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GEOCHEMICAL SERVICE REPORT

Prepared for

SAGA PETROLEUM A.S.

GEOCHEMICAL EVALUATION OF SAGA'S 34/4-5 WELL

NORWEGIAN NORTH SEA

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SUMMARY

Screening analyses were performed from 1000 metres to TD (3913 metres), but detailed, follow-up analyses were restricted to the interval 2950-3661 metres.

The shaly mudstones at 1350-1510± metres require further investigation, but with this possible exception, the analysed section apparently consists of poor and gas-prone source rocks. Some intervals are, organically, quite good but the quality of their organic matter is poor. As a result, only minor hydrocarbon generation has occurred but, if oil-prone organic matter had been present, significant generation would have been anticipated below 3380± metres.

Nevertheless, there are oil shows throughout the interval between 1940± metres and 3510± metres. These vary in strength (see text) but there are strong shows in the limestone at 2140-2150± metres, at 3455-3510± metres (and particularly in the sands above 3475± metres) and also at 2350-2600± metres. At least below 2950± metres, these shows generally involve a light to medium gravity oil which resembles the DST 1 crude.

The specified correlation analyses confirm that the DST 1 oil was not sourced from the sediments at 3247-3373 metres and also suggest that the show at 3319-3328 metres involves a different oil.

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GEOCHEM LABORATORIES (UK) LIMITED

INTRODUCTION

This report contains a geochemical evaluation of the section between 1000 metres and 3913 metres (TD) in Saga's 34/4-5 well.

The analytical format was specified by the client and consisted of screening analyses throughout the section with detailed follow-up analyses upon the interval from 2950 metres to 3661 metres.

This project was authorised by S. Ulvoen, Saga Petroleum A.S., Hoevik.

A. ANALYTICAL

Three hundred and forty nine (349) canned ditch cuttings samples, composited over ten (10) metres down to 3040 metres and thereafter at nine (9) metres, were received from the interval 520-3913 metres in 34/4-5. The DST 1 oil sample (depth unspecified) was also included in the study.

Only occasional contamination was observed during the sample preparation steps (e.g. 2680-2690 metres, 2720-2730 metres, 2870-2880 metres and 3103-3112 metres).

Geochem were instructed to screen every second sample from 1000 metres to TD with the light hydrocarbon (C_1-C_7) and organic carbon analyses. These results were then forwarded to Saga who specified further analyses upon the interval 2950-3661 metres. Vitrinite reflectance data were supplied by Saga.

A total of one hundred and fifty one light hydrocarbon analyses, two hundred organic carbon analyses, sixteen pyrolysis analyses, sixteen pyrolysis-GC analyses, sixteen visual kerogen analyses, sixteen C_{15+} extractions with chromatography, sixteen high resolution paraffin-napthene analyses, four aromatic capillary chromatograms, nine carbon isotope analyses and three mass fragmentograms were performed upon the sediments. In addition, a specified suite of analyses was run upon the DST 1 oil sample.

Due to the lack of sample material, it was not possible to run all of the requested analyses (branched-cyclic chromatograms, carbon isotopes) upon the sediments whilst the crude oil had lost its associated gas before it was received at our laboratory.

These data are presented in tables 1 through 12 and graphically in figures 1 through 11. A brief description of the analytical techniques employed in this study is included in the back of the report.

B. GENERAL INFORMATION

Ten (10) copies of this report have been forwarded to S. Ulvoen in Hoevik together with the kerogen slides prepared for this study. A copy of the data has been retained by Geochem for future consultation with authorised Saga personnel.

The unused sample material was washed and dried and will be returned to B. Corneliussen at Saga.

All of the results related to this study are proprietary to Saga Petroleum A.S.

RESULTS AND INTERPRETATION

In this report on 34/4-5, the light hydrocarbon (C_1-C_7) data will be considered first and then the hydrocarbon potential of the source rocks will be discussed.

No well logs were available for this study and hence, the following zonation will be employed in the interpretation.

ZONATION

Six (6) major zones are recognised.

Zone A 1000 metres down to 1280± metres, consists of sands. The samples, particularly above 1160± metres, contain variable proportions of basalt.

