1.

RAPPORTENS TITTEL

Source Rock Analysis of
well 30/6-3.

OPPDRAGSGIVER:

Statoil

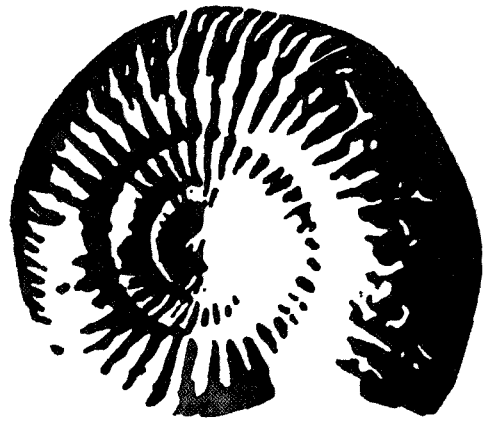
OPPDRAGSGIVERS REF.:

Roar Kræmer

OPPDRAGSRAPPORT NR.:

0-268

IKU



INSTITUTT FOR
KONTINENTALSOKKELUNDERSØKELSER

Continental Shelf Institute

Håkon Magnussons gt. 1B
Postboks 1883
7001 Trondheim
Telefon: (075) 15660
Telex: 55548
Telegram: "NORSHELF"

IKU

TILGJENGELIGHET:
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well 30/6-3.

OPPDRAGSGIVER:
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0-268

SAKSBEHANDLER / FORFATTER:
Bjorøy, M., Rønningsland, T.M.,
Vigran, J.O., Lind, K.

DATO:
28.5.1980

PROSJEKT NR.:

ANTALL SIDER:
35

ANTALL BILAG:
7

AVDELING:
Organic Geochemistry

OPPDRAGSANSVARLIG:
Malvin Bjorøy

SAMMENDRAG:
The analysed sequence of the well 2235-2910 m was devided into four zones.
A: 2235-2310 m;Clay stone: Poor/fair potential as a source rock for oil and gas.
Limestone; Good potential as a source rock for oil and gas.
B: 2325-2505 m: Clayey siltstone: Rich potential as a source rock for gas.
C: 2505-2775 m: Claystone. Good potential as a source rock for gas.
D: 2775-2910 m: Good potential as a source rock for gas.
The whole analysed section is immature.

STIKKORD
Source rock

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 Ia. 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.

Total Organic Carbon (TOC).

Picked cuttings of the various lithologies in each sample were crushed in a centrifugal mill. Aliquotes of the samples were then weighted into Leco cruisibles and treated with hot 2N HCl to remove carbonate and washed twice with distilled water to remove traces of HCl. Thecrusibles 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 determinator, to determine the total organic carbon (TOC).

Extractable Organic Matter (EOM)

From the TOC results samples were selected for extraction. Of the selected samples, approximately 100 gm of each was extracted 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 evaluated on a Buchi Rotavator and transferred to glas-vials 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 glasscapillary column and an automatic injection system. Hydrogen (0.7 ml/min.) was used as carrier gas and the injection was performed in the splitt mode (1:20).

Vitrinite Reflectance.

Samples, taken at various intervals, were sent for vitrinite reflectance measurements at Geoconsultants, Newcastle-upon-Tyne. The samples were mounted in Bakelite resin blocks; care being taken during the setting of the plastic to avoid temperatures in excess of $100^{o}C$. The samples where then ground, initially on a diamond lap followed by two grades of corundum paper. All grinding and subsequent polishing stages in the preparation were carried out using isopropyl alcohol as lubricant, since water leads to the swelling and disintegration of the clay fraction of the samples.

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

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

The surface of the polished block was searched by the operator for suitable areas of vitrinitic material in the sediment. The reflectance of the organic particle was determined relative to optical glass standards of known reflectance. Where possible, a minimum of twenty individual particles of

vitrinite was measured, although in many cases this number could not be achieved.

The samples were also analysed in UV light, and the colour of the fluoressing material determined. Below, a scale comparing the vitrinite reflectance measurements and the fluorescence measurements are given.

VITRINITE REFLECTANCE R.AVER. 546nm 1·516		0·20		0·30		0·40		0·50		0·60		0·70		0·80		0·90		1·00		1·10	
% CARBON CONTENT D.A.F.		57		62		70		73		76		79		80·5		82·5		84		85·5	
LIPTINITE FLUOR. EXC. 400nm BAR. 530nm	nm	725	750	790		820		840				860		890		940					
	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 MEASUREMENT 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 PROGRESS TO DEEP ORANGE COLOUR AND THEN FADE RATHER THAN DEVELOP O/R AND 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 meshes).
O-slide contains palynodebris remaining after flotation ($Zn\ Br_2$) 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 consentrate the larger fragments, and to study palynomorphs (pollen, spores and dino-flagellates) 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).

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).

R_o	0.45	0.6	0.9	1.0	1.3	
Colour index	2-	2	2+	3-	3	3+
Maturity intervals	1 Moderate mature	Mature (oil window)			Very mature	

Rock-Eval Pyrolyses.

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

RESULTS AND DISCUSSION.

Headspace Analyses.

Based on the headspace analyses of the C1 - C7 hydrocarbons, the analysed sequence, 2235 - 2910 m is divided into four zones:

A: 2235 - 2310 m
B: 2325 - 2505 m
C: 2505 - 2775 m
D: 2775 - 2910 m.

The lithology of the analysed sequence varies and mainly claystone and sandstone are recorded.

Zone A: This zone consists mainly of claystone with a small percentage of limestone. The abundance of C1 - C4 is found to be fair while the abundance of C_5^+ hydrocarbons is poor. The wetness of the gas is high and the iC_4/nC_4 is low. The iC_4/nC_4 ratio varies only slightly throughout the analysed sequence.

Zone B: The abundance of the C_1 - C_4 hydrocarbons varies in this zone, but on the whole it is found to be higher than in zone A. The abundance of the C_5^+ hydrocarbons is, however, very low.

Zone C: This is the main sandstone sequence of the analysed part of the well. The abundances of both C_1 - C_4 and C_5^+ hydrocarbons are found to be poor, indicating that hydrocarbons have not migrated into this sandstone unit.

Zone D: This is again a claystone unit and the abundances of both C_1 - C_4 and C_5^+ hydrocarbons are higher than in zone C, but still poor.

Total Organic Carbon. TOC.

Total organic carbon was measured on all samples, except sandstone samples. Where more than one lithology was found in the samples, TOC was measured on each lithology which was found to be 10 % or more of the whole sample. A

number of sidewall cores were also analysed to verify the results, due to the bad quality of some of the samples.

Zone A: This zone consists of claystone and limestone. Some of the limestone samples are found to have very high TOC values for limestone. Sidewall cores were analysed in these intervals, where they were available, and these results agree with the results found from the cuttings. The claystone samples have a poor abundance of organic carbon.

Zone B: This zone consists mainly of claystone and siltstone, together with coal in some samples. The claystone in the upper part of the zone has TOC values similar to zone A and the TOC values increase with increasing depth. The siltstone is, however, found to have high TOC values. This might be due to contamination of coal particles or of coal particles in the cuttings. A number of sidewall cores from this zone were analysed and a large variation was found in the organic carbon values. The clayey siltstone in the upper part of the zone is found to have high TOC values, which fit in well with the TOC values found for the siltstone cuttings in the canned samples. The claystone is found to have far lower TOC values. This is also in agreement with the results from the analyses of the cuttings. The large variation found in the lithology of the sidewall cores indicates that there are rapid changes between siltstone and claystone in the well, and the cuttings found in the canned samples could therefore mainly be true cuttings, i.e. not cavings.

Zone C: A large proportion of the samples from this zone had a high percentage of sandstone. The claystone in the samples was analysed and the TOC values of the upper part of this zone are similar to those recorded for the claystone in zone B. The middle part of the zone is found to have higher values, 1 - 3 % organic carbon.

Zone D: Again a zone with claystone and sandstone, but in this zone, claystone is found to be most prominent. The TOC values are uniform throughout the zone, approximately 1.5 %. The analysed sidewall core from this zone agrees well with these results.

Extraction and Chromatographic Separation.

Zone A: Two samples, 2235 - 50 m and 2280 - 2325 m, from this zone were extracted. The latter was a combination of sidewall core chips and picked cuttings. The uppermost sample, 2235 - 50 m is found to have a fair abundance of extractable hydrocarbons, while the lowermost sample has a rich abundance. The gas chromatograms of the saturated hydrocarbon fractions of the two samples vary slightly in the front end, especially in the pristane/nC_{17} ratio. In the high molecular end there is small differences espesially in the sterane/ triterpane distribution, which is found to be well pronounced, indicating an input of terrestrial material. Such pronounced sterane/triterpane distribution as seen for thess samples are normally found for immature samples. This does not agree with the n-alkane distribution, which is smooth with a low CPI value, indicating well mature hydrocarbons. These samples could therefore be contaminated by migrated hydrocarbons. This is also indicated by the very high HC/TOC ratio found for the sample from 2280 - 2325 m.

Zone B: Five samples, 2385 - 2412 m, 2426.5 - 2431.5 m, 2439 - 2442 m, 2445 -2460 m and 2460 m, from this zone were extracted. Some of these samples are sidewall cores while others are cuttings (Table III). The uppermost sample, 2385 - 2412 m shows a fair abundance of extractable hydrocarbons while the three next samples were found to have a poor abundance. The lowermost sample, 2460 m, which is a core chip, is found to have a rich abundance of extractable hydrocarbons. The distribution of hydrocarbons in these samples vary. The three uppermost samples have approximately equal amounts of saturated and aromatic hydrocarbons, while the two lowermost samples have approximately twice as much aromatic as saturated hydrocarbons. The extractability, measured in mg HC/g Org. carb. (HC/TOC) is poor for all the samples.

The gas chromatograms of the saturated hydrocarbon fractions vary only slightly from sample to sample. They all show n-alkane distributions with high CPI values together with high pristane/nC_{17} ratio, indicating immature terrestrial sediments. The one sample which differs slightly from the others is the sample from 2460 m. The overall distribution is similar to the other samples, but it is found to contain a large proportion of not straight chain compounds, espesially in the front end of the chromatogram. Presently the

reason for this high abundance of these compounds is not known, but biodegradation of the n-alkanes could be a possibility.

