



GEOCHEMICAL SERVICE REPORT

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BP PETROLEUM DEVELOPMENT OF NORWAY A.S.

GEOCHEMICAL EVALUATION OF THE B.P. NORWAY'S 30/4-1
WELL, NORWEGIAN NORTH SEA



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COMPANY PROPRIETARY

GEOCHEMICAL EVALUATION OF THE B.P. NORWAY'S 30/4-1 W. 25.1WELL, NORWEGIAN NORTH SEASUMMARY

Eight (8) geochemical zones are recognised between 1375 metres and 5450 \pm metres.

The Zone A¹ (1375-1780 \pm metres) shales are fair (with good interbeds above 1690 \pm metres) source rocks for oil and gas. They are however immature on-structure and, therefore, unable to realise this potential.

Zones A² and B (1780-2170 \pm metres and 2170-2480 \pm metres) are, with the exception of a fair interval at 1950-2050 \pm metres, poor, immature hydrocarbon sources.

With the exception of minor coals at 3020-3110 \pm metres and interbeds of fair to good dark grey shale below 3710 \pm metres Zones C¹ and C² (2480-3920 \pm metres) have a negligible hydrocarbon potential.

Significant coals and fair to good dark grey shales occur below 4010 \pm metres within Zone C³ (3920-4370 \pm metres). This interval is otherwise rated as a poor to fair hydrocarbon source. The sediments are moderately mature on-structure and are starting to generate gas and associated liquids.

Interbeds of dark grey and brownish black shale occur throughout Zones D and E (4370-5450 \pm metres). These shales have a fair to good (particularly below 4790 \pm metres) potential for gas which is, to a large extent, being realised on-structure. The coals below 5240 \pm metres are also generating significant volumes of gas.

A show of mature medium gravity crude oil is present in the minor sands at 2570-2630 \pm metres. This oil was not sourced by sediments in the analysed well section. Traces of the same or a similar crude oil were detected in the shales at 2810-2960 \pm metres and at 3170-3200 \pm metres. These hydrocarbons may represent a separate show but could also be due to entrained oil in the mud system.


M.J. Sauer
GEOCHEM LABORATORIES (UK) LIMITED

INTRODUCTION

This report presents a geochemical evaluation of the section between 1375 metres and 5450 metres in BP's 30/4-1 well, Norwegian North Sea. An appendix to this report contains analytical data relating to a series of test samples supplied by BP.

The study was designed to be compatible with previous studies performed for BP and to have the following objectives.

- to determine the hydrocarbon source potential of the section in terms of richness, maturity and hydrocarbon type.
- to recognise and characterise migrated hydrocarbons.

This study was authorised by Mr. D. South, BP Petroleum Development of Norway A.S.

A. ANALYTICAL

One hundred and thirty canned cuttings samples were received from the interval 1375-5450 metres in 30/4-1. They were generally composited (spot samples between 2370 metres and 2760 metres) on a 30 metre interval below 1600 metres with a 10 metre composite sample at 1590-1600 metres and 25 metre composite at 2320-2345 metres. The cuttings samples were supplemented by thirty four (34) sidewall cores, two mud samples and two contaminated cleaning rags. A total of twenty two (22) test samples, including two hydrocarbon solutions, were also received. The samples were assigned the Geochem job number 313 and numbered sequentially.

The samples were screened using the light hydrocarbon and organic carbon analyses and samples for further analysis were selected on the basis of the screen results. A total of one hundred and thirty four light hydrocarbon analyses, three hundred and fifty organic carbon analyses, seventy four visual kerogen analyses, forty five vitrinite reflectance determinations, forty seven extractions with chromatography, forty seven paraffin-naphthene analyses and forty two pyrolysis analyses were performed.

The data are presented in tables 1 to 8 and graphically in figures 1 to 5 of the main text and in tables 9 to 13 of the appendix.

B. GENERAL INFORMATION

Twelve copies of this report have been forwarded to Mr. A. Grainge, BP Petroleum Development of Norway A.S., Stavanger. A copy of the data has been retained by Geochem for future consultation with authorised BP personnel.

The kerogen slides and vitrinite reflectance worksheets will be forwarded with the final report and the remaining sample material handled as directed.

All of the results and interpretations related to this study are regarded as highly confidential and are proprietary to BP Petroleum Development of Norway A.S.

RESULTS AND INTERPRETATION

Each of the parameters relevant to the evaluation of the interval 1375-5450 metres will be discussed individually and then combined to form the "Conclusions".

A. ORGANIC GEOCHEMICAL ZONATION

This zonation is based upon the light (C₁-C₇) hydrocarbon and organic carbon data. Eight (8) zones are recognised.

Zone A¹ (1375-1780[±] metres), apparently consists of olive grey and greenish grey shales with minor sandstones (notably at 1660-1720[±] metres). However, the sidewall cores at 1573 metres and 1647 metres ([±] 1541.5 metres) are dominantly sandy suggesting that the sands may be under represented in the cuttings - possibly due to losses on the shale shaker. Cuttings samples from between 1560[±] metres and 1690[±] metres contain minor to significant proportions of caved shales.

The sand at 1541.5 metres yielded a minor blue cut.

C₁-C₄ hydrocarbon abundances exceed 1000 ppm above 1600[±] metres (1560-4941 ppm) but are generally less than 200 ppm (765 ppm at 1720-1750[±] metres) below this depth. These gases are dry (less than 10% C₂+ hydrocarbons) and are accompanied by traces (less than 100 ppm) of the C₅-C₇ hydrocarbons fraction.

Organic carbon contents are generally above average in this Zone ranging from (0.63)0.85-1.65%.

Zone A² (1780-2170[±] metres) is largely shaly, with minor limestones, although the lowermost 50[±] metres consists mainly of sandstones. The shales are dominantly greenish grey and less frequently olive grey, in colour.

No fluorescence was observed in the sandstones.

Gaseous hydrocarbons vary irregularly between 363 ppm and 3806 ppm (generally above 1000 ppm) and are dry (3.6-15.2% wetness). This dryness is reflected in the heavier C₅-C₇ hydrocarbon fraction which is relatively sparse (36-375 ppm).

Unlike the Zone A¹ shales, the Zone A² shales rarely contain more than 0.7% organic carbon (0.9% at 1950[±] metres).

Zone B (2170-2480 \pm metres) consists largely of grey and greenish grey shales, interbedded with minor to significant sandstones and limestones. Thin coals are present below 2270 \pm metres.

No fluorescence was detected.

Gaseous hydrocarbons are less abundant (101-904 ppm, 1807 ppm at 2200 \pm metres and 1630 ppm at 2400 \pm metres) but wetter (21-63% C₂₊ hydrocarbons) than those in the overlying sediments whilst the gasoline range hydrocarbons vary erratically between 87 ppm and 1193 ppm. Isobutane to normal butane ratios (0.37-0.85) decrease with increasing depth.

The shales, which contain 0.26-0.61% (0.86% at 2370 \pm metres) organic carbon, improve in richness towards the base of the interval.

Zone C¹ (2480-3260 \pm metres) is a sequence of medium grey and olive grey (silty) shales which contains significant interbeds of light grey and, below 2710 \pm metres dusky brown, mudstones and shales. Minor limestones occur at 2550 \pm metres and sandstones (oil stained) at 2570-2630 \pm metres. Coals are significant at 3020-3110 \pm metres and minor below this depth.

No fluorescence was observed.

This Zone is rich in light hydrocarbons - notably between 2570 \pm metres and 2670 \pm metres. The gases range in abundance from 1618 ppm up to 14580 ppm and are marginally wet to wet (38.9-86.3% C₂₊ hydrocarbons). A significant increase in the abundance of gasoline range hydrocarbons (1320-9013 ppm) is also apparent in this interval. Isobutane to normal butane ratios at 0.40-0.71 are somewhat lower than those in Zone B.

Apart from minor mudstones with organic carbon contents of 0.51-1.16% the interval is characterised by shales which generally contain less than 0.5% organic carbon.

Zone C² lies between 3260 \pm metres and 3920 \pm metres and is shaly. Mixed dusky brown and dark grey shales overlie an interval containing light grey shales and greenish yellow mudstones at 3560-3760 \pm metres. Below this depth the shales are mainly medium grey or olive grey in colour although they become dark grey towards the base of the Zone.

The silty shales (caved?) at 3530-3590[±] metres yielded a blue cut.

Light hydrocarbon abundances continue the rising trend established in Zone C¹. Thus, the gaseous hydrocarbons range between 3956 ppm and 11936 ppm but apart from the interval 3560-3650[±] metres, where they are marginally wet (45.6-55.8%), are dry (23.1-38.5% C₂₊ hydrocarbons). The C₅-C₇ fraction is slightly leaner (1513-5197 ppm) than in Zone C¹ whilst the isobutane to normal butane ratios (0.41-0.63) are comparable.

Organic carbon values for the shales rarely exceed 0.50% in this Zone although they improve (to 1.27-2.17%) in the darker grey shales below 3710[±] metres.

Zone C³ (3920-4370[±] metres) consists of medium grey, dark grey and minor light brownish grey shales above 4010[±] metres. The underlying shales are mainly dark grey or greenish grey in colour and are frequently interbedded with mudstones and, below 4100[±] metres, coals.

The shales at 4190-4280[±] metres yielded a blue cut.

The C₁-C₄ hydrocarbons vary irregularly in abundance between 2763 ppm and 31253 ppm (exceeding 20,000 ppm at 4040-4130[±] metres). They are marginally wet (42.5-53.9% C₂₊ hydrocarbons) and this increased gas wetness is reflected in the abundance of the C₅-C₇ fraction (2020-7632 ppm). Isobutane to normal butane ratios differ little from those in Zone C².

Organic carbon contents are similar to those in Zone C² although the coals are rich (10.65-41.9%) and the dark grey and dusky brown shales good at (1.06-1.66%). The more abundant lighter grey and greenish grey shales are poor and fair with values of less than 0.8%.

Zone D extends from 4370[±] metres down to 5180[±] metres and, above 4790[±] metres, is lithologically similar to Zone C³ consisting of medium grey and dark grey shales with significant interbedded greenish grey mudstones. Below 4790[±] metres the shales are mainly greenish black or brownish black although lighter grey and greenish grey interbeds are also present.

No fluorescence was observed.

This interval is rich in gaseous hydrocarbons. They generally exceed 20,000 ppm (13737-51556 ppm) and are wet (50.0-66.6% C₂₊ hydrocarbons) but not very wet. The abundance of C₅-C₇ hydrocarbons (1074-8902 ppm) does not reflect this enhanced richness and is similar to that in Zone C³. The ratios of isobutane to normal butane at 0.73 to 1.42 are, however, significantly higher than those in Zones C¹ to C³.

The lighter grey and greenish grey shales have poor to fair (0.3-0.74%) organic carbon contents but the greenish black, brownish black and dark grey shales are generally much richer with values of 1.72 to 5.10%.

Zone E lies between 5180± metres and the deepest sample at 5450± metres. It contains abundant sandstones with interbedded coals and dark grey, and greenish grey, shales.

A (milky) blue cut, with yellow fluorescence at 5300± metres, was observed in the sands.

Although the C₁-C₄ hydrocarbons are abundant (19995-63645 ppm) they are comparatively dry (10.0-31.3% C₂₊ hydrocarbons) and the heavier C₅-C₇ fraction correspondingly poor at 398-1835 ppm. Isobutane to normal butane ratios (1.43-2.03) are higher again than those in Zones C³ and D.

The coals are rich (15.3-56.4% organic carbon) and the dark grey shales generally good (2.46-5.10% but the light grey and greenish grey shales are fair and poor respectively.

B. AMOUNT AND TYPE OF ORGANIC MATTER

The amount of organic matter within a sediment is measured by its organic carbon content. Average shales contain approximately one per cent organic carbon and this is the standard to which these samples will be compared.

Organic matter type influences not only source richness but also the character (oil/gas) of the hydrocarbon product and the response to thermal maturation. Richness and oiliness decrease in the order: amorphous-herbaceous-stem-woody. Wood has a primary (but not exclusive) potential for gas, whilst coaly (oxidised) material has only a limited hydrocarbon potential.

Down to 1560± metres the olive grey and greenish grey shales have average ((0.63), 0.85-1.12% organic carbon) contents of mainly woody, herbaceous and stem kerogen in varying proportions. Amorphous and

coaly debris are generally minor to significant fractions in this interval. The underlying greenish grey shales (within Zone A¹) are of similar richness (0.96-1.43% organic carbon) but contain woody and coaly organic matter with only minor to significant proportions of herbaceous and stem material. The medium olive grey shales (believed caved at 1590-1690[±] metres) have good (1.36-1.65%) organic carbon contents and contain organic matter which resembles that in the shales above 1560[±] metres.

Grey, greenish grey and olive grey shales occur throughout Zone A². They are, however, lean with organic carbon contents of less than 0.5% except at 1950-2050[±] metres where the values reach 0.90%. Woody and herbaceous organic matter is dominant (stem and coaly kerogens minor) in the olive grey and medium dark grey shales. The more abundant, but slightly leaner, greenish grey shales contain mainly woody and coaly debris and only minor to significant amounts of herbaceous and stem material.

Organic carbon values range from 0.26% to 0.86% (average 0.4%) and improve with increasing depth in the greenish grey and grey Zone B shales. Woody and coaly organic matter is dominant in this Zone although a slight improvement (woody and herbaceous, possible contamination) is noted in the olive grey shales at 2240[±] metres. The limestones at 2318[±] metres and 2370[±] metres contain sparse (0.28-0.31% organic carbon) woody and coaly debris. Herbaceous and stem organic matter is generally minor in the Zone B sediments.

Within Zone C¹ the dominant grey and olive grey shales have poor to fair (0.35-0.57%) organic carbon contents although the less abundant mudstones and dusky brown shales, which occur intermittently throughout the interval, are somewhat richer (0.51-0.90% organic carbon). Abundant poor to fair (0.31-0.60% organic carbon) dusky brown and medium grey shales are present in Zone C² but only the dark grey shales below 3710[±] metres have above average (1.27-2.17%) organic carbon contents. The richer shales (1.06-1.66% carbon) are, again, dark grey in colour in Zone C³ whilst the lighter grey and brownish grey shales are poor to fair with values of 0.35% to 0.88%. Significant coals occurring between 4100[±] metres and 4370[±] metres are, naturally, rich having organic carbon contents of 10.65-41.9%.

Woody and coaly organic matter is, without exception, the dominant type of organic matter within the sediments of Zones C¹ to C³. Herbaceous kerogen is generally a minor, very occasionally a significant, fraction of the total organic matter whereas amorphous and algal material (if present) is invariably minor.

Brownish black and greenish black shales occur widely within Zone D. They generally have very good organic carbon contents (1.77-5.10%). The equally abundant grey and greenish grey shales are, however, poor to fair with values of 0.24 to 0.80%. Similar shales within

Zone E are of comparable richness (0.31-0.87% organic carbon) whilst the richer, dark grey, shales contain 2.24 to 5.10% organic carbon and the coals 15.3 to 56.4%.

Minor to significant proportions of degraded amorphous organic matter are present in the dark grey shales at 4500± metres and at 4630± metres (also observed at 3781± metres and 4130± metres in Zones C² and C³). This amorphous material is not the more normal 'oil prone' amorphous organic matter but, nonetheless, is believed to be capable of generating liquid hydrocarbons. Partly degraded woody (at 4540± metres) and herbaceous organic matter (at 4720± metres and 4840± metres) was also identified (chiefly in brownish black shales). Apart from these exceptions the sediments of Zones D and E contain minor to significant amounts of herbaceous organic matter but woody and coaly (oxidised) material is invariably predominant.

Oxidising conditions prevailed at the seawater/sediment interface when most of the sediments in the analysed well section were deposited. Interludes of more reducing conditions existed when the shales at 1950± metres, 1878± metres and above 1560± metres were laid down.

C. LEVEL OF THERMAL MATURATION

Thermal maturity has been evaluated using the organic matter colouration and vitrinite reflectance methods.

Maturation indices, from the colour of the organic matter, range from 2- at approximately 1800± metres, to 2 at 2900± metres and achieve 2+ at 4700± metres. A level of 2+ is maintained down to 5200± metres below which depth the sediments increase slightly in maturity (2+ to 3-).

Vitrinite reflectance values range from 0.36% Ro at 1471± metres up to 2.32% at 5420± metres. Many samples, including virtually all of the sidewall cores, have two vitrinite populations. Above 4280± metres the lower Ro values (with one exception) lie between 0.36% and 0.77% Ro whilst the higher Ro group generally exceed 1% (maximally 1.53% at 3550± metres). The latter group is believed to represent reworked material and this description also includes the relatively low Ro (0.7-1.0%) material above 3000± metres. The former (low Ro) population, which is largely based upon sidewall core measurements, defines (when plotted) a linear trend which passes through 0.35% Ro at 1500± metres and 0.85% Ro at 4200± metres.

The vitrinite reflectance and organic matter colouration scales may be related by equating an Ro value of 0.53% with a maturation index of 2 and 0.7% Ro with 2 to 2+. There is, therefore, a good agreement between the two methods down to approximately 4200± metres.

Below 4200[±] metres the range of mean Ro values embraces two, and often three, vitrinite particle populations per sample. If the means are recalculated for each significant vitrinite population a new trend emerges which is lower than that suggested by the vitrinite reflectance worksheets. The new mean Ro values are as follows:

<u>Sample No.</u>	<u>Depth</u> <u>(metres)</u>	<u>Mean</u> <u>Ro</u>	<u>Popln.</u>	<u>Mean</u> <u>Ro</u>	<u>Popln.</u>	<u>Mean</u> <u>Ro</u>	<u>Popln.</u>
142A	4200	0.87	1	1.21	7		
148A	4370	1.01	1	1.25	11		
152A	4490	1.05	7	1.31	13		
156C	4610	1.17	10	1.56	3	1.85	8
159B	4700	0.96	2	1.26	14	1.57	3
163A	4820	1.09	6	1.34	8	1.70	5
167A	4940	1.11	3	1.53	16	1.92	1
170A	5030	1.11	5	1.39	10	1.29	5
174A	5150	1.21	9	1.43	5	1.92	6
177B	5240	1.21	3	1.67	17		

If the mean reflectivity versus depth trend established above 4200[±] metres is extended downwards, the Ro values (1.01-1.85%) for the samples between 4370[±] metres and 4640[±] metres are considerably more mature than this line would suggest. It would appear, therefore, that these measurements were made upon reworked material (see also work sheets for comments). Between 4640[±] metres and 5240[±] metres the lower (recalculated) mean reflectivities define, with acceptable accuracy, a trend which is coincident with the extension of that above 4200[±] metres. This line reaches a maximum Ro value of 1.20% at 5240[±] metres and is consistent with the organic matter colouration data.

The two lowermost samples at 5330[±] metres and 5420[±] metres have mean Ro values of 2.03 and 2.32 respectively. These relatively high Ro values are not encountered in samples above approximately 5150[±] metres. They may be attributed to the proximity of the sediments to intrusives or, alternatively, to the presence of an unconformity. In the latter case, the removal of approximately 5000 metres of section would be required to produce the necessary increase in maturation. The colour of the organic matter is incompatible with these high Ro values. A decrease in gas wetness and abundance of C₅-C₇ hydrocarbons below 5180[±] metres coincides with the appearance of sands but could be interpreted in terms of advanced maturation (dry gas generation). This level of maturation would, however, be incompatible with the high isobutane to normal butane ratios observed in this interval.

In conclusion, the preferred vitrinite reflectance trend, mainly established from sidewall core data, extends from 0.35% Ro at 1500 \pm metres to 1.20% at 5240 \pm metres and is compatible with the organic matter colouration. Above 4000 \pm metres this trend is supported by the range of spore fluorescence colours. Below this depth the spore fluorescence colours suggest a lower level of maturity than that indicated by the vitrinite reflectance and organic matter colouration methods. This discrepancy is believed to be due to observations on organic matter of uncertain origin (either caved or non spore material).

From the foregoing, the sediments are totally immature above 1800 \pm metres and, since the organic matter largely consists of immature woody and coaly (oxidised) debris, effectively immature down to approximately 2900 \pm metres. Below this depth the (minor) herbaceous fraction of the organic matter is mature and generating traces of liquid hydrocarbons. The more abundant woody material is marginally mature and starting to generate limited volumes of gas and associated liquids. The onset of maturity is reflected in the steady increase in gas abundance and wetness within Zones C¹ and C² (i.e. between 2900 \pm metres and 3900 \pm metres). Below 3900 \pm metres the woody-coaly organic matter is mature and enters the maturation "oil window" at approximately 4700 \pm metres. With the exception of the interval 5180-5420 \pm metres (see above) the gases are correspondingly abundant and wet indicating that peak hydrocarbon generation is occurring.

Between 4070 \pm metres and 4280 \pm metres (also at 4400 \pm metres) chromatograms of the extracted C₁₅₊ hydrocarbons display normal paraffin peaks which have a strong odd carbon preference. This characteristic of immature organic matter is somewhat unexpected in these mature sediments. The phenomenon is exhibited by samples containing coal and it suggests that the normal maturation processes are in some way hindered.

D. SOURCE RICHNESS

Preliminary assessments of present and potential source richness can be obtained from the light hydrocarbon and organic carbon abundances respectively.

Light hydrocarbon data suggest that apart from a poor interval at 1600-1800 \pm metres the shales of Zones A¹ and A² are fair source rocks. Zone B is similarly rated as fair above 2320 \pm metres and at 2400 \pm metres but otherwise poor. Apart from intervals affected by non-indigenous hydrocarbons at 2570-2670 \pm metres and 2800-2970 \pm metres Zones C¹ and C² are rated as fair becoming fair to good below 3750 \pm metres. The Zone C³ sediments are generally fair with a good interval at 4040-4130 \pm metres. Zone D is good throughout and Zone E, apparently, very good.

The Zone A¹ shales are, from the organic carbon data, fair to good or good source rocks whereas Zones A² and B, with the exception of fair intervals at 1950-2050± metres, at 2370± metres and 2460± metres, are poor.

Zones C¹ and C² generally have a poor hydrocarbon potential but the minor coals occurring at 2490-2510± metres and at 3020-3110± metres are, per unit volume, a rich potential gas source whilst the dark grey shales at 3710-3920± metres are rated as fair to good. Zone C³ contains good dark grey shales (below 4010± metres) whilst the light grey and brownish grey shales are poor to fair. Significant coals are present at 4100-4370± metres within Zone C³. Very good dark grey and brownish black shales are abundant within Zone D although the interbedded lighter grey and brownish grey shales are generally poor to fair. Zone E is sandy but also contains dark grey shales and coals which are very good and rich source rocks respectively.

Much of the organic matter below 1560± metres within the analysed well section consists of woody and coaly debris which frequently displays signs of reworking. This reworked organic matter will have exhausted most of its hydrocarbon potential and the organic carbon based ratings will, therefore, be somewhat optimistic.

The abundance of C₁₅₊ hydrocarbons can provide a definitive assessment of source richness. They vary from 139 ppm up to 1098 ppm within Zones A¹ to B (i.e. above 2480± metres) indicating that these sediments are variously fair to rich source rocks. However, the hydrocarbon to total extract and hydrocarbon to organic carbon ratios (24-56% and 2.2-19.3% respectively) are higher than expected for these largely immature sediments. The data indicate that non indigenous hydrocarbons have augmented those sourced by the sediments (see Section E). The indigenous C₁₅₊ hydrocarbons are estimated to be 100 ppm to 200 ppm indicating poor to fair source rocks within Zones A¹ to B. Out of place hydrocarbons (indicated by the high hydrocarbon to total extract ratios) have also affected the sediments above 2900± metres (and possibly at 3170-3200± metres) within Zone C¹. Hydrocarbons resembling drilling introduced contamination have augmented the indigenous species in Zone C². The C₁₅₊ fraction of the latter is estimated to be less than 100 ppm; suggesting a poor rating for Zone C². C₁₅₊ hydrocarbon abundances range from 134 ppm up to 1138 ppm within Zone C³ and are, undoubtedly, affected by the presence of coal in the extracted samples (see Sections C and E). The Zone C³ shales, after allowing for traces of contamination (in sidewall cores and cuttings), are estimated to contain approximately 100-150 ppm indigenous C₁₅₊ hydrocarbons which corresponds to a poor to fair hydrocarbon potential. Within Zone D the C₁₅₊ hydrocarbon abundances range from 50 ppm up to 434 ppm and, although the hydrocarbon to total extract ratios are not diagnostically high (2.6 to 39.3%), the paraffin-naphthene chromatograms

suggest possible non-indigenous hydrocarbons. The front end bias to the C₁₅₊ hydrocarbons in conjunction with the enhanced light hydrocarbon abundances indicate that traces of a very mature condensate could be present. Alternatively, the 'good' C₁-C₇ hydrocarbon abundances and sparse C₁₅₊ hydrocarbons may equally well be due to source rocks which contain a high proportion of reworked organic matter which has primary potential for gas and associated liquids. Although the possibility of a mature condensate cannot be eliminated, it is more probable that the very mature organic matter within these sediments has little or no indigenous hydrocarbons associated with it. In this respect, it should be noted that where the sands, which are a potential reservoir, appear (in Zone E) the hydrocarbon abundances and gas wetness decrease significantly. Low C₁₅₊ hydrocarbon abundances and hydrocarbon to total extract ratios (25-137 ppm and 7.8 to 11.8% respectively) emphasise the poor potential for oil of the Zone E shales.

The pyrolysis analysis measures source richness under conditions equivalent to those of optimum maturation. Good interbeds of greenish grey and olive grey shale occur above 1750± metres although the interval 1560-1600± metres (± 1660 metres) and the underlying sediments within Zones A¹ to B are poor (poor to fair at 1950± metres). Within Zones C¹ to C³ the shales are generally poor source rocks (277-930 ppm pyrolysate) although the olive grey shales represented by the sidewall core at 2900± metres are fair. At 2990-3200± metres and 4070-4370± metres (+ 4370-4400± metres in Zone D) the pyrolysate yields (1117-16956 ppm) are affected by the presence of coal in the samples. Pyrolysate yields of 817-2869 ppm for Zone D are largely due to the presence of good brownish black and dark grey shales in the analysed samples. Similar shales occur in Zone E.

Apart from olive grey and greenish grey interbeds at 1375-1560± metres and 1870-1950± metres, which contain oil prone organic matter, the analysed shales have a potential for gas and associated liquids. For this reason the ratings derived from C₁₅₊ hydrocarbon abundances are often poorer than those suggested from the light hydrocarbon, organic carbon and pyrolysis data.

To summarise:

The Zone A¹ shales are fair to good source rocks and have a potential for oil and gas above 1560± metres.

Between 1560± metres and total depth the sediments generally have a primary potential for gas and associated liquids (oil and gas at 1870-1950± metres).

Zones A² and B, apart from a fair interval at 1950-2050± metres, have a poor hydrocarbon potential.

The shales within Zones C¹ and C² are mainly poor (fair

at 2900± metres) source rocks although the dark grey shales below 3710± metres are fair to good and the coals at 3020-3110± metres rich.

Zone C³ consists largely of poor shales with fair to good dark grey interbeds. Interbeds of dark grey and brownish black shales also occur throughout Zone D and (with coals) Zone E. These shales are believed to contain dominantly reworked organic matter and, in general, have a fair to good rather than very good hydrocarbon potential.

E. MIGRATED HYDROCARBONS

Potential reservoir facies are represented by sandstone interbeds above 1720± metres, at 2430± metres, at 2570-2620± metres and by more abundant sandstones in Zone E (5180-5420± metres). Significant limestones occur at 2110-2140± metres, at 2320-2370± metres and at 2470± metres.

Blue cut was observed in the sandstone sidewall core at 1541.5± metres (minor) and, more strongly, in the Zone E sands. The minor sandstones at 2570-2630± metres are oil stained. Blue cut was also observed in the (silty) shales at 3530-3650± metres and, with evidence of oil staining, in the shales at 4190-4370± metres.

The abundance and wetness of the light hydrocarbons are sensitive indicators of migrated hydrocarbons. Above 2420± metres the gases are dry and do not suggest the presence of crude oil and, although they are frequently of fair to good abundance, it is only in Zone C¹ (and possibly Zones C² and D) that they are sufficiently wet to indicate the presence of migrated liquid hydrocarbons. In general the gas wetness is compatible with the maturity of the sediments.

From the above it is evident that the C₁₅+ hydrocarbon abundances (139-1098 ppm) within Zones A¹, A² and B (see Section D) are not due to migrated crude oil. Their paraffin-naphthene chromatograms all display the same characteristics - namely a high background hump and a low proportion of normal paraffins. The hump, which is believed to be due to contamination, is frequently most pronounced in those samples which have high hydrocarbon to total extract ratios. The strong odd carbon preference shown by the normal paraffins is indicative of immature organic matter. Hence the chromatograms indicate the presence of both source-indigenous and contaminant hydrocarbons, but not migrated species.

Between 2570± metres and 2670± metres the light hydrocarbons are both abundant (3691-14580 ppm) and wet (46-86% C₂+ hydrocarbons). At 2580± metres the C₁₅+ hydrocarbons (2065 ppm) constitute 84.3%

of the total extract and the paraffin-naphthene fraction resembles a medium gravity crude oil derived from a mixed, amorphous-land plant, source. This show of crude oil although mainly associated with the sands at 2570-2630[±] metres appears to have diffused into the underlying shales. It is difficult to reconcile this crude oil with the dominantly woody-coaly organic matter in the analysed well section. The only conceivable source could be the shales at 1870-2030[±] metres or possibly even those at 1375-1560[±] metres. They are, however, immature on-structure which suggests that either the source facies are not represented in the analysed samples or that a facies change occurs off-structure.

The gases at 2810-2960[±] metres are wet but only of fair abundance whilst the C₁₅₊ hydrocarbon abundances at 2795[±] metres and 2900[±] metres are higher than expected from fair but immature source rocks. These heavy hydrocarbons, which resemble the show at 2570-2630[±] metres, were extracted from shales (including sidewall core material) and may be due to diffusion of oil into the shales or more probably, since the C₁-C₄ hydrocarbons are comparatively poor, to entrainment of crude oil in the mud system.

A slight enhancement in the gas wetness (45-56% C₂₊ hydrocarbons) and C₅-C₇ hydrocarbon abundances at 3560-3650[±] metres correlates approximately with a blue cut in the (silty) shales at this depth. The C₁₅₊ hydrocarbon abundances (166 ppm) and hydrocarbon total extract ratio (40.9%) are not diagnostic of out of place hydrocarbons. Superficially the paraffin-naphthene fraction chromatogram resembles a condensate but the weight of evidence suggests that drilling introduced hydrocarbons are present - only insignificant traces of non indigenous hydrocarbons are involved.

The light hydrocarbon and C₁₅₊ hydrocarbon data suggest but do not unambiguously identify migrated hydrocarbons within Zone D (see also Section D).

Below 5180[±] metres the hydrocarbon gases are abundant (20,000-54,000 ppm) but dry (10.0-31.3% C₂₊ hydrocarbons). Neither they, nor the low C₁₅₊ hydrocarbon abundances (25-137 ppm) and low hydrocarbon to total extract ratios (7.8-11.8%) indicate the presence of migrated hydrocarbons within Zone E.

F. CONCLUSIONS

Eight geochemical zones are recognised between 1375 metres and 5450 metres in the 30/4-1 well.

