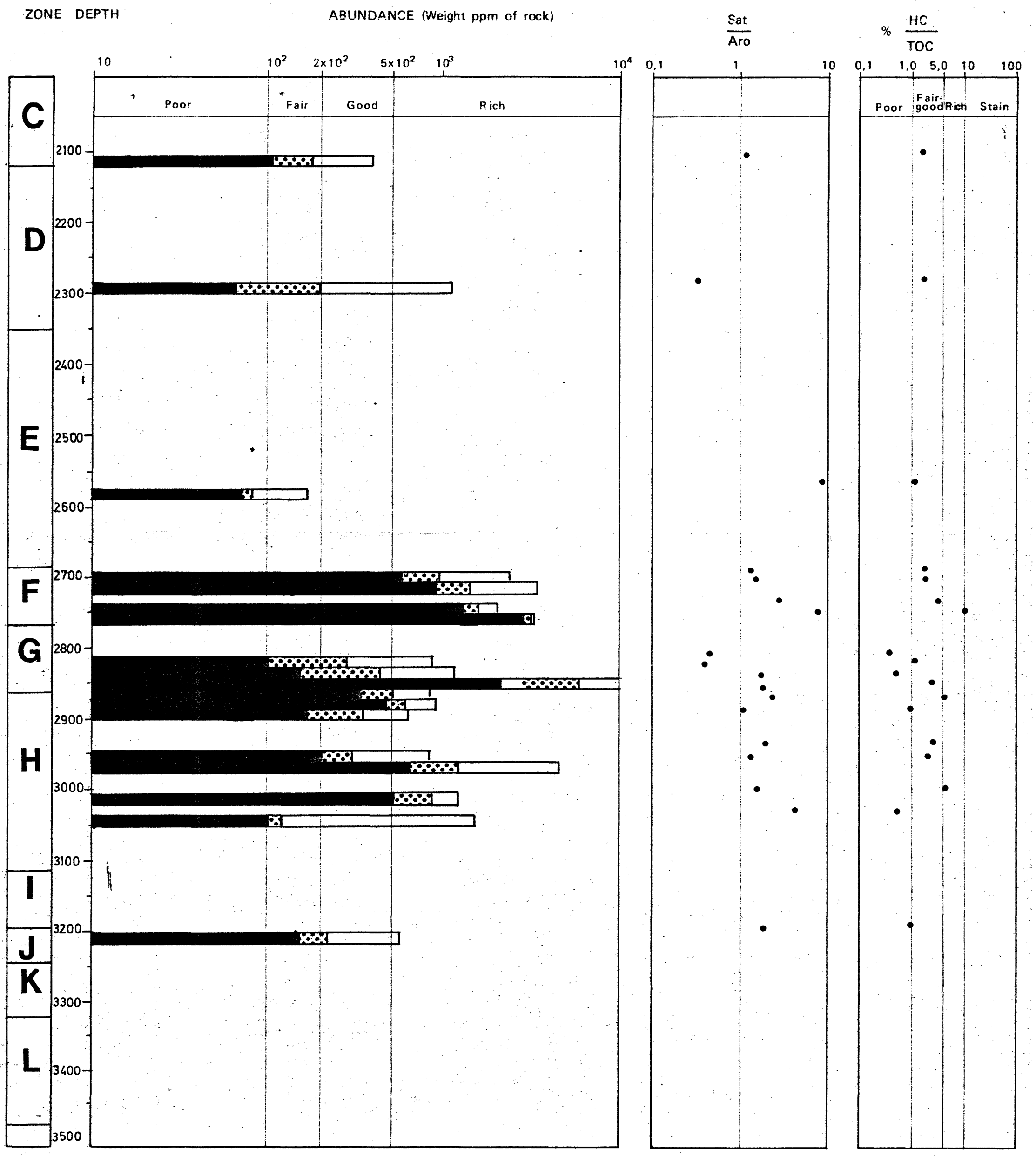

3010-25m


3040-55m


3205-20m

C_{15}^{+} HYDROCARBONS

Presentation of Analytical Data

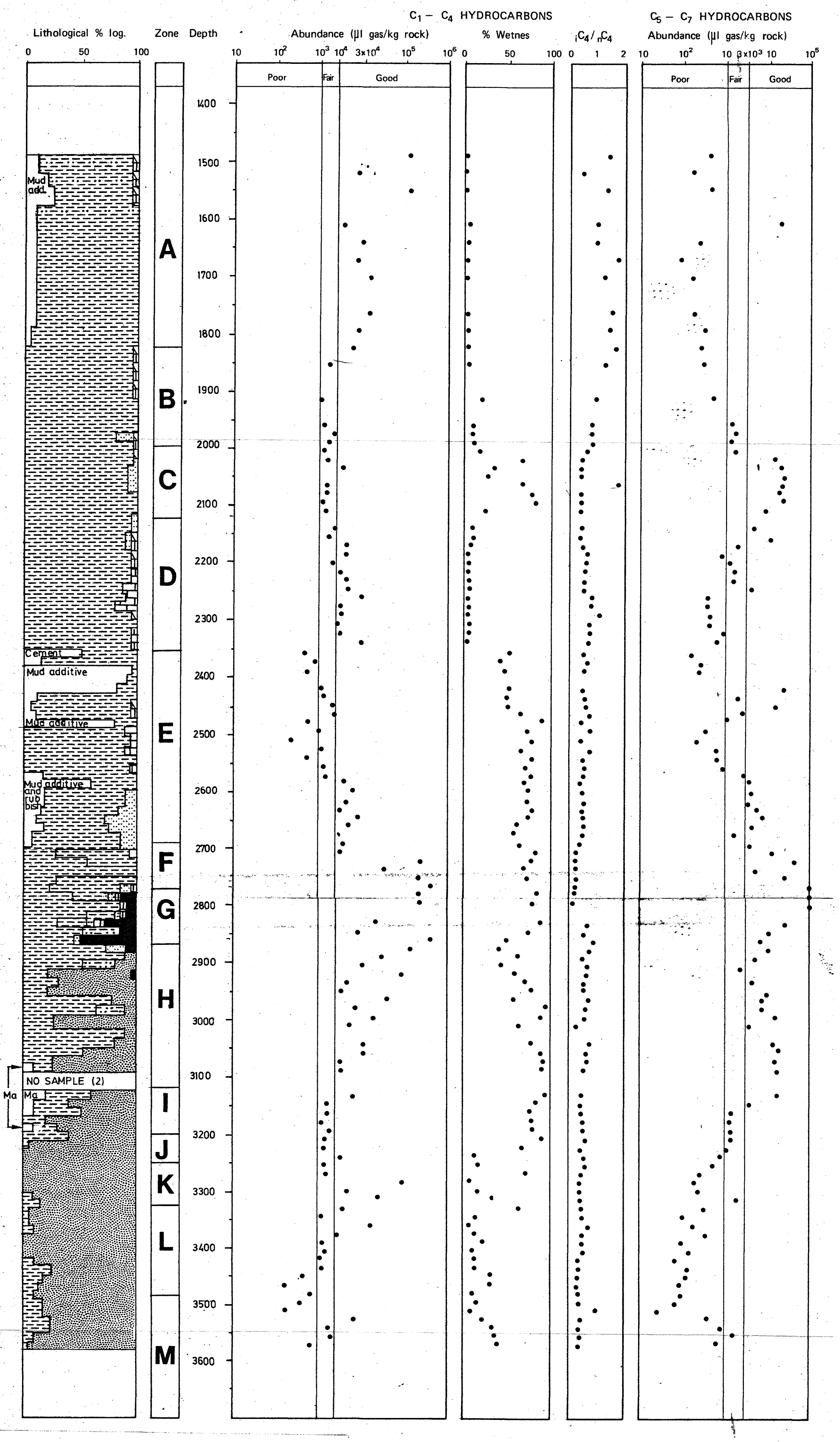