Zone C: Three samples, 2565 - 80 m, 2631 m and 2667 m from this zone were extracted. The uppermost sample 2565 - 80 m, a sample of picked cuttings, and the lowermost sample, 2667 m, a sidewall core, both show a poor abundance of extractable hydrocarbons, and with a high proportion of aromatic hydrocarbons. The sample from 2631 m, a sidewall core has a good abundance of extractable hydrocarbons. The percentage of saturated hydrocarbons is far higher in this sample compared to the two other samples from this zone. The gas chromatograms of the saturated hydrocarbon fractions are similar to those from the zone above, i.e: very pronounced heavy n-alkanes with high CPI values and high pristane/nC_{17} ratio. This, together with pronounced steranes/triterpanes indicate an input of immature terrestrial material.

Zone D: One sample, 2789 m, a sidewall core from this sample was extracted and found to have a fair abundance of extractable hydrocarbons. Again the sat/aro ratio is found to be very low. The gas chromatogram of the saturated hydrocarbon fraction is similar to those from zone D and C, indicating immature terrestrial kerogen.

Vitrinite Reflectance.

Eleven samples were examined in reflected light, and vitrinite reflectance measured. Below each sample is described and together with the reflectance values, other information from the analyses are given.

Sample K 2511, 2235 - 50 m: Grey and red shale, Ro 1 0.32(1) and Ro 1 0.61(2).

The sample has a very low organic content with small gnarled particles of inertinite and reworked material, very corroded. A few bitumen blebs are recorded but no reliable vitrinite, only three doubtful particles. UV light shows a yellow and yellow/orange fluorescence from spores and hydrocarbon specks and a low exinite content.

Sample K 2515, 2295 - 2310 m: Red and grey shale, Ro 1 0.40(2).

The red shale is barren. The grey shale contains some small, very corroded particles of high reflectance reworked material and inertinite together with some blebs of bitumen. The sample has an overall low organic content. UV light shows a yellow and yellow/orange fluorescence from spores and a trace of exinite.

Sample K 2519, 2340 - 55 m: Ro = 0.41(21).

The sample has a low organic content with particles of inertinite and reworked material being dominant. A few particles of coal and wisps of true vitrinite together with some bitumen are recorded. UV light shows a yellow/ orange to mid-orange fluorescence from spores and a low exinite content.

Sample K 2523, 2415 - 30 m: Shale, siltstone and carbonate, Ro = 0.43(14) and Ro = 1.02(7).

The sample has a moderate organic content with particles of inertinite and reworked material being dominant. A few vitrinite particles and wispy particles were recorded, some cuttings show strong bitumen staining. Some, very small, loose coal fragments were recorded in the sample. UV light shows a yellow/ orange and light orange fluorescence from spores and a low exinite content.

Sample K 2526, 2460 - 75 m: Shale, carbonate and coal. Ro = 0.46(20).

The sample has a low organic content apart from the coal fragments. Two coal lithologies, vitrinitic and lightly brecciated, inertinite rich, are recorded. UV light shows a light orange and dull mid-orange fluorescence from spores and a moderate exinite content. All measurements were on coal.

Sample K 2531, 2535 - 50 m: Mixed shale and carbonate lithologies, Ro = 0.47(9).

The sample has a low organic content with plentiful bitumen wisps and locallised staining. Otherwise, inertinite and reworked particles are very dominant. Only a trace of vitrinite wisps were recorded. UV light shows a yellow to mid-orange fluorescence from spores and a lower exinite content.

Sample K 2535, 2595 - 2610 m: Shale, sandstone and carbonate, Ro = 0.39(21).

The sample has a low organic content with a few particles of reworked material and inertinite. Only a trace of poor vitrinite particles with variable reflectance were recorded. UV light shows a yellow/orange and light orange fluorescence from spores, plentiful in a few cuttings, together with a low overall exinite content.

Sample K 2540, 2670 - 85 m: Shale, Ro = 0.48(21).

The sample has a moderate organic content. Inertinite and reworked particles are dominant. Some bitumen wisps and a low content of rather variable vitrinite wisps were recorded. UV light shows a light orange fluorescence from spores and a moderate to rich exinite content.

Sample K 2547, 2775 - 90 m: Shale, Ro = 0.49(21).

This sample has a low organic content, mostly inertinite and reworked particles. Only a trace of poor vitrinite wisps together with plentiful bitumen wisps were recorded. UV light shows a yellow/orange and light orange and light orange fluorescence from spores and a moderate to rich exinite content.

Sample K 2551, 2835 - 50 m: Shale and carbonate, Ro = 0.45(19) and
Ro = 1,07(1).

This sample contains plentiful bitumen wisps, otherwise a low content of inertinite and reworked particles. Only a trace of small vitrinite wisps were recorded. UV light shows a light and mid-orange fluorescence from spores and a moderate to rich exinite content.

Sample K 2553, 2865 - 80 m: Shale, Ro = 0.48(21).

The sample has a low organic content with good bitumen wisps and a few good vitrinite wisps and wispy particles. Inertinite and reworked particles are slightly dominant. UV light shows a light orange fluorescence from spores and a moderate to rich exinite content.

The vitrinite reflectance measurements show a good maturity gradient throughout the measured sequence. The upperpart, down to 2600 m is immature, while the lower 300 m is found to be moderate mature.

Visual Kerogen Evaluation.

The total acid insoluble residues from eleven samples, sidewall cores from 2252 m to 2875 m depth, were investigated for evaluation of kerogen composition and colour of the organic remains.

On the basis of kerogen we distinguish the main intervals. The residues from 2252 m to 2475 m represent marine low energy deposits, probably nearer to shoreline at 2285 m and 2352 m. The residues from 2545 m and below represent more deltaic though marine conditions, and we find an increase in colour index from 1+ or 1+/2- above 2- and 2-/2 below.

2252 m swc and 2285 m swc.

Amorphous material dominates, mostly as aggregates. We suspect some sapropelized, herbaceous/cuticular material in the lower sample, but it is difficult to distinguish from true sapropel. Colour index: 1+

2352 m swc.

Amorphous material dominates, but the residue also includes pollen, spores, dinoflagellate cysts, woody material and reworked woody/coaly fragments. Palynomorphs apparently are fairly dark but well preserved. Colour index: 1+/2-

2418 m swc and 2475 m swc.

Amorphous material dominates partly as aggregates. Dinoflagellate cysts are common, but poorly preserved. Indeterminate, finely dispersed material is recorded in small amounts. Colour index: 1+/2-

2545 m swc 2600 m swc.

Terrestrial remains dominate and include varied (poorly sorted) assemblages of woody remains, indeterminate herbaceous material, cuticles, pollen and spores. In addition there are reworked woody/coaly fragments. Amorphous material and dinoflagellate cysts form a minor constituent. Colour index: 2-

2679,5 m swc.

Amorphous material dominates. There are numerous pollen and spores and some indeterminate herbaceous material. Colour index: 2-

2789 m swc, 2835 m swc, 2875 m swc.

Amorphous material dominates above, terrestrial material below. The terrestrial remains include varied assemblages of woody material, cuticles, pollen and spores as well as indeterminate finely dispersed material. Together the samples might indicate increasing marine conditions upwards. Colour index: 2- and 2-/2

Rock-Eval Pyrolysis.

Twenty five samples, a combination of sidewall cores and picked cuttings, were pyrolysed, and the results shown in table X. Below we will discuss the results from the various zones, and compare the results from the visual kerogen examination.

Zone A: Four samples from this zone were analysed. The two uppermost samples have low hydrogen indeces, while the limestone sample from 2280 m has a light hydrogen index indicating type II kerogen. The oxygen indeces are extremely high, and it is believed that this is due to a decomposition of carbonates in the samples at a lower temperature than normally, so that the CO_2 from the carbonate is registered in the CO_2 analysis. The low hydrogen index found for the two uppermost samples does not agree with the visual kerogen results. It is believed that this might be due to a high percentage of reworked material, which will distort the Rock-Eval results.

Zone B: The hydrogen indeces measured for the samples in this zone vary from 36 to 258. Generally, the whole zone contains mainly kerogen type III,

but with an input of more amorphous kerogen in some of the samples. This agrees well with the results found in the visual kerogen examination.

Zone C: Again a zone with some variation in the measured hydrogen indeces, but most of the samples are found to have hydrogen indeces between 100 and 200. This indicates type III kerogen, in good agreement with the visual kerogen examination.

Zone D: Again a zone with hydrogen indeces between 100 and 200 typical for type III kerogen.

The maturity parameter from the Rock-Eval analyses (T_{max}) indicate that the analysed sequence down to approximately 2430 m are immature with a slightly higher maturity for the rest of the well. We should, however, bear in mind that this is a far coarser maturity measurement than vitrinite reflectance and visual kerogen. These measurements indicate that the well is immature down to approximately 2600 m.

CONCLUSION.

Based on the headspace analyses the analysed sequence of the well, 2235 - 2910 m, is divided into four zones:

A: 2235 - 2310 m
B: 2325 - 2505 m
C: 2505 - 2775 m
D: 2775 - 2910 m.

In the evaluation of the well, the results from the headspace analysis, total organic carbon and extraction are used in the evaluation of the richness of the source rock while the visual kerogen examination and Rock-Eval pyrolyses are used for the typeing of kerogen in the samples. The combination of vitrinite reflectance, fluorescence, visual kerogen examination and Rock-Eval pyrolysis are used in evaluation of the maturity of the various sequences.

Zone A: 2235 - 2310 m: A zone with claystone and limestone. The claystone in the upper part of the zone is found to have a poor/fair potential as a source rock for oil and gas while the limestone in the lower part of the zone has a good potential as a source rock for oil and gas. Signs of migrated hydrocarbons in samples from this zone. There was only small amounts of limestone from this interval, and we would strongly advise further analyses of this if samples are available.