Zone A¹ (1375-1780[±] metres) consists of mixed shale lithologies but is dominated by olive grey and greenish grey shales which have, in general, above average ((0.63), 0.85-1.65%) organic carbon contents. The medium olive grey shales (possibly caved) at 1590-1690[±] metres are the richest and their organic matter is dominantly woody in type, although with significant proportions of herbaceous

and stem kerogen. A similar type of organic matter is present in the shales above 1560± metres whilst those below this depth contain mainly woody and coaly debris. The shales have a fair to good potential for gas and oil (chiefly for gas below 1560± metres) but are immature on-structure and, therefore, unable to realise this potential.

Zone A² (1780-2170± metres). The dominant (greenish grey) shales are interbedded with minor limestones, although the basal 50 metres is sandy. In contrast to the overlying sediments these shales are lean (less than 0.5% organic carbon), although the values improve to 0.5-0.9% at 1950-2050± metres. Their organic matter is dominantly woody and coaly in character but improves in type to a herbaceous-woody assemblage in the less abundant grey shales.

The "richest" interval (1950-2050± metres) is characterised by this improved type of organic matter. The herbaceous and stem fraction of the organic matter is marginally mature but the dominant woody (and coaly) debris, which determines for practical purposes the maturity of these sediments, is immature. The Zone A² shales are both lean and immature and, therefore, have a negligible hydrocarbon potential.

Zone B lies between 2170± metres and 2480± metres and is composed of shales and minor sandstones (limestone below 2320± metres). The shales are lean (0.26-0.61%, 0.86% at 2370± metres) and contain mainly woody and coaly organic matter (woody and herbaceous in the minor grey shale at 2240± metres). Minor proportions of stem and herbaceous (± amorphous) kerogen also occur in these sediments. The woody-coaly fraction of the organic matter is immature and the marginally mature herbaceous and stem debris is only capable of generating minor volumes of liquids. Hence, this is a poor and effectively immature source interval which is of minimal exploration interest.

Zone C¹ (2480-3260± metres) is dominated by medium grey and olive grey shales within which are interbedded mudstones and dusky brown shales. Minor, oil stained, sands occur at 2570-2630± metres and significant coals at 3020-3110± metres. The grey shales generally have poor (less than 0.57% organic carbon) contents of dominantly woody and coaly organic matter whilst the dusky brown shales are somewhat richer at 0.51-0.90%. Olive grey shales represented by the sidewall core at 2900± metres have fair (0.9%) organic carbon contents and contain organic matter which although mainly composed of woody material also contains significant herbaceous kerogen. At approximately 2900 metres the woody organic matter changes from immature to marginally mature and starts to generate minor volumes of gas and associated liquids. The minor herbaceous-amorphous fraction is moderately mature but only able to contribute traces of liquid hydrocarbons. Zone C¹ is thus a poor, largely immature, gas (and oil) source which, apart from rich coals at 3020-3110± metres has negligible hydrocarbon potential.

Zone C² (3260-3920[±] metres). Dusky brown and dark grey shales pass, below 3560[±] metres to a 200 foot interval containing light grey shales and greenish-yellow mudstones. The underlying shales are mainly medium grey in colour with more abundant darker grey interbeds towards the base of the Zone. Below 2710[±] metres the dark grey shales have good (1.27-2.17%) organic carbon contents but the remaining shales are uniformly poor with values of 0.2% to 0.6%. The organic matter, consisting mainly of woody and coaly debris, is largely reworked and marginally mature on-structure whilst the sparse herbaceous fraction is mature but only generating insignificantly minor volumes of liquids. The dark grey shales below 3710[±] metres are rated as fair to good source rocks for gas and oil. Zone C² is otherwise of minimal exploration value.

Zone C³ (3920-4370[±] metres) is composed of medium grey, minor brownish grey and dark grey, shales above 4010[±] metres. Below this depth the shales are mainly dark grey in colour and contain interbedded coals and greenish grey shales (and mudstones). The medium grey shales generally have poor to fair (0.35-0.88%) organic carbon contents whilst the 'richer' (1.01-1.66% organic carbon) dark grey shales mainly occur below 4010[±] metres. The coals are rich (10.6-41.9% organic carbon) and are starting to realise their potential for gas whereas the shales, which are organically similar to those in Zone C², are generating minor volumes of gas and associated liquids. Zone C³ contains significant interbeds of rich coal and fair-good dark grey shales below 4010[±] metres but is largely a poor to fair hydrocarbon source. The sediments are mature (but not in the oil window) on-structure and have a potential for gas rather than oil.

Zone D lies between 4370[±] metres and 5180[±] metres and, above 4790[±] metres, contains shales which resemble those of Zone C³. Below this depth the shales are mainly greenish black or brownish black in colour, with light grey interbeds. The black shales have good (1.77-5.10% organic carbon) contents of partially reworked woody and coaly organic matter and, although the medium grey shales at 4500-4630[±] metres occasionally contain significant amounts of degraded amorphous organic matter, woody and coaly debris is dominant in the leaner shales. The abundance of moderately wet light hydrocarbons confirms that the sediments are mature (oil window below 4700[±] metres) and are already realising a significant proportion of their potential for gas and associated liquids. Reworked organic matter is present in the sediments and the richer shales are, therefore, rated as fair to good rather than very good whilst the leaner shales are poor to fair.

Zone D is rated as a mature poor to fair source with fair-good interbeds, chiefly below 4790[±] metres. The sediments have a potential for gas and associated liquids which, to a large extent, is being realised on-structure.

Zone E extends from 5180 \pm metres down to the deepest sample at 5450 \pm metres and consists of sandstones in which are significant interbeds of shale and, below 5240 \pm metres, coal. The light grey and greenish grey shales have poor to fair (0.31-0.87%) organic carbon contents whereas the more abundant dark grey shales are, apparently, very good (2.24-5.10% organic carbon) and the coals rich. This richness in the dark grey shales is more apparent than real since the pyrolysis analysis rates them as fair to good rather than very good source rocks. Their organic matter, in common with the other Zone E sediments, consists of woody and coaly (largely reworked) debris and only minor herbaceous kerogen. The shales and coals are within the maturation oil window and are generating significant volumes of gas.

The dark grey shales and coals within Zone E are fair to good and rich source rocks respectively. They are mature on-structure and are realising their potential for gas.

A show of medium gravity crude oil is present in the minor sands at 2570-2630 \pm metres and traces of this oil have diffused into the underlying shales. The oil is believed to have been sourced from sediments which are rich in herbaceous and amorphous organic matter. Geochemically compatible source facies, apart from the immature shales at 1375-1560 \pm metres and 1870-2030 \pm metres, were not penetrated in the analysed well section.

Traces of crude oil resembling the above show were detected in the shales at 2810-2960 \pm metres and at 3170-3200 \pm metres. These hydrocarbons may represent a separate show but are believed to be due to entrained crude oil in the mud system.

The light hydrocarbon and C₁₅₊ hydrocarbon data indicate possible traces of a mature condensate within Zone D (4370-5180 \pm metres). The data, however, are not definitive and the non indigenous hydrocarbons could equally well be drilling introduced.

APPENDIX TO 30/4-1 STUDY

Introduction

Geochem Laboratories were requested to undertake specified analyses on a selection of sediment and standard hydrocarbons samples.

A. Analytical

A total of twenty two samples were received. Their details are as follows:-

<u>Sample Number</u>	<u>Description</u>
313-045	Sample A Ground Sediment
313-046	" B " "
313-047	" C " "
313-048	" A Core Pieces
313-049	" B " "
313-050	" C " "
313-075	" D Unground Sample
313-076	" E " "
313-077	" F " "
313-078	" D Ground Sample
313-079	" E " "
313-080	" F " "
313-184	" G Core Pieces
313-185	" H " "
313-186	" I " "
313-187	" J " "
313-188	" G Ground Sample
313-189	" H " "
313-190	" I " "
313-191	" J " "
313-051	" GC1 Hydrocarbon solution
313-052	" GC2 " "

Geochem Laboratories are requested to:

- (1) determine total organic carbon, total soluble extract, saturate and aromatic hydrocarbon values and n-alkane distributions on ground sediment samples.
- (2) determine vitrinite reflectance, kerogen type and maturity (from spore colouration) on core pieces.
- (3) determine normalised n-alkane distribution for standard hydrocarbon solutions.

The data are presented in tables 9 to 13 and graphically in figure 6.

RESULTS AND DISCUSSION

The samples were analysed by the procedures used routinely by Geochem and the data are, therefore, compatible with those in the main report. These data are listed in tables 8 to 12 of this appendix and include therein the parameters requested by BP. With few exceptions the data are self explanatory. However, the following observations should be made concerning points which arose during this work.

- (1) Only low weights of the paraffin-naphthene fractions were commonly available for gas-chromatographic analysis. Nonetheless, the quality of the resultant data should not be impaired since the solvent blanks gave flat baselines.
- (2) It is evident from the vitrinite reflectance worksheets that the mean reflectivities (% Ro) quoted often contain values from two or more sub-populations. Recalculated means frequently correlate more closely with the organic matter colouration data than the values on the worksheets. These preferred vitrinite sub-populations are as follows:

<u>Sample</u>	<u>Mean % Ro</u>
B	0.50 (5)
C	1.66 (8)
D	1.04 (1), 1.34 (8)
F	1.19
I	0.48 (11)
J	0.52 (6)

However, sample G and C, D and F after recalculation, do not correlate with maturation ratings based upon spore colouration. This is believed to be due to the fact that, for these samples, the reflectivity measurements were made upon dominantly reworked material.

TABLE 1A

CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN AIR SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-003	1500-530m	3461	29	7.1	-	-	3497	36	1.0	1.7	-
313-005	1560m	1367	14.3	3.2	-	-	1384	17.5	1.3	1.3	-
313-006	1560-590m	1020	104	1.9	-	-	1126	106	9.4	0.2	-
313-008	1590-600m	4809	81	10.6	-	-	4901	92	1.9	86	-
313-009	1600-630m	120	1.6	0.2	-	-	122	1.9	1.5	0.4	-
313-010	1630-660m	164	3.0	0.3	-	-	167	3.3	1.9	4.4	-
313-012	1660-690m	69	1.6	0.3	-	-	71	1.9	2.7	-	-
313-013	1690-720m	54	1.8	0.5	-	-	56	2.3	4.1	8.7	-
313-014	1720-750m	337	5.8	1.7	-	-	344	7.5	2.2	-	-
313-015	1750-780m	66	3.7	1.1	-	-	71	4.9	6.9	19.9	-
313-017	1780-810m	60	4.8	1.7	-	-	66	6.5	9.9	9.8	-
313-018	1810-840m	2540	71	11.3	7.4	3.4	2633	93	3.5	61	2.19
313-019	1840-870m	293	25	3.4	-	-	321	28	8.7	59	-
313-020	1870-900m	3080	96	19.7	7.8	3.2	3207	126	3.9	5.6	2.41
313-022	1900-930m	1075	44	8.4	3.8	1.8	1132	58	5.1	11.7	2.12
313-023	1930-960m	310	43	7.2	-	-	360	51	14.0	62	-
313-025	1960-990m	3426	187	28	17.3	5.9	3665	239	6.5	64	2.91
313-026	1990-2020m	2039	94	13.9	10.3	3.2	2161	122	5.6	24	3.18
313-027	2020-050m	1047	57	7.5	9.3	1.6	1122	75	6.7	25	5.99
313-029	2050-080m	427	45	21	6.2	1.0	500	74	14.7	32	6.37
313-030	2080-110m	1422	147	20	30	5.3	1624	203	12.5	285	5.58
313-032	2110-140m	2691	178	15.3	18.0	3.1	2906	215	7.4	44	5.86
313-033	2140-170m	1182	75	8.3	13.9	3.2	1282	100	7.8	48	4.35
313-034	2170-200m	184	30	12.1	8.7	9.0	244	59	24.4	79	0.96
313-035	2200-230m	1295	157	75	37	36	1599	304	19.0	1053	1.05
313-036	2230-260m	562	55	32	16.5	15.7	681	119	17.5	62	1.05
313-039	2260-290m	108	15.9	13.6	9.1	13.5	160	52	32.5	293	0.67
313-040	2290-320m	229	32	28	14.1	15.6	318	89	28.1	92	0.91
313-042	2320-345m	31	7.5	2.4	-	-	40	9.8	24.4	83	-
313-043	2345m	225	23	8.6	-	-	256	31	12.3	51	-

TABLE 1A

CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN AIR SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-083	2370m	244	35	25	6	9	318	74	23.3	111	0.66
313-084	2400m	594	109	96	25	35	859	265	30.8	141	0.73
313-085	2430m	15	4	5	2	2	28	13	45.6	8	0.77
313-086	2460m	28	5	5	1	2	41	13	31.8	26	0.72
313-087	2490m	1832	230	257	106	151	2576	744	28.9	355	0.70
313-088	2510m	1164	124	93	36	52	1469	305	20.7	223	0.70
313-089	2550m	3014	743	505	168	207	4637	1623	35.0	192	0.81
313-090	2580m	1009	244	389	172	209	2023	1013	50.1	380	0.82
313-091	2610m	7526	2098	1894	759	917	13194	5668	43.0	2531	0.83
313-092	2660m	351	129	698	613	1191	2983	2632	88.2	4586	0.52
313-093	2710m	5387	965	1091	380	583	8407	3020	35.9	1459	0.65
313-094	2760m	2685	488	602	255	377	4407	1723	39.1	712	0.68
313-095	2760-810m	1453	303	537	243	436	2974	1520	51.1	1434	0.56
313-096	2810-840m	286	72	309	238	429	1335	1049	78.6	1967	0.55
313-097	2840-870m	304	83	316	205	430	1338	1034	77.3	1515	0.48
313-098	2870-900m	561	160	365	174	285	1546	984	63.7	1062	0.61
313-099	2900-930m	1074	312	522	213	358	2478	1404	56.7	901	0.59
313-100	2930-960m	606	160	431	222	422	1840	1234	67.1	1665	0.53
313-101	2960-990m	1496	348	514	259	512	3128	1632	52.2	2533	0.51
313-102	2990-020m	1462	403	465	220	432	2982	1520	51.0	2427	0.51
313-103	3020-050m	1829	365	550	325	593	3663	1834	50.1	2921	0.55
313-104	3050-080m	2019	552	826	461	904	4763	2743	57.6	3944	0.51
313-105	3080-110m	1419	321	407	205	362	2714	1295	47.7	991	0.57
313-106	3110-140m	1942	437	435	173	306	3294	1352	41.0	1287	0.57
313-107	3140-170m	1298	307	339	181	250	2374	1076	45.3	450	0.72
313-108	3170-200m	1216	330	358	168	265	2337	1121	48.0	676	0.63
313-109	3200-230m	942	261	370	76	128	1777	834	47.0	792	0.59
313-110	3230-260m	1326	328	363	217	334	2568	1242	48.4	806	0.65
313-111	3260-290m	2120	280	220	77	155	2851	731	25.6	1567	0.49
313-112	3290-320m	1091	130	104	33	75	1434	343	23.9	1188	0.44

TABLE 1A

CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN AIR SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-113	3320-350m	2450	246	191	67	138	3092	642	20.8	1157	0.49
313-114	3350-380m	2011	223	144	39	106	2524	512	20.3	836	0.37
313-115	3380-410m	4835	670	631	195	480	6811	1976	29.0	2031	0.41
313-116	3410-440m	1765	217	131	31	68	2212	447	20.2	209	0.46
313-117	3440-470m	1582	207	142	37	88	2057	474	23.1	309	0.42
313-118	3470-500m	3399	390	261	70	147	4268	869	20.4	506	0.48
313-119	3500-530m	3269	455	275	80	152	4230	961	22.7	423	0.53
313-120	3530-560m	4538	639	416	118	244	5955	1417	23.8	671	0.48
313-121	3560-590m	3719	924	974	296	535	6448	2729	42.3	1560	0.55
313-122	3590-620m	3748	756	979	347	644	6474	2727	42.1	1610	0.54
313-123	3620-650m	2636	682	1043	375	667	5402	2766	51.2	1822	0.56
313-124	3650-680m	3733	522	539	178	360	5332	1598	30.0	1354	0.49
313-125	3680-710m	4071	558	420	115	212	5376	1305	24.3	797	0.54
313-126	3710-740m	1342	250	253	61	119	2024	682	33.7	337	0.52
313-127	3740-770m	2745	549	350	79	154	3877	1132	29.2	928	0.52
313-128	3770-800m	6237	1198	726	187	293	8641	2404	27.8	909	0.64
313-129	3800-830m	2251	507	388	102	153	3402	1151	33.8	513	0.67
313-130	3830-860m	5711	1257	843	253	380	8445	2734	32.4	1095	0.67
313-131	3860-890m	4236	850	578	162	232	6059	1822	30.1	766	0.70
313-132	3890-920m	1749	426	317	98	144	2734	986	36.0	429	0.68
313-133	3920-950m	3613	1188	977	286	379	6445	2831	43.9	830	0.75
313-134	3950-980m	3923	1183	885	248	406	6645	2722	41.0	1484	0.61
313-135	3980-010m	4982	1725	1460	411	682	9260	4278	46.2	3973	0.60
313-136	4010-040m	2963	755	603	172	351	4845	1882	38.8	2315	0.49
313-137	4040-070m	9230	4083	3144	593	947	17997	8767	48.7	3167	0.63
313-138	4070-100m	12593	5257	4387	1184	1878	25299	12706	50.2	3252	0.63
313-139	4100-130m	4284	1434	1324	356	575	7974	3690	46.3	858	0.62
313-140	4130-160m	1123	275	271	81	154	1904	781	41.0	1242	0.53
313-141	4160-190m	419	75	66	15	32	607	188	31.0	1105	0.47
313-142	4190-220m	1128	371	404	89	195	2186	1059	48.4	503	0.46

TABLE 1A

CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN AIR SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-143	4220-250m	251	82	77	15	31	456	205	44.9	56	0.49
313-144	4250-280m	3717	1102	1152	292	510	6773	3056	45.1	1371	0.57
313-145	4280-310m	3222	973	1122	330	531	6178	2956	47.9	1581	0.62
313-146	4310-340m	3705	1453	1717	500	755	8129	4425	54.4	2373	0.66
313-147	4340-370m	2693	845	916	267	417	5138	2445	47.6	1224	0.64
313-148	4370-400m	10250	4558	5119	1841	2126	23894	13644	57.1	2865	0.87
313-149	4400-430m	5016	2177	2182	819	809	11003	5987	54.4	817	1.01
313-150	4430-460m	3042	1377	1336	441	435	6631	3589	54.1	418	1.02
313-151	4460-490m	20080	9110	6919	1656	1584	39350	19270	49.0	1563	1.04
313-152	4490-520m	4289	1782	1867	956	896	9790	5501	56.2	1370	1.07
313-153	4520-550m	6287	2518	2114	759	839	12517	6230	49.8	1467	0.91
313-154	4550-580m	5212	2299	2023	685	850	11069	5858	52.9	1598	0.81
313-155	4580-610m	10098	4806	4910	2086	2213	24114	14016	58.1	3738	0.94
313-156	4610-640m	4659	2127	1767	685	646	9883	5225	52.9	1039	1.06
313-157	4640-670m	4714	2064	1746	702	642	9867	5154	52.2	1143	1.09
313-158	4670-700m	8889	3396	2560	835	867	16545	7656	46.3	1764	0.96
313-159	4700-730m	6069	2582	2038	688	683	12060	5991	49.7	1173	1.01
313-160	4730-760m	4278	1794	1128	332	311	7842	3565	45.5	649	1.07
313-161	4760-790m	5779	2558	1827	666	530	11361	5582	49.1	857	1.26
313-162	4790-820m	7787	4333	3996	1403	1312	18831	11044	58.6	1816	1.07
313-163	4820-850m	6898	4739	3991	1722	1344	18693	11796	63.1	1966	1.28
313-164	4850-880m	2454	1216	1152	622	449	5892	3439	58.4	689	1.38
313-165	4880-910m	6260	3021	2464	954	658	13355	7096	53.1	793	1.45
313-166	4910-940m	10166	5080	3620	1311	959	21137	10971	51.9	1206	1.37
313-167	4940-970m	5953	2815	2739	1490	1049	14046	8092	57.6	1094	1.42
313-168	4970-000m	6770	3293	2566	858	684	14171	7401	52.2	678	1.26
313-169	5000-030m	14890	6424	4139	1350	1025	27827	12938	46.5	981	1.32
313-170	5030-060m	15942	7707	6785	2988	2817	36237	20296	56.0	2921	1.06
313-171	5060-090m	12332	6140	5397	2118	2036	28022	15690	56.0	2492	1.04
313-172	5090-120m	7197	3423	2982	1852	1481	16935	9739	57.5	745	1.25

TABLE 1A

CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN AIR SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-173	5120-150m	2625	1283	1123	568	426	6025	3400	56.4	255	1.33
313-174	5150-180m	4310	1897	1502	573	455	8737	4427	50.7	509	1.26
313-175	5180-210m	11252	1969	603	257	136	14218	2966	20.9	315	1.89
313-176	5210-240m	6971	2329	1266	587	296	11449	4478	39.1	499	1.98
313-177	5240-270m	7435	1971	780	425	188	10800	3364	31.2	334	2.26
313-178	5270-300m	16907	2333	529	277	122	20169	3261	16.2	293	2.27
313-179	5300-330m	31485	3659	827	352	172	36494	5009	13.7	340	2.05
313-180	5330-360m	12545	1747	408	160	85	14945	2400	16.1	190	1.87
313-181	5360-390m	33262	3328	778	284	177	37829	4567	12.1	314	1.61
313-182	5390-420m	8527	865	203	95	49	9738	1211	12.4	125	1.94
313-183	5420-450m	11792	1177	318	159	78	13523	1731	12.8	235	2.05

TABLE 1B

CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN CUTTINGS GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-003	1500-530m	366	7.0	1.9	-	-	375	8.9	2.4	15.3	-
313-005	1560m	245	5.0	0.9	-	-	251	5.9	2.4	20	-
313-006	1560-590m	426	7.0	1.1	-	-	434	9.1	2.1	14.0	-
313-008	1590-600m	37	3.2	-	-	-	40	3.2	8.0	15.2	-
313-009	1600-630m	64	1.6	-	-	-	66	1.6	2.4	11.8	-
313-010	1630-660m	27	3.5	1.0	-	-	32	4.5	14.1	-	-
313-012	1660-690m	28	3.5	1.9	-	-	33	5.4	16.4	7.7	-
313-013	1690-720m	23	3.3	-	-	-	26	3.3	12.7	0.5	-
313-014	1720-750m	388	14	9.6	-	-	412	24	5.7	-	-
313-015	1750-780m	23	3.2	-	-	-	26	3.2	12.3	46	-
313-017	1780-810m	55	3.2	-	-	-	58	3.2	5.5	36	-
313-018	1810-840m	70	4.8	-	-	-	75	4.8	6.4	25	-
313-019	1840-870m	37	5.0	-	-	-	42	5.0	11.9	5.5	-
313-020	1870-900m	218	14.4	4.2	2.6	1.3	241	23	9.3	30	2.00
313-022	1900-930m	110	6.9	1.1	-	-	118	8.0	6.8	37	-
313-023	1930-960m	18.6	5.2	3.0	-	-	27	8.2	30.4	59	-
313-025	1960-990m	92	26	9.7	8.5	5.0	141	49	34.9	73	1.70
313-026	1990-2020m	408	21	4.2	3.8	1.5	439	31	6.9	71	2.53
313-027	2020-050m	557	45	9.5	9.0	3.7	624	67	10.8	145	2.43
313-029	2050-080m	60	6.9	2.2	3.8	1.3	74	14.2	19.2	131	2.92
313-030	2080-110m	60	8.6	3.2	5.6	2.1	80	19.5	24.3	89	2.66
313-032	2110-140m	232	24	3.2	3.8	1.2	264	32	12.2	41	3.16
313-033	2140-170m	408	45	8.4	10.3	3.0	475	67	14.0	76	3.43
313-034	2170-200m	97	30	22	15.8	21	186	89	47.7	160	0.75
313-035	2200-230m	129	25	20	11.6	21	207	78	37.5	140	0.55
313-036	2230-260m	147	23	22	11.6	19.1	223	76	33.9	133	0.61
313-039	2260-290m	36	8.0	9.1	5.8	10.7	70	34	48.0	128	0.54
313-040	2290-320m	58	10.0	14.0	6.6	14.0	103	45	43.3	162	0.47
313-042	2320-345m	44	3.3	4.0	2.3	6.2	60	15.8	26.3	99	0.37
313-043	2345m	4.5	1.5	-	-	-	6.0	1.5	25.0	36	-

TABLE 1B
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN CUTTINGS GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	iC ₄ nC ₄
313-083	2370m	126	18	33	14	27	217	91	41.9	276	0.52
313-084	2400m	323	84	158	76	131	772	449	58.1	892	0.58
313-085	2430m	155	36	90	59	104	444	289	65.0	864	0.57
313-086	2460m	155	39	73	41	77	385	230	59.7	422	0.53
313-087	2490m	105	27	124	142	228	626	521	83.2	965	0.62
313-088	2510m	461	99	225	193	310	1288	827	64.2	1708	0.62
313-089	2550m	3914	784	1365	776	1437	8277	4363	52.7	1843	0.54
313-090	2580m	1145	488	1755	1121	2253	6762	5617	83.1	5980	0.50
313-091	2610m	331	100	224	238	492	1386	1055	76.1	2723	0.48
313-092	2660m	155	32	72	126	323	708	553	78.1	4431	0.39
313-093	2710m	273	66	132	117	264	852	579	68.0	1964	0.44
313-094	2760m	1284	228	339	220	463	2534	1251	49.4	3895	0.48
313-095	2760-810m	185	49	135	89	280	737	552	74.9	3322	0.32
313-096	2810-840m	98	27	71	142	305	642	544	84.7	2658	0.46
313-097	2840-870m	78	17	34	48	104	281	203	72.2	2187	0.46
313-098	2870-900m	227	50	116	110	224	726	500	68.8	3560	0.49
313-099	2900-930m	294	65	129	88	204	779	486	62.3	2766	0.43
313-100	2930-960m	344	49	75	80	188	735	391	53.2	1732	0.42
313-101	2960-990m	1959	236	170	119	418	2903	944	32.5	3884	0.29
313-102	2990-020m	1140	121	115	70	231	1677	536	32.0	2144	0.30
313-103	3020-050m	797	63	49	33	117	1059	262	24.7	4561	0.29
313-104	3050-080m	300	34	63	89	262	748	448	59.9	2913	0.34
313-105	3080-110m	424	66	177	131	385	1183	759	64.1	3980	0.34
313-106	3110-140m	797	90	109	58	190	1244	448	36.0	2913	0.31
313-107	3140-170m	519	121	222	141	339	1342	823	61.3	1903	0.42
313-108	3170-200m	497	115	247	128	366	1353	856	63.3	1942	0.35
313-109	3200-230m	775	126	289	150	437	1777	1002	56.4	3272	0.34
313-110	3230-260m	1477	206	299	192	556	2729	1253	45.9	1478	0.35
313-111	3260-290m	2527	333	334	189	365	3749	1221	32.6	3270	0.52
313-112	3290-320m	1910	240	244	175	251	2821	911	32.3	2335	0.70

TABLE 1B
 CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN CUTTINGS GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-113	3320-350m	1682	218	191	86	156	2332	650	27.9	2217	0.55
313-114	3350-380m	1323	173	143	63	110	1812	489	27.0	1568	0.58
313-115	3380-410m	3503	379	263	128	303	4576	1073	23.4	2278	0.42
313-116	3410-440m	2164	310	291	127	286	3177	1013	31.9	1664	0.44
313-117	3440-470m	1295	197	182	82	142	1899	604	31.8	1203	0.58
313-118	3470-500m	1676	215	186	69	193	2340	664	28.4	1070	0.36
313-119	3500-530m	2522	343	309	138	264	3577	1055	29.5	1328	0.52
313-120	3530-560m	3178	381	308	137	295	4299	1121	26.1	1606	0.47
313-121	3560-590m	1659	332	537	330	578	3438	1778	51.7	1875	0.57
313-122	3590-620m	673	206	491	352	719	2440	1768	72.4	3105	0.49
313-123	3620-650m	589	182	332	252	537	1892	1303	68.9	3375	0.47
313-124	3650-680m	2074	240	316	173	393	3196	1122	35.1	2109	0.44
313-125	3680-710m	1558	229	211	86	158	2241	683	30.5	1447	0.54
313-126	3710-740m	1441	209	263	150	302	2364	923	39.1	1699	0.50
313-127	3740-770m	5219	592	542	221	351	6925	1706	24.6	2016	0.63
313-128	3770-800m	2349	334	284	125	202	3294	946	28.7	1787	0.62
313-129	3800-830m	1373	301	354	163	302	2493	1119	44.9	1942	0.54
313-130	3830-860m	1872	375	378	173	371	3170	1298	40.9	2344	0.47
313-131	3860-890m	2405	429	445	212	383	3873	1469	37.9	2373	0.55
313-132	3890-920m	2881	399	384	188	347	4199	1318	31.4	2629	0.54
313-133	3920-950m	767	341	496	156	405	2165	1398	64.6	2066	0.38
313-134	3950-980m	641	279	365	117	379	1780	1139	64.0	4118	0.31
313-135	3980-010m	2069	368	420	162	424	3444	1375	39.9	4839	0.38
313-136	4010-040m	1271	305	413	156	376	2520	1249	49.6	1842	0.41
313-137	4040-070m	1213	522	635	157	370	2897	1684	58.1	2509	0.42
313-138	4070-100m	2358	865	1270	458	1004	5954	3596	60.4	2670	0.46
313-139	4100-130m	10504	3459	1819	706	1294	17782	7278	40.9	2260	0.55
313-140	4130-160m	399	94	142	68	156	859	459	53.5	777	0.43
313-141	4160-190m	2731	684	962	333	722	5432	2701	49.7	2765	0.46
313-142	4190-220m	3372	822	1077	359	815	6445	3074	47.7	5799	0.44