Zone B 1280± metres to 1510± metres, is composed of siltstones passing, below 1350± metres, to very light olive grey shaly mudstones.

Zone C extends from 1510± metres down to 1940± metres and is a unit of shales and shaly mudstones which range from medium olive grey to light grey.

Zone D 1940± metres to 3260± metres is dominated by mudstones which are grossly medium light grey in colour. Below 3100± metres it consists of medium dark grey shales, which occur as interbeds up to 3000± metres.

The limestone at 2140-2150± metres is oil-stained. Interbedded sands are indicated at 2475-2610± metres and there are occasional dolomites within the intervals 2660-2790± metres and 2970-3000± metres. Both the sands and the dolomites yielded a pale milky cut.

Zone E 3260± metres to 3455± metres, is a unit of medium dark grey and brownish grey shales, silty shales and siltstones.

Zone F 3455± metres to 3913 metres (TD), consists of sandstones with interbedded shales and siltstones which are generally medium dark

grey, but occasionally greyish red, in colour.

The shales suggest that cavings are a problem throughout much of this section and particularly in Zone D.

INTERPRETATION OF LIGHT HYDROCARBON (C_1-C_7) DATA

Within Zone A (1000-1280± metres) the C_1-C_4 gaseous hydrocarbons have fair or poor to fair abundances of 1082-5367 ppm, although they generally fail to exceed 3500 ppm. These gases are extremely dry (normally less then 1.5% C_{2+}) whilst the heavier C_5-C_7 hydrocarbons could be detected only above 1150± metres. No shows are indicated within this interval.

Zone B (1280-1510± metres) is also extremely dry and again, the gasoline range hydrocarbons were not detected. However the gases (dominantly methane) are more abundant than in Zone A at (3607)9311-15400 ppm, but this reflects source character and not shows.

Fair gas abundances of (3052)3805-9645(15417) ppm characterise Zone C (1510-1940± metres). These gases are extremely dry at the top of the zone but a trend of increasing wetness is evident below 1760± metres and particularly below 1880± metres, although the gases are still dry. With the exception of the basal sample, this enhancement is not reflected in any significant increase in gas abundances but the C_5-C_7 hydrocarbons, which are extremely sparse above 1820± metres, reach 746-3375 ppm below 1880± metres. Isobutane to normal butane ratios approximate 0.35 below 1860± metres. Hence it would appear that there has been some migration of liquid hydrocarbons into the interval below 1880± metres in Zone C, with insignificant traces up to approximately 1800± metres. These hydrocarbons are probably wet gas or condensate in type.

Zone D is subdivided into Zones D^1 (1940-2350± metres), D^2 (2350-2650± metres) and D^3 (2650-3260± metres).

Zone D^1 is richer and wetter than Zone C. The gases have good abundances of 9103-20794(54351) ppm, peaking at 1940-1950± metres, 2130-2150± metres and 2180-2210± metres. In addition they are now generally wet, containing 48-77% of the C_{2+} fraction and reaching 80-90% wetness at 2130-2160± metres. Values in excess of 70% wetness apply most frequently below 2130± metres (but also at 1940-1950± metres). The richest and wettest sample is at 2140-2150± metres. Butane ratios generally range from 0.31 to 0.36. The C_5-C_7 hydrocarbons, although variable (i.e. 4599-29597(65159) ppm), are dramatically more abundant than in Zone C. There are shows, probably of oil, throughout Zone D^1 with the best shows at 1940-1950± metres, 2130-2160(2210)± metres and perhaps 2280-2310± metres. The best show is in the limestone at 2140-2150± metres.

On average, Zone D^2 is richer than Zone D^1 (C_1-C_4: 14665-31939 ppm; C_5-C_7 (10260)20017-44944 ppm) and is also very wet with 75-91(generally over 80)% C_{2+} in the C_1-C_4 fraction. Good shows of oil are suggested throughout this interval and particularly in the sands above 2600± metres.

Zone D^3 is more variable but is commonly leaner and drier. Thus the C_1-C_4 gaseous hydrocarbons lie within the limits of 2824-20109 ppm above 2920±metres (peaking at 2740-2790± metres) but then drop (