Zone B: 2325 - 2505 m. A zone with mainly claystone and clayey siltstone. The TOC values for the latter are very high while the extractability is low. Both Rock-Eval analyses and visual kerogen indicate the zone to be mainly of kerogen type III with some small lenses with kerogen type II. On the whole the clayey siltstone is found to have a rich potential as a source rock for gas, while the claystone in the lower part has a fair potential as a source rock for gas (and oil).

Zone C: 2505 - 2775. This zone consists mainly of claystone and sandstone. The claystone is found to have a good potential as a source rock for gas.

Zone D: 2775 -2910 m: This zone consists mainly of claystone which is found to have a good potential as a source rock for gas.

Various maturity measurements indicate the well to be immature down to 2600 m and moderate mature for the rest of the well. Since the lower part of the well mainly consists of kerogen type III which needs higher maturity to reach the production stage, we would, however, be inclined to classify the whole analysed sequence as immature.

TABLE I contd...

Concentration l gas/pr. kg rock (Headspace)

Sample	Depth	C_1	C_2	C_3	iC_4	nC_4	C_5+	C_1-C_4	C_2-C_4	% wetness	$\frac{iC_4}{nC_4}$
K-2511	2235 - 50	975	367	636	189	493	107	2661	1686	63.35	0.38
K-2512	2250 - 65	3157	1644	6170	2354	4816	543	18141	14984	82.60	0.49
K-2513	2265 - 80	1483	829	3666	1603	4098	904	11679	10196	87.30	0.39
K-2514	2280 - 95	Open	Lid								
K-2515	2295 - 2310	676	206	305	86	196	43	1469	793	54.01	0.44
K-2516	2310 - 25	Open	Lid								
K-2517	2325 - 40	584	219	399	106	261	54	1569	985	62.75	0.41
K-2518	2340 - 55	25745	9825	9438	1433	3309	265	49750	24005	48.25	0.43
K-2519	2355 - 70	10874	5967	4070	402	911	37	22224	11350	51.07	0.44
K-2520	2370 - 85	78272	11928	8795	937	1846	70	101780	23507	23.10	0.51
K-2521	2385 - 2400	21386	6939	4222	433	1012	57	33992	12606	37.09	0.43
K-2522	2400 - 15	53509	23343	13441	1161	2946	209	94401	40892	43.32	0.39
K-2523	2415 - 30	11118	7540	4959	482	953	49	25052	13934	55.62	0.51
K-2524	2430 - 45	Open	Lid								
K-2525	2445 - 60	18225	6858	3563	478	988	122	30113	11887	39.48	0.48
K-2526	2460 - 75	49104	17304	7527	839	1654	156	76428	27324	35.75	0.51
K-2527	2475 - 90	18422	5557	2723	498	890	146	28089	9668	34.42	0.56
K-2528	2490 - 2505	33041	11584	8208	1823	3489	598	58145	25105	43.18	0.52
K-2529	2505 - 20	20485	7064	3511	488	906	98	32455	11970	36.88	0.54
K-2530	2520 - 35	14528	5919	3061	310	676	56	24495	9966	40.69	0.46
K-2531	2535 - 50	10347	6999	4831	527	1101	57	23807	13459	56.54	0.48
K-2532	2550 - 65	21040	9401	5947	669	1248	57	38305	17266	45.07	0.54

37/G/1

TABLE I contd...

Concentration l gas/pr. kg rock (Headspace)

Sample	Depth	C_1	C_2	C_3	iC_4	nC_4	C_5+	C_1-C_4	C_2-C_4	% wetness	$\frac{iC_4}{nC_4}$
K-2533	2565 - 80	11474	7984	6693	702	1717	89	28571	17097	58.84	0.41
K-2534	2580 - 95	Open	Lid								
K-2535	2595 - 2610	486	423	872	154	409	49	2345	1858	79.26	0.38
K-2536	2610 - 25	7868	2586	2557	391	935	55	14337	6470	45.12	0.42
K-2537	2625 - 40	9544	3212	2774	434	1048	86	17012	7468	43.90	0.41
K-2538	2640 - 55	3420	2567	3377	479	1248	79	11031	7611	68.99	0.38
K-2539	2655 - 70	960	468	932	189	480	43	3029	2069	68.30	0.39
K-2540	2670 - 85	1682	1169	2164	430	1151	106	6596	4913	74.49	0.37
K-2541	2685 - 2700	88	83	140	22	56	6	390	302	77.51	0.39
K-2542	2700 - 15	164	21	50	12	32	40	279	115	41.27	0.36
K-2543	2715 - 30	338	43	94	21	55	59	551	213	38.65	0.39
K-2544	2730 - 45	600	96	172	30	78	84	977	376	38.57	0.39
K-2545	2745 - 60	58	22	43	9	22	25	154	97	62.65	0.44
K-2546	2760 - 75	304	151	251	50	115	77	871	567	65.08	0.44
K-2547	2775 - 90	9658	4411	6525	1046	2430	1140	24071	14412	59.87	0.43
K-2548	2790 - 2805	733	396	664	123	264	197	2180	1447	66.36	0.46
K-2549	2805 - 20	4014	1910	2911	486	1148	567	10469	6455	61.66	0.42
K-2550	2820 - 35	3672	1609	1879	306	659	356	8127	4454	54.81	0.46
K-2551	2835 - 50	888	677	848	124	305	199	2843	1955	68.77	0.41
K-2552	2850 - 65	4014	1796	2436	408	891	670	9545	5531	57.95	0.46
K-2553	2865 - 80	751	489	852	173	421	544	2687	1936	72.05	0.41
K-2554	2880 - 95	70	59	98	16	42	76	285	215	75.45	0.39
K-2555	2895 - 2910	Open lid									

TABLE II

IKU No.	Depth	TOC		Lithology
2511	2235-50	0,96	100 %	Claystone, grey, some light green.
			sm.am.	Limestone.
2512	2250-65	0,59	65 %	Claystone, as above.
		0,95	35 %	Limestone, brownish white.
2513	2265-80	0,69	75 %	Claystone, grey, some greenish, redbrown.
		2,04	25 %	Limestone, brownish white.
			obs.	Sand, medium/coarse, clear, subangular.
2514	2280-95	0,56	65 %	Claystone, as above.
		2,31	35 %	Limestone, white to brownwhite.
2515	2295-2310	0,70	95 %	Claystone, grey, greenish, some redbrown
			5 %	Coal (? mud additive).
			sm.am.	Limestone, as above; Sand, rounded, medium.
2516	2310-25	0,47	70 %	Claystone, grey, greenish to light green, some redbrown.
		2,19	20 %	Limestone, brownwhite to light yellowbrown.
			10 %	Coal (? mud additive)
			sm.am.	Pyrite.
2517	2325-40	0,56	87 %	Claystone, grey, light greenish grey, light green/green and redbrown.
			10 %	Limestone, white, brownwhite.
			3 %	Coal.
			sm.am.	Siderite, brown, hard; Pyrite.
2518	2340-55	0,39	95 %	Claystone, grey, light greenish grey, green and redbrown.
			5 %	Coal.
			sm.am.	Limestone; Pyrite.

TABLE II contd...

IKU No.	Depth	TOC		Lithology
2519	2355-70	0,59	70 %	Claystone, as above.
			5 %	Siltstone, clayey and sandy, dark brownish grey, very micaceous, with Coal-fragments.
			15 %	Coal.
			10 %	Sand and Sandstone, very fine to medium, angular-subangular, clear - light grey, micaceous.
			sm.am.	Limestone, brownwhite; Pyrite.
2520	2370-85	0,92	60 %	Claystone, grey to greenish and light grey, some green and redbrown.
		3,18	35 %	Siltstone, as above, grading to black, great coalified plant fragments.
			5 %	Limestone, brownwhite, some grey (clayey).
2521	2385-2400	0,49	65 %	Claystone, as above.
		4,79	30 %	Siltstone, as above.
			5 %	Limestone, white, brownwhite.
			sm.am.	Pyrite; Sandstone, fine-veryfine.
2522	2400-15	0,48	50 %	Claystone, as above.
		6,43	50 %	Siltstone, as above.
			sm.am.	Limestone; Pyrite; Sandstone, fine to very fine.

TABLE II contd...

IKU No.	Depth	TOC		Lithology
2523	2415-30	0,62	77 %	Claystone, grey-greygreen. (soopy tuffaceous).
			20 %	Coal.
			3 %	Sand, medium to coarse.
2524	2430-45	0,74	70 %	Claystone, as above, browngrey waxy (with Coal).
		2,66	20 %	Siltstone, as above.
			10 %	Coal.
			sm.am.	Limestone, white to brownwhite, obs. clear crystallized Calcite; Sand; Pyrite.
2525	2445-60	1,02	100 %	Claystone, grey to greygreen, (light) grey-brown partly waxy with Coal-lenses, some darkgrey/black carbonaceous claystone with coal.
			sm.am.	Coal.
2526	2460-75	0,36	67 %	Claystone, grey to green.
			30 %	Coal with carbonaceous claystone.
			3 %	Pyrite.
			sm.am.	Sand, fine - medium; ? Siderite, yellowbrown.
		2,28		Greybrown, claystone.

TABLE II contd...

IKU No.	Depth	TOC		Lithology
2527	2475-90		80%	Sand, medium to coarse, subangular to angular, white/clear
			15%	Claystone, as above
			5%	Coal with carbonaceous claystone
2528	2490-2505		90%	Sand, as above, some very coarse and Graved.
			10%	Claystone, as above, Coal.
2529	2505-20		80%	Sand, as above
		0,60	20%	Claystone, grey-greygreen.
2530	2520-35	1,92	97%	Claystone, grey - light green, some dark grey, redbrown.
			3%	Coal
			Sm.am.	Sand, Pyrite, light yellowish brown ? Siderite and light grey (brownish)
2531	2535-50	0,60	90%	Claystone, grey-greygreen, some redbrown.
			10%	Limestone, white to yellowish brown ? sideritic.
			Sm.am.	Coal and carbonaceous claystone, Silstone, grey (dark), micaceous.

TABLE II contd...