TABLE 1B

CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN CUTTINGS GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-143	4220-250m	2379	616	906	254	730	4886	2507	51.3	3149	0.35
313-144	4250-280m	1964	373	535	209	477	3558	1594	44.8	3610	0.44
313-145	4280-310m	1442	354	576	208	454	3033	1591	52.5	3420	0.46
313-146	4310-340m	3701	930	1574	620	1113	7938	4237	53.4	5260	0.56
313-147	4340-370m	1289	337	521	181	310	2639	1350	51.1	1581	0.58
313-148	4370-400m	1924	759	2046	1230	1701	7659	5735	74.9	2822	0.72
313-149	4400-430m	10940	5885	6953	3414	3312	30504	19564	64.1	3169	1.03
313-150	4430-460m	2224	1218	1736	741	1185	7105	4881	68.7	2554	0.63
313-151	4460-490m	2338	2817	4061	1437	1553	12206	9868	80.8	1403	0.93
313-152	4490-520m	9843	3938	4496	2169	2278	22723	12881	56.7	3728	0.95
313-153	4520-550m	2687	1333	1843	858	1063	7785	5098	65.5	2033	0.81
313-154	4550-580m	3238	1576	2135	974	1348	9270	6032	65.1	3856	0.72
313-155	4580-610m	3991	2209	2953	1385	1869	12407	8416	67.8	5164	0.74
313-156	4610-640m	2667	1660	2075	1049	1134	8586	5918	68.9	2406	0.93
313-157	4640-670m	5704	2850	3296	1711	1825	15386	9682	62.9	3984	0.94
313-158	4670-700m	2972	1425	1862	969	1053	8281	5309	64.1	2716	0.92
313-159	4700-730m	1294	757	902	409	498	3860	2566	66.5	158	0.82
313-160	4730-760m	2042	1371	1686	805	1014	6919	4876	70.5	3184	0.79
313-161	4760-790m	3489	2010	2018	911	903	9330	5841	62.6	1780	1.01
313-162	4790-820m	2790	1892	1865	805	871	8223	5433	66.1	1678	0.92
313-163	4820-850m	7116	4433	4258	1722	1869	19398	12282	63.3	4324	0.92
313-164	4850-880m	8947	3414	3270	1394	1421	18446	9499	51.5	3202	0.98
313-165	4880-910m	2672	1890	1583	643	464	7251	4579	63.1	903	1.39
313-166	4910-940m	3081	1654	1534	591	576	7435	4355	58.6	1134	1.03
313-167	4940-970m	4193	2314	2098	813	880	10298	6105	59.3	1727	0.92
313-168	4970-000m	7904	2544	2326	942	924	14638	6735	46.0	1778	1.02
313-169	5000-030m	7657	2517	1954	679	629	13437	5780	43.0	893	1.08
313-170	5030-060m	4807	1910	1080	337	341	8475	3668	43.3	1264	0.99
313-171	5060-090m	8798	6784	5414	742	1082	22821	14023	61.4	3050	0.69
313-172	5090-120m	9052	7408	8161	3395	3728	31744	22692	71.5	3959	0.91

TABLE 1B
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN CUTTINGS GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-173	5120-150m	3514	2663	1925	564	648	9315	5801	62.3	819	0.87
313-174	5150-180m	7893	3834	2331	766	794	15617	7725	49.5	1014	0.96
313-175	5180-210m	15628	2360	733	300	222	19243	3615	18.8	472	1.35
313-176	5210-240m	14378	2907	1274	551	500	19609	5231	26.7	933	1.10
313-177	5240-270m	18382	3532	1140	529	420	24003	5622	23.4	874	1.26
313-178	5270-300m	17295	1210	304	156	113	19078	1783	9.3	354	1.38
313-179	5300-330m	15326	1405	396	168	92	17387	2061	11.9	296	1.82
313-180	5330-360m	17283	2397	816	202	141	20838	3556	17.1	208	1.43
313-181	5360-390m	23297	1736	419	226	139	25817	2519	9.8	360	1.62
313-182	5390-420m	9426	575	125	60	27	10214	788	7.7	342	2.19
313-183	5420-450m	19783	1177	330	162	109	21561	1779	8.2	1600	1.48

TABLE 1C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS (1A + 1B)

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-003	1500-530m	3827	36	9.0	-	-	3872	45	1.2	17.0	-
313-005	1560m	1612	19.3	4.1	-	-	1635	23	1.4	21	-
313-006	1560-590m	1446	111	3.0	-	-	1560	114	7.3	14.2	-
313-008	1590-600m	4846	84	10.6	-	-	4941	95	1.9	101	-
313-009	1600-630m	184	3.2	0.2	-	-	187	3.4	1.8	12.2	-
313-010	1630-660m	191	6.5	1.3	-	-	199	7.8	3.9	4.4	-
313-012	1660-690m	97	5.1	2.2	-	-	104	7.3	7.0	7.7	-
313-013	1690-720m	77	5.1	0.5	-	-	83	5.6	6.7	9.2	-
313-014	1720-750m	725	19.8	11.3	-	-	756	31	4.1	-	-
313-015	1750-780m	89	6.9	1.1	-	-	97	8.0	8.2	66	-
313-017	1780-810m	115	8.0	1.7	-	-	125	9.7	7.8	46	-
313-018	1810-840m	2610	76	11.3	7.4	3.4	2708	98	3.6	86	2.18
313-019	1840-870m	330	30	3.4	-	-	363	33	9.2	65	-
313-020	1870-900m	3298	110	24	10.4	4.5	3447	150	4.3	36	2.31
313-022	1900-930m	1185	51	9.5	3.8	1.8	1251	66	5.3	49	2.11
313-023	1930-960m	329	48	10.2	-	-	387	58	15.0	121	-
313-025	1960-990m	3518	213	38	26	10.9	3806	288	7.6	137	2.39
313-026	1990-2020m	2447	115	18.1	14.1	7.4	2602	155	5.9	95	1.91
313-027	2020-050m	1604	102	17.0	18.3	5.3	1747	143	8.2	170	3.45
313-029	2050-080m	487	52	23	10.0	2.3	574	87	15.2	163	4.35
313-030	2080-110m	1482	156	23	36	7.4	1704	222	13.0	374	4.86
313-032	2110-140m	2923	202	18.5	22	4.3	3170	247	7.8	85	5.12
313-033	2140-170m	1590	120	16.7	24	6.2	1757	167	9.5	124	3.87
313-034	2170-200m	281	60	34	24	30	430	149	34.6	239	0.82
313-035	2200-230m	1424	182	95	49	57	1807	383	21.2	1193	0.85
313-036	2230-260m	709	78	54	28	35	904	195	21.6	195	0.81
313-039	2260-290m	144	24	23	14.9	24	230	86	37.3	421	0.62
313-040	2290-320m	287	42	42	21	30	421	134	31.9	254	0.70
313-042	2320-345m	75	10.8	6.4	2.3	6.2	101	26	25.5	182	0.37
313-043	2345m	230	25	8.6	-	-	263	33	12.6	87	-

TABLE 1C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS (1A + 1B)

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-083	2370m	370	52	57	20	35	534	165	30.8	387	0.55
313-084	2400m	917	193	253	101	166	1630	713	43.8	1033	0.61
313-085	2430m	171	40	95	60	106	472	301	63.9	872	0.57
313-086	2460m	183	44	78	42	78	426	243	57.0	448	0.53
313-087	2490m	1937	257	381	248	379	3201	1265	39.5	1320	0.65
313-088	2510m	1625	223	317	230	362	2757	1132	41.0	1931	0.63
313-089	2550m	6928	1527	1870	944	1644	12913	5985	46.4	2036	0.57
313-090	2580m	2154	732	2144	1293	2461	8784	6630	75.5	6360	0.53
313-091	2610m	7858	2198	2118	998	1409	14580	6722	46.1	5254	0.71
313-092	2660m	507	161	770	739	1514	3691	3185	86.3	9017	0.49
313-093	2710m	5660	1032	1223	497	847	9258	3599	38.9	3423	0.59
313-094	2760m	3968	717	942	475	840	6942	2974	42.8	4607	0.57
313-095	2760-810m	1638	352	672	332	716	3710	2072	55.9	4757	0.46
313-096	2810-840m	384	99	380	380	734	1977	1593	80.6	4625	0.52
313-097	2840-870m	382	100	349	253	535	1618	1236	76.4	3702	0.47
313-098	2870-900m	788	210	481	284	509	2272	1484	65.3	4622	0.56
313-099	2900-930m	1367	376	651	300	562	3258	1890	58.0	3667	0.53
313-100	2930-960m	950	208	506	301	609	2575	1625	63.1	3396	0.49
313-101	2960-990m	3455	584	684	378	930	6031	2576	42.7	6416	0.41
313-102	2990-020m	2602	524	580	290	663	4659	2057	44.1	4571	0.44
313-103	3020-050m	2626	428	599	358	710	4722	2096	44.4	7482	0.50
313-104	3050-080m	2319	586	889	550	1166	5511	3192	57.9	6857	0.47
313-105	3080-110m	1843	387	584	336	746	3896	2054	52.7	4971	0.45
313-106	3110-140m	2739	528	544	231	497	4538	1799	39.6	4200	0.47
313-107	3140-170m	1817	427	562	322	588	3716	1899	51.1	2353	0.55
313-108	3170-200m	1713	445	605	296	631	3690	1977	53.6	2618	0.47
313-109	3200-230m	1717	388	659	226	564	3553	1836	51.7	4064	0.40
313-110	3230-260m	2803	533	661	410	890	5297	2495	47.1	2284	0.46
313-111	3260-290m	4647	613	554	266	520	6600	1952	29.6	4837	0.51
313-112	3290-320m	3002	370	348	208	327	4255	1254	29.5	3522	0.64

TABLE 1C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS (1A + 1B)

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-113	3320-350m	4132	464	381	153	294	5424	1292	23.8	3375	0.52
313-114	3350-380m	3334	396	287	102	216	4336	1001	23.1	2404	0.47
313-115	3380-410m	8338	1049	893	323	783	11387	3049	26.8	4310	0.41
313-116	3410-440m	3929	527	422	158	354	5389	1461	27.1	1874	0.45
313-117	3440-470m	2877	405	324	119	230	3956	1079	27.3	1513	0.52
313-118	3470-500m	5075	606	448	139	340	6608	1533	23.2	1576	0.41
313-119	3500-530m	5791	798	584	218	416	7808	2016	25.8	1751	0.52
313-120	3530-560m	7717	1021	723	255	539	10254	2538	24.7	2277	0.47
313-121	3560-590m	5378	1256	1512	627	1113	9886	4508	45.6	3435	0.56
313-122	3590-620m	4420	963	1470	698	1363	8915	4494	50.4	4715	0.51
313-123	3620-650m	3225	863	1375	627	1204	7294	4069	55.8	5197	0.52
313-124	3650-680m	5807	762	855	351	753	8527	2720	31.9	3463	0.47
313-125	3680-710m	5629	787	631	201	369	7617	1988	26.1	2244	0.54
313-126	3710-740m	2782	459	515	211	421	4388	1606	36.6	2035	0.50
313-127	3740-770m	7964	1141	891	301	504	10802	2838	26.3	2944	0.60
313-128	3770-800m	8586	1533	1011	312	495	11936	3350	28.1	2696	0.63
313-129	3800-830m	3624	808	742	265	455	5894	2270	38.5	2455	0.58
313-130	3830-860m	7584	1632	1222	427	751	11615	4031	34.7	3439	0.57
313-131	3860-890m	6641	1279	1023	374	615	9932	3291	33.1	3139	0.61
313-132	3890-920m	4630	826	701	285	492	6934	2304	33.2	3058	0.58
313-133	3920-950m	4380	1529	1473	442	785	8609	4229	49.1	2896	0.56
313-134	3950-980m	4564	1462	1250	364	785	8425	3862	45.8	5602	0.46
313-135	3980-010m	7051	2094	1880	573	1106	12704	5653	44.5	8812	0.52
313-136	4010-040m	4234	1060	1016	328	727	7365	3131	42.5	4157	0.45
313-137	4040-070m	10443	4604	3779	750	1318	20894	10451	50.0	5676	0.57
313-138	4070-100m	14951	6122	5656	1642	2881	31253	16302	52.2	5922	0.57
313-139	4100-130m	14788	4893	3144	1062	1869	25756	10967	42.6	3118	0.57
313-140	4130-160m	1522	368	413	149	310	2763	1241	44.9	2020	0.48
313-141	4160-190m	3150	759	1028	348	754	6039	2889	47.8	3870	0.46
313-142	4190-220m	4500	1193	1481	448	1010	8632	4132	47.9	6302	0.44

TABLE 1C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS (1A + 1B)

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-143	4220-250m	2631	697	983	270	761	5342	2712	50.8	3206	0.35
313-144	4250-280m	5681	1475	1687	501	987	10330	4650	45.0	4982	0.51
313-145	4280-310m	4664	1327	1698	537	985	9211	4547	49.4	5001	0.55
313-146	4310-340m	7405	2382	3291	1120	1868	16067	8662	53.9	7632	0.60
313-147	4340-370m	3983	1182	1438	449	727	7777	3795	48.8	2805	0.62
313-148	4370-400m	12175	5317	7165	3070	3827	31554	19379	61.4	5687	0.80
313-149	4400-430m	15956	8062	9135	4233	4121	41507	25551	61.6	3986	1.03
313-150	4430-460m	5266	2595	3073	1182	1620	13737	8470	61.7	2973	0.73
313-151	4460-490m	22418	11928	10980	3093	3137	51556	29138	56.5	2967	0.99
313-152	4490-520m	14132	5720	6363	3125	3174	32514	18382	56.5	5098	0.98
313-153	4520-550m	8974	3851	3958	1618	1902	20303	11328	55.8	3500	0.85
313-154	4550-580m	8450	3875	4158	1659	2198	20340	11890	58.5	5453	0.75
313-155	4580-610m	14090	7015	7864	3471	4081	36521	22432	61.4	8902	0.85
313-156	4610-640m	7326	3788	3842	1734	1780	18469	11143	60.3	3445	0.97
313-157	4640-670m	10418	4914	5042	2413	2467	25253	14836	58.7	5127	0.98
313-158	4670-700m	11861	4820	4421	1803	1920	24826	12965	52.2	4480	0.94
313-159	4700-730m	7364	3339	2939	1097	1181	15920	8557	53.7	1331	0.93
313-160	4730-760m	6320	3165	2814	1137	1325	14761	8441	57.2	3833	0.86
313-161	4760-790m	9268	4568	3845	1577	1433	20691	11423	55.2	2637	1.10
313-162	4790-820m	10577	6225	5861	2208	2182	27054	16477	60.9	3494	1.01
313-163	4820-850m	14014	9172	8249	3444	3213	38091	24077	63.2	6290	1.07
313-164	4850-880m	11400	4629	4422	2016	1870	24338	12938	53.2	3891	1.08
313-165	4880-910m	8932	4910	4046	1596	1121	20606	11674	56.7	1696	1.42
313-166	4910-940m	13247	6734	5154	1902	1535	28572	15325	53.6	2339	1.24
313-167	4940-970m	10146	5129	4837	2303	1929	24344	14198	58.3	2821	1.19
313-168	4970-000m	14674	5837	4892	1800	1607	28809	14136	49.1	2456	1.12
313-169	5000-030m	22547	8940	6094	2030	1654	41264	18717	45.4	1873	1.23
313-170	5030-060m	20748	9616	7864	3325	3158	44712	23964	53.6	4185	1.05
313-171	5060-090m	21130	12925	10811	2859	3118	50843	29713	58.4	5542	0.92
313-172	5090-120m	16248	10830	11144	5247	5210	48679	32431	66.6	4704	1.01

TABLE 1C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS (1A + 1B)

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
313-173	5120-150m	6139	3946	3048	1132	1074	15340	9201	60.0	1074	1.05
313-174	5150-180m	12202	5731	3833	1339	1249	24354	12152	49.9	1524	1.07
313-175	5180-210m	26880	4328	1336	557	359	33461	6581	19.7	787	1.55
313-176	5210-240m	21349	5236	2540	1138	795	31058	9709	31.3	1432	1.43
313-177	5240-270m	25817	5504	1920	954	608	34803	8986	25.8	1208	1.57
313-178	5270-300m	34202	3543	834	433	235	39247	5045	12.9	647	1.84
313-179	5300-330m	46811	5063	1223	520	264	53881	7070	13.1	636	1.97
313-180	5330-360m	29828	4143	1224	361	227	35783	5956	16.6	398	1.59
313-181	5360-390m	56559	5064	1197	509	316	63645	7086	11.1	674	1.61
313-182	5390-420m	17953	1439	329	155	76	19952	1999	10.0	468	2.03
313-183	5420-450m	31574	2354	648	321	187	35085	3510	10.0	1835	1.72

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-001 S.W.C. No.87	1375m	Shale, fissile, non calcareous, olive grey	5Y3/2	1.01
313-002 S.W.C. No.84	1471m	Shale, fissile, non calcareous, olive grey	5Y3/2	0.98,0.95
313-003	1500- 1530m	A 85% Shale, fissile, non calcareous, medium grey to medium greenish grey	N5-5GY5/1	1.12
		B 15% Silty shale, fissile to blocky, non calcareous, cavings, medium olive grey Minor sandstone	5Y5/1	0.85
313-004 S.W.C. No.81	1541.5m	Shale, fissile, non calcareous, dark greenish greyish black Sandstone, very fine grained, N8 non calcareous, minor blue cut, very light grey	5GY3/1	0.63
313-005	1560m	A 98% Shale, as 313-003A Minor siltstone and other shale	N5-5GY5/1	1.05
313-006	1560- 1590m	A 70% Shale, fissile, non calcareous, significant cavings, medium grey to medium olive grey	N5-5Y5/1	1.46
		B 30% Shale, fissile, non calcareous, greenish grey to greenish grey Minor other shale and sandstone cavings	5GY6/1- 5G6/1	1.19,1.19
313-007 S.W.C. No.79	1573m	A Silty sandstone, very fine, angular grained, no fluorescence, medium greenish grey	5Y7/1	
		B Silty sandstone, fine grained, non calcareous, no fluorescence, medium olive grey Minor shale, olive grey	5Y4/2 5Y3/2	
313-008	1590- 1600m	A 60% Shale, as 313-006B	5GY6/1- 5G6/1	1.11
		B 40% Shale, as 313-006A, significant cavings Minor sandstone	N5-5Y5/1	1.65

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-009	1600- 1630m	A 60% Shale, fissile, non cal- careous, greenish grey to greenish grey, cavings	5GY6/1- 5G6/1	1.43
		B 40% Shale, fissile, non cal- careous, medium grey to medium olive grey, cavings Minor sandstone	N5-5Y5/1	1.48
313-010	1630- 1660m	A 55% Shale, as 313-009A, minor cavings	5GY6/1- 5G6/1	1.21, 1.21
		B 45% Shale, as 313-009B, minor cavings Minor sandstone	N5-5Y5/1	1.36
313-011 S.W.C. No.78	1647m	Sandstone, very fine ang- ular grained, non calcare- ous, no fluorescence, light olive grey	5Y6/1	
313-012	1660- 1690m	A 95% Shale, fissile, non cal- careous, medium grey to greenish grey, minor cavings	N5-5GY6/1	1.34
		B 5% Quartz grains, coarse to medium, subangular clear to opaque Minor other shale		
313-013	1690- 1720m	A 85% Shale, as 313-012A	N5-5GY6/1	0.96
		B 15% Quartz grains, as 313-012B Minor other shale		
313-014	1720- 1750m	A 98% Shale, fissile, non cal- careous, medium greenish grey Minor limestone	5G5/1	1.05
313-015	1750- 1780m	A 98% Shale, as 313-012A Minor limestone	N5-5GY6/1	1.07, 1.07
313-016 S.W.C. No.74	1780m	Shale, fissile, non cal- careous, dark greenish grey	5GY4/1	1.10
313-017	1780- 1810m	A 98% Shale, fissile, non cal- careous, medium greenish grey, minor cavings Minor limestone and other shale	5GY4/2	0.19

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-018	1810- 1840m	A 99% Shale, fissile, non cal- careous, medium yellow greenish grey	10GY6/2	0.17
313-019	1840- 1870m	A 98% Shale, fissile, non cal- careous, medium greenish grey Minor limestone and other shale	5G5/1	0.29
313-020	1870- 1900m	A 65% Shale, as 313-019A, cavings	5G5/1	0.17
		B 30% Shale, fissile, non cal- careous, dark greenish grey	5G4/1	0.37,0.37
		C 5% Shale, fissile, non cal- careous, brownish grey Minor other shale and limestone	5YR4/1	
313-021 S.W.C. No.72	1878m	Shale, fissile, non cal- careous, olive grey	5Y3/2	0.22
313-022	1900- 1930m	A 98% Shale, fissile, non cal- careous, medium grey to greenish grey Minor limestone	N5-5GY6/1	0.16
313-023	1930- 1960m	A 98% Shale, fissile, non cal- careous, medium grey to medium greenish grey, cavings Minor other caved shale	N5-5GY5/1	0.25
313-024 S.W.C. No.70	1950m	Shale, fissile, non cal- careous, olive grey	5Y4/1	0.90
313-025	1960- 1990m	A 98% Shale, as 313-023A, signi- ficant cavings Minor limestone and other caved shales	N5-5GY5/1	0.47
313-026	1990- 2020m	A 98% Shale, as 313-023A, cavings Minor other shale	N5-5GY5/1	0.68
313-027	2020- 2050m	A 70% Shale, as 313-023A	N5-5GY5/1	0.34,0.34
		B 30% Shale, fissile, non cal- careous, medium dark grey to dark greenish grey Minor other shale	N4-5GY4/1	0.78

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH		GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-028 S.W.C. No.39	2024m		Silty shale, fissile to blocky, slightly calcareous, olive grey Shale inclusions - fissile, non calcareous, greenish grey	5Y3/2 5G6/1	0.46,0.46
313-029	2050- 2080m	A 98%	Shale, fissile, non calcareous, medium light grey to greenish grey Minor other shale	N6-5GY6/1	0.13
313-030	2080- 2110m	A 98%	Shale, as 313-029A, minor cavings Minor quartz grains	N6-5GY6/1	0.28
313-031 S.W.C. No.67	2102m	A	Silty shale, fissile to blocky, non calcareous, dark greenish grey	5GY4/1	0.33
		B	Shale, fissile, non calcareous, medium greenish grey	5GY5/1	0.06
313-032	2110- 2140m	A 85%	Shale, fissile, non calcareous, medium dark to medium grey	N4-5	0.52
		B 10%	Quartz grains, fine angular clear		
		C 5%	Limestone, blocky, no fluorescence, very light grey to pinkish grey Minor other shale Minor coal Poor sample	N8-5YR8/1	
313-033	2140- 2170m	A 70%	Quartz grains, coarse to medium, subangular to subrounded, opaque		
		B 30%	Shale, fissile, non calcareous, cavings, medium grey Minor limestone	N5	0.36,0.37
313-034	2170- 2200m	A 80%	Shale, fissile, non calcareous, medium grey to medium greenish grey, cavings	N5-5GY5/1	0.49
		B 20%	Quartz grains, as 313-033A Minor sandstone		

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-035	2200- 2230m	A 95% Shale, fissile, non cal- careous, medium grey to medium greenish grey, cavings B 5% Quartz grains, coarse to medium, subangular to subrounded, opaque	N5-5GY5/1	0.40
313-036	2230- 2260m	A 98% Shale, as 313-035A, cavings Minor quartz grains	N5-5GY5/1	0.26
313-037 S.W.C. No.64	2240m	Silty shale, fissile, cal- careous, olive grey	5Y4/1	0.42
313-038 S.W.C. No.63	2259m	Shale, fissile, calcare- ous, medium grey	N5	0.36
313-039	2260- 2290m	A 95% Shale, as 313-035A, cavings B 5% Quartz grains, as 313-035B Minor coal and limestone	N5-5GY5/1	0.48
313-040	2290- 2320m	A 95% Shale, as 313-035A, minor cavings B 5% Limestone, blocky, no fluorescence, very light grey to pinkish grey Minor coal and quartz grains	N5-5GY5/1 N8-5YR8/1	0.34,0.34
313-041 S.W.C. No.61	2318	Limestone, fissile to blocky, no fluorescence, light grey Minor shale inclusions - poor sample	N7	0.28,0.28
313-042	2320- 2345	A 65% Shale, as 313-035A, sig- nificant cavings B 35% Quartz grains, as 313-035B Minor limestone	N5-5GY5/1	0.61
313-043	2345m	Mud sample		

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH		GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-083	2370m	A 45%	Shale, blocky, soft, non calcareous to calcareous, silty in parts, significant cavings, medium grey	N5	0.86
		B 20%	Limestone, blocky, soft to hard, chalky in parts, medium light grey to light greenish grey	N6-5G8/1	
		C 10%	Mudstone, blocky, very soft, calcareous, finely divided, light greenish grey	5G8/1	
		D 10%	Lost circulation material - rubber		
		E 10%	Coal, soft to hard, dull lustre, ver finely disseminated, black	N1	
		F 5%	Sand, unconsolidated, fine grained, subrounded, colourless to very light grey, no fluorescence	N8	
313-053 S.W.C.No. 179	2400m		Shale, fissile, calcareous, olive grey	5Y4/1	0.52
313-084	2400m	A 95%	Shale, blocky, hard, silty calcareous, pyritic in parts, medium grey	N5	0.54
		B 5%	Limestone, as 313-083B Minor chert, free pyrite, metal turnings	N6-5G8/1	
313-085	2430m	A 50%	Sand, unconsolidated, very fine grained, subangular - subrounded, colourless to very light grey, very finely divided	N8	
		B 25%	Shale, as 313-084A, very finely divided	N5	
		C 15%	Limestone, very finely divided, very fossiliferous, completely replaced by pyrite	N6-5G8/1	
		D 10%	Coal, very finely divided, as 313-083E Minor lost circulation material - rubber metal turnings	N1	

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-086	2460m	A 70% Shale, blocky, hard, calcareous, silty, medium grey	N5	0.60
		B 15% Sand, unconsolidated, very fine grained, subangular, subrounded, colourless to very light grey	N8	
		C 15% Limestone, very finely divided, pyritic fossils, very small samples, medium light grey to light greenish grey	N6-5G8/1	
313-054 S.W.C. No.178	2460m	Shale, fissile, calcareous, olive grey to dark greenish grey	5Y4/1- 5GY4/1	0.48
313-087	2490m	A 95% Shale, as 313-086A	N5	0.37, 0.37 0.66
		B 5% Shale, poor to blocky, hard silty, dull to vitreous lustre, black Minor limestone, mudstone, free pyrites, very small sample	N1	
313-088	2510m	A 75% Shale, as 313-086A	N5	0.50
		B 20% Mudstone, blocky, soft, calcareous, finely divided, pale yellowish green	10GY7/2	
		C 5% Shale, as 313-087B, very finely divided Minor pyrite, limestone very small sample	N1	
313-089	2550m	A 95% Shale, blocky to platy, calcareous, silty, occasionally iron stained, significant cavings, medium grey	N5	0.58
		B 5% Limestone, very fine grained, soft, blocky, chalky in parts, no fluorescence, white Minor mudstone, pyrite, sand	N9	

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH		GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-055 S.W.C. No. 175	2562m		Shale, fissile, non calcareous, medium dark grey to dark greenish grey	N4-5GY4/1	0.68
313-090	2580m	A 90%	Shale, blocky to platy, calcareous, silty, occasionally iron stained, significant cavings, medium grey	N5	0.52
		B 10%	Mudstone, blocky, calcareous, soft, very light grey to light greenish grey Minor oil stained sandstone, limestone, pyrite	N8-5GY8/1	0.63
313-091	2610m	A 85%	Shale, blocky to platy, non calcareous, becoming slightly calcareous, silty in parts, often pyritic, minor caving, medium dark grey to medium grey	N4-N5	0.50,0.50
		B 15%	Mudstone, as 313-090B, abundant caving Minor oil stained sandstone, free pyrite	N8-5GY8/1	1.16
313-056 S.W.C. No. 172	2610m		Shale, fissile, non calcareous, medium grey to dark greenish grey	N5-5GY4/1	0.22
313-092	2660m	A 70%	Shale, as 313-091A, abundant caving	N4-N5	0.57
		B 30%	Mudstone, as 313-090B, moderate caving	N8-5GY8/1	0.90
313-057 S.W.C. No. 170	2697m		Shale, fissile, non calcareous, medium grey	N5	0.28,0.28
313-093	2710m	A 95%	Shale, as 313-091A, abundant cavings	N4-N5	0.37
		B 5%	Mudstone, blocky, soft to hard, very fine grained, occasionally vitreous, dusky brown to dusky yellowish brown Minor mudstone, pyrites	5YR2/2- 10YR2/2	0.64,0.64

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH		GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-094	2760m	A	90% Shale, blocky to platy, non calcareous, becoming slightly calcareous, silty in parts, often pyritic, abundant cavings, medium dark to medium grey	N4-N5	0.51
		B	8% Mudstone, blocky, soft to hard, very fine grained, occasionally vitreous, minor cavings, dusky brown to dusky yellowish brown	5YR2/2- 10YR2/2	0.51
		C	2% Mudstone, blocky, calcareous, soft, very light grey to light greenish grey	N8-5GY8/1	
313-095	2760-810m	A	98% Shale, as 313-094A, abundant cavings	N4-N5	0.48
		B	2% Mudstone, as 313-094B	5YR2/2- 10YR2/2	0.19
313-058 S.W.C. No. 168	2795		Shaly, silty, fissile, slightly calcareous, medium grey	N5	0.63
313-096	2810-840m	A	99% Shale, as 313-094A, abundant cavings Minor mudstone	N4-N5	0.40, 0.40
313-097	2840-870m	A	99% Shale, blocky to platy, silty becoming sandy, often pyritic, slightly calcareous to calcareous, moderate cavings, medium dark to medium grey Minor mudstone, minor coal	N4-N5	0.54
313-098	2870-900m	A	95% Shale, as 313-094A, abundant cavings	N4-N5	0.53
		B	5% Mudstone, blocky, soft to hard, non calcareous, dusky brown to dusky yellowish brown Minor other mudstone, shale	5YR2/2- 10YR2/2	
313-059 S.W.C. No. 166	2900m		Shale, slightly silty, fissile, slightly calcareous, olive grey	5Y4/1	1.00

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-099	2900-930m A	70% Shale, blocky to platy, non calcareous to calcareous, silty and pyritic, abundant cavings, medium dark to medium grey	N4-N5	0.42
	B	30% Mudstone, blocky, soft to hard, non calcareous, dusky brown to dusky yellowish brown Minor other shale, mudstone, free pyrites	5YR2/2- 10YR2/2	0.73
313-100	2930-960m A	60% Shale, as 313-099A, abundant cavings	N4-N5	0.35, 0.36
	B	40% Shale, blocky, hard, non calcareous, silty in parts, abundant cavings, dusky brown to brownish black Minor red shale, minor mudstone (calcareous)	5YR2/2- 5YR2/1	0.79
313-101	2960-990m A	50% Shale, as 313-100B, turbo-drilled, moderate cavings	5YR2/2- 5YR2/1	0.55
	B	50% Silty shale, blocky, calcareous, sandy in parts, abundant cavings, medium grey	N5	0.47
313-102	2990-3020 A	70% Shale, as 313-100B, turbo-drilled, moderate cavings, often finely divided	5YR2/2- 5YR2/1	0.73
	B	30% Silty shale, as 313-101B Minor chalky limestone	N5	0.53, 0.52
313-060 S.W.C. No. 164	3003m	Shale, fissile, non calcareous, medium dark grey to dark greenish grey	N4-5GY4/1	0.73
313-103	3020-050m A	90% Shale, blocky, soft to hard, slightly calcareous, silty in parts, turbo-drilled, moderate cavings, medium dark to medium grey	N4-N5	0.50
	B	10% Coal, blocky, hard, dull to vitreous lustre, finely divided particles, black	N1	

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-104	3050-080m	A 80% Shale, blocky, soft to hard slightly calcareous, silty in parts, moderate cavings, medium dark to medium grey	N4-N5	0.66
		B 20% Coal, blocky, hard, dull to vitreous lustre, very finely divided, black Minor mudstone, limestone	N1	
313-105	3080-110m	A 70% Shale, as 313-104A, abundant cavings	N4-N5	0.43
		B 30% Coal, as 313-104B, very finely divided Poor sample	N1	27.97
313-061 S.W.C. No. 162	3100m	Shale, fissile, non calcareous, dark greenish grey	5GY4/1	0.52
313-106	3110-140m	A 60% Shale, as 313-104A, abundant cavings	N4-N5	0.63, 0.62
		B 35% Shale, blocky, hard, very fine grained, vitreous, non calcareous, abundant cavings, dusky brown	5YR2/2	0.36
		C 5% Coal, as 313-104B, very finely divided Poor sample	N1	
313-107	3140-170m	A 80% Shale, as 313-104A, abundant cavings	N4-N5	0.56
		B 15% Shale, as 313-106B, caved	5YR2/2	
		C 5% Coal, as 313-104B, very finely divided	N1	
313-108	3170-200m	A 90% Shale, as 313-104A, abundant cavings	N4-N5	0.44
		B 10% Shale, as 313-106B, caved Minor sandstone, coal, mudstone	5YR2/2	
313-062 S.W.C. No. 160	3190m	Shale, fissile, slightly calcareous, medium dark grey	N4	0.37