Sat. Aro. NSO Asp

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

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

$C_1 - C_7$ HYDROCARBONS
Presentation of Analytical Data



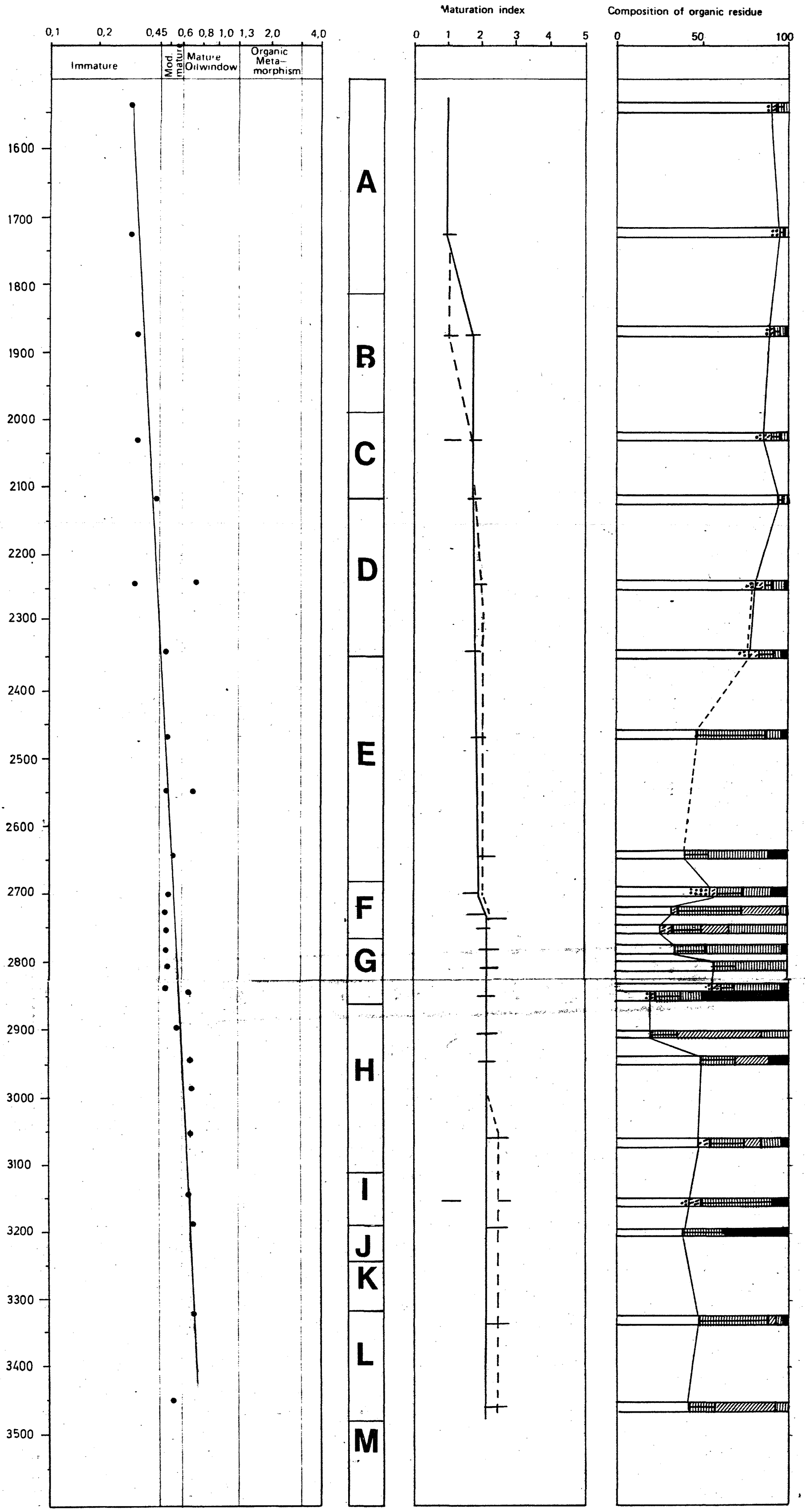
MATURATION

DEPTH

VITRINITE REFLECTANCE

ZONE

VISUAL KEROGEN