IKU No.	Depth	TOC		Lithology
2532	2550-65	0,54	82%	Claystone, grey- light green, some browngrey (with Coal)
			10%	Voliths, brownish grey to greenish; fine Sandstone and coarse Sand.
			5%	Limestone/Silstone, browngrey; white-brown limestone
			3%	Pyrite
			Sm.am.	Silstone, clayey, dark grey, micaceous, with Coalfragments/lenses; fine Sandstone and coarse Sand.
2533	2565-80	2,45	100%	Claystone, as above, some dark grey/black Sandstone, fine, and Sand, medium to coarce, clear.
			Sm.am.	Limestone/Silstone, sandy; Coal; dark grey clayey Silstone; Limestone yellow-brown; white Calcite.
2534	2580-95	1,09	40%	Cement, brownwhite
			40%	Silt/Claystone, sandy, grey-light grey
			20%	Sandstone, fine-very fine and Sand, medium to coarse, subangular to subrounded, some rounded, micaceous, slightly glauconitic.
2535	2595-2610		40%	Cement
		1,50	40%	Clay/Siltstone, sandy, micaceous, grey
			20%	Sandstone, light grey/white, very fine to medium, Glauconite observed, some coarse Sand. Considerably contaminated by steel.

TABLE II contd....

IKU No.	Depth	TOC		Lithology
2536	2610-25		60%	Sandstone, fine-very fine, some medium, white to light grey, and some Sand, medium, angular.
		1,17	15%	Clay/Siltstone, as above
			25%	Cement
				Considerably mud contaminated by steel.
2537	2625-40		60%	Mud and steel
			60%	Sandstone
		2,89	20%	Clay/Siltstone, as above
			Sm.am.	Pyrite
2538	2640-55		50%	Sandstone, fine to very fine, white
		2,45	50%	Clay/Siltstone, as above
			Sm.am.	Pyrite. Considerably contaminated by steel.
2539	2655-70		45%	Sandstone, fine to very fine, white
		2,08	25%	Clay/silt-stone, as above
			30%	Steel
			Sm.am.	Pyrite; calcareous micaceous Siltstone; Limestone, light browngrey.
2540	2670-85	1,44	90%	Claystone, silty grading to sandy Siltstone, micaceous,
			5%	Sandstone
			5%	Steel
2541	2685-2700		92%	Sand, clear-white, medium - coarce, subangular angular, slighty micaceous
			8%	Claystone, as above
2542	2700-15		100%	Sand, as above

TABLE II contd...

IKU No.	Depth	TOC	Lithology
2543	2715-30		100% Sand, as above
2544	2730-45		100% Sand, as above
2545	2745-60		100% Sand, as above
2546	2760-75		90% Sand, as above 10% Claystone, silty, grading to sandy Siltstone, grey
2547	2775-90	1,63	80% Claystone, as above 20% Sand, as above, some fine Sandstone (micaceous).
2548	2790-2805	1,37	75% Clay/Siltstone, sandy, micaceous, grey 25% Sand, as above, and Sandstone, very fine, to fine, white-light grey. Sm.am. Pyrite; Calcite, white; ? Siderite, brown. Considerably contaminated by steel.
2549	2805-20	1,38	95% Claystone, silty grading to clayey/sandy Siltstone, micaceous, coal observed, grey. 5% Sand/Sandstone Contaminated by steel.
2550	2820-35	1,39	90% Claystone, as above 10% Sandstone, very fine - fine, white.
2551	2835-50	1,46	90% Claystone, as above 10% Sandstone, as above

TABLE II contd...

IKU No.	Depth	TOC		Lithology
2552	2850-65	1,46	75%	Claystone, as above
			25%	Sandstone, as above
			Sm.am.	Pyrite. Considerably contaminated by steel.
2553	2865-80	1,66	70%	Claystone, as above
			30%	Sandstone, as above, and some medium Sand
2554	2880-95		93%	Sand, coarse- very coarse, some medium, white, angular
			7%	Claystone, as above
2555	2895-2910		100%	Sand, as above.

TABLE IIb

Lithology and TOC of sidewall cores

Provenance	Depth (m)	TOC	Lithology
IKU-1	2265	0.45	Claystone, grey
-2	2280	1.31	Limestone, brownish white.
-3	2285	0.70	Claystone, dark grey/grey White mottles, scattered micaceous, calcareous
-4	2376	7.81	Very micaceous clayey siltstone, dark grey
-5	2396	5.20	As above.
-6	2405	3.99	As above.
-7	2412	6.57	Micaceous clayey siltstone, dark grey/grey.
OSU	2426.5	1.22	Claystone, grey, slightly calcareous.
	2431.2	1.75	As above.
↓	2439	0.49	Claystone grey - grey/green.
	2442.3	0.61	As above.
	2443	0.76	As above.
	2460	7.05	Siltstone, light grey, micaceous.
	2667	1.48	Claystone, silty, dark grey.
-15	2789	1.38	Claystone, silty, micaceous, some fissile, grey.

TABLE III

Weight (mg) of EOM and Chromatographic fractions

IKU No.	Depth	Rock extr. (g)	EOM	Sat.	Aro.	HC	Non HC	TOC
K-2511	2235 - 50 m	24,5	11,5	1,8	1,7	3,5	8,0	0,96
	2280 - 2325 m	11,5	74,1	23,0	8,7	31,7	42,4	1,15
	2385 - 2412 m	59,8	66,8	6,4	4,8	11,2	55,6	3,97
	2426,5 - 2431,5 m	47,5	11,9	2,4	2,2	4,6	7,3	1,27
	2439 - 43 m	70,6	13,9	3,8	2,2	6,0	7,9	0,68
K-2525	2445 - 60 m	67,8	14,4	1,7	3,3	5,0	9,4	1,02
	2460 m	21,6	31,1	5,9	10,2	16,1	15,0	7,05
K-2533	2565 - 80 m	23,0	5,0	0,4	0,7	1,1	3,9	2,45
	2631 m	9,2	9,4	1,9	1,4	3,3	6,1	1,84
	2667 m	9,0	5,2	0,1	0,5	0,6	4,6	1,48
	2789 m	5,2	3,3	0,1	0,8	0,9	2,4	1,38

TABLE IV

Concentration of EOM and Chromatographic Fractions (Weight ppm of rock)

IKU No.	Depth	EOM	Sat.	Aro.	HC	Non HC
K2511	2235 - 50 m	469	73	69	143	327
	2280 - 2325 m	6443	2000	757	2757	3687
	2385 - 2415 m	1117	107	80	187	930
133 SWC no.	2426,5-2431,2 m	250	51	46	97	154
136 SWC no.	2439 - 43 m	197	54	31	85	112
K2525	2445 - 60 m	212	25	49	74	139
137 SWC	2460 m	1440	273	472	745	694
K2533	2565 - 80 m	217	17	30	48	170
140 SWC	2631 m	1022	207	152	359	663
138 SWC	2667 m	578	11	56	67	511
139 SWC	2789 m	635	19	154	173	462

TABLE V

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

IKU No.	Depth.		EOM	Sat.	Aro.	HC	Non HC
K-2511	2235 - 50	m	49	8	7	15	34
	2280 - 2325	m	560	174	66	240	321
	2385 - 2412	m	28	3	2	5	23
	2426,5-2431,5	m	20	4	4	8	12
	2439 - 43	m	29	8	5	13	16
K-2525	2445 - 60	m	21	2	5	7	14
	2460	m	20	4	7	11	10
K-2533	2565 - 80	m	9	1	1	2	7
	2631	m	56	11	8	19	36
	2667	m	39	1	4	5	35
	2789	m	46	1	11	13	33

TABLE VI

Composition in % of the material extracted from the rock

IKU No.	Depth (m)		Sat / EOM	Aro / EOM	HC / EOM	Sat / Aro	Non Hc / EOM	HC / Non HC
K-2511	2235 - 50	m	16	15	30	106	70	44
	2280 - 2325	m	31	12	43	264	57	75
	2385 - 2412	m	10	7	17	133	83	20
	2426,5-2431,5	m	20	18	39	109	61	63
	2439 - 43	m	27	16	43	173	57	76
K-2525	2445 - 60	m	12	23	35	52	65	53
	2460	m	19	33	52	58	48	107
K-2533	2565 - 80	m	8	14	22	57	78	28
	2631	m	20	15	35	136	65	54
	2667	m	2	10	12	20	88	13
	2789	m	3	24	27	13	73	38

TABLE VII

Tabulation of datas from the gaschromatograms

IKU No.	Depth (m)	Pristane/nC_{17}	Pristane/Phytane	CPI
K-2511	2235 - 50 m	0.95	1.47	1.0
	2280 - 2325 m	0.73	1.41	1.1
	2385 - 2405 m	1.76	2.10	1.4
	2426,5-2431,5 m	1.48	3.33	2.0
	2439 - 43 m	1.00	2.71	1.4
K-2525	2445 - 60 m	1.48	3.69	1.7
	2460 m	1.40	2.92	1.4
K-2533	2565 - 80 m	1.21	2.13	1.4
	2631 m	1.29	2.19	1.4
	2667 m	1.17	2.57	1.4
	2789 m	1.33	2.00	1.4

TABLE VIII

Vitrinite Reflectance

IKU No.	Depth (m)	Vitrinite Reflectance	Fluorescence	Exinite Content
K-2511	2235 - 50 m	0.32(1), 0.61(2)	Yellow and yellow/orange	Low
K-2515	2295 - 2310 m	0.40(2)	Yellow and yellow/orange	Trace
K-2519	2340 - 55 m	0.41(21)	Yellow/orange, Mid.orange	Low
K-2523	2415 - 30 m	0.43(14), 1.02(7)	Yellow/orange, Light orange	Low
K-2526	2460 - 75 m	0.46(2)	Light orange, Mid.orange	Moderate
K-2531	2535 - 50 m	0.47(9)	Yellow-mid.orange	Low
K-2535	2595 - 2610 m	0.39(21)	Yellow/orange, Light orange	Low
K-2540	2670 - 85 m	0.48(21)	Light orange	Mod./Rich
K-2547	2775 - 90 m	0.49(21)	Yellow/orange, Light orange	Mod./Rich
K-2551	2835 - 50 m	0.45(19),1.07(1)	Light and mid.orange	Mod./Rich
K-2553	2865 - 80 m	0.48(21)	Light orange	Mod./Rich