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-109	3200-230m	A 40% Shale, blocky, calcareous, silty, sandy, abundant cavings, pyritic, medium dark to medium grey	N4-N5	0.45
		B 35% Shale, blocky, hard, very fine grained, vitreous non calcareous, abundant cavings, dusky brown	5YR2/2	0.49
		C 20% Shale, platy, silty in parts, slightly calcareous, moderate cavings, medium dark to medium grey	N4-N5	0.46
		D 5% Mudstone, blocky, calcareous, light greenish grey Minor coal, pyrite	5G8/1	0.73
313-110	3230-260m	A 70% Shale, blocky to platy, non calcareous to slightly calcareous, pyritic, silty and sandy in parts, moderate cavings, medium dark to medium grey	N4-N5	0.45
		B 30% Shale, as 313-109B, abundant cavings	5YR2/2	0.49, 0.49
313-063 S.W.C. No. 159	3245m	Shale, fissile, slightly calcareous, medium dark to medium grey	N4-N5	0.39, 0.39
313-111	3260-290m	A 60% Shale, as 313-109B	5YR2/2	0.48
		B 35% Shale, platy, hard, non calcareous, very fine grained, becoming silty in parts, dark to medium dark grey	N3-N4	0.57
		C 5% Shale, blocky, soft, non calcareous, very fine grained, medium grey to medium light grey	N5-N6	0.61
313-112	3290-320m	A 95% Shale, blocky, hard, non calcareous, very fine grained, becoming silty, turbo-drilled, dusky brown to brownish black	5YR2/2- 5YR2/1	0.39, 0.40
		B 5% Shale, as 313-111B, very finely divided Minor coal	N3-N4	

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-113	3320-350m	A 90% Shale, blocky, hard, non calcareous, very fine grained, becoming silty, turbo-drilled, dusky brown to brownish black	5YR2/2- 5YR2/1	0.43
		B 10% Shale, platy, hard, non calcareous, very fine grained, becoming silty in parts, dark to medium dark grey	N3-N4	0.48
313-114	3350-380m	A 95% Shale, as 313-113A	5YR2/2- 5YR2/1	0.46
		B 5% Shale, as 313-113B	N3-N4	0.52
313-115	3380-410m	A 90% Shale, as 313-113A	5YR2/2- 5YR2/1	0.36, 0.37
		B 10% Shale, as 313-113B	N3-N4	0.40
313-064 S.W.C. No. 156	3400m	Shale, fissile, very calcareous, medium grey	N5	0.51
313-116	3410-440m	A 85% Shale, as 313-113A	5YR2/2- 5YR2/1	0.45
		B 15% Shale, as 313-113B	N3-N4	0.56
313-117	3440-470m	A 75% Shale, as 313-113A, abundant cavings	5YR2/2- 5YR2/1	0.46
		B 20% Shaly, platy, blocky, hard non calcareous, silty in parts, moderate caving, dark to medium dark grey	N3-N4	0.47, 0.46
		C 5% Coal, poor, dull to vitreous lustre, blocky, hard, brownish black to black	5YR2/1- N1	0.42
313-118	3470-500m	A 98% Shale, as 313-113A	5YR2/2- 5YR2/1	0.42
		B Coal, as 313-117C	5YR2/1-N1	0.31
313-065 S.W.C. No. 154	3500m	Shale, fissile, calcareous medium dark grey to olive grey	N4-5Y4/1	0.38
313-119	3500-530m	A 90% Shale, as 313-113A	5YR2/2- 5YR2/1	0.43
		B 10% Shale, as 313-117B, moderate cavings Minor coal	N3-N4	0.34, 0.36

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-120	3530-560m	A 90% Shale, blocky, hard, non calcareous, becoming silty, dusky brown to brownish black, moderate cavings, blue cut	5YR2/2- 5YR2/1	0.47
		B 10% Shale, platy, blocky, hard non calcareous, silty in parts, moderate caving, dark to medium dark grey Minor coal	N3-N4	0.52
313-066 S.W.C. No.151	3550m	Shale, fissile, non calcareous, medium dark grey Very poor sample	N4	
313-121	3560-590m	A 70% Shale, platy, non calcareous, silty in parts, occasionally pyritic, medium dark to medium grey, abundant cavings	N4-N5	0.54
		B 20% Shale, as 313-120A, abundant cavings, blue cut	5YR2/2- 5YR2/1	0.45
		C 5% Mudstone, blocky, soft-hard, slightly calcareous, silty, moderate cavings, pale yellowish green	10Y8/2	0.20, 0.18
		D 5% Siltstone, blocky, hard, non calcareous, medium light grey	N6	0.50
313-122	3590-620m	A 65% Shale, blocky, platy, non calcareous to slightly calcareous, silty in parts, abundant cavings, medium to medium light grey	N5-N6	0.32
		B 20% Shale, slightly calcareous, blocky, platy, silty, abundant cavings, dark to medium dark grey	N3-N4	0.45
		C 10% Mudstone, as 313-121C, moderate cavings	10Y8/2	0.22
		D 5% Shale, as 313-120A, caved	5YR2/2- 5YR2/1	
313-123	3620-650m	A 75% Shale, as 313-122A, abundant cavings	N5-N6	0.44
		B 15% Shale, as 313-120A, caved	5YR2/2- 5YR2/1	
		C 10% Mudstone, as 313-121C	10Y8/2	0.58, 0.58

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-124	3650-680m	A 50% Shale, blocky, hard, non calcareous, very fine grained, becoming silty, turbo-drilled, dusky brown to brownish black, abundant cavings	5YR2/2- 5YR2/1	0.46
		B 35% Shale, platy, non calcareous, soft to hard, silty and pyritic, abundant cavings, dark to medium dark grey	N3-N4	0.50
		C 10% Mudstone, blocky, soft, calcareous, occasionally pyritic, light greenish grey	5G8/1	2.10
		D 5% Siltstone, blocky, calcareous, sandy and pyritic, greenish grey Minor coal, pyrite	5GY6/1	0.11
313-125	3680-710m	A 60% Shale, as 313-124A, abundant cavings,	5YR2/2- 5YR2/1	0.60, 0.60
		B 30% Shale, as 313-124B, abundant cavings	N3-N4	0.52
		C 10% Shale, platy, soft to hard slightly calcareous, silty in parts, medium light grey Minor mudstone, coal, limestone, gypsum	N6	0.42
313-067	3700m	Shale, fissile, slightly calcareous, medium grey	N5	0.44
313-126	3710-740m	A 60% Shale, blocky, very fine grained, soft to hard, calcareous, turbo-drilled, abundant cavings, light brownish grey to medium light grey	5YR6/1- N6	0.36
		B 25% Shale, as 313-124B, abundant cavings	N3-N4	0.60
		C 15% Shale, as 313-125C, abundant cavings Minor coal	N6	0.30, 0.30

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-127	3740-770m	A 40% Shale, platy, soft to hard slightly calcareous, silty in parts, medium light grey to medium grey, abundant cavings	N6-N5	0.40
		B 30% Shale, platy, non calcareous, soft to hard, silty and pyritic, abundant cavings, dark to medium dark grey	N3-N4	0.72
		C 25% Shale, blocky, very fine grained, soft to hard, calcareous, abundant cavings, light brownish grey to medium light grey	5YR6/1-N6	0.54,0.50
		D 5% Siltstone, blocky, non calcareous - slightly calcareous, sandy, greenish grey Minor coal	5GY6/1	0.33
313-128	3770-800m	A 35% Shale, as 313-127A, moderate cavings	N6-N5	0.46
		B 35% Shale, platy, non calcareous, silty and pyritic in parts, medium dark grey	N4	1.75
		C 30% Shale, as 313-127C, moderate cavings	5YR6/1-N6	0.42
313-068	3781m	Shale, fissile, calcareous medium grey Minor calcareous mudstone	N5	0.51,0.51
313-069	3800m	Shale, fissile, calcareous medium grey to medium light grey	N5-N6	0.48
313-129	3800-830m	A 40% Shale, as 313-128B, abundant cavings	N4	1.27
		B 35% Shale, as 313-127A, abundant cavings	N6-N5	0.43,0.46
		C 25% Shale, as 313-127C, abundant cavings Minor lost circulation material - metal turnings	5YR6/1-N6	0.47

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH		GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-130	3830-860m	A	65% Shale, platy, non cal- careous, silty and pyritic, medium dark grey, moderate cavings	N4	2.62
		B	35% Shale, platy, soft to hard slightly calcareous, silty in parts, medium light grey to medium grey, abund- ant cavings	N6-N5	0.41
		C	5% Siltstone, blocky, cal- careous, sandy, greenish grey Minor limestone, mudstone, coal	5GY6/1	0.63
313-131	3860-890m	A	50% Shale, as 313-130A, abundant cavings	N4	1.14
		B	45% Shale, as 313-130B, Minor cavings	N6-N5	0.58
		C	5% Siltstone, blocky, slig- htly calcareous, hard, light brownish grey to medium grey	5YR6/1- N5	0.52, 0.52
313-070 S.W.C. No. 135	3895m		Shale, fissile to blocky, very calcareous, medium light grey to light grey, poor sample, minor anhydrite, (barytes), mudstone	N6-N7	0.35
313-132	3890-920m	A	65% Shale, as 313-130A, abundant cavings	N4	2.17
		B	35% Shale, as 313-130B, abundant cavings Minor calcareous mudstone and other shale	N6-N5	0.39
313-071 S.W.C. No. 132	3930m		Shale, fissile to blocky, very calcareous, medium dark grey to medium grey poor sample	N4-N5	0.88
313-133	3920-950m	A	90% Shale, platy, non calcar- eous, hard and brittle, occasionally silty and pyritic, abundant cavings, medium grey	N5	0.53

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH		GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-133	3920-950m	B 10%	Shale, platy, non calcareous, hard, silty in parts, dark grey, abundant cavings	N3	1.66
313-134	3950-980m	A 45%	Shale, blocky, very fine grained, soft to hard, calcareous, light brownish grey to medium light grey	5YR6/1-N6	0.64, 0.65
		B 30%	Shale, platy, non calcareous, hard and brittle, occasionally silty and pyritic, abundant cavings, medium grey	N5	0.43
		C 25%	Shale, as 313-133B, abundant cavings	N3	1.62
313-072 S.W.C. No. 95	3990m		Shale, fissile, non calcareous, medium grey to olive grey Minor mudstone	N5-5Y4/1	0.46
313-135	3980-4010	A 40%	Shale, as 313-134A	5YR6/1-N6	0.45, 0.47
		B 40%	Shale, as 313-134B, abundant cavings	N5	0.44
		C 20%	Shale, as 313-133B, abundant cavings	N3	1.35
313-073 S.W.C. No. 125	4015m		Shale, fissile, non calcareous, medium dark grey to medium grey	N4-N5	0.80
313-136	4010-040m	A 45%	Shale, as 313-134B, abundant cavings	N5	0.53
		B 35%	Shale, as 313-133B, abundant cavings	N3	1.17
		C 15%	Shale, as 313-134A	5YR6/1-N6	0.78, 0.77
		D 5%	Siltstone, blocky, slightly calcareous, hard, light brownish grey to medium grey Minor pyrite nodules, calcareous mudstone	5YR6/1-N5	0.75
313-137	4040-070m	A 60%	Shale, platy, hard, brittle non calcareous, silty and pyritic in parts, moderate cavings, dark to medium dark grey	N3-N4	1.06

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-137	4040-070m	B 40% Shale, platy, hard, brittle non calcareous, occasionally pyritic, minor cavings, medium grey to medium light grey Minor other shale, mudstone	N5-N6	0.64
313-138	4070-100m	A 75% Shale, platy, hard, brittle non calcareous, silty and pyritic in parts, minor cavings, dark to medium dark grey	N3-N4	1.01
		B 15% Mudstone, blocky, soft to hard, non calcareous, silty in parts, pale greenish yellow	10Y8/2	0.84
		C 10% Shale, as 313-137B	N5-N6	0.62
313-139	4100-130m	A 40% Coal, very finely divided blocky, hard, dull to vitreous lustre, irregular fracture, black	N1	23.10
		B 35% Shale, platy, soft to hard occasionally silty, non calcareous, pyritic, brownish black to greyish black	5YR2/1- N2	1.48
		C 15% Mudstone, as 313-138B	10Y8/2	0.62
		D 10% Mudstone, soft, calcareous greenish grey Minor loose sand	5G6/1	3.54
313-140	4130-160m	A 30% Shale, as 313-139B, mod- erate cavings	5YR2/1-N2	1.16
		B 30% Mudstone, blocky, soft, very calcareous, greenish grey	5G6/1	0.57
		C 25% Coal, as 313-139A	N1	37.94
		D 10% Shale, as 313-137B, significant cavings	N5-N6	0.50, 0.48
		E 5% Mudstone, as 313-138B, caved Minor free pyrites, other shale	10Y8/2	

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-141	4160-190m	A 40% Shale, blocky, hard, slightly calcareous, greenish grey	5G6/1	0.50
		B 25% Mudstone, blocky, soft, very calcareous, greenish grey	5G6/1	0.61
		C 15% Shale, platy, hard, brittle, non calcareous, occasionally pyritic, minor cavings, medium grey to medium light grey	N5-N6	0.42
		D 15% Coal, very finely divided blocky, hard, dull to vitreous lustre, irregular fracture, black	N1	
		E 5% Shale, platy, soft to hard occasionally silty, non calcareous, pyritic, brownish black to greyish black	5YR2/1-N2	1.15
313-142	4190-220m	A 80% Shale, platy, hard, brittle, slightly calcareous, micaceous in parts, blue cut, significant cavings, medium grey	N5	0.53
		B 10% Shale, as 313-141A	5G6/1	0.56, 0.58
		C 10% Coal, as 313-141D, very finely divided Minor mudstone, lost circulation material - rubber	N1	
313-143	4220-250m	A 70% Shale, platy to blocky, hard, brittle, micaceous and pyritic in parts, non calcareous to slightly calcareous, blue cut, medium grey to medium dark grey	N5-N4	0.52
		B 20% Shale, as 313-141A	5G6/1	0.56
		C 10% Coaly shale, poor coal, small particle size, soft to hard, non calcareous, brownish black to black Minor mudstone	5YR2/1-N1	

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-144	4250-280m	A 70% Shale, platy, blocky, soft to hard, pyritic in parts, non calcareous, slightly calcareous, abundant cavings, blue cut, medium dark grey	N4	0.53
		B 20% Shale, blocky, hard, slightly calcareous, greenish grey	5G6/1	0.62
		C 5% Calcareous mudstone, blocky, rounded, soft, blue cut, brownish grey	5YR4/1	
		D 5% Coal, very finely divided blocky, hard, dull to vitreous lustre, irregular fracture, black Minor other shale	N1	
313-145	4280-310m	A 65% Shale, as 313-144A, significant cavings	N4	0.67, 0.64
		B 15% Shale, as 313-144B	5G6/1	0.70
		C 10% Shale, blocky to platy, soft to hard, slightly calcareous, dusky brown to brownish grey, blue cut	5YR2/2- 5YR4/1	0.84
		D 10% Coal, coaly shale, blocky, soft to hard, dull to vitreous lustre, brownish black to black Minor calcareous mudstone and other shale, free pyrites	5YR2/1- N1	10.65
313-146	4310-340m	A 70% Shale, blocky, platy, slightly calcareous, micaceous and occasionally pyritic, soft to hard, abundant cavings, medium dark grey to dark grey	N4-N3	0.72
		B 20% Mudstone, as 313-144C blue cut	5YR4/1	0.61
		C 10% Coal, as 313-144D, very finely divided Minor other shale, lost circulation material - metal turnings	N1	

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-147	4340-370m	A 55% Shale, blocky, platy, slightly calcareous, micaceous and occasionally pyritic, soft to hard, abundant cavings, medium dark grey to dark grey	N4-N3	0.63
		B 20% Shale, blocky to platy, soft to hard, slightly calcareous, dusky brown to brownish grey, minor blue cut	5YR2/2- 5YR4/1	0.60
		C 20% Coal, finely ground, blocky hard, dull to vitreous lustre, irregular fracture, black	N1	41.92
		D 5% Mudstone, blocky, rounded soft, brownish grey Minor other shale, free pyrite, minor lost circulation material - metal turnings	5YR4/1	
313-148	4370-400m	A 95% Shale, platy, non calcareous, brittle, often iron stained, significant cavings, medium grey	N5	0.52, 0.53
		B 5% Mudstone, blocky, soft, sandy, calcareous, light greenish grey Minor other shale, coal	5G8/1	0.41
313-149	4400-430m	A 80% Shale, as 313-148A, abundant cavings	N5	0.61
		B 10% Shale, as 313-147D	5YR4/1	0.60
		C 5% Calcareous mudstone, as 313-148B	5G8/1	0.40
		D 5% Shale, blocky, soft to hard, non calcareous, black to brownish black Minor pyrite as nodules Lost circulation material - metal	N1-5YR2/1	5.76
313-150	4430-460m	A 95% Shale, as 313-148A, abundant cavings	N5	0.62
		B 5% Shale, as 313-147A Minor mudstone, free pyrites	N4-N3	6.36

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-151	4460-490m	A 98% Shale, platy, non calcareous, brittle, often iron stained, significant cavings, medium grey	N5	0.60
		B Shale, blocky, platy, slightly calcareous, micaceous and occasionally pyritic, soft to hard, medium dark to dark grey Minor free pyrite, mudstone	N4-N3	
313-152	4490-520m	A 98% Shale, platy to blocky, hard, non calcareous, occasionally pyritic, moderate cavings, medium dark grey Minor mudstone, other shale	N4	0.74
313-153	4520-550m	A 65% Shale, platy, becoming blocky, slightly calcareous, rare pyrite, moderate cavings, medium grey	N5	0.64
		B 25% Shale, blocky, silty, hard slightly calcareous, dull lustre, brownish black to black.	5YR2/1-N1	2.68
		C 10% Mudstone, calcareous, soft to hard, pyritic, occasionally sandy, greyish green to greenish grey Minor other shale, free pyrite	5G5/2-5G6/1	0.32
313-154	4550-580m	A 70% Shale, blocky, platy, non calcareous, slightly calcareous, silty, pyritic, occasionally sandy in parts, abundant cavings, medium dark grey to medium grey	N4-N5	0.56, 0.56
		B 15% Mudstone, as 313-153C	5G5/2-5G6/1	0.30
		C 10% Shale, as 313-153B	5YR2/1-N1	3.14
		D 5% Shale, platy, soft, becoming hard, non calcareous, dark grey Minor free pyrite, other shale	N3	3.42, 3.42

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-155	4580-610m	A 70% Shale, blocky, platy, non calcareous, slightly calcareous, silty, pyritic and occasionally sandy in parts, moderate cavings, medium dark grey to medium grey	N4-N5	0.66
		B 15% Mudstone, silty, blocky, calcareous, pyritic, light greenish grey to greenish grey	5G8/1- 5G6/1	0.29
		C 15% Shale, blocky, hard, non calcareous, silty, minor cavings, dark grey to greyish black Minor other shale, pyrite as nodules	N3-N2	3.62
313-156	4610-640m	A 45% Shaly mudstone, silty, blocky, soft becoming hard calcareous to very calcareous, pyritic, greenish grey to light grey	5GY6/1-N7	0.32
		B 35% Shale, as 313-155A, moderate cavings	N4-N5	0.62, 0.62
		C 10% Shale, blocky, silty, hard slightly calcareous, dull lustre, brownish black to black	5YR2/1-N1	2.72
		D 10% Shale, as 313-155C Free pyrite, lost circulation material - metal, rubber	N3-N2	3.82
313-157	4640-670m	A 45% Shale, as 313-155A, significant cavings	N4-N5	0.56
		B 30% Shaly mudstone, as 313-156A	5GY6/1-N7	0.31, 0.31
		C 20% Shale, as 156C	5YR2/1-N1	3.10
		D 5% Shale, as 313-155C Minor lost circulation material - metal, rubber	N3-N2	1.94
313-158	4670-700m	A 35% Shale, 313-155A, minor cavings	N4-N5	0.80
		B 35% Shale, as 313-155C	N3-N2	5.10
		C 25% Mudstone, calcareous very calcareous, soft to hard, platy to blocky, often pyritic, iron stained, medium light grey to greenish grey	N6-5GY6/1	0.31

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-158	4670-700m	D 5% Shale, blocky, silty, hard slightly calcareous, dull lustre, brownish black to black Minor lost circulation material - metal, rubber, free pyrite	5YR2/1- N1	4.02
313-159	4700-730m	A 40% Shale, blocky, platy, soft brittle, non calcareous to slightly calcareous, brownish grey to medium dark grey	5YR4/1- N4	0.52
		B 25% Shale, blocky, soft, non calcareous, occasionally micaceous, occasionally pyritic, brownish black to greyish black	5YR2/1- N2	3.54
		C 20% Mudstone, blocky to platy calcareous, soft, pyritic, greenish grey	5G6/1	0.25
		D 15% Shale, as 313-159D, very finely divided Minor other shale	5YR2/1- N1	3.58
313-160	4730-760m	A 35% Shale, blocky, soft, calcareous, often pyritic and with lenses of darker shale, minor cavings, greenish grey to medium light grey	5G6/1- N6	0.52, 0.51
		B 30% Shale, as 313-159A, minor cavings	5YR4/1- N4	0.63
		C 30% Shale, as 313-159B, minor cavings	5YR2/1- N2	3.80
		D 5% Coaly shale, very finely divided, black	N1	
313-161	4760-790m	A 35% Shale, blocky, platy, soft to hard, slightly calcareous, micaceous in parts, minor cavings, medium dark grey to medium grey	N4-N5	0.24
		B 35% Shale, shaley mudstone, blocky, soft, calcareous, greenish grey	5G6/1	0.31, 0.32

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-161	4760-790m	C 30% Shale, blocky, soft, non calcareous, occasionally micaceous, occasionally pyritic, brownish black to greyish black Minor free pyrite, other shale	5YR2/1- N2	4.30
313-162	4790-820m	A 35% Shale, blocky, platy, soft to hard, slightly calcareous, micaceous in parts, significant cavings, medium dark grey to medium grey	N4-N5	0.61
		B 30% Shale, shaley mudstone, blocky, soft, calcareous, greenish grey, significant cavings	5G6/1	0.61
		C 30% Shale, as 313-161C, abundant cavings	5YR2/1- N2	3.80
		D 5% Shale, blocky, silty, hard slightly calcareous, dull lustre, brownish black to black Minor free pyrite, other shale, minor shell debris	5YR2/1- N1	3.08
313-163	4820-850m	A 50% Shale, blocky, non calcareous, hard, silty, dull to vitreous, moderate caving, brownish black to greyish black	5YR2/1- N2	3.10
		B 25% Shale, as 313-162A, moderate caving	N4-N5	0.53, 0.53
		C 25% Shale, as 313-162B, moderate caving	5G6/1	0.35
313-164	4850-880m	A 60% Shale, as 313-163A, moderate caving	5YR2/1- N2	3.50
		B 20% Shale, platy, blocky, hard, slightly calcareous, medium grey	N5	0.61
		C 20% Shale, as 313-162B	5G6/1	0.32

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	GSA Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-165	4880-910m	A 45% Shale, blocky, finely divided, non calcareous, carbonaceous, turbo-drilled vitreous lustre to surface, greyish black to black	N2-N1	2.62
		B 30% Shale, blocky, non calcareous, hard, silty, dull to vitreous, moderate caving, brownish black to greyish black	5YR2/1-N2	2.60, 2.60
		C 15% Shale, blocky, non calcareous to slightly calcareous, medium dark grey to medium grey	N4-N5	0.67
		D 10% Shale - mudstone, soft to hard, calcareous, pyritic in parts, greenish grey to light greenish grey Minor free pyrite	5G6/1- 5G8/1	0.34
313-166	4910-940m	A 40% Shale, as 313-165A	N2-N1	1.72
		B 40% Shale, as 313-165B	5YR2/1-N2	3.54
		C 15% Shale, as 313-165D	5G6/1- 5G8/1	0.34, 0.34
		D 5% Shale, as 313-165C	N4-N5	0.76
313-167	4940-970m	A 65% Shale, as 313-165A	N2-N1	2.18
		B 20% Shale, as 313-165B, abundant cavings	5YR2/1-N2	4.00
		C 10% Shale, blocky, platy, non calcareous, slightly calcareous, pyritic in parts, medium grey to medium light grey	N5-N6	0.65
		D 5% Shale, as 313-165D Minor free pyrite	5G6/1- 5G8/1	0.35, 0.35
313-168	4970-5000	A 65% Shale, as 313-165A	N2-N1	1.98
		B 15% Shale, as 313-165B, moderate cavings	5YR2/1-N2	3.42
		C 10% Shale, calcareous, very fine grained, like mudstone, occasionally with darker shale lenses, soft, light greenish grey	5G8/1	0.29
		D 10% Shale, as 313-167C, minor cavings Minor other shale	N5-N6	0.49

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-169	5000-030m.	A 70% Shale, blocky, finely divided, non calcareous, carbonaceous, turbo-drilled, vitreous lustre to surface, greyish black to black	N2-N1	2.48, 2.46
		B 15% Shale, blocky, non calcareous, hard, silty, dull to vitreous, minor cavings, brownish black to greyish black	5YR2/1-N2	2.76
		C 10% Shale, blocky, silty, soft to hard, slightly calcareous, medium grey to medium light grey	N5-N6	0.68
		D 5% Shale, calcareous, very fine grained, like mudstone, occasionally with darker shale lenses, soft, light greenish grey	5G8/1	0.37
313-170	5030-060m	A 65% Shale, blocky, platy, hard non calcareous, silty and micaceous, vitreous lustre, abundant caving, dark grey to greyish black	N3-N2	2.46, 2.46
		B 20% Shale, as 313-169C, moderate caving	N5-N6	0.58
		C 15% Shale, as 313-169A Minor mudstone, free pyrite	N2-N1	2.34
313-171	5060-090m	A 65% Shale, blocky, hard, silty and micaceous, non calcareous, moderate caving, dark grey to greyish black	N3-N2	2.54
		B 15% Shale, blocky, hard, occasionally pyritic, non calcareous to slightly calcareous, medium grey to medium light grey	N5-N6	0.54
		C 15% Shale, blocky, soft to hard, calcareous, light grey to light greenish grey	N7-5G8/1	0.30, 0.30
		D 5% Shale, blocky, silty, vitreous lustre to surface, greyish black to black Free pyrite as nodules	N2-N1	1.82

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH		GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-172	5090-120m	A 80%	Shale, blocky, hard, silty and micaceous, non calcareous, abundant cavings dark grey to greyish black	N3-N2	2.46
		B 15%	Shale, blocky, soft, hard, calcareous, moderate cavings, light greenish grey to greenish grey	5G8/1- 5G6/1	0.41
		C 5%	Shale, blocky, silty, vitreous lustre to surface, greyish black to black Minor other shale, pyrite	N2-N1	2.64
313-173	5120-150m	A 60%	Shale, blocky, hard, non calcareous, silty, occasionally micaceous, moderate cavings, dark grey to greyish black	N3-N2	2.70, 2.70
		B 20%	Shale, blocky, soft to hard, calcareous, medium light grey to light grey	N6-N7	0.55
		C 20%	Shale, as 313-172C Minor other shale, pyrite	N2-N1	2.56
313-174	5150-180m	A 70%	Shale, as 313-173A, moderate cavings	N3-N2	3.12
		B 15%	Shale, blocky, soft, calcareous to very calcareous pyritic, minor cavings, light greenish grey to greenish grey	5G8/1- 5G6/1	0.38, 0.40
		C 10%	Shale, as 313-172C	N2-N1	2.64
		D 5%	Shale, as 313-173B, minor cavings Minor other shale, pyrite, minor fossils - Belemnite	N6-N7	0.56
313-175	5180-210m	A 35%	Shale, as 313-173A, minor cavings	N3-N2	2.91
		B 35%	Sand, loose and consolidated, non calcareous, irregular, subrounded grain, fine to occasionally medium sized, colourless, no fluorescence, strong milky blue cut, greenish grey	5G6/1	

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-175	5180-210m	C 15% Shale, blocky, hard, occasionally pyritic, non calcareous to slightly calcareous, minor cavings, medium grey to medium light grey	N5-N6	0.87
		D 15% Shale, blocky, soft to hard, calcareous, light grey to light greenish grey Minor coal	N7-5G8/1	0.31, 0.30
313-176	5210-240m	A 60% Sand, loose and consolidated, non calcareous, irregular, subrounded grain, fine, occasionally medium sized, no fluorescence, blue cut, greenish grey	5G6/1	
		B 25% Shale, blocky, hard, non calcareous, silty, occasionally micaceous, moderate cavings, dark grey to greyish black	N3-N2	2.59
		C 10% Shale, blocky, silty, vitreous lustre to surface, greyish black to black	N2-N1	2.24
		D 5% Shale, as 313-175D Minor other shale, coal	N7-5G8/1	0.44
313-177	5240-270m	A 60% Sand, as 313-176A, blue cut	5G6/1	
		B 30% Shale, as 313-176B, moderate cavings	N3-N2	3.34
		C 5% Shale, as 313-175D	N7-5G8/1	0.49, 0.49
		D 5% Coal, vitreous lustre, greyish black to black	N2-N1	43.33
313-178	5270-300m	A 70% Sand, as 313-176A, blue cut	5G6/1	
		B 30% Shale, as 313-176B, moderate cavings Minor coal, as 313-177D	N3-N2 N2-N1	2.84
313-179	5300-330m	A 55% Sand, as 313-176A, blue cut, patchy yellow fluorescence	5G6/1	
		B 30% Shale, as 313-176B moderate cavings	N3-N2	2.26
		C 10% Coal, as 313-177D	N2-N1	15.32
		D 5% Shale, as 313-175D Minor other shale	N7-5G8/1	0.40

TABLE 2
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH		GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-180	5330-360m	A 65%	Sand, loose and consolidated, non calcareous, subrounded, grain, fine, occasionally medium sized, no fluorescence, blue cut, greenish grey	5G6/1	
		B 25%	Shale, blocky, hard, non calcareous, silty, occasionally micaceous, abundant cavings, dark grey to greyish black	N3-N2	2.46, 2.46
		C 10%	Coal, vitreous lustre, greyish black to black Minor other shale	N2-N1	56.44
313-181	5360-390m	A 65%	Sand, as 313-180A, blue cut	5G6/1	
		B 20%	Shale, blocky, hard, non calcareous, occasionally micaceous, minor cavings, dark grey	N3	4.78
		C 10%	Shale, blocky, soft, calcareous, greenish grey	5G6/1	0.47
		D 5%	Coal, blocky, hard, vitreous lustre, black Free pyrite	N1	26.88
313-182	5390-420m	A 50%	Sandstone, mostly consolidated, some loose sand, subrounded, subangular, very fine to fine grained, blue cut, colourless to greenish grey	5G6/1	
		B 30%	Shale, as 313-181B	N3	3.18
		C 10%	Shale, as 313-181C	5G6/1	
		D 10%	"Sticky resinous gum" - lost circulation material		0.45
313-183	5420-450m	A 55%	Shale, as 313-181B	N3	5.10
		B 30%	Coal, as 313-181D	N1	46.90
		C 15%	Sandstone, as 313-182A blue cut Minor other shale and lost circulation material, as 313-182D	5G6/1	

TABLE 3

VISUAL KEROGEN DATA

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC MATTER DESCRIPTION				THERMAL MATURATION INDEX
		TYPES	REMARKS	PARTICLE SIZE	PRESERV- ATION	
313-001	1375m	W;Am*-H*;S-C	* includes H passing to Am.	M	F-G	1+ to 2-/2-
313-002	1471m	W-S;H-Am;C	some H at 2-	F-M	G	1+ to 2-/2-
313-004	1541.5m	H-S-W;-;C-Am		F-M	F-G	2-max.
313-005	1560m	H;W-S-C;Am		M	G	2-max.
313-006B	1560-590m	W;C-H;S		F-M	F	1+ to 2-/2-
313-010A	1630-660m	W-C;-;S-H	lean	F	F	2-(?)
313-010B	1630-660m	W;H*-S;C	* scattered minor sapropel- isation	M	F	1+ to 2-/2-
313-012A	1660-690m	W-C;H-S;-	lean	F-M	F	1+ to 2-
313-014A	1720-750m	W;C-S;H		F-M	F	2-(?)
313-016	1780m	W;C-H;S	lean, contamination. Rework- ing	F	F	2-
313-018A	1810-840m	W;C-H;S	lean	F	F-G	1+ to 2-
313-021	1878m	H;W;S-C	algae. Significant H at 1+ to 2-	F	G	2-
313-022A	1900-930m	W;C;S-(H)	fine contaminant, lean	F	F	2-
313-024	1950m	H;W;S-C		F	G	2-
313-027B	2020-050m	W-H;-;S-C		F-M	F-G	2-
313-028	2024m	W;C-S;H	reworking	F-M	F	2-
313-029A	2050-080m	W-C;H;S	lean, contamination	F	F	2- to 2
313-031A	2102m	W;C;H-S		M	G	2- to 2
313-031B	2102m	W-C;-;H-S	lean	F-M	P	
313-032A	2110-140m	W;H-C;S-Am	reworking (2).	M	F-G	2- to 2

Algal, Amorphous, Coaly, Herbaceous, Stem, Woody.