COLORATION AND COMPOSITION OF ORGANIC RESIDUE



Amorphous material, Sapropel

Algal

Spores and pollen

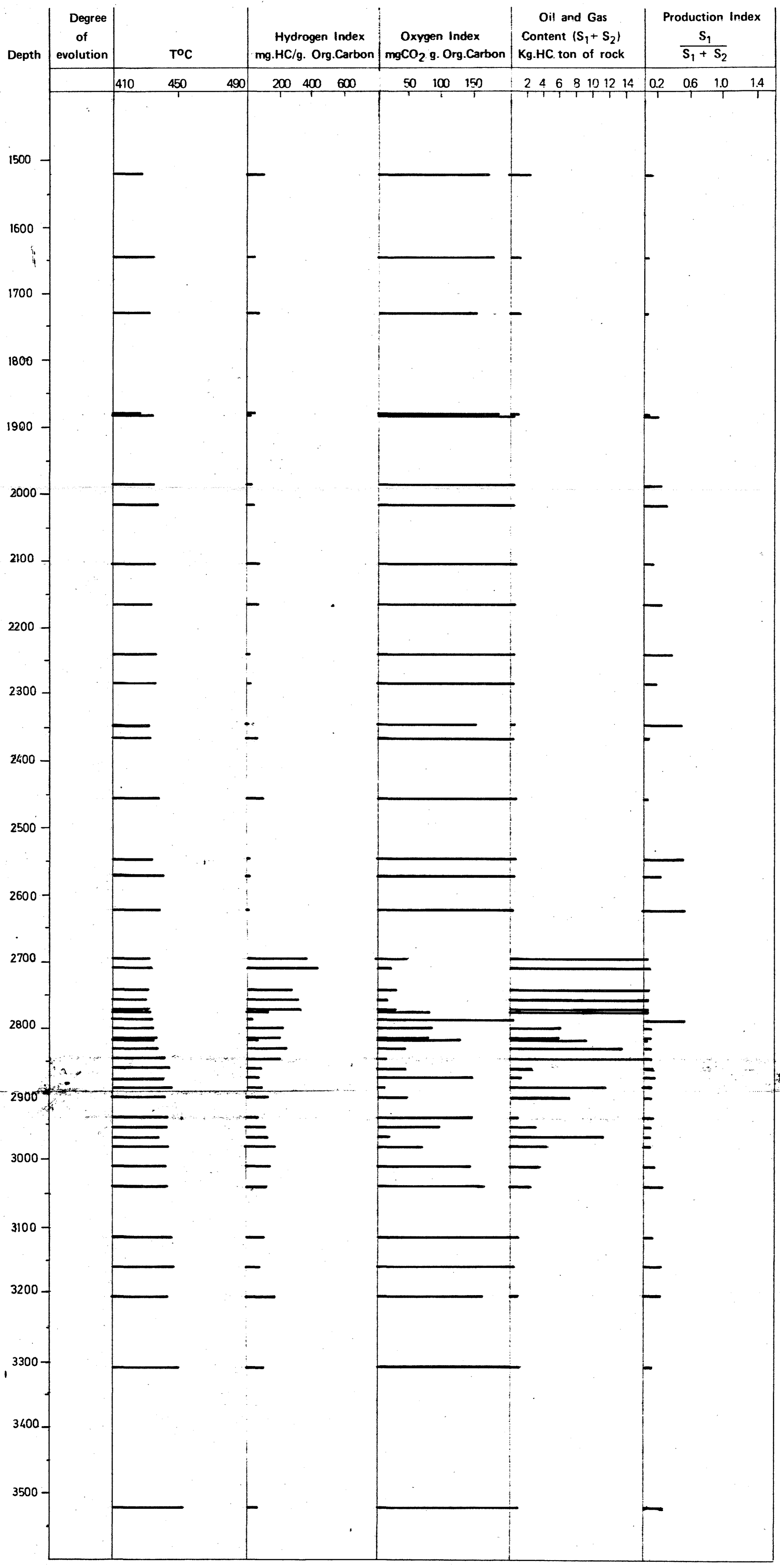
Cuticles

Wood remains