TABLE IX

IKU | Well no. 30/6-3 . | VISUAL KEROGEN ANALYSIS | (Trondheim 1980)

Sample depth	Composition of residue	Particle size	Preservation of palynomorphs	Thermal maturation index	Remarks
swc. 2252 m	Am/Poll-spor,He,W,Cysts	F	good to fair	1+ or lower	Aggregates are present
swc. 2285 m	Am/Cut,He,Poll-spor	F/C	poor	1+	Aggregates, sapropelization
swc. 2385 m	Am,Cysts/W,WR!,Poll-spor	F	fair or good	1+/2-	Dark cysts
swc. 2418 m	Am/Cysts,Poll-spor,?Cut.	F	very poor	1+/2-	Some aggregates
swc. 2475 m	Am/Poll-spor ,Cysts,Cut.	F	very poor	1+/2-	Some aggregates
swc. 2545 m	W,He,Cut,Poll-spor/Am	F	fair to good	2-/2	
swc. 2600 m	He,W,WR!,Poll-spor	F/M,C	fair to poor	2-	
swc. 2679.5 m	Am/Poll-spor,He	F/M	fair to good	2-	
swc. 2789 m	Am/Poll-spor,Cut,He,W	F/M	fair to good	2-	Pollen dom. screened res.
swc. 2835 m	Am,Cy/W,He,Cut'Poll-spor, WR!	F/M,C	fair to poor	2- or 2-/2	
swc. 2875 m	Poll-spor,Cut,W,He/Am,Cy	F/M,C	good	2-/2	

Am amorphous
He herbaceous
W woody material
Cut cuticles
Cy cysts
R! reworked in the assemblage

F fine
M medium
C coarse

TABLE X

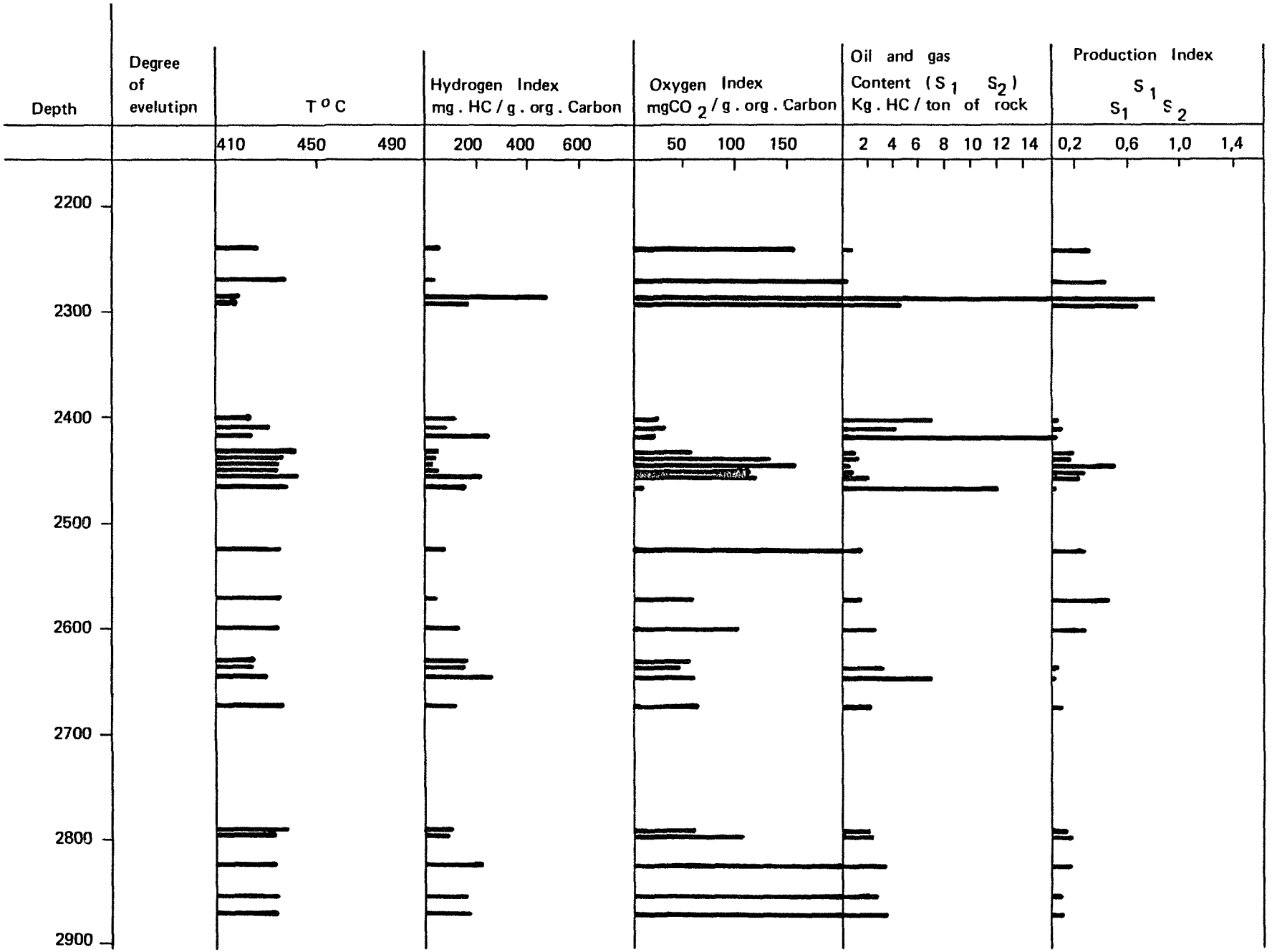
Rock-Eval Pyrolysis

Sample	Depth	S_1	S_2	S_3	C_{org}	Hydrogen Index	Oxygen Index	Oil of bas content (S_1+S_2)	Production Index $\frac{S_1}{S_1+S_2}$	Max ^oC
K-2511	2235 - 50 m	0.26	0.60	1.47	0.96	62.50	153.13	0.86	0.30	427°
	2265 m	0.15	0.21	4.52	0.45	46.67	1004.44	0.36	0.42	438°
	2280 m	13.86	3.34	4.45	0.70	477.14	635.71	17.20	0.81	420°
	2285 m	3.44	1.19	4.41	0.70	170.00	630.00	4.63	0.74	419°
	2396 m	0.52	7.15	1.34	5.20	137.50	25.77	7.67	0.07	425°
	2405 m	0.35	3.67	1.35	3.99	91.98	33.83	4.02	0.09	430°
	2412 m	0.78	16.92	1.33	6.57	257.53	20.24	17.70	0.04	425°
	2426.5 m	0.17	0.75	0.81	1.22	61.48	66.39	0.92	0.18	441°
	2431.2 m	0.19	0.98	2.31	1.75	56.00	132.00	1.17	0.16	437°
	2439 m	0.18	0.18	0.75	0.49	36.73	153.06	0.36	0.50	435°
	2442.3 m	0.15	0.35	0.72	0.61	57.38	118.03	0.50	0.30	435°
	2443 m	0.46	1.78	0.93	0.76	234.21	122.37	2.24	0.21	443°
	2460 m	0.61	11.39	0.85	7.05	161.56	12.06	12.00	0.05	438°
K-2530	2520 - 35 m	0.43	1.52	4.55	1.92	79.17	236.98	1.95	0.22	436°
K-2533	2565 - 80 m	0.82	0.97	1.54	2.45	39.59	62.86	1.79	0.46	437°
K-2535	2595-2610 m	0.80	2.14	1.51	1.50	142.67	100.67	2.94	0.27	436°
K-2537	2625 - 40 m	0.97	5.07	1.53	2.89	175.43	52.94	6.04	0.16	427°
	2631 m	0.21	3.34	0.91	1.94	172.16	46.91	3.55	0.06	426°