TABLE 3
VISUAL KEROGEN DATA

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC MATTER DESCRIPTION				THERMAL MATURATION INDEX
		TYPES	REMARKS	PARTICLE SIZE	PRESERV- ATION	
313-034A	2170-200m	C-W;H;S	reworking (2)	M-C	F	2- to 2
313-037	2240m	W;H;S-C	contamination	F-M	F-G	
313-038	2259m	W;C;H-S		F-C	F	2- to 2
313-041	2318m	W;C;H	lean	F	F	2- to 2(?)
313-053	2400m	W;C;H-(A1)		F-M	G	2- to 2
313-054	2460m	W;C-H;A1		M	G	2- to 2
313-055	2562m	W;C;H-A1	lean, reworking	M	F	2- to 2/2(?)
313-056	2610m	W;C;H		M	F	2- to 2
313-057	2697m	W;C;(H)	reworking	M	F	2 max (?)
313-058	2795m	W-C;-;H		M	F	2- to 2
313-096	2810-840m	W;C;H	minor sapropelisation	F-M	F-G	2- to 2
313-059	2900m	W;C-H;A1-(S-Am)		M	F	2- to 2/2
313-101A	2960-990m	W;C-H;-	very lean	F	F	2
313-060	3003m	W-C;-;H		M	F	2
313-104B	3050-080m	W;C;H	lean	F-M	F	2(?)
313-061	3100m	W-C;-;(H)	very lean	F-M	P-F	
313-062	3190m	W;C;H	lean	F-M	F	2(??)
313-063	3245m	W;C;(H)	lean	F	F	2
313-112A	3290-320m	W;C;H*	very lean. *Degraded	F	P	2/2 to 2+(??)
313-064	3400m	W-C;-;H		M	F-G	2
313-065	3500m	W;C;H		M	F	2- to 2/2
313-119A	3500-530m	W-C;-;-	lean	F-M	P-F	
313-066	3550m	W;C;H		M	F	2

Algal, Amorphous, Coaly, Herbaceous, Stem, Woody.

TABLE 3
VISUAL KEROGEN DATA

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC MATTER DESCRIPTION				THERMAL MATURATION INDEX
		TYPES	REMARKS	PARTICLE SIZE	PRESERV- ATION	
313-121A	3560-590m	W;C;H	some at 2/2 to 2+	F-M	F	2
313-124B	3650-680m	W;C;H	dominantly caved 2- to 2	M	F	2
313-067	3708m	W;C;H-(A1)	reworking	F-M	F	2
313-068	3781m	W;C;H-Am*	*degraded, not true Am	M	F	2
313-070	3895m	W;C;H		M	F	2
313-132A	3890-920m	W;C;H		F-M	F-G	2/2 to 2+
313-071	3930m	W;C;H		M	P-F	2 to 2+ max.
313-134A	3950-980m	C-W;-; (H)	lean, contamination	F-M	P-F	
313-073	4015m	W;C; (H)		F-M	F	2 to 2+
313-137A	4040-070m	W;-;C-H- (A1-S)		M	F-G	2 to 2+
313-139A	4100-130m	W;C;-; (H)	lean	F-M	F	
313-140A	4130-160m	W;C-H;Am*-S- (A1)	*degraded, not true Am	M	F-G	2 to 2+
313-142A	4190-220m	W;C;H-S- (A1)	some at 2- to 2	M	F	2 to 2+
313-144A	4250-280m	W;C;H-S		M	F	2/2 to 2+
313-145C	4280-310m	W-C;-;S-H- (A1)	caved material present	F-M	F	2 to 2+
313-148A	4370-400m	W;C;H- (S)		M	F	2 to 2+
313-152A	4490-520m	W;C;Am*-H-S	cavings. *Degraded, not true Am	M	F	2 to 2+
313-153B	4520-550m	W*;C; (H)	*includes "degraded" material	M	F	
313-156C	4610-640m	W;Am*-H-C;-	*degraded	M	F	2+.
313-158A	4670-700m	W;C;H-S	abundant cavings 2- to 2	F-M	F-G	2 to 2+/2+
313-159B	4700-730m	W;H*-C;Am- (S)	*includes degraded material	M	F	2+
313-161A	4760-790m	W;C;H- (S)		M	F	2+
313-161B	4760-790m	W-C;-;H	lean, caved material present	F-M	F	

TABLE 3
VISUAL KEROGEN DATA

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC MATTER DESCRIPTION				THERMAL MATURATION INDEX
		TYPES	REMARKS	PARTICLE SIZE	PRESERV- ATION	
313-163A	4820-850m	W;C-H*;-	*largely degraded	M	F	2+
313-167A	4940-970m	W;C;H		M	F	2+
313-170A	5030-060m	W;C;H-S		F-M	F	2+
313-171B	5060-090m	W;C;H-A1-(S)		M	F	2+
313-173A	5120-150m	W;C-H;-		F-M	F	2+
313-177A	5240-270m	W;C;H-(S)		F-M	F	2+ to 3-(?)
313-180B	5330-360m	C-W;-;H		M	F	2+ to 3-
313-183B	5420-450m	C;W;(H)		F-C	F	2+ to 3-(??)

Algal, Amorphous, Coaly, Herbaceous, Stem, Woody.

TABLE 4
VITRINITE REFLECTANCE DATA

GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	AVERAGE REFLECTIVITY			NUMBER OF PARTICLES			REMARKS
			Ro (%)			1	2	3	
			1	2	3				
313-001	1375m	S.W.C.	0.39	-	-	20	-	-	Green-yellow fluorescence
313-002	1471m	S.W.C.	0.36	-	-	20	-	-	yellow fluorescence
313-004	1541.5m	S.W.C.	0.43	-	-	18	-	-	yellow-mid orange fluorescence
313-016	1780m	S.W.C.	0.50	1.09*	-	3	4	-	yellow/orange fluorescence
313-021	1878m	S.W.C.	0.74	1.05*	-	1	2	-	lt-mid orange fluorescence
313-024	1950m	S.W.C.	0.38	-	-	12	-	-	yellow+orange fluorescence
313-028	2024m	S.W.C.	0.42	-	-	20	-	-	yellow/orange fluorescence
313-031B	2102m	S.W.C.	0.87	1.18*	-	1	1	-	barren
313-037	2240m	S.W.C.	0.78	1.11*	-	3	17	-	mid-deep orange fluorescence
313-038	2259m	S.W.C.	0.65	1.16*	-	3	11	-	
313-041	2318m	S.W.C.	0.47	0.80	1.04*	4	3	11	lt-mid orange fluorescence
313-053	2400m	S.W.C.	0.52	0.95*	-	3	17	-	mid orange fluorescence
313-054	2460m	S.W.C.	0.62	-	-	11	-	-	lt+mid orange fluorescence
313-055	2562m	S.W.C.	0.50	0.78	1.31	2	2	4	mid orange fluorescence
313-056	2610m	S.W.C.	NO DETERMINATION POSSIBLE						
313-057	2697m	S.W.C.	NO DETERMINATION POSSIBLE						lt orange fluorescence
313-058	2795m	S.W.C.	0.59	0.87*	-	3	12	-	lt orange fluorescence
313-059	2900m	S.W.C.	0.51	-	-	20	-	-	lt orange fluorescence
313-060	3003m	S.W.C.	0.62	1.02	-	5	8	-	lt-mid orange fluorescence
313-104B	3050-080m	CUTTING	0.31	-	-	8	-	-	+additive?
313-061	3100m	S.W.C.	0.63	-	-	9	-	-	lt-mid orange fluorescence
313-062	3190m	S.W.C.	NO DETERMINATION POSSIBLE						mid orange fluorescence

TABLE 4
VITRINITE REFLECTANCE DATA

GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	AVERAGE REFLECTIVITY R _o (%)			NUMBER OF PARTICLES			REMARKS
			1	2	3	1	2	3	
313-063	3245m	S.W.C.	1.14 *	-	-	21	-	-	lt-mid orange fluorescence
313-064	3400m	S.W.C.	0.60	1.19*	-	3	5	-	mid orange fluorescence
313-065	3500m	S.W.C.	0.69	1.01*	-	3	1	-	lt-mid orange fluorescence
313-066	3550m	S.W.C.	0.53	0.78	1.53*	1	2	17	
313-067	3708m	S.W.C.	0.83	1.35*	-	1	19	-	lt-mid orange fluorescence
313-068	3781m	S.W.C.	0.61	1.13*	-	2	5	-	mid orange fluorescence
313-070	3895m	S.W.C.	1.32 *	-	-	20	-	-	
313-071	3930m	S.W.C.	0.78	1.43*	-	3	17	-	
313-073	4015m	S.W.C.	1.41 *	-	-	20	-	-	light orange fluorescence
313-139A	4100-130m	CUTTING	0.21	-	-	9	-	-	
313-142A	4190-220m	CUTTING	1.17 *	-	-	8	-	-	lt-mid orange fluorescence
313-145D	4280-310m	CUTTING	0.26	0.58	0.77	14	1	5	
313-148A	4370-400m	CUTTING	✓1.23 *	-	-	12	-	-	
313-152A	4490-520m	CUTTING	✓1.29 *	-	-	20	-	-	
313-156C	4610-640m	CUTTING	✓1.53 *	-	-	21	-	-	mid orange fluorescence
313-159B	4700-730m	CUTTING	✓1.21 *	-	-	20	-	-	
313-163A	4820-850m	CUTTING	✓1.37	-	-	20	-	-	deep orange fluorescence
313-167A	4940-970m	CUTTING	✓1.43 *	-	-	20	-	-	mid-deep orange fluorescence
313-170A	5030-060m	CUTTING	✓1.42	-	-	20	-	-	
313-174A	5150-180m	CUTTING	X 1.29	1.92 *	-	14	6	-	
313-177B	5240-270m	CUTTING	✓1.60 *	-	-	20	-	-	
313-180B	5330-360m	CUTTING	✓2.03	-	-	22	-	-	
313-183B	5420-450m	CUTTING	✓2.32	-	-	25	-	-	

5435m.

TABLE 5A

WEIGHT (GRAMMES) OF C₁₅+ EXTRACTS AND CHROMATOGRAPHIC FRACTIONS

GEOCHEM SAMPLE NUMBER	INTERVAL	ROCK EXTRACTED	TOTAL EXTRACT OBTAINED	TOTAL EXTRACT		nC ₅ SOLUBLE FRACTION				
				Precipitd. Asphaltenes	nC ₅ soluble	Paraffin - Naphthenes	Aromatics	Eluted NSO's	Non-eluted NSO's	Sulphur
313-001	1375m	8.43000	0.02323	0.01147	0.01176	0.00556	0.00361	0.00226	0.00033	-
313-005A	1560m	35.83000	0.01725	0.00481	0.01244	0.00569	0.00212	0.00343	0.00122	-
313-008A	1590-600m	7.04000	0.01505	0.00537	0.00968	0.00497	0.00276	0.00182	0.00013	-
313-012	1660-690m	51.91000	0.01951	0.00830	0.01121	0.00594	0.00346	0.00167	0.00014	-
313-014	1720-750m	49.84000	0.01753	0.00984	0.00769	0.00488	0.00204	0.00047	0.00030	-
313-016	1780m	8.56000	0.01705	0.00686	0.00389	0.00235	0.00102	0.00030	0.00022	-
313-024	1950m	8.55000	0.01303	0.00747	0.00556	0.00410	0.00107	0.00032	-	-
313-030	2080-110m	31.58000	0.01820	0.00914	0.00906	0.00593	0.00274	0.00039	-	-
313-034A	2170-200m	11.12000	0.00982	0.00327	0.00655	0.00329	0.00223	0.00073	0.00030	-
313-038	2259m	11.37000	0.01449	0.00691	0.00758	0.00474	0.00226	0.00039	0.00019	-
313-043	2345m	28.00000	0.11417	0.02050	0.09367	0.04737	0.01533	0.03097	-	-
313-083	2370m	15.89000	0.00796	0.00389	0.00407	0.00194	0.00066	0.00136	0.00011	-
313-055	2562m	17.44000	0.00605	0.00348	0.00257	0.00090	0.00056	0.00111	-	-
313-090	2580m	26.13000	0.06400	0.00467	0.05933	0.04422	0.00973	0.00538	-	-
313-094	2760m	6.70000	0.01054	0.00576	0.00478	0.00258	0.00091	0.00115	0.00014	-
313-058	2795m	11.79000	0.01989	0.00426	0.01563	0.01181	0.00218	0.00135	0.00029	-
313-059	2900m	14.23000	0.02771	0.01404	0.01367	0.00942	0.00220	0.00205	-	-
313-102	2990-3020	29.26000	0.02445	0.00679	0.01766	0.00786	0.00544	0.00432	0.00004	-
313-108	3170-200m	27.46000	0.00966	0.00260	0.00706	0.00433	0.00121	0.00108	0.00044	-
313-112	3290-320m	27.31000	0.02504	0.01735	0.00769	0.00390	0.00162	0.00184	0.00033	-
313-116	3410-440m	27.47000	0.00925	0.00445	0.00480	0.00256	0.00112	0.00112	-	-
313-120	3530-566m	24.27000	0.00986	0.00467	0.00519	0.00253	0.00150	0.00100	0.00016	-
313-126	3710-740m	28.60000	0.00954	0.00350	0.00603	0.00315	0.00139	0.00128	0.00021	-
313-068	3781m	5.17000	0.00618	0.00390	0.00228	0.00065	0.00053	0.00072	0.00038	-
313-130	3830-860m	30.98000	0.00886	0.00335	0.00551	0.00296	0.00151	0.00100	0.00004	-
313-071	3990m	4.81000	0.00682	0.00404	0.00278	0.00106	0.00061	0.00093	0.00018	-
313-073	4015m	11.57000	0.00614	0.00318	0.00296	0.00148	0.00056	0.00072	0.00020	-
313-138	4070-100m	28.53000	0.01404	0.00680	0.00724	0.00241	0.00304	0.00179	-	-
313-139A	4100-130m	16.15000	0.06185	0.03627	0.02558	0.00643	0.01195	0.00070	0.00020	-
313-142	4190-220m	33.54000	0.03266	0.01455	0.01811	0.00750	0.00638	0.00402	0.00021	-
313-144	4250-280m	19.59000	0.01301	0.00886	0.00415	0.00121	0.00142	0.00140	0.00012	-

TABLE 5A

WEIGHT (GRAMMES) OF C₁₅+ EXTRACTS AND CHROMATOGRAPHIC FRACTIONS

GEOCHEM SAMPLE NUMBER	INTERVAL	ROCK EXTRACTED	TOTAL EXTRACT OBTAINED	TOTAL EXTRACT		nC ₅ SOLUBLE FRACTION				
				Precipitd. Asphaltenes	nC ₅ soluble	Paraffin - Naphthenes	Aromatics	Eluted NSO's	Non-eluted NSO's	Sulphur
313-148	4370-400m	27.93000	0.01225	0.00581	0.00644	0.00225	0.00211	0.00182	0.00026	-
313-153	4520-550m	34.14000	0.01025	0.00523	0.00502	0.00222	0.00126	0.00154	-	-
313-156	4610-640m	32.62000	0.01387	0.00626	0.00761	0.00346	0.00200	0.00215	-	-
313-074	MUD	20.52000	0.11121	0.01731	0.09408	0.07454	0.01290	0.00663	-	-
313-081	RAG	0.53484	0.53484	0.14331	0.36153	0.15011	0.18382	0.02760	-	-
313-082	RAG	2.36616	2.36616	0.18548	2.18068	1.64864	0.35438	0.17766	-	-
313-164	4850-880m	28.90000	0.01364	0.00572	0.00792	0.00296	0.00205	0.00275	0.00216	-
313-167	4940-970m	29.07000	0.04322	0.03714	0.00608	0.00273	0.00156	0.00179	-	-
313-170	5030-060m	30.28000	0.05712	0.05469	0.00243	0.00110	0.00040	0.00090	0.00003	-
313-174A	5150-180m	5.62000	0.00791	0.00456	0.00335	0.00155	0.00089	0.00086	0.00005	-
313-175	5180-210m	40.76000	0.06309	0.05519	0.00790	0.00315	0.00244	0.00231	-	-
313-176A	5210-240m	7.10000	0.00568	0.00466	0.00102	0.00033	0.00011	0.00048	0.00010	-
313-177A	5240-270m	29.28000	0.01149	0.00925	0.00224	0.00063	0.00055	0.00101	0.00005	-
313-179A	5300-330m	16.70000	0.01117	0.00849	0.00268	0.00070	0.00062	0.00136	-	-
313-181	5360-390m	43.24000	0.00926	0.00720	0.00206	0.00068	0.00040	0.00096	0.00002	-
313-182D	5390-420m	0.02013	0.02013	0.01668	0.00345	0.00106	0.00117	0.00122	-	-

TABLE 5B
 CONCENTRATION (PPM) OF EXTRACTED C₁₅₊ MATERIAL IN ROCK

GEOCHEM SAMPLE NUMBER	INTERVAL	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS				
			Paraffin - Naphthenes	Aromatics	TOTAL	Precipitd. Asphaltenes	Eluted NSO's	Non-eluted NSO's	Sulphur	TOTAL
313-001	1375m	2756	660	428	1088	1361	268	39	-	1668
313-005A	1560m	481	159	59	218	134	96	34	-	264
313-008A	1590-600m	2138	706	392	1098	763	259	18	-	1040
313-012	1660-690m	376	114	67	181	160	32	3	-	195
313-014	1720-750m	352	98	41	139	197	9	6	-	213
313-016	1780m	1256	275	119	394	801	35	26	-	862
313-024	1950m	1524	480	125	605	874	46	-	-	919
313-030	2080-110m	576	188	87	275	289	12	-	-	302
313-034A	2170-200m	883	296	201	496	294	66	27	-	387
313-038	2259m	1274	417	199	616	608	34	17	-	659
313-043	2345m	4078	1692	548	2239	732	1106	-	-	1838
313-083	2370m	501	122	42	164	245	86	7	-	337
313-055	2562m	347	52	32	84	200	64	-	-	263
313-090	2580m	2449	1692	372	2065	179	206	-	-	385
313-094	2760m	1573	385	136	521	860	172	21	-	1052
313-058	2795m	1687	1002	185	1187	361	115	25	-	500
313-059	2900m	1947	662	155	817	987	144	-	-	1131
313-102	2900-3020	836	269	186	455	232	148	1	-	381
313-108	3170-200m	352	158	44	202	95	39	16	-	150
313-112	3290-320m	917	143	59	202	635	67	12	-	715
313-116	3410-440m	337	93	41	134	162	41	-	-	203
313-120	3530-560m	406	104	62	166	192	41	7	-	240
313-126	3710-740m	333	110	49	159	122	45	7	-	174
313-068	3781m	1195	126	103	228	754	139	74	-	967
313-130	3830-860m	286	96	49	144	108	32	1	-	142
313-071	3930m	1418	220	127	347	840	193	37	-	1071
313-073	4015m	531	128	48	176	275	62	17	-	354
313-138	4070-100m	492	84	107	191	238	63	-	-	301
313-139A	4100-130m	3830	398	740	1138	2246	433	12	-	2692
313-142	4190-220m	974	224	190	414	434	120	6	-	560
313-144	4250-280m	664	62	72	134	452	71	6	-	530

TABLE 5B
 CONCENTRATION (PPM) OF EXTRACTED C₁₅₊ MATERIAL IN ROCK

GEOCHEM SAMPLE NUMBER	INTERVAL	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS				
			Paraffin - Naphthenes	Aromatics	TOTAL	Precipd. Asphaltenes	Eluted NSO's	Non-eluted NSO's	Sulphur	TOTAL
313-148	4370-400m	439	81	76	156	208	65	9	-	282
313-153	4520-550m	300	65	37	102	153	45	-	-	198
313-156	4610-640m	425	106	61	167	192	66	-	-	258
313-164	4850-880m	472	102	71	173	198	95	6	-	299
313-167	4940-970m	1487	94	54	148	1278	62	-	-	1339
313-170	5030-060m	1886	36	13	50	1806	30	1	-	1837
313-174A	5150-180m	1407	276	158	434	811	153	9	-	973
313-175	5180-210m	1548	77	60	137	1354	57	-	-	1411
313-176A	5210-240m	800	46	15	62	656	68	14	-	738
313-177A	5240-270m	392	22	19	40	316	34	2	-	352
313-179A	5300-330m	669	42	37	79	508	81	-	-	590
313-181	5360-390m	214	16	9	25	167	22	31	-	189
313-074	MUD	5420	3633	629	4261	835	323	-	-	1158

TABLE 5C

COMPOSITION (NORMALISED %) OF C₁₅₊ MATERIAL EXTRACTED FROM ROCK

GEOCHEM SAMPLE NUMBER	INTERVAL	HYDROCARBONS			NON HYDROCARBONS					HC NON HC
		Paraffin - Naphthenes	Aromatics	P - N AROM	Preciptd. Asphaltenes	Eluted NSO's	Non eluted NSO's	Sulphur	ASPH NSO	
313-001	1375m	23.93	15.54	1.54	49.38	9.73	1.42	-	4.43	0.65
313-005A	1560m	32.98	12.29	2.68	27.89	19.88	7.07	-	1.03	0.83
313-008A	1590-600m	33.02	18.34	1.80	35.68	12.09	0.86	-	2.75	1.06
313-012	1660-690m	30.45	17.73	1.72	42.54	8.56	0.72	-	4.59	0.93
313-014	1720-750m	27.84	11.64	2.39	56.13	2.68	1.71	-	12.78	0.65
313-016	1780m	21.86	9.49	2.30	63.81	2.79	2.05	-	13.19	0.46
313-024	1950m	31.47	8.21	3.83	57.33	2.99	-	-	19.15	0.66
313-030	2080-110m	32.58	15.05	2.16	50.22	2.14	-	-	23.44	0.91
313-034A	2170-200m	33.50	22.71	1.48	33.30	7.40	3.05	-	3.17	1.28
313-038	2259m	32.71	15.60	2.10	47.69	2.69	1.31	-	11.91	0.93
313-043	2345m	41.49	13.43	3.09	17.96	27.13	-	-	0.66	1.22
313-083	2370m	24.37	8.29	2.94	48.87	17.09	1.38	-	2.65	0.49
313-055	2562m	14.88	9.26	1.61	57.52	18.35	-	-	3.14	0.32
313-090	2580m	69.09	15.20	4.54	7.30	8.41	-	-	0.87	5.37
313-094	2760m	24.48	8.63	2.84	54.65	10.91	1.33	-	4.47	0.50
313-058	2795m	59.38	10.96	5.42	21.42	6.79	1.46	-	2.60	2.37
313-059	2900m	33.99	7.94	4.28	50.67	7.40	-	-	6.85	0.72
313-102	2990-3020	32.15	22.25	1.44	27.77	17.67	0.16	-	1.56	1.19
313-108	3170-200m	44.82	12.53	3.58	26.92	11.18	4.55	-	1.71	1.34
313-112	3290-320m	15.58	6.47	2.41	69.29	7.35	1.32	-	8.00	0.28
313-116	3410-440m	27.68	12.11	2.29	48.11	12.11	-	-	3.97	0.66
313-120	3530-560m	25.66	15.21	1.69	47.36	10.14	1.62	-	4.03	0.69
313-126	3710-740m	33.05	14.59	2.27	36.73	13.43	2.20	-	2.35	0.91
313-068	3781m	10.52	8.58	1.23	63.11	11.65	6.15	-	3.55	0.24
313-130	3830-860m	33.41	17.04	1.96	37.81	11.29	0.45	-	3.22	1.02
313-071	3930m	15.54	8.94	1.74	59.24	13.64	2.64	-	3.64	0.32
313-073	4015m	24.10	9.12	2.64	51.79	11.73	3.26	-	3.46	0.50
313-138	4070-100m	17.17	21.65	0.79	48.43	12.75	-	-	3.80	0.63
313-139A	4100-130m	10.40	19.32	0.54	58.64	11.32	0.32	-	5.04	0.42
313-142	4190-220m	22.96	19.53	1.18	44.55	12.31	0.64	-	3.44	0.74
313-144	4250-280m	9.30	10.91	0.85	68.10	10.76	0.92	-	5.83	0.25

TABLE 5C

COMPOSITION (NORMALISED %) OF C₁₅+ MATERIAL EXTRACTED FROM ROCK

GEOCHEM SAMPLE NUMBER	INTERVAL	HYDROCARBONS			NON HYDROCARBONS					HC NON HC
		Paraffin -- Naphthenes	Aromatics	P - N AROM	Precipd. Asphaltenes	Eluted NSO's	Non eluted NSO's	Sulphur	ASPH NSO	
313-148	4370-400m	18.37	17.22	1.07	47.43	14.86	2.12	-	2.79	0.55
313-153	4520-550m	21.66	12.29	1.76	51.02	15.02	-	-	3.40	0.51
313-156	4610-640m	24.95	14.42	1.73	45.13	15.50	-	-	2.91	0.65
313-164	4850-880m	21.70	15.03	1.44	41.94	20.16	1.17	-	1.97	0.58
313-167	4940-970m	6.32	3.61	1.75	85.93	4.14	-	-	20.75	0.11
313-170	5030-060m	1.93	0.70	2.75	95.75	1.58	0.05	-	58.81	0.03
313-174A	5150-180m	19.60	11.25	1.74	57.65	10.87	0.63	-	5.01	0.45
313-175	5180-210m	4.99	3.87	1.29	87.48	3.66	-	-	23.89	0.10
313-176A	5210-240m	5.81	1.94	3.00	82.04	8.45	1.76	-	8.03	0.08
313-177A	5240-270m	5.48	4.79	1.15	80.50	8.79	0.44	-	8.73	0.11
313-179A	5300-330m	6.27	5.55	1.13	76.01	12.18	-	-	6.24	0.13
313-181	5360-390m	7.34	4.32	1.70	77.75	10.37	0.22	-	7.35	0.13
313-182D	5390-420m	5.27	5.81	0.91	82.86	6.06	-	-	13.67	0.12
313-074	MUD	67.03	11.60	5.78	15.40	5.97	-	-	2.58	3.68
313-081	RAG	29.73	36.41	0.82	28.39	5.47	-	-	5.19	1.95
313-082	RAG	69.68	14.98	4.65	7.84	7.51	-	-	1.04	5.52

TABLE 6

SIGNIFICANT RATIOS (%) OF C₁₅₊ FRACTIONS AND ORGANIC CARBON

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC CARBON	<u>HYDROCARBONS</u> TOTAL EXTRACT	<u>HYDROCARBONS</u> ORGANIC CARBON	<u>TOTAL EXTRACT</u> ORGANIC CARBON
313-001	1375m	0.82	39.48	13.27	33.61
313-005A	1560m	0.66	45.32	3.30	7.29
313-008A	1590-1600m	0.60	51.36	18.30	35.63
313-012	1660-1690m	0.73	48.14	2.48	5.15
313-014	1720-1750m	0.64	39.49	2.17	5.50
313-016	1780m	0.61	31.37	6.46	20.59
313-024	1950m	0.63	39.70	9.60	24.19
313-030	2080-2110m	0.56	47.74	4.91	10.29
313-034A	2170-2200m	0.56	56.17	8.86	15.77
313-038	2259m	0.32	48.35	19.25	39.81
313-043	2345m	1.18	54.90	18.97	34.56
313-083	2370m	0.70	32.73	2.34	7.16
313-055	2562m	0.82	24.21	1.02	4.23
313-090	2580m	0.54	84.32	38.24	45.35
313-094	2760m	0.46	33.12	11.33	34.20
313-058	2795m	0.65	70.36	18.26	25.95
313-059	2900m	1.05	41.96	7.78	18.54
313-102	2990-3020m	2.82	54.43	1.61	2.96
313-108	3170-3200m	0.79	57.39	2.56	4.46
313-112	3290-3320m	0.68	22.03	2.97	13.49
313-116	3410-3440m	0.64	39.76	2.09	5.27
313-120	3530-3560m	0.91	40.89	1.82	4.46
313-126	3710-3740m	0.56	47.75	2.84	5.95
313-068	3781m	0.51	19.08	4.47	23.43
313-130	3830-3860m	0.68	50.35	2.12	4.21
313-071	3930m	1.03	24.47	3.37	13.77
313-073	4015m	0.86	33.15	2.05	6.17
313-138	4070-4100m	1.90	38.82	1.01	2.59

TABLE 6
SIGNIFICANT RATIOS (%) OF C₁₅₊ FRACTIONS AND ORGANIC CARBON

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC CARBON	<u>HYDROCARBONS</u> <u>TOTAL EXTRACT</u>	<u>HYDROCARBONS</u> <u>ORGANIC CARBON</u>	<u>TOTAL EXTRACT</u> <u>ORGANIC CARBON</u>
313-139A	4100-4130m	9.87	29.71	1.15	3.88
313-142	4190-4220m	3.00	42.51	1.38	3.25
313-144	4250-4280m	1.21	20.18	1.11	5.49
313-148	4370-4400m	1.40	35.54	1.11	3.14
313-153	4520-4550m	1.05	34.00	0.97	2.86
313-156	4610-4640m	1.35	39.29	1.24	3.15
313-164	4850-4880m	2.08	36.65	0.83	2.27
313-167	4940-4970m	1.70	9.95	0.87	8.75
313-170	5030-5060m	1.79	2.65	0.28	10.54
313-174A	5150-5180m	2.57	30.85	1.69	5.47
313-175	5180-5210m	2.11	8.85	0.65	7.34
313-176A	5210-5240m	0.17	7.75	3.65	47.06
313-177A	5240-5270m	2.00	10.20	0.20	1.96
313-179A	5300-5330m	1.37	11.81	0.58	4.88
313-181	5360-5390m	2.48	11.68	0.10	0.86

TABLE 7

PYROLYSIS ANALYSIS

SAMPLE NUMBER	DEPTH	ORGANIC CARBON	PPM BITUMEN*	PPM	PYROLYSATE ORGANIC CARBON	BITUMEN PYROLYSATE	PEAK PYROL. TEMP. (°C)
				PYROLYSATE ⁺			
313-001	1375m	0.82	42	2594	0.32	0.02	540
313-005	1560m	0.66	63	1296	0.20	0.05	510
313-008A	1590-600m	0.60	53	865	0.14	0.06	510
313-012	1660-690m	0.73	86	1755	0.24	0.05	510
313-014	1720-750m	0.64	56	1106	0.17	0.05	490 (540)
313-016	1780m	0.61	39	891	0.15	0.04	470
313-024	1950m	0.63	68	986	0.16	0.07	490
313-030	2080-110m	0.56	86	928	0.17	0.09	500
313-034	2170-200m	0.56	29	964	0.17	0.03	480 (540)
313-038	2259m	0.32	36	662	0.21	0.05	470 (540)
313-083	2370m	0.70	22	701	0.10	0.03	500
313-055	2562m	0.82	36	863	0.11	0.04	487
313-090	2580m	0.54	5	581	0.11	0.01	490
313-094	2760m	0.46	9	515	0.11	0.02	490
313-058	2795m	0.65	15	784	0.12	0.20	488
313-059	2900m	1.05	17	1071	0.10	0.02	495
313-102	2930-3020m	2.81	17	2311	0.08	0.01	507
313-108	3170-200m	0.79	10	1117	0.14	0.01	500
313-112	3290-320m	0.68	16	566	0.08	0.03	500
313-116	3410-440m	0.64	10	573	0.09	0.02	493
313-120	3530-560m	0.91	18	930	0.10	0.02	500
313-126	3710-740m	0.56	11	410	0.07	0.03	480
313-068	3781m	0.51	65	584	0.11	0.11	500
313-130	3830-860m	0.68	14	277	0.04	0.05	483
313-071	3930m	1.03	15	894	0.09	0.02	496
313-073	4015m	0.86	20	674	0.08	0.03	497
313-138	4070-100m	1.90	16	3148	0.17	0.01	500
313-139A	4100-130m	9.87	31	16956	0.17	0.01	500
313-142	4190-220m	3.00	30	4802	0.16	0.01	500
313-144	4250-280m	1.21	32	2221	0.18	0.02	500
313-148	4370-400m	1.40	9	1665	0.12	0.01	500

IC
1716
56
19
IC
56
19
1950

TABLE 7

PYROLYSIS ANALYSIS

SAMPLE NUMBER	DEPTH	ORGANIC CARBON	PPM BITUMEN*	PPM PYROLYSATE ⁺	PYROLYSATE		PEAK PYROL. TEMP. (°C)
					ORGANIC CARBON	BITUMEN PYROLYSATE	
313-153	4520-550m	1.05	23	817	0.08	0.03	500
313-156	4610-640m	1.35	23	1548	0.12	0.02	500
313-164	4850-880m	2.08	11	2869	0.14	0.01	500
313-167	4940-970m	1.70	19	2124	0.13	0.01	500
313-170	5030-060m	1.79	14	1795	0.10	0.01	500
313-174A	5150-180m	2.57	27	2573	0.10	0.01	500
313-175	5180-210m	2.11	19	2075	0.10	0.01	495
313-176A	5210-240m	0.17	11	105	0.06	0.10	485
313-177A	5240-270m	1.98	18	2262	0.11	0.01	500
313-179A	5300-330m	1.37	12	1304	0.10	0.01	500
313-181	5360-390m	2.48	10	2506	0.10	0.01	500

*300°C

+550°C

5340

TABLE 8
COMPOSITION (NORMALISED %) OF C₁₅+ PARAFFIN - NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-001	-005A	-008A	-012	-014	-016	-024
DEPTH	1375m	1560m	1590-600m	1660-690m	1720-750m	1780m	1950m
SAMPLE TYPE							
nC ₁₅	5.1	8.9	6.1	8.8	7.9	3.8	3.4
nC ₁₆	7.3	10.0	7.8	10.2	9.3	6.9	6.3
nC ₁₇	8.8	9.1	10.4	11.6	9.6	10.0	9.9
nC ₁₈	9.5	7.9	8.7	8.8	8.2	9.6	9.1
nC ₁₉	8.1	6.6	6.5	5.7	5.9	6.7	6.9
nC ₂₀	9.4	7.0	7.6	5.8	5.1	6.8	6.7
nC ₂₁	7.3	5.1	6.1	4.0	3.8	5.4	5.7
nC ₂₂	7.4	4.4	6.1	3.8	3.8	5.8	5.7
nC ₂₃	6.7	4.6	5.8	4.4	5.0	6.3	6.7
nC ₂₄	6.1	3.7	5.1	3.7	5.2	6.1	6.5
nC ₂₅	4.7	4.9	4.6	5.0	6.4	6.4	6.3
nC ₂₆	4.0	3.3	3.7	3.5	4.9	5.1	5.3
nC ₂₇	3.4	5.4	4.1	5.5	6.0	5.8	4.6
nC ₂₈	2.9	3.1	3.7	3.7	3.6	3.8	3.9
nC ₂₉	3.4	5.9	4.6	5.7	5.6	4.9	3.8
nC ₃₀	1.9	2.1	2.7	3.0	3.6	2.6	2.8
nC ₃₁	2.3	4.2	3.1	3.8	3.2	2.8	2.9
nC ₃₂	0.8	1.4	1.7	1.4	1.0	0.8	1.3
nC ₃₃	0.6	1.3	1.0	1.0	0.8	0.3	1.1
nC ₃₄	0.1	0.6	0.5	0.3	0.8	0.2	0.7
nC ₃₅	0.1	0.3	0.2	0.3	0.4	0.2	0.4
PARAFFIN	8.3	17.7	13.4	11.1	18.9	16.4	18.6
ISOPRENOID	1.0	1.7	1.9	1.5	2.6	2.2	2.0
NAPHTHENE	90.7	80.6	84.7	87.4	78.5	81.4	79.4
CPI INDEX A	0.96	1.23	1.00	1.20	1.16	1.08	1.03
CPI INDEX B	1.19	1.84	1.22	1.58	1.43	1.38	1.14
PRISTANE/PHYTANE	0.81	1.02	0.91	1.33	1.27	0.95	1.17
PRISTANE/nC ₁₇	0.59	0.53	0.64	0.68	0.81	0.66	0.58

TABLE 8
COMPOSITION (NORMALISED %) OF C₁₅₊ PARAFFIN - NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-030	-034A	-038	-043	-074	-081	-082
DEPTH	2080-110m	2170-200m	2259m	2345m			
SAMPLE TYPE				MUD	MUD	RAG	RAG
nC ₁₅	6.8	3.5	3.0	8.0	2.5	0.6	4.0
nC ₁₆	9.0	5.6	5.5	10.8	7.9	2.9	10.2
nC ₁₇	12.5	8.5	9.5	14.3	11.9	19.1	13.1
nC ₁₈	13.6	8.8	9.6	14.0	12.5	15.8	13.2
nC ₁₉	7.0	6.4	5.1	9.3	12.0	11.8	12.7
nC ₂₀	6.0	6.4	5.3	7.5	10.3	9.4	10.8
nC ₂₁	4.2	5.7	4.2	5.1	8.6	7.1	8.3
nC ₂₂	4.6	5.7	5.5	4.2	7.2	6.2	6.2
nC ₂₃	5.3	6.3	6.6	3.3	5.9	5.7	4.7
nC ₂₄	5.3	6.2	7.7	3.1	4.5	5.1	3.1
nC ₂₅	5.7	6.1	7.7	3.5	3.5	4.5	2.2
nC ₂₆	4.2	5.3	6.4	2.9	2.5	3.3	2.9
nC ₂₇	4.2	5.1	5.8	2.5	2.4	2.6	1.4
nC ₂₈	2.7	4.7	4.2	3.1	1.7	1.6	2.3
nC ₂₉	2.9	4.8	4.5	1.8	1.0	1.5	1.1
nC ₃₀	2.2	3.2	3.7	1.4	2.2	0.7	1.8
nC ₃₁	2.0	3.5	2.9	0.9	1.7	1.2	0.9
nC ₃₂	0.7	1.3	1.4	1.2	0.9	0.3	0.6
nC ₃₃	0.5	1.3	0.6	1.2	0.6	0.2	0.2
nC ₃₄	0.4	1.5	0.5	0.9	0.2	0.2	0.2
nC ₃₅	0.2	0.3	0.3	0.8	0.1	0.1	0.1
PARAFFIN	10.0	14.3	13.8	9.7	26.5	26.7	15.9
ISOPRENOID	3.0	1.4	1.4	1.5	2.3	3.3	2.4
NAPHTHENE	87.0	84.3	84.8	88.8	71.2	70.0	81.7
CPI INDEX A	1.06	1.02	1.00	0.95	1.07	1.02	0.93
CPI INDEX B	1.26	1.18	1.14	0.92	0.99	1.28	0.66
PRISTANE/PHYTANE	1.40	1.02	0.91	1.11	1.08	0.69	0.97
PRISTANE/nC ₁₇	1.40	0.58	0.53	0.57	0.38	0.26	0.56

TABLE 8
COMPOSITION (NORMALISED %) OF C₁₅₊ PARAFFIN - NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-083	-055	-090	-094	-058	-059	-102
DEPTH	2370m	2562m	2580m	2760m	2795m	2900m	2990-3020m
SAMPLE TYPE							
nC ₁₅	0.1	0.1	1.1	0.0	0.0	0.0	0.0
nC ₁₆	0.2	0.3	5.3	0.0	0.4	0.4	2.2
nC ₁₇	1.2	0.8	8.6	1.6	3.4	3.5	6.3
nC ₁₈	6.1	2.1	9.9	5.6	8.7	7.3	8.7
nC ₁₉	11.8	5.6	9.9	8.4	11.5	9.0	9.3
nC ₂₀	13.2	8.4	9.3	9.4	13.5	9.7	9.0
nC ₂₁	11.8	10.2	8.5	9.7	12.4	9.3	8.9
nC ₂₂	10.8	10.9	7.7	9.9	10.6	9.1	8.7
nC ₂₃	9.9	10.7	7.1	9.5	9.4	8.4	8.4
nC ₂₄	8.1	9.8	6.1	9.7	8.4	8.0	7.2
nC ₂₅	6.6	8.4	5.1	7.5	6.5	6.8	6.2
nC ₂₆	5.0	7.2	4.5	6.3	5.0	6.0	5.1
nC ₂₇	4.0	6.3	3.7	5.4	3.6	5.2	4.8
nC ₂₈	2.7	4.9	3.1	4.2	2.5	4.4	3.5
nC ₂₉	2.8	5.1	2.7	3.8	1.9	4.0	4.0
nC ₃₀	1.1	3.0	2.0	2.5	1.0	2.9	2.1
nC ₃₁	1.7	3.6	1.7	2.5	0.7	2.4	2.3
nC ₃₂	1.0	1.3	1.7	1.8	0.2	1.4	1.2
nC ₃₃	0.7	1.1	0.9	1.2	0.1	1.1	1.2
nC ₃₄	0.8	0.3	0.5	0.5	0.1	0.6	0.5
nC ₃₅	0.2	0.1	0.3	0.4	0.1	0.4	0.4
PARAFFIN	24.5	32.1	64.8	30.4	42.0	47.6	42.5
ISOPRENOID	0.6	0.3	2.8	0.6	2.4	2.4	2.6
NAPHTHENE	74.9	67.6	32.4	69.0	55.6	50.0	54.9
CPI INDEX A	1.04	1.03	1.02	0.99	1.03	1.00	1.05
CPI INDEX B	1.21	1.18	1.01	1.07	1.10	1.06	1.21
PRISTANE/PHYTANE	0.19	0.43	1.50	0.33	0.58	0.71	0.90
PRISTANE/nC ₁₇	0.31	0.33	0.67	0.33	0.63	0.60	0.46

TABLE 8
COMPOSITION (NORMALISED %) OF C₁₅₊ PARAFFIN - NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-108	-112	-116	-120	-126
DEPTH	3170-200m	3290-320m	3410-440m	3530-566m	3710-740m
SAMPLE TYPE					
nC ₁₅	0.0	0.0	0.0	0.0	0.0
nC ₁₆	0.0	1.4	0.1	0.1	0.0
nC ₁₇	1.3	5.6	1.6	0.8	2.2
nC ₁₈	4.7	9.7	8.4	6.1	8.8
nC ₁₉	7.9	11.4	13.1	12.6	13.1
nC ₂₀	9.2	10.6	15.3	13.5	13.5
nC ₂₁	9.4	9.8	14.4	12.4	12.4
nC ₂₂	9.5	8.9	12.4	11.4	10.8
nC ₂₃	9.2	8.3	9.0	9.8	9.1
nC ₂₄	8.7	6.7	7.1	8.0	7.3
nC ₂₅	7.6	5.9	5.4	6.4	5.3
nC ₂₆	6.5	4.8	4.1	4.4	4.2
nC ₂₇	5.9	4.0	3.0	3.7	3.1
nC ₂₈	4.8	3.0	2.0	2.4	2.4
nC ₂₉	4.6	3.0	1.8	2.8	2.3
nC ₃₀	3.3	2.0	0.8	1.5	1.5
nC ₃₁	3.0	1.5	0.9	1.9	1.6
nC ₃₂	1.8	1.4	0.2	0.7	0.9
nC ₃₃	1.5	1.3	0.2	0.6	0.8
nC ₃₄	0.8	0.4	0.1	0.5	0.5
nC ₃₅	0.5	0.3	0.1	0.3	0.2
PARAFFIN	37.3	39.0	37.0	41.3	40.5
ISOPRENOID	0.7	2.0	1.6	0.8	1.5
NAPHTHENE	62.0	59.0	61.4	57.9	58.0
CPI INDEX A	1.02	1.05	1.03	1.05	1.03
CPI INDEX B	1.10	1.07	1.17	1.27	1.09
PRISTANE/PHYTANE	0.38	0.63	0.20	0.11	0.33
PRISTANE/nC ₁₇	0.36	0.36	0.43	0.22	0.42

TABLE 8
COMPOSITION (NORMALISED %) OF C₁₅₊ PARAFFIN – NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-068	-130	-071	-073	-138	-139A
DEPTH	3781m	3830-860m	3930m	4015m	4070-100m	4100-130m
SAMPLE TYPE						
nC ₁₅	0.0	0.0	0.0	0.0	0.0	0.2
nC ₁₆	0.0	0.0	0.0	0.1	0.1	1.2
nC ₁₇	0.3	1.7	0.3	0.6	3.4	4.6
nC ₁₈	1.4	7.2	2.1	3.3	10.9	7.4
nC ₁₉	4.8	11.0	9.5	7.2	13.4	7.8
nC ₂₀	8.5	12.1	16.5	10.1	15.4	16.8
nC ₂₁	10.7	11.8	17.7	11.8	11.9	9.6
nC ₂₂	11.8	10.8	15.0	12.7	11.2	6.5
nC ₂₃	11.8	9.5	11.6	12.0	9.4	6.2
nC ₂₄	10.7	7.9	9.1	10.3	6.4	4.6
nC ₂₅	9.0	6.2	6.2	7.8	5.0	6.2
nC ₂₆	7.1	4.9	4.1	6.1	3.3	3.9
nC ₂₇	6.1	3.9	2.7	4.9	3.3	8.0
nC ₂₈	3.5	3.1	1.5	3.5	1.5	2.1
nC ₂₉	5.0	3.0	1.5	3.4	2.3	7.4
nC ₃₀	2.5	1.9	0.5	1.9	0.7	2.1
nC ₃₁	3.8	2.1	1.1	2.3	1.0	3.0
nC ₃₂	1.2	1.1	0.3	0.9	0.4	0.9
nC ₃₃	1.2	1.0	0.2	0.6	0.3	0.5
nC ₃₄	0.4	0.5	0.2	0.3	0.1	0.7
nC ₃₅	0.2	0.3	0.2	0.1	0.1	0.2
PARAFFIN	30.0	40.4	32.3	30.8	31.0	37.9
ISOPRENOID	0.2	1.1	0.3	0.4	1.1	1.7
NAPHTHENE	69.8	58.5	67.4	68.8	67.9	60.4
CPI INDEX A	1.06	1.03	1.07	1.03	1.07	1.34
CPI INDEX B	1.33	1.12	1.28	1.17	1.48	2.33
PRISTANE/PHYTANE	0.20	0.30	0.20	0.11	0.42	0.92
PRISTANE/nC ₁₇	0.33	0.35	0.50	0.20	0.32	0.46

TABLE 8
COMPOSITION (NORMALISED %) OF C₁₅₊ PARAFFIN - NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-142	-144	-148	-153	-156
DEPTH	4190-220m	4250-280m	4370-400m	4520-550m	4610-640m
SAMPLE TYPE					
nC ₁₅	0.6	0.0	0.0	0.0	0.0
nC ₁₆	0.6	0.2	0.1	0.0	0.1
nC ₁₇	4.3	3.0	1.8	1.2	3.3
nC ₁₈	9.6	8.1	7.2	7.8	13.0
nC ₁₉	13.6	10.5	11.1	13.3	17.2
nC ₂₀	13.6	10.6	11.8	13.3	16.9
nC ₂₁	9.9	10.3	11.4	11.9	14.0
nC ₂₂	8.8	10.3	10.5	10.6	10.3
nC ₂₃	7.3	9.2	9.2	9.2	7.1
nC ₂₄	6.4	7.2	7.5	7.4	5.5
nC ₂₅	6.4	6.3	6.6	5.9	4.2
nC ₂₆	4.0	4.5	4.7	4.8	2.8
nC ₂₇	4.9	5.0	5.0	4.0	2.1
nC ₂₈	2.2	2.9	3.0	2.9	1.2
nC ₂₉	3.6	4.9	4.2	2.7	1.1
nC ₃₀	1.2	2.0	1.4	1.5	0.4
nC ₃₁	1.8	3.1	2.5	1.5	0.4
nC ₃₂	0.4	0.7	0.8	0.8	0.1
nC ₃₃	0.3	1.0	1.0	0.8	0.1
nC ₃₄	0.1	0.3	0.2	0.3	0.1
nC ₃₅	0.1	0.1	0.1	0.2	0.1
PARAFFIN	28.7	37.6	38.4	50.3	49.8
ISOPRENOID	1.2	0.9	0.7	0.8	1.7
NAPHTHENE	70.1	61.5	60.9	48.9	48.5
CPI INDEX A	1.10	1.09	1.10	1.03	1.08
CPI INDEX B	1.66	1.53	1.49	1.13	1.27
PRISTANE/PHYTANE	0.45	0.44	0.42	0.16	0.52
PRISTANE/nC ₁₇	0.31	0.24	0.31	0.19	0.35

TABLE 8
COMPOSITION (NORMALISED %) OF C₁₅₊ PARAFFIN - NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-164	-167	-170	-174A	-175
DEPTH	4850-880m	4940-970m	5030-060m	5150-180m	5180-210m
SAMPLE TYPE					
nC ₁₅	0.0	0.0	0.0	0.0	0.0
nC ₁₆	1.1	0.0	0.0	0.0	0.1
nC ₁₇	6.3	4.6	0.2	0.8	3.0
nC ₁₈	11.7	13.5	3.5	6.4	9.7
nC ₁₉	13.6	16.9	11.3	12.8	12.8
nC ₂₀	12.6	17.1	13.1	17.3	12.5
nC ₂₁	10.5	13.7	12.5	16.8	11.6
nC ₂₂	9.1	9.8	11.4	13.0	10.2
nC ₂₃	7.8	7.3	9.9	10.5	8.6
nC ₂₄	6.3	5.5	7.7	7.8	7.2
nC ₂₅	5.1	4.0	6.2	5.6	5.7
nC ₂₆	3.9	2.6	4.8	3.5	4.3
nC ₂₇	3.3	1.9	4.7	2.3	3.9
nC ₂₈	2.3	1.0	3.2	1.3	2.7
nC ₂₉	2.4	0.9	4.5	1.0	2.9
nC ₃₀	1.2	0.4	1.9	0.3	1.1
nC ₃₁	1.3	0.3	3.1	0.3	1.7
nC ₃₂	0.6	0.1	0.8	0.1	0.7
nC ₃₃	0.6	0.1	0.9	0.1	0.7
nC ₃₄	0.2	0.1	0.2	0.1	0.3
nC ₃₅	0.1	0.1	0.2	0.1	0.3
PARAFFIN	48.4	52.4	44.0	50.9	47.7
ISOPRENOID	2.1	2.1	0.2	0.5	1.2
NAPHTHENE	49.5	45.5	55.8	48.6	51.1
CPI INDEX A	1.04	1.10	1.07	1.11	1.05
CPI INDEX B	1.21	1.29	1.40	1.23	1.26
PRISTANE/PHYTANE	0.69	0.48	0.33	0.22	0.47
PRISTANE/nC ₁₇	0.28	0.28	0.50	0.25	0.28

TABLE 8
COMPOSITION (NORMALISED %) OF C₁₅₊ PARAFFIN - NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-176A	-177A	-179A	-181	-182D
DEPTH	5210-240m	5240-270m	5300-330m	5360-390m	5390-420m
SAMPLE TYPE					
nC ₁₅	0.0	0.0	0.6	0.1	0.0
nC ₁₆	0.0	0.0	0.1	0.1	0.0
nC ₁₇	0.2	0.6	0.9	0.4	0.7
nC ₁₈	0.8	1.9	2.0	3.7	4.8
nC ₁₉	4.2	7.2	6.8	9.2	9.7
nC ₂₀	8.5	14.6	13.8	12.1	11.8
nC ₂₁	10.9	16.3	13.6	12.5	13.1
nC ₂₂	11.0	15.2	13.6	12.0	14.0
nC ₂₃	9.7	12.3	12.0	10.8	11.6
nC ₂₄	9.7	9.9	10.2	8.8	10.0
nC ₂₅	8.7	7.2	8.3	7.2	7.2
nC ₂₆	7.2	4.9	4.9	5.5	4.7
nC ₂₇	7.4	3.8	4.9	4.7	4.0
nC ₂₈	4.8	2.0	1.9	3.0	1.8
nC ₂₉	7.9	1.9	3.3	3.5	2.7
nC ₃₀	2.8	0.6	0.6	1.7	1.2
nC ₃₁	4.2	0.8	1.3	2.4	2.0
nC ₃₂	1.0	0.4	0.6	0.8	0.3
nC ₃₃	0.6	0.1	0.1	0.8	0.2
nC ₃₄	0.1	0.1	0.1	0.6	0.2
nC ₃₅	0.1	0.1	0.1	0.2	0.2
PARAFFIN	23.7	41.1	37.5	33.9	18.5
ISOPRENOID	0.1	0.3	0.4	0.3	0.4
NAPHTHENE	76.2	58.6	62.1	65.8	81.1
CPI INDEX A	1.07	1.06	1.09	1.06	1.03
CPI INDEX B	1.47	1.27	1.61	1.29	1.44
PRISTANE/PHYTANE	1.00	0.50	0.29	0.14	0.33
PRISTANE/nC ₁₇	0.50	0.40	0.29	0.25	0.75

TABLE 9-
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (% of Rock)
313-045X	Sample A	Rock Powder		4.28
313-046X	Sample B	Rock Powder		2.58, 2.53
313-047X	Sample C	Rock Powder		0.13
313-078X	Sample D	Ground Sample		0.55
313-079X	Sample E	Ground Sample		0.11
313-080X	Sample F	Ground Sample		0.73
313-188X	Sample G	Ground Sample		0.50
313-189X	Sample H	Ground Sample		NIL
313-190X	Sample I	Ground Sample		3.68
313-191X	Sample J	Ground Sample		2.17

TABLE 10
VISUAL KEROGEN DATA

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC MATTER DESCRIPTION				THERMAL MATURATION INDEX
		TYPES	REMARKS	PARTICLE SIZE	PRESERV- ATION	
313-048	Sample A Core	Am;Al*-H*-W;C-(S)	*passing to Am. Oil prone.	F-C	G	2- to 2
313-049	Sample B Core	Am-W-C;H*-Al*;S	reworking. *Includes mat- erial passing to Am.	M	F-G	2- to 2/2
313-050	Sample C Core	W;C; (H-Am-S)	largely reworked?	F-C	F-G	2-(?)
313-075	Sample D Unground	W;C;H	abundant f.g. degraded (?) material, H-like. Reworking. Unreliable.	F-M	F	2- to 2(??)
313-076	Sample E Unground		almost entirely very fine grained and unrecognisable (includes bacterial cells?). Minor W-H-Am-Al.	F	F	2(??)
313-077	Sample F Unground	W;C; (H-Al-S)	abundant reworking.	F-C	F	2/2 to 2+
313-184	Sample G Core	C;W-Am*;H	lean. *Degraded W, not true Am. Reworking (3)	F-M	F	2- to 2(??)
313-185	Sample H Core	W-C;-;H	almost barren. Reworking	F	F	2-/2- to 2(?)
313-186	Sample I Core	Am*;W-H ⁺ ;C-Al	*includes fine grained degraded material. ⁺ Passing to Am	M	F-G	2- to 2
313-187	Sample J Core	W-Am;C-H;Al	some at 2- and 2- to 2. W partially degraded. H passing to Am.	M	F	2

TABLE 11

VITRINITE REFLECTANCE DATA

GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	AVERAGE REFLECTIVITY R _o (%)			NUMBER OF PARTICLES			REMARKS
			1	2	3	1	2	3	
313-048	Sample A	CORE	0.48*	0.73	-	5	2	-	*preferred
313-049	Sample B	CORE	0.55	0.84	-	13	2	-	prefer 0.50%
313-050	Sample C	CORE	1.89	-	-	20	-	-	prefer 1.66%
313-075	Sample D	UNGROUND	1.59	-	-	20	-	-	prefer 1.04%, 1.34%
313-076	Sample E	UNGROUND	No Determination Possible						
313-077	Sample F	UNGROUND	1.62	-	-	23	-	-	prefer 1.19%
313-184	Sample G	CORE PIECES	2.61	-	-	21	-	-	
313-185	Sample H	CORE PIECES	No Determination Possible						
313-186	Sample I	CORE PIECES	0.50	0.79	-	13	1	-	prefer 0.48%
313-187	Sample J	CORE PIECES	0.59	0.82	-	16	4	-	prefer 0.52%

N.B. "preferred values" refer to sub-populations.