Undifferentiated disperse herbaceous material

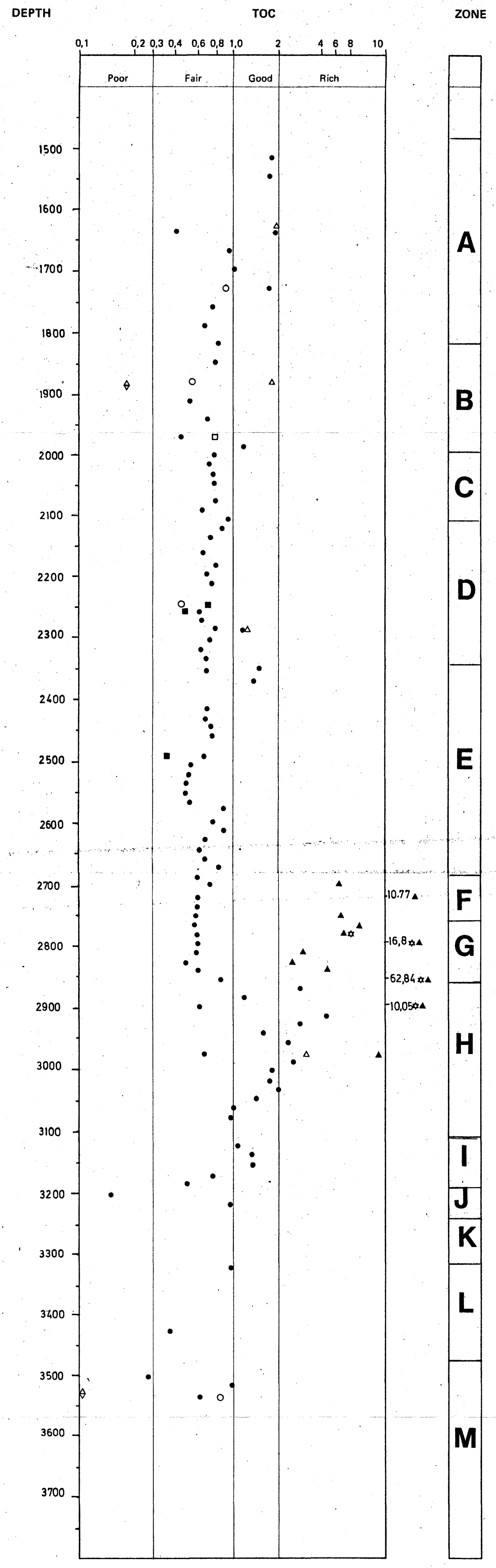
Black coal fragments

ROCK-EVAL PYROLYSIS



TOTAL ORGANIC CARBON (TOC)