TABLE X

Rock-Eval Pyrolysis

Sample	Depth	S_1	S_2	S_3	C_{org}	Hydrogen Index	Oil of bas Oxygen Index	Production content (S_1+S_2)	Index $\frac{S_1}{S_1+S_2}$	Max ^oC
K-2538	2640 - 55 m	0.38	6.82	1.44	2.45	278.37	58.78	7.20	0.05	431^o
	2667 m	0.26	1.75	1.00	1.48	118.25	67.57	2.01	0.09	437^o
	2789 m	0.27	1.74	0.90	1.38	126.09	69.57	2.01	0.13	439^o
K-2548	2790-2805 m	0.37	1.70	1.50	1.37	124.09	109.49	2.07	0.18	435^o
K-2550	2820 - 35 m	0.75	3.22	12.51	1.39	231.69	900.00	3.97	0.19	436^o
K-2552	2850 - 65 m	0.37	2.51	5.71	1.46	171.92	391.10	2.88	0.13	437^o
K-2553	2865 - 80 m	0.56	3.13	4.70	1.66	188.55	283.13	3.69	0.15	437^o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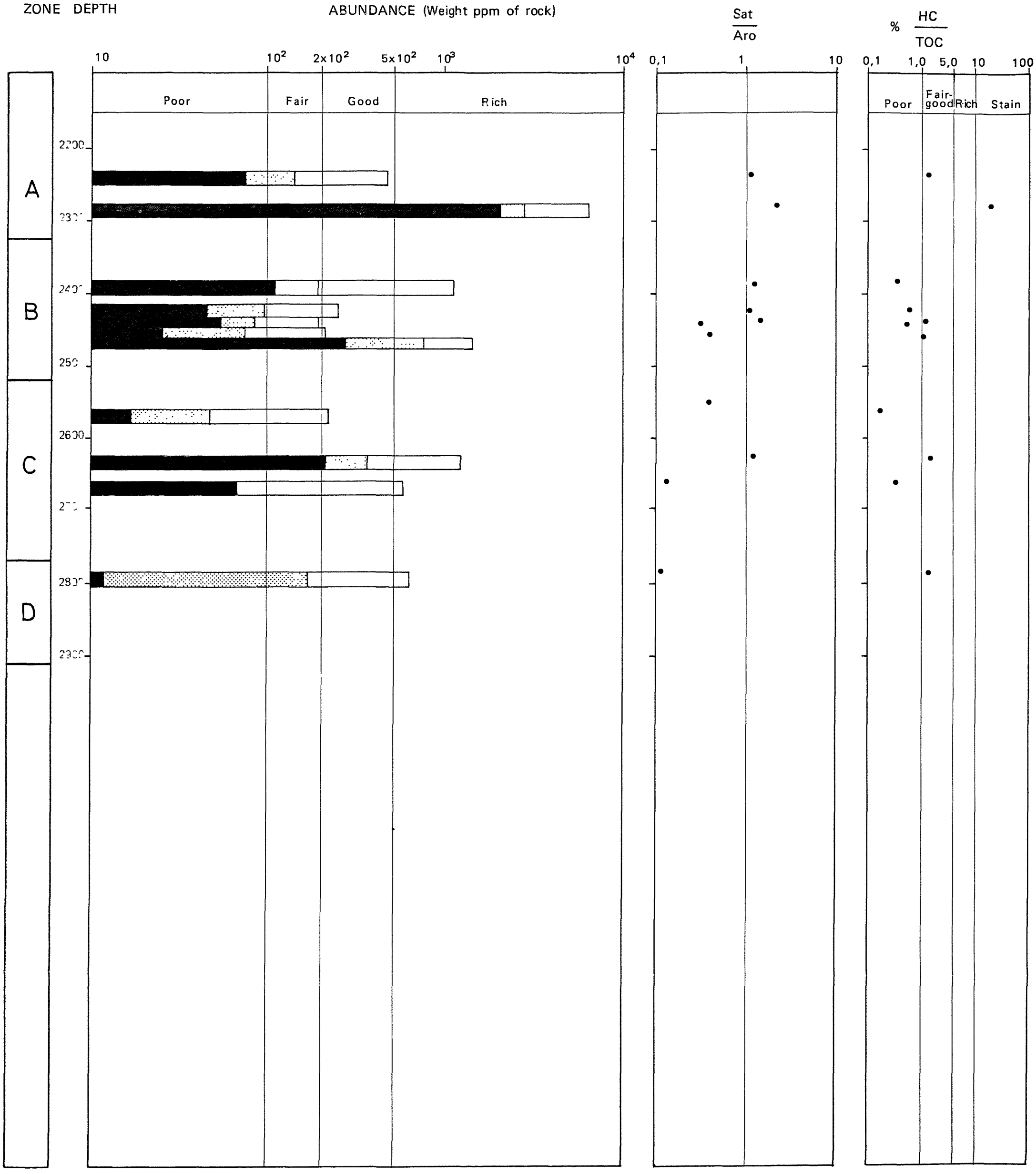
Degree of evelutipn
T °C
410 450 490
Hydrogen Index
mg . HC / g . org . Carbon
200 400 600
Oxygen Index
mgCO 2 / g . org . Carbon
50 100 150
Oil and gas
Content (S 1 S2)
Kg . HC / ton of rock
2 4 6 8 10 12 14
Production Index
S 1
S1 S 2
0,2 0,6 1,0 1,4
2200
2300
2400
2500
2600
2700
2800
2900