TABLE 12A
WEIGHT (GRAMMES) OF C₁₅+ EXTRACTS AND CHROMATOGRAPHIC FRACTIONS

GEOCHEM SAMPLE NUMBER	INTERVAL	ROCK EXTRACTED	TOTAL EXTRACT OBTAINED	TOTAL EXTRACT		nC ₅ SOLUBLE FRACTION				
				Precipd. Asphaltenes	nC ₅ soluble	Paraffin - Naphthenes	Aromatics	Eluted NSO's	Non-eluted NSO's	Sulphur
313-045	Sample A	24.89000	0.06255	0.05054	0.01201	0.00446	0.00477	0.00245	0.00033	-
313-046	Sample B	15.83000	0.02532	0.02020	0.00512	0.00246	0.00140	0.00093	0.00033	-
313-047	Sample C	23.30000	0.00333	0.00204	0.00129	0.00035	0.00032	0.00039	0.00023	-
313-078	Sample D	31.54000	0.00230	0.00115	0.00116	0.00037	0.00034	0.00043	0.00003	-
313-079	Sample E	27.26000	0.00220	0.00092	0.00128	0.00071	0.00009	0.00048	-	-
313-080	Sample F	27.57000	0.00432	0.00318	0.00114	0.00021	0.00032	0.00041	0.00020	-
313-188	Sample G	39.80000	0.01105	0.00780	0.00325	0.00074	0.00070	0.00160	0.00021	-
313-189	Sample H	35.33000	0.00651	0.00452	0.00199	0.00034	0.00025	0.00116	0.00023	-
313-190	Sample I	36.12000	0.11404	0.07818	0.03586	0.00765	0.01312	0.01508	-	-
313-191	Sample J	16.66000	0.02111	0.01355	0.00756	0.00102	0.00238	0.00390	0.00026	-

TABLE 12B
CONCENTRATION (PPM) OF EXTRACTED C₁₅₊ MATERIAL IN ROCK

GEOCHEM SAMPLE NUMBER	INTERVAL	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS				
			Paraffin - Naphthenes	Aromatics	TOTAL	Precipitd. Asphaltenes	Eluted NSO's	Non-eluted NSO's	Sulphur	TOTAL
313-045	Sample A	2513	179	192	371	2031	99	13	-	2142
313-046	Sample B	1599	155	88	244	276	59	21	-	1356
313-047	Sample C	143	15	14	29	88	17	10	-	114
313-078	Sample D	73	12	11	22	36	13	1	-	51
313-079	Sample E	81	26	3	29	34	18	-	-	51
313-080	Sample F	157	8	12	19	115	15	7	-	137
313-188	Sample G	278	19	18	36	196	40	5	-	241
313-189	Sample H	184	10	7	17	128	33	7	-	167
313-190	Sample I	3157	212	363	575	2164	418	-	-	2582
313-191	Sample J	1267	61	143	204	813	234	16	-	1063

TABLE 12C

COMPOSITION (NORMALISED %) OF C₁₅₊ MATERIAL EXTRACTED FROM ROCK

GEOCHEM SAMPLE NUMBER	INTERVAL	HYDROCARBONS			NON HYDROCARBONS					HC NON HC
		Paraffin - Naphthenes	Aromatics	P - N AROM	Preciptd. Asphaltenes	Eluted NSO's	Non eluted NSO's	ASPH Sulphur	ASPH NSO	
313-045	Sample A	7.13	7.63	0.94	80.80	3.92	0.53	-	18.15	0.17
313-046	Sample B	9.72	5.53	1.76	79.78	3.67	1.30	-	16.03	0.18
313-047	Sample C	10.51	9.61	1.09	61.26	11.71	7.00	-	3.27	0.25
313-078	Sample D	15.91	14.64	1.09	49.72	18.46	1.27	-	2.52	0.44
313-079	Sample E	32.27	4.09	7.89	41.82	21.82	-	-	1.92	0.57
313-080	Sample F	4.86	7.41	0.66	73.61	9.49	4.63	-	5.21	0.14
313-188	Sample G	6.70	6.33	1.06	70.59	14.48	1.90	-	4.31	0.15
313-189	Sample H	5.38	3.84	1.40	69.43	17.82	3.53	-	3.25	0.10
313-190	Sample I	6.71	11.51	0.58	68.55	13.23	-	-	5.18	0.22
313-191	Sample J	4.83	11.27	0.43	64.19	18.47	1.23	-	3.26	0.19

TABLE 13
COMPOSITION (NORMALISED %) OF C₁₅₊ PARAFFIN - NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-045	-046	-047	-051	-052	-078	-079	-080
DEPTH	Sam.A	Sam.B	Sam.C	GC 1	GC 2	Sam.D	Sam.E	Sam.F
SAMPLE TYPE								
nC ₁₅	0.1	1.3	0.1	4.0	0.9	1.3	1.7	2.3
nC ₁₆	0.4	2.1	0.2	3.8	1.2	1.3	2.4	3.9
nC ₁₇	5.1	2.9	0.3	4.5	2.5	2.6	2.4	4.7
nC ₁₈	7.1	3.6	1.2	4.3	2.4	6.4	2.7	5.5
nC ₁₉	10.3	7.2	7.9	4.3	2.4	7.8	8.9	9.2
nC ₂₀	9.2	9.6	12.2	4.4	5.6	9.2	14.4	12.4
nC ₂₁	10.8	10.8	13.3	4.9	7.2	10.2	14.6	11.9
nC ₂₂	7.7	9.3	13.7	5.3	7.4	10.6	14.6	12.1
nC ₂₃	11.8	10.8	12.4	5.7	7.4	9.7	10.8	9.6
nC ₂₄	5.8	8.1	10.4	6.5	7.1	10.0	8.9	8.6
nC ₂₅	7.3	7.8	8.2	6.8	7.2	7.8	5.9	6.3
nC ₂₆	4.5	5.5	5.7	7.2	6.8	5.4	4.1	4.7
nC ₂₇	5.1	6.0	5.0	6.8	7.3	4.4	3.2	3.6
nC ₂₈	4.9	5.8	2.6	6.8	6.8	3.0	1.4	1.9
nC ₂₉	2.5	3.5	2.7	5.9	7.0	3.2	1.6	1.6
nC ₃₀	3.1	1.8	1.7	5.4	6.1	2.2	0.8	0.7
nC ₃₁	1.7	1.8	1.2	4.3	6.1	2.4	0.8	0.6
nC ₃₂	1.3	1.2	0.7	4.3	3.9	1.3	0.3	0.3
nC ₃₃	0.9	0.4	0.2	2.4	2.7	0.8	0.1	0.1
nC ₃₄	0.1	0.2	0.1	1.9	1.2	0.3	0.1	0.1
nC ₃₅	0.1	0.1	0.1	0.8	0.8	0.1	-	-
PARAFFIN	29.7	24.0	19.5	68.3	52.0	22.7	23.9	22.2
ISOPRENOID	10.3	0.7	0.5	3.5	2.1	1.0	0.7	1.1
NAPHTHENE	60.0	75.3	80.0	28.2	45.9	76.3	75.5	76.7
CPI INDEX A	1.40	1.16	1.06	0.99	1.06	1.01	1.01	0.99
CPI INDEX B	1.05	1.12	1.23	0.96	1.09	1.18	1.26	1.18
PRISTANE/PHYTANE	0.44	0.74	0.21	3.31	2.63	0.64	1.00	0.94
PRISTANE/nC ₁₇	2.06	0.40	1.33	0.89	1.19	0.67	0.57	0.50

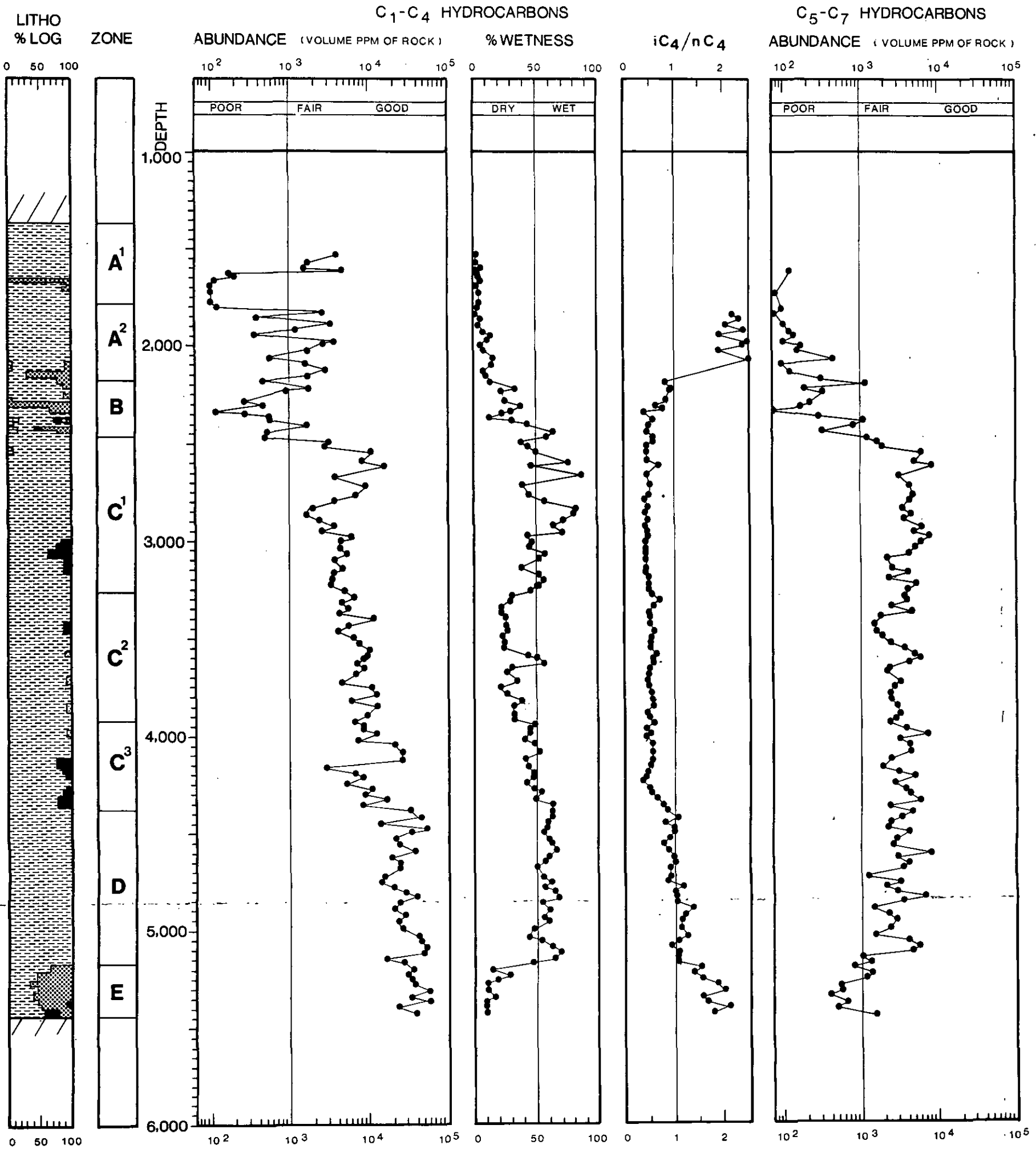
TABLE 13
COMPOSITION (NORMALISED %) OF C₁₅₊ PARAFFIN - NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-188	-189	-190	-191
DEPTH	Sam. G	Sam. H	Sam. I	Sam. J
SAMPLE TYPE				
nC ₁₅	0.6	0.2	5.5	1.1
nC ₁₆	2.0	0.8	7.6	3.5
nC ₁₇	7.3	7.0	9.8	12.4
nC ₁₈	10.4	14.7	6.5	12.1
nC ₁₉	9.8	13.7	7.1	11.9
nC ₂₀	7.3	10.4	5.6	7.0
nC ₂₁	7.0	9.8	6.5	7.6
nC ₂₂	7.3	11.5	4.8	5.3
nC ₂₃	7.8	9.2	7.7	7.7
nC ₂₄	7.9	7.2	3.9	4.7
nC ₂₅	6.8	5.4	5.9	5.9
nC ₂₆	5.4	1.7	4.5	6.2
nC ₂₇	5.2	3.1	8.0	5.6
nC ₂₈	3.8	1.6	5.5	3.3
nC ₂₉	4.8	1.9	3.5	3.4
nC ₃₀	2.1	0.5	3.3	1.1
nC ₃₁	2.9	0.7	2.6	0.9
nC ₃₂	0.8	0.2	1.2	0.2
nC ₃₃	0.4	0.1	0.2	0.1
nC ₃₄	0.4	0.1	0.1	0.1
nC ₃₅	0.2	-	0.1	-
PARAFFIN	36.3	28.0	38.7	26.2
ISOPRENOID	1.7	2.1	11.1	8.2
NAPHTHENE	62.0	69.9	50.2	65.6
CPI INDEX A	1.03	1.08	1.50	1.26
CPI INDEX B	1.33	1.92	1.27	1.25
PRISTANE/PHYTANE	0.67	0.54	0.99	0.81
PRISTANE/nC ₁₇	0.25	0.38	1.46	1.13

FIGURE 1

C₁-C₇ HYDROCARBONS

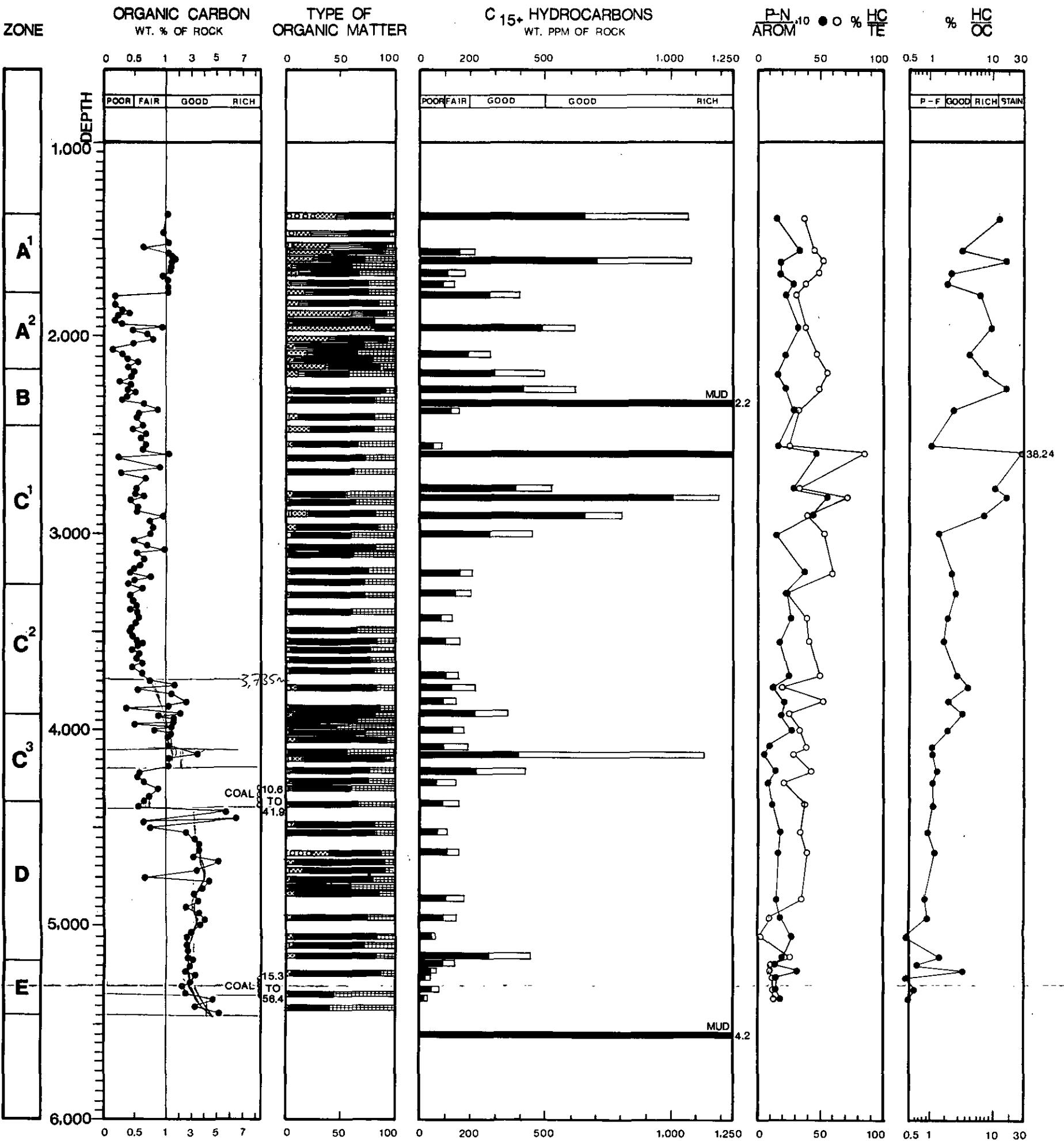
WELL 30/4-1



LITHOLOGIES

- | | | |
|------------------|------------------|---------------------------|
| CARBONATE | SANDSTONE / SAND | EVAPORITE |
| SHALE / MUDSTONE | COAL | LOST CIRCULATION MATERIAL |
| SILTSTONE | IGNEOUS | |

iC₄ - ISOBUTANE
 nC₄ - NORMAL BUTANE

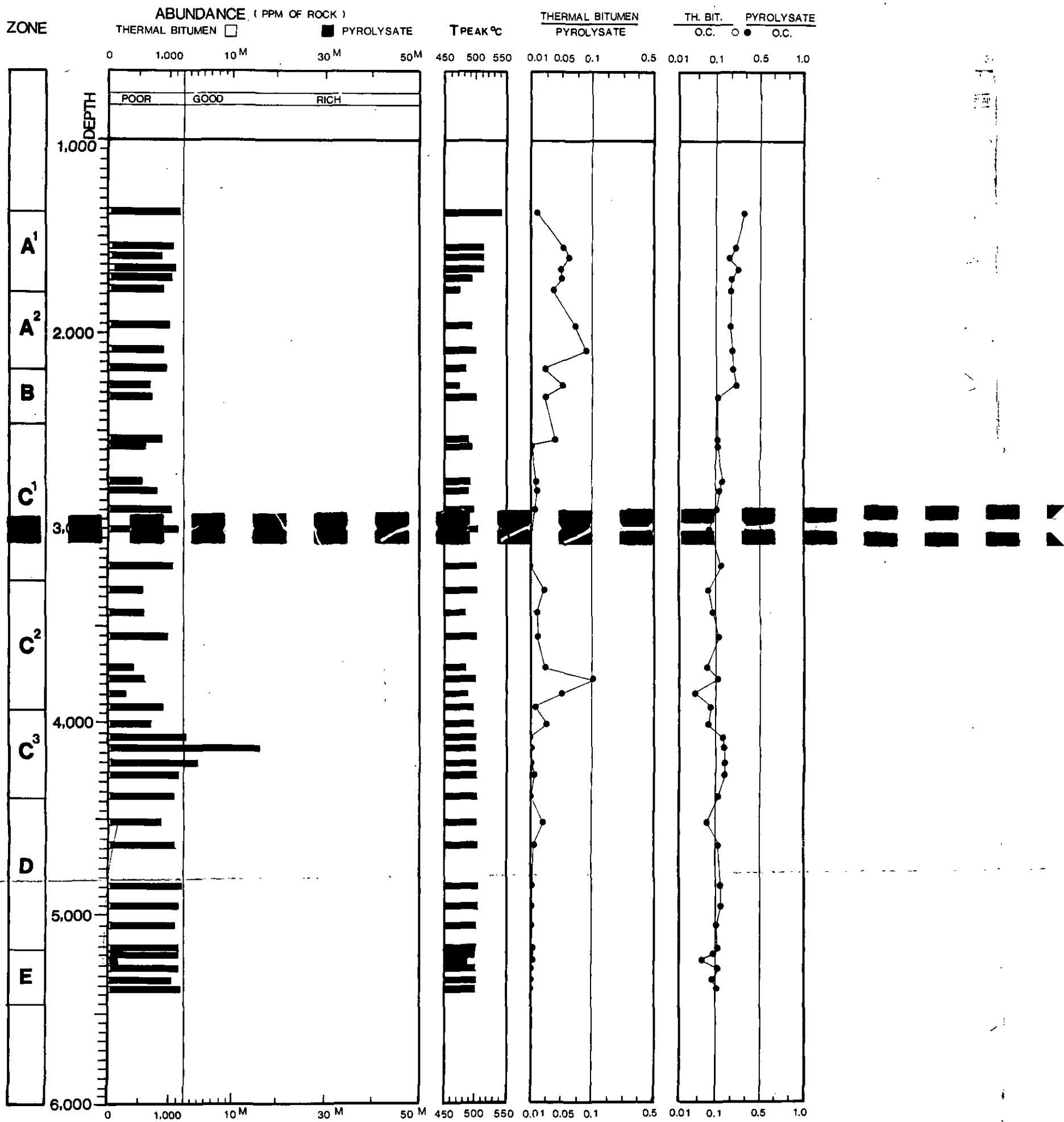


● SHALE
○ OTHER LITHOLOGIES

□ ALGAL
○ AMORPHOUS
▨ HERBACEOUS - SPORE, POLLEN, CUTICLE.
▨ STEM
▨ WOODY
▨ COALY (FUSINITE)

▨ PARAFFIN-NAPHTHENES
□ AROMATIC HYDROCARBONS
▨ FREE ELEMENTAL SULPHUR
▨ N₂-S-O₂ BEARING COMPOUNDS
▨ ASPHALTENES

P-N AROM S NSO ASP
HC = C₁₅₊ HYDROCARBONS
OC = ORGANIC CARBON
TE = TOTAL EXTRACT



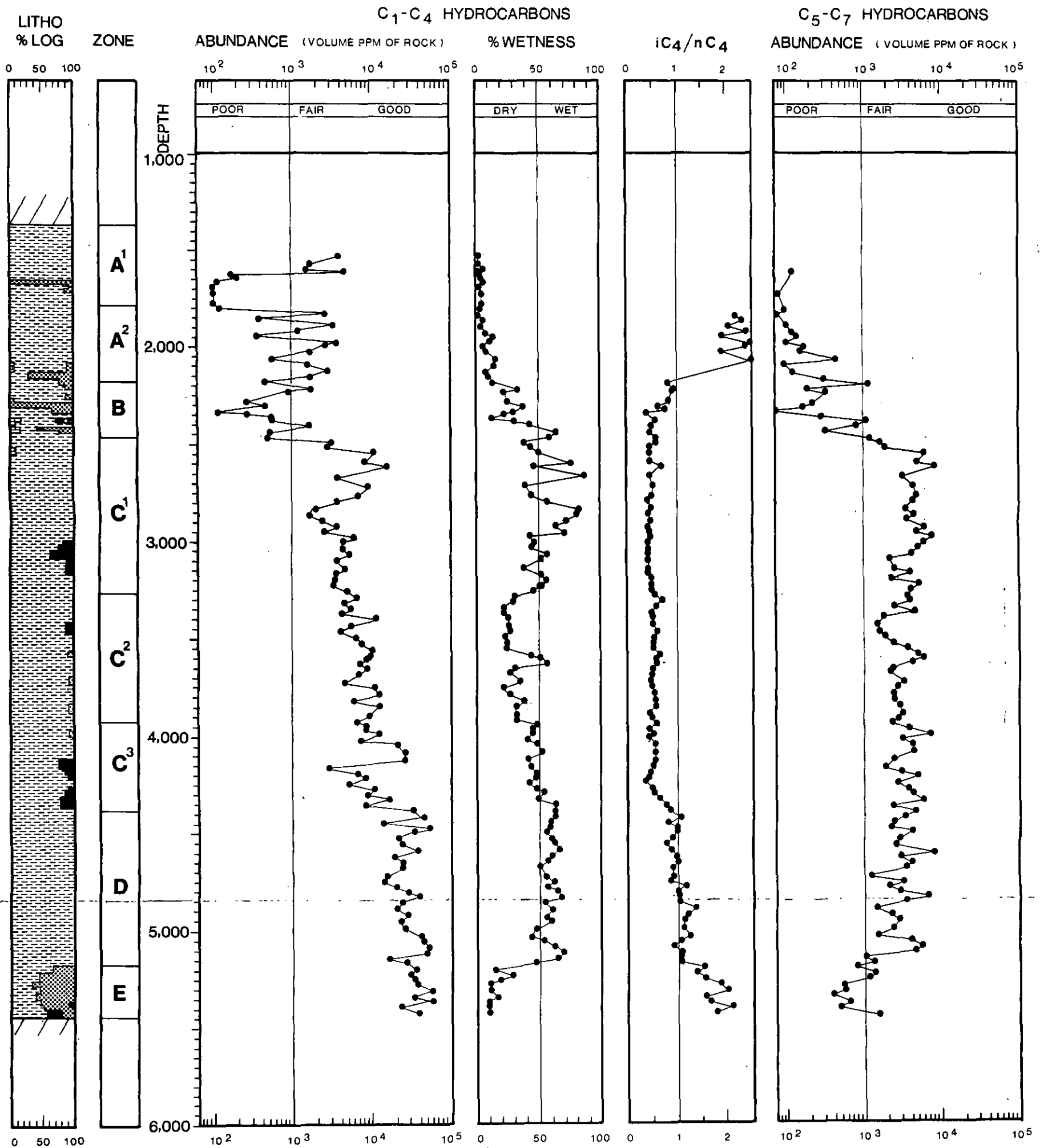
M = 10³

O.C. = ORGANIC CARBON

FIGURE 1

C₁-C₇ HYDROCARBONS

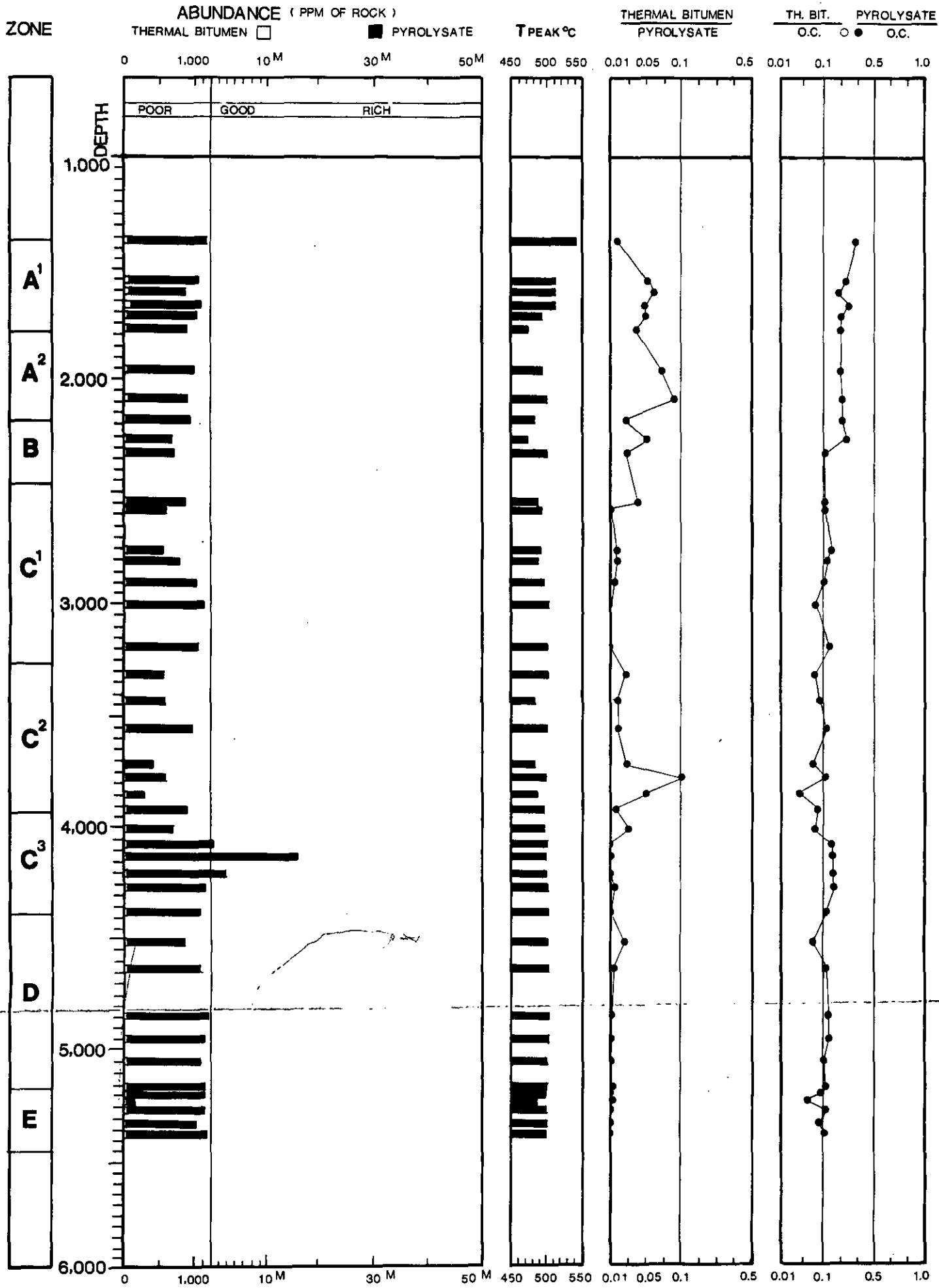
WELL 30/4-1



LITHOLOGIES

- CARBONATE
- SANDSTONE / SAND
- EVAPORITE
- SHALE / MUDSTONE
- COAL
- LOST CIRCULATION MATERIAL
- SILTSTONE
- IGNEOUS
-

iC₄ - ISOBUTANE
nC₄ - NORMAL BUTANE



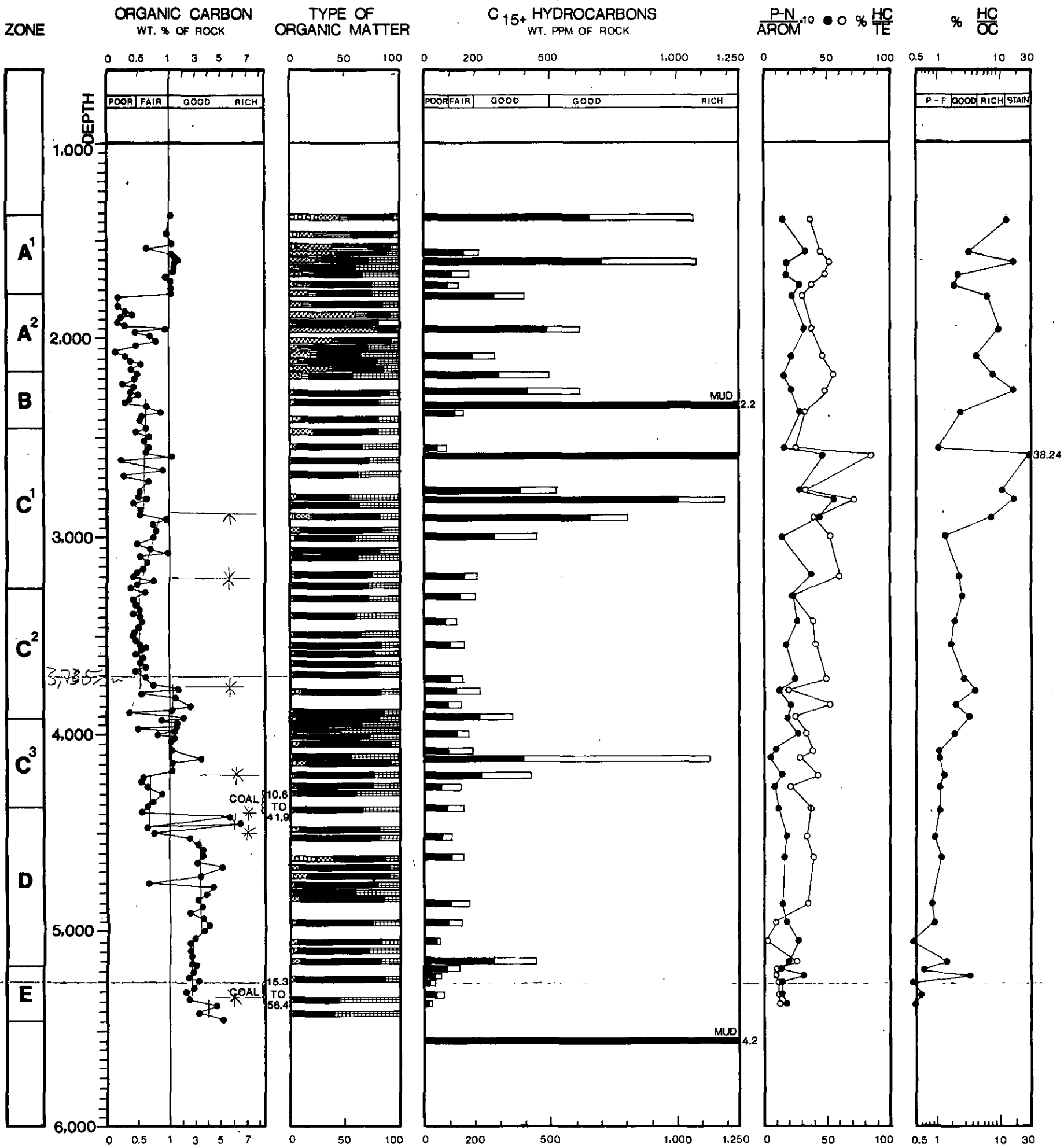
M = 10³

O.C. = ORGANIC CARBON

FIGURE 3

RICHNESS

WELL 30/4-1



● SHALE
○ OTHER LITHOLOGIES

□ ALGAL
○ AMORPHOUS
▨ HERBACEOUS - SPORE, POLLEN, CUTICLE.
▨ STEM
▨ WOODY
▨ COALY (FUSINITE)