Presentation of Analytical Data



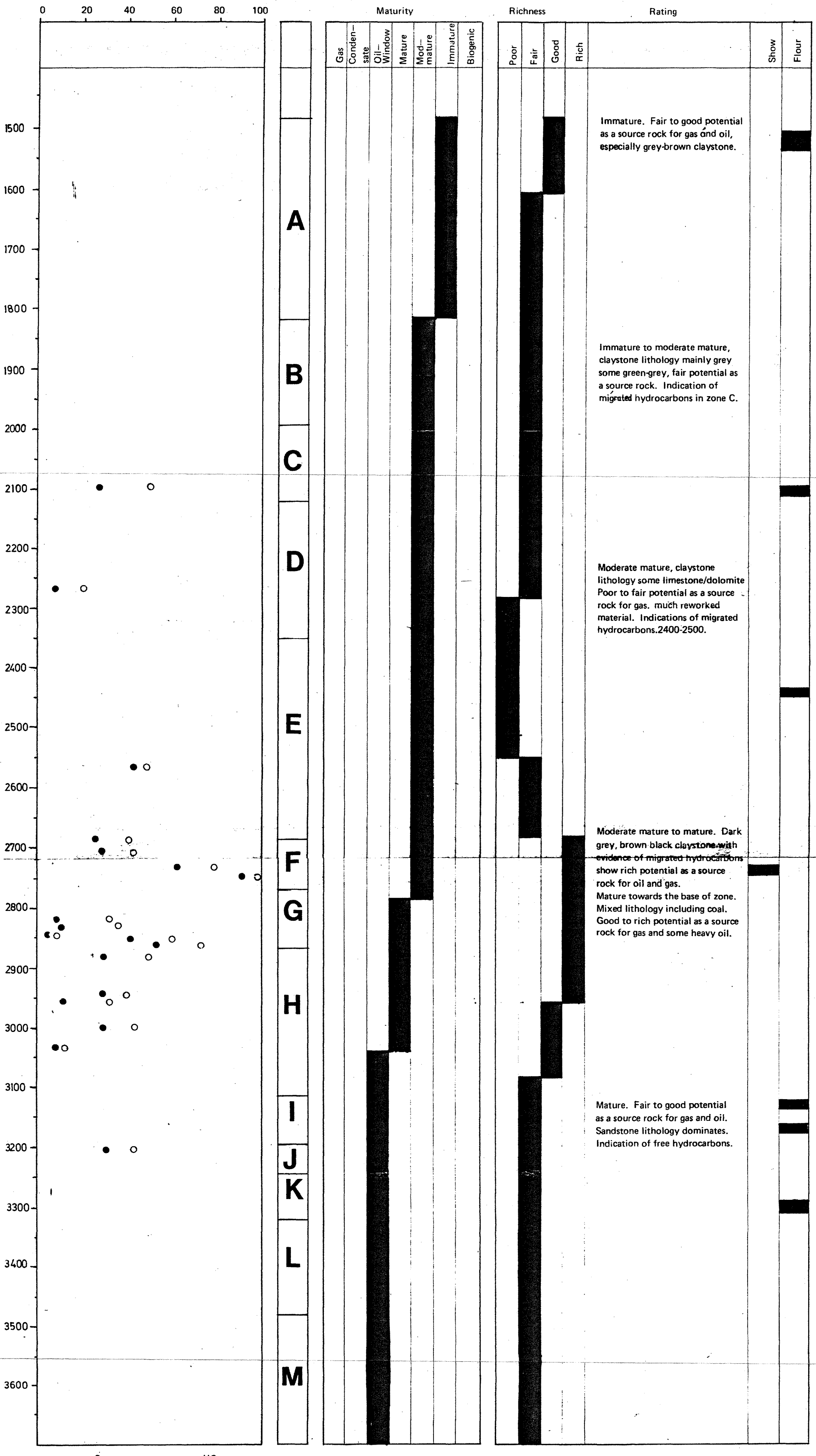
- Claystone, grey, green-grey (some red-brown)
- Claystone, green-grey
- Claystone, red-brown
- Claystone, grey-brown
- Claystone, dark-grey, brown-black
- Silty white claystone
- Limestone
- Carbonaceous claystone and coal

DEPTH

MATURATION
C_{15}^{+} FRACTION

ZONE

RATING
SUMMARY OF SOURCE POTENTIAL



● % $\frac{\text{Sat}}{\text{EOM}}$ ○ % $\frac{\text{HC}}{\text{EOM}}$

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