C_{15}^{+}HYDROCARBONS

Presentation of Analytical Data



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

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

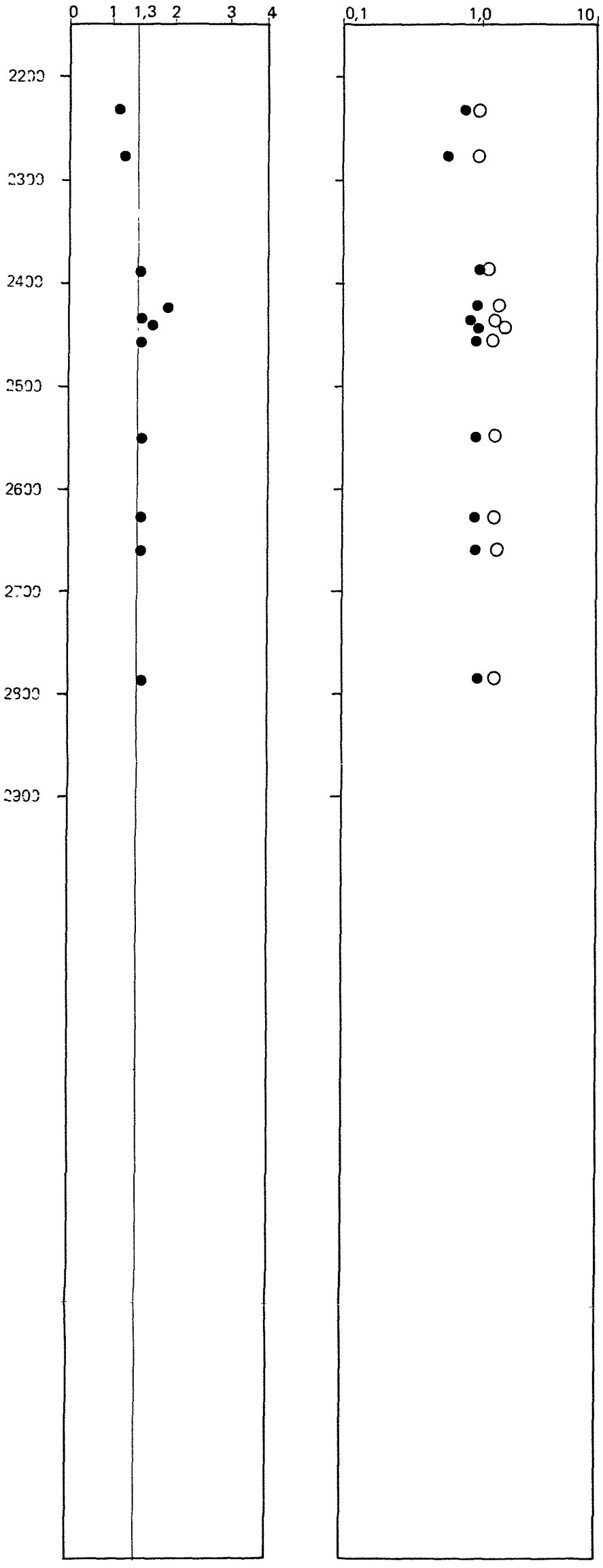
C_{15}^{+} SATURATED HYDROCARBONS

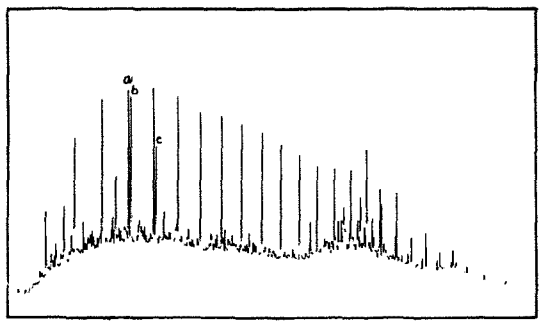
DEPTH

CPI

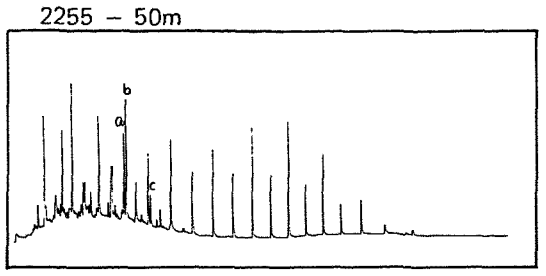
● PRISTANE / n^{C} 17

○ PRISTANE / PHYTANE

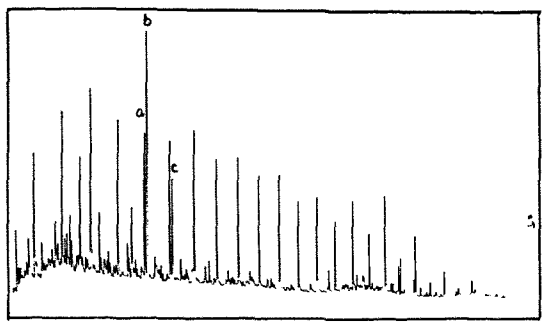




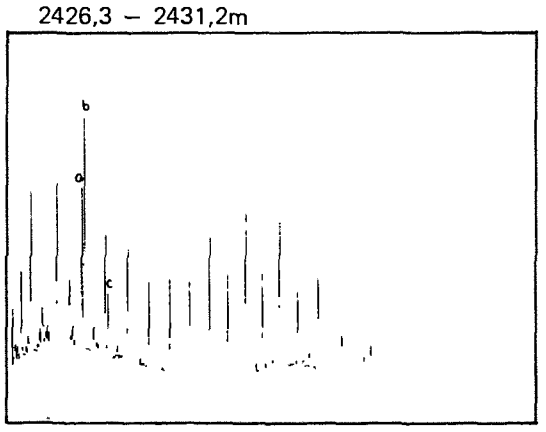
2255 – 50m



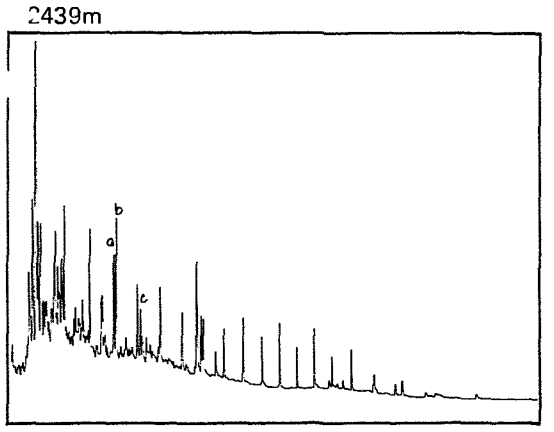
2385 – 2412m



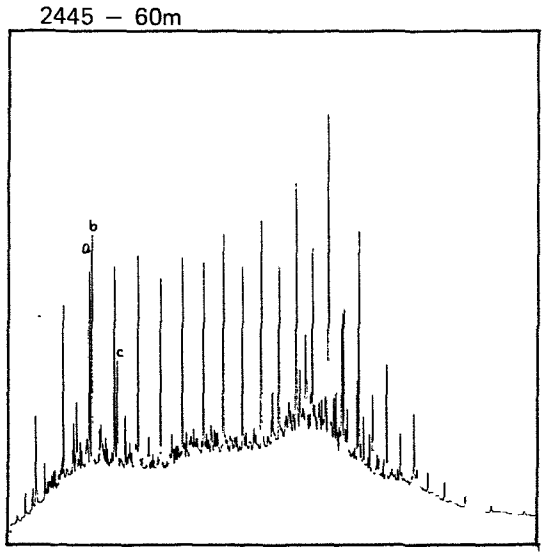
2426,3 – 2431,2m



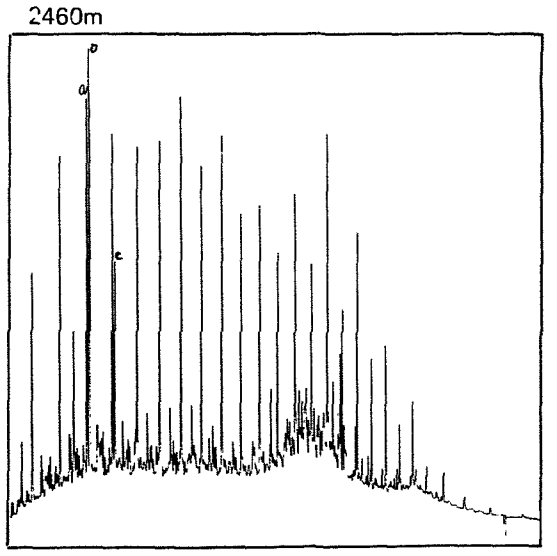
2439m



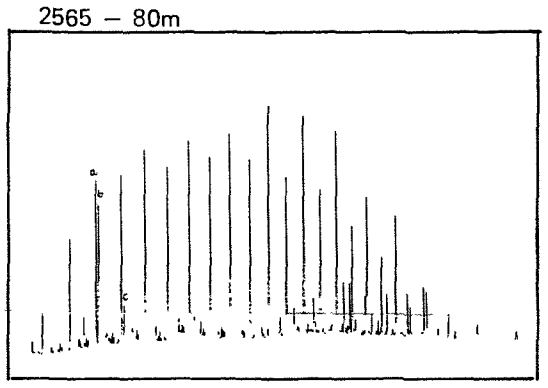
2445 – 60m



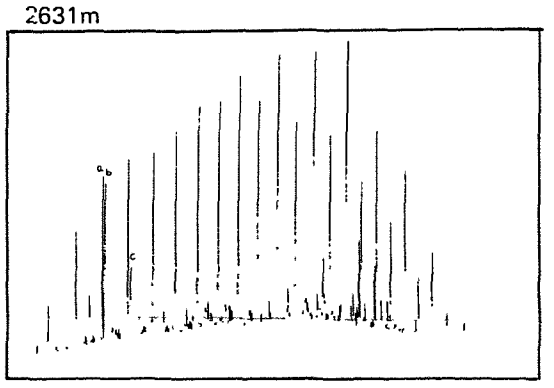
2460m



2565 – 80m

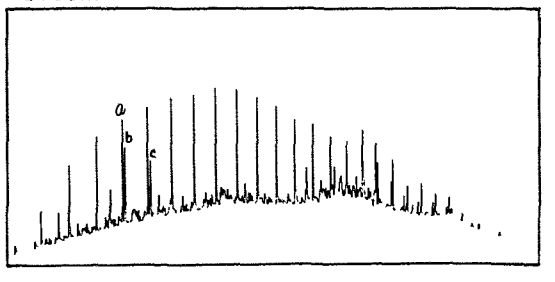


2631m



2667m

2789m



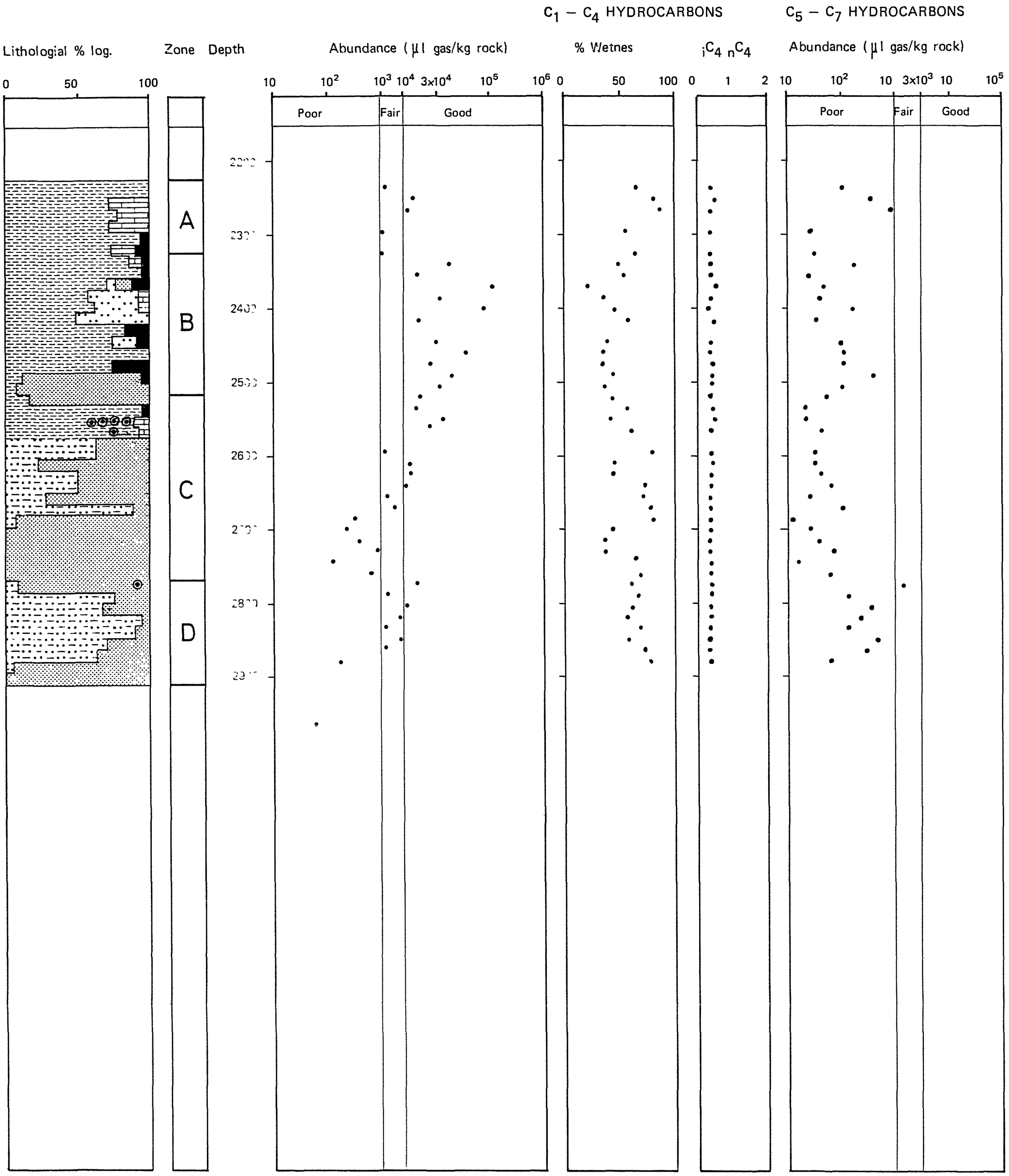