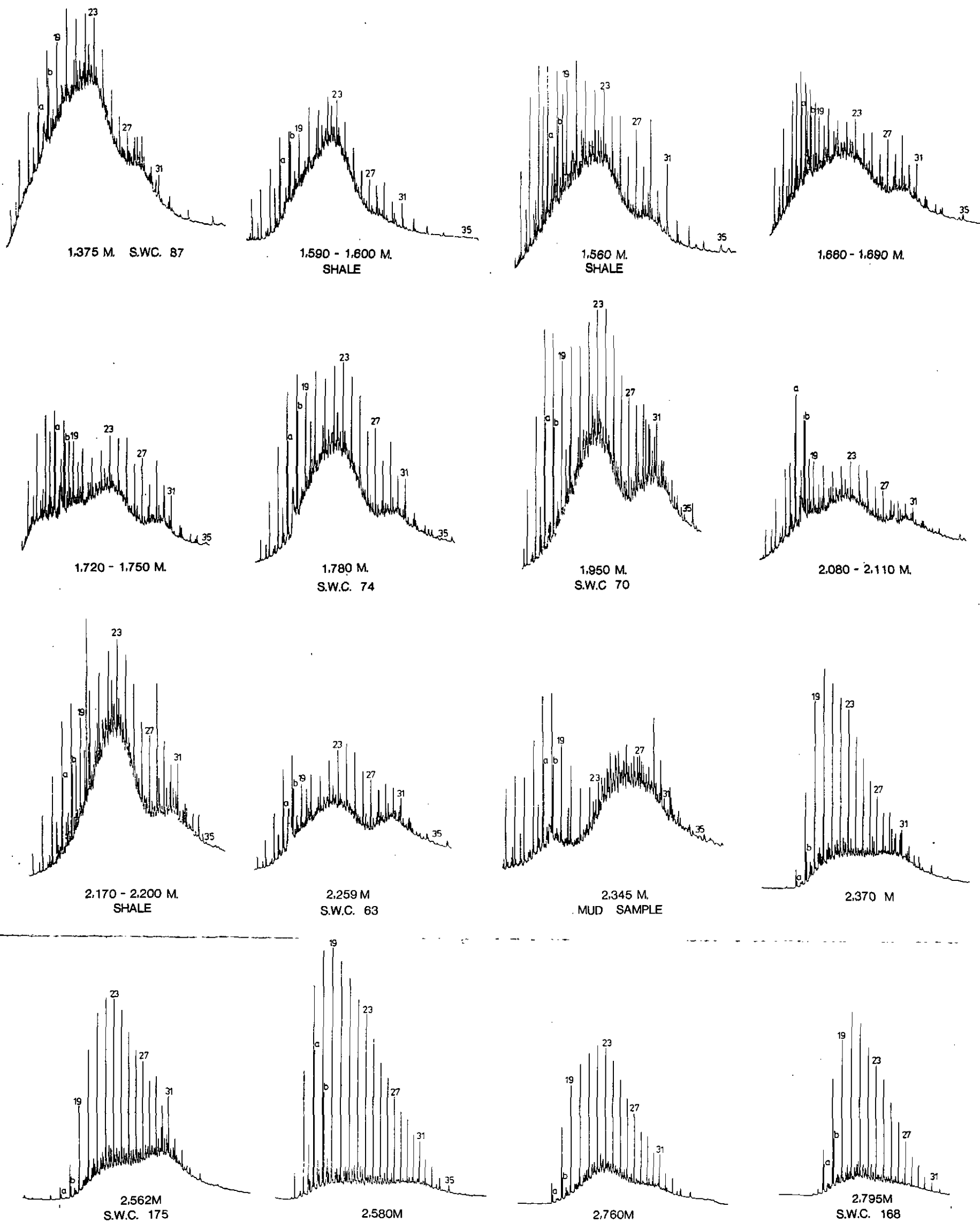
▨ PARAFFIN-NAPHTHENES
□ AROMATIC HYDROCARBONS
▨ FREE ELEMENTAL SULPHUR
▨ N₂-S-O₂ BEARING COMPOUNDS
▨ ASPHALTENES

P-N AROM S NSO ASP HC = C₁₅+ HYDROCARBONS OC = ORGANIC CARBON TE = TOTAL EXTRACT

FIGURE 4a

C₁₅₊ PARAFFIN - NAPHTHENES

WELL 30/4-1



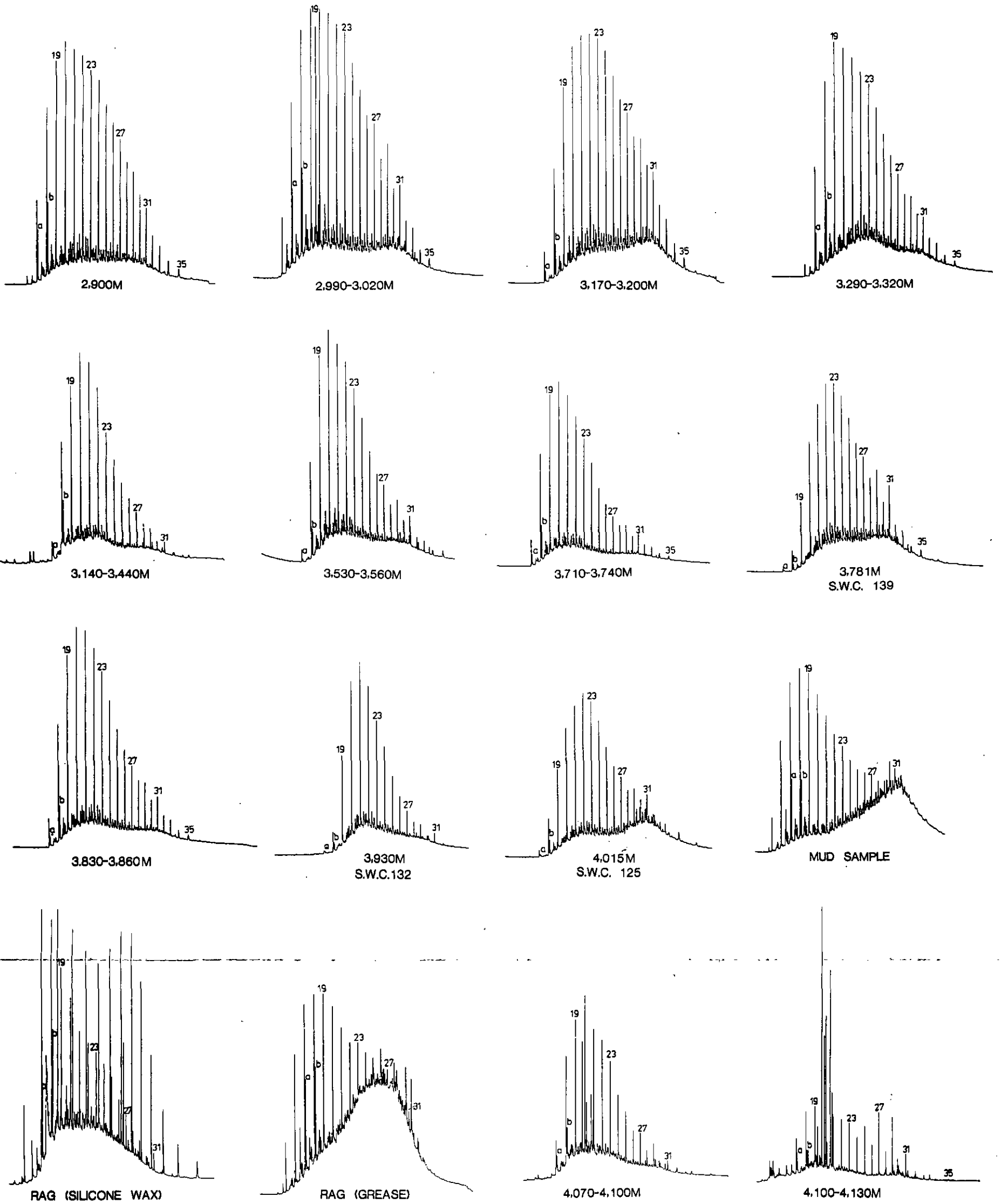
a = PRISTANE
b = PHYTANE

CARBON NUMBERS OF NORMAL PARAFFINS INDICATED (20 = nC₂₀)

FIGURE 4b

C₁₅₊ PARAFFIN - NAPHTHENES

WELL 30/4-1



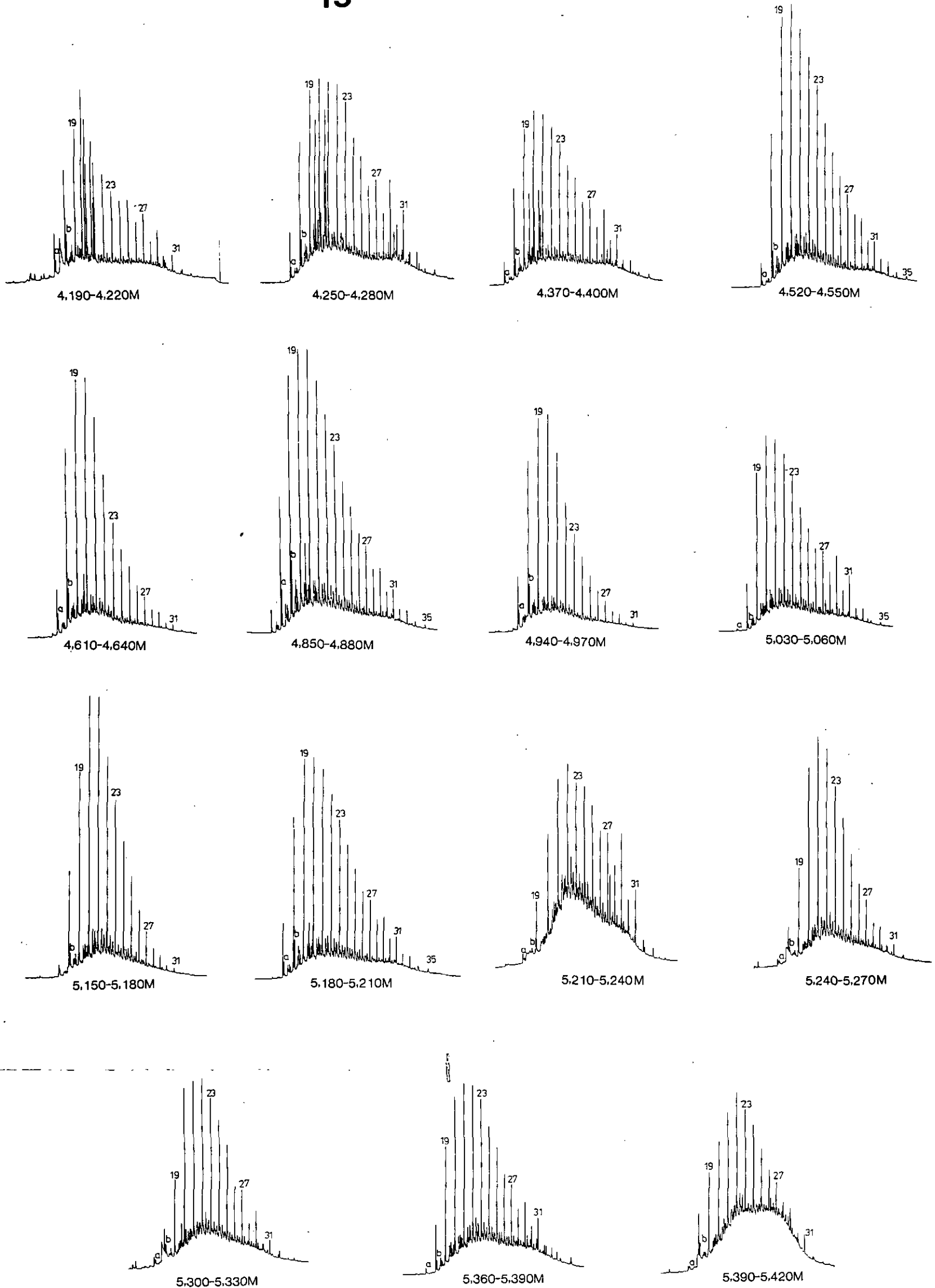
a = PRISTANE
b = PHYTANE

CARBON NUMBERS OF NORMAL PARAFFINS INDICATED (20 = nC₂₀)

FIGURE 4c

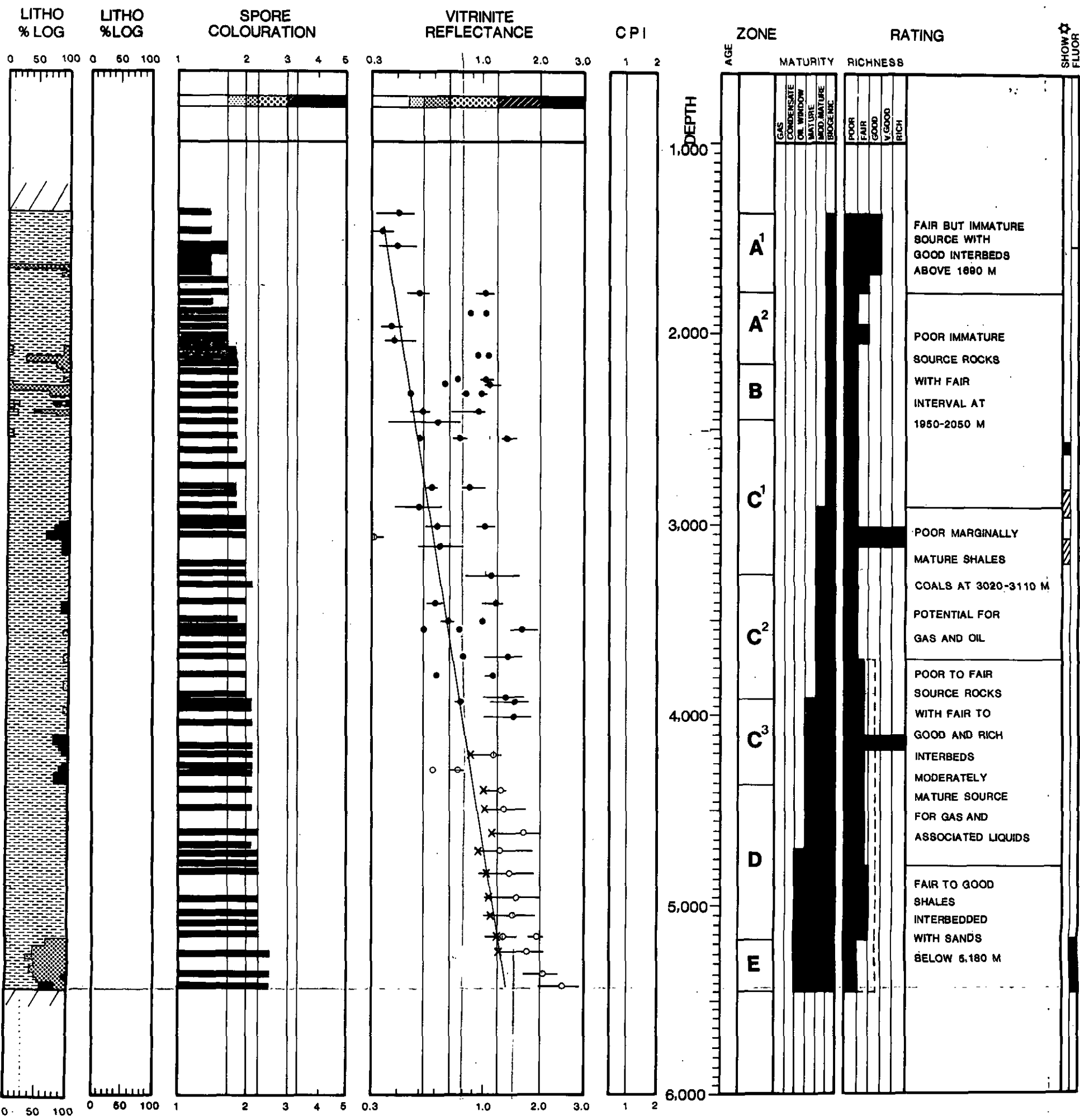
C₁₅₊ PARAFFIN - NAPHTHENES

WELL 30/4-1



a = PRISTANE
b = PHYTANE

CARBON NUMBERS OF NORMAL PARAFFINS INDICATED (20 = nC₂₀)



LITHO

	CARBONATE		SAND
	SHALE/MUDSTONE		COAL
	SILTSTONE		IGNEOUS
	EVAPORITE		LOST CIRCULATION MATERIAL

SPORE COLOURATION

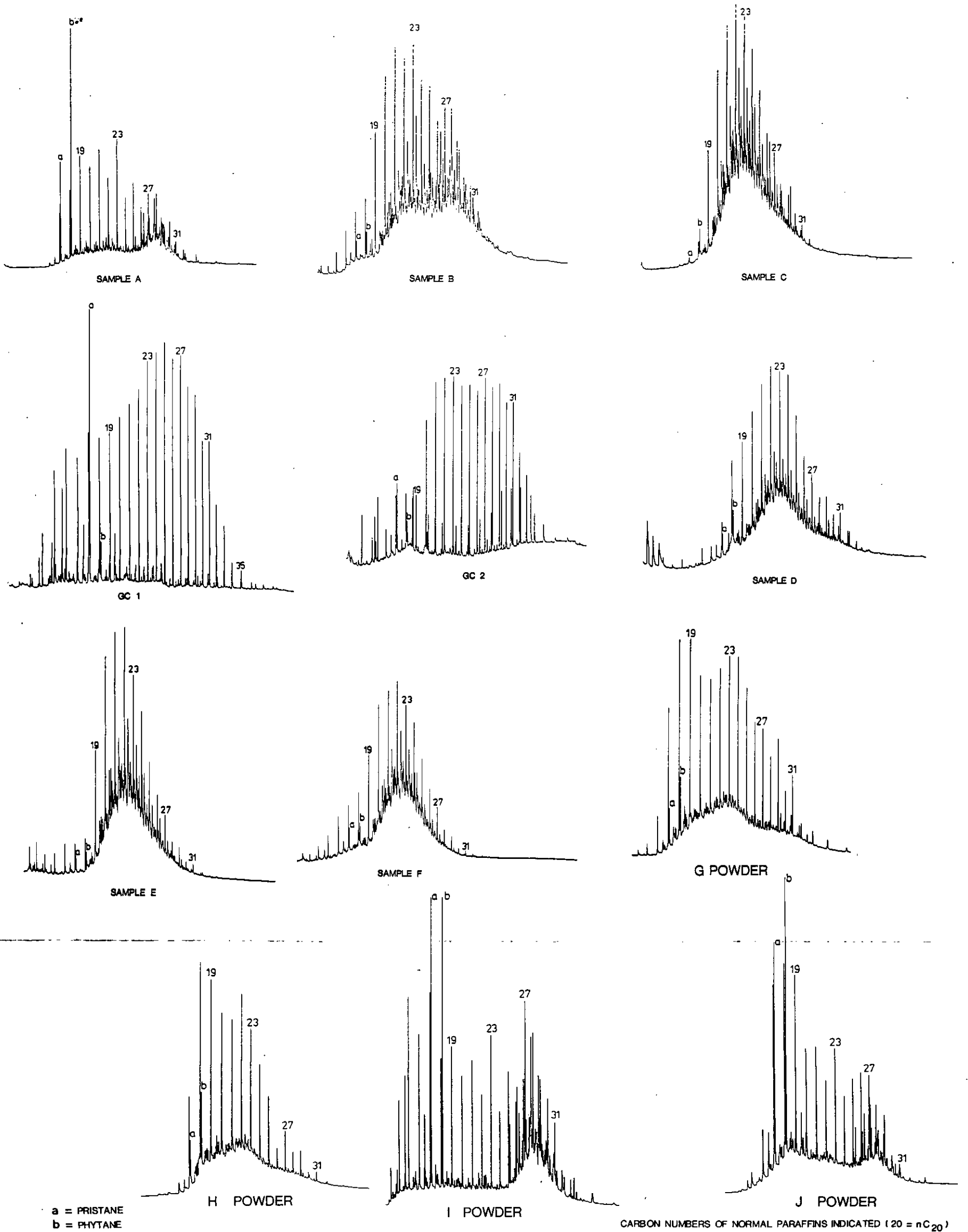
2-	2	2 to 2+	3	3+
IMMATURE	MARG. MATURE	MATURE	OIL WINDOW	COND. EOMETA
REFLECTIVITY	0.53	0.7	1.2	2.0

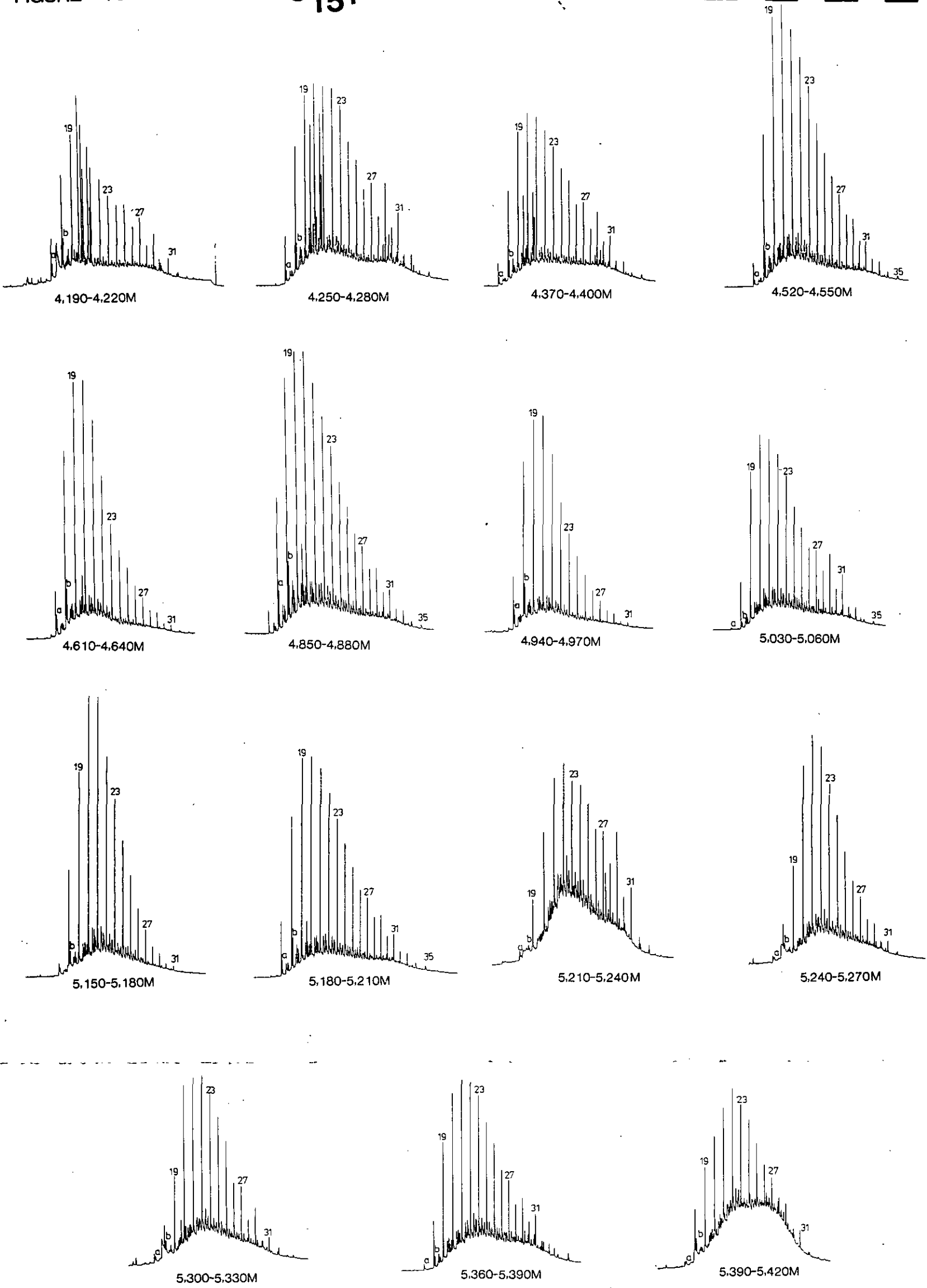
CPI CARBON PREFERENCE INDEX

X RECALCULATED VALUE
 ● CORE
 - PREFERRED TREND

SHOW FLUOR

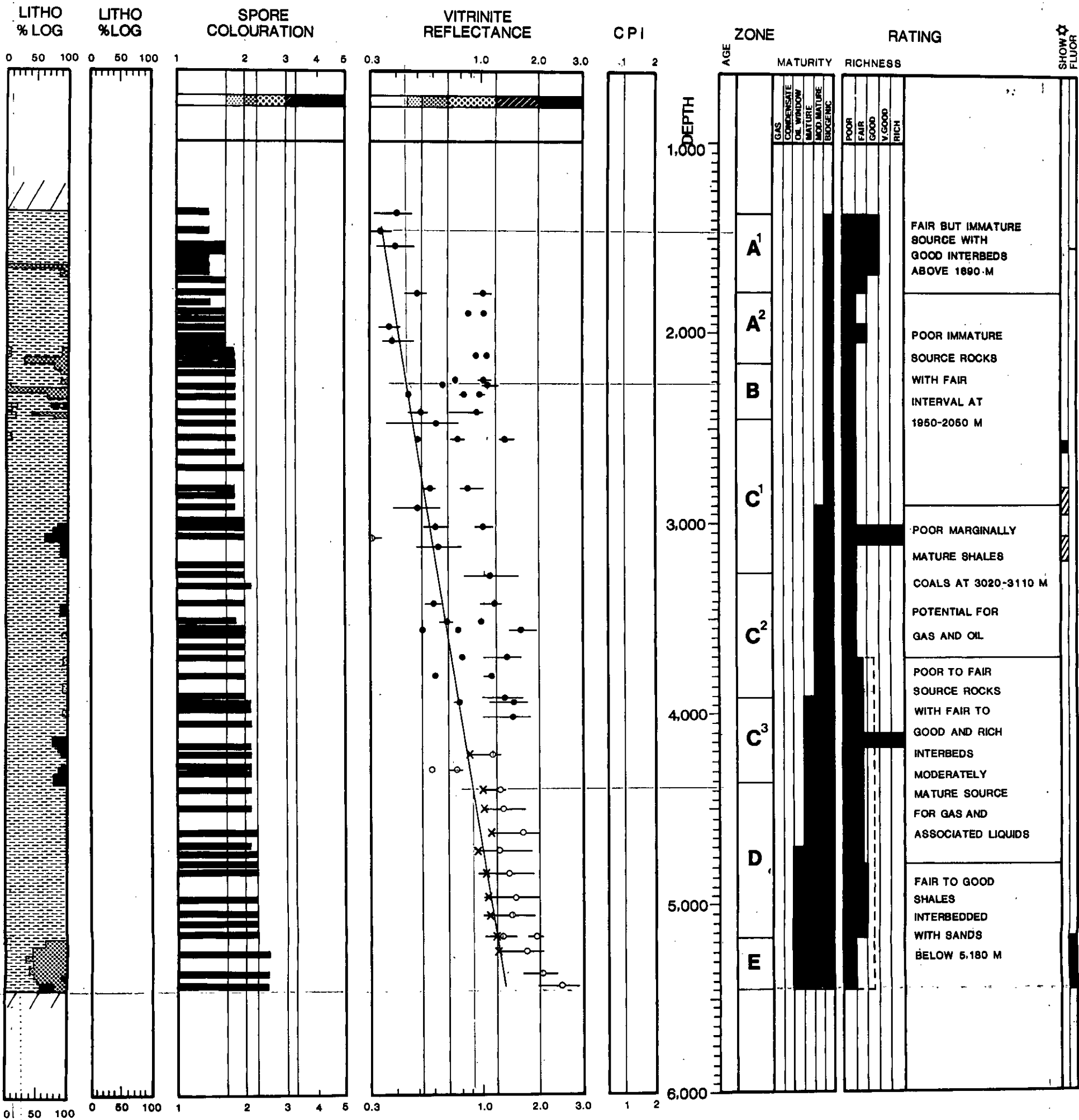
TEST SAMPLES





a = PRISTANE
b = PHYTANE

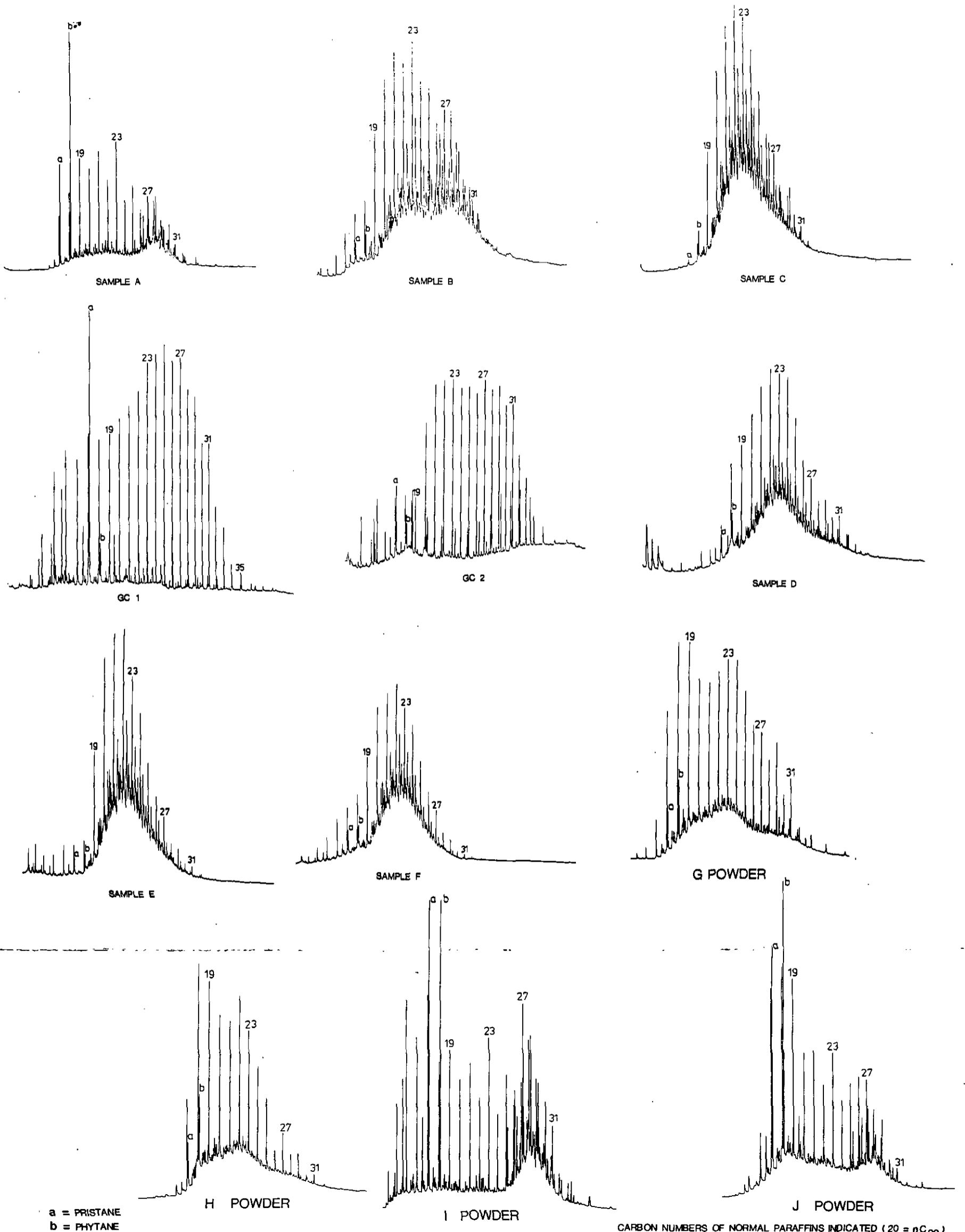
CARBON NUMBERS OF NORMAL PARAFFINS INDICATED (20 = nC₂₀)



- LITHOLOGIES**
- C. CARBONATE
 - SI SHALE/MUDSTONE
 - SI SILTSTONE
 - EV EVAPORITE
 - LC LOST CIRCULATION MATERIAL
 - SAND
 - COAL
 - IGNEOUS

- X RECALCULATED VALUE
 - CORE
 - PREFERRED TREND
- CPI CARBON PREFERENCE INDEX**
- SPORE COLOURATION**
- | | | | | |
|--------------|--------------|---------|------------|--------------|
| IMMATURE | MARG. MATURE | MATURE | OIL WINDOW | COND. EOMETA |
| 2- | 2 | 2 to 2+ | 3 | 3+ |
| REFLECTIVITY | 0.53 | 0.7 | 1.2 | 2.0 |

TEST SAMPLES



a = PRISTANE
b = PHYTANE

CARBON NUMBERS OF NORMAL PARAFFINS INDICATED (20 = nC₂₀)