a : n^{C} 17

b : Pristane

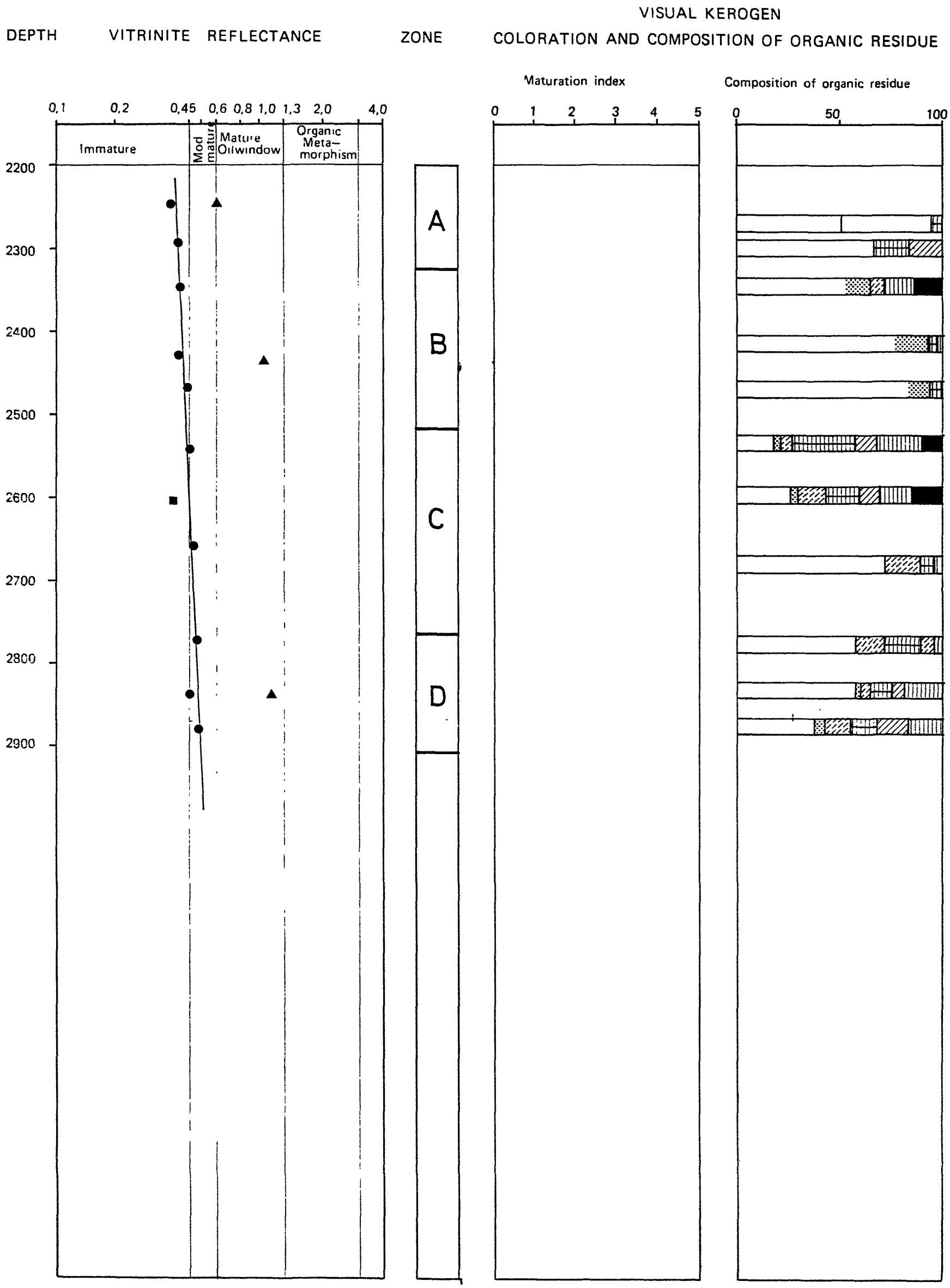
c : Phytane

2880 – 2895m

$C_1 - C_7$ HYDROCARBONS
Presentation of Analytical Data

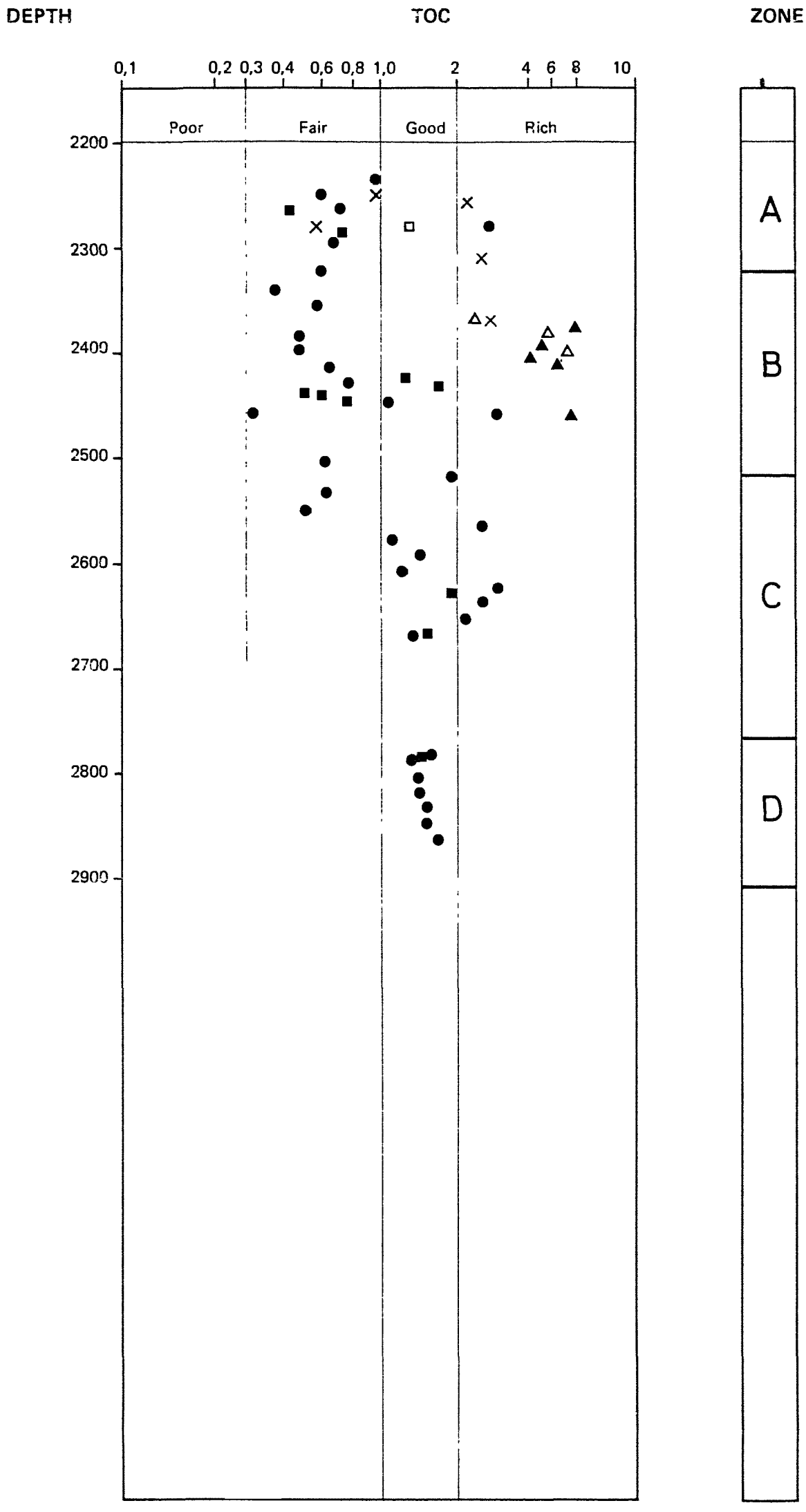


MATURATION

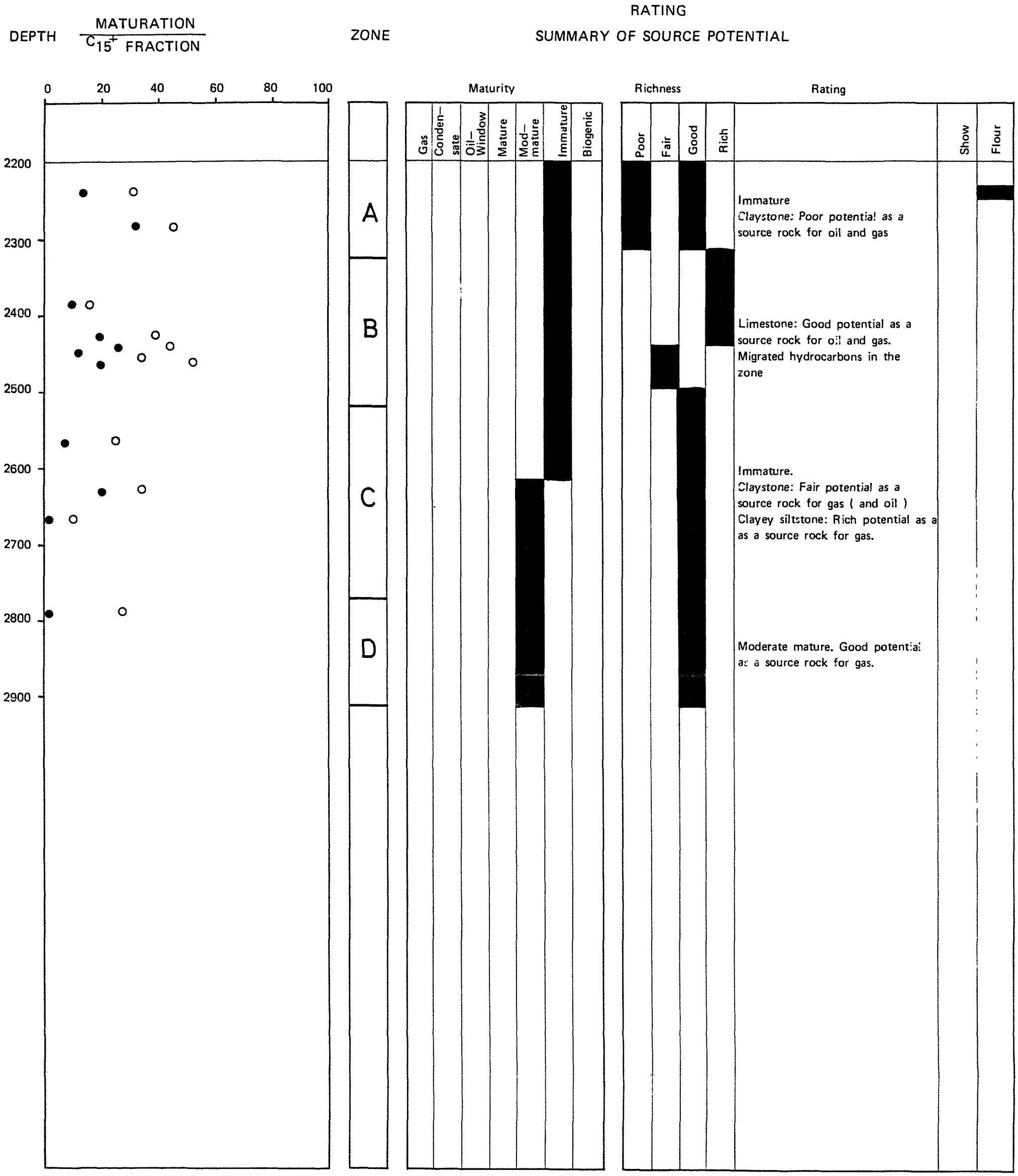

DEPTH
VITRINITE REFLECTANCE
ZONE
VISUAL KEROGEN
COLORATION AND COMPOSITION OF ORGANIC RESIDUE
Maturation index
Composition of organic residue
0,1
0,2
0,45
0,6
0,8
1,0
1,3
2,0
4,0
Immature
Mod mature
Mature Oilwindow
Organic Meta– morphism
0
1
2
3
4
5
0
50
100
2200
2300
2400
2500
2600
2700
2800
2900
A
B
C
D
True vitrinite
Downfall
Cavings
Amorphous material, Sapropel
Algal
Spores and pollen
Cuticles
Wood remains
Undifferentiated disperse herbaceous material
Black coal fragments

TOTAL ORGANIC CARBON (TOC)

Presentation of Analytical Data



INTERPRETATION DIAGRAM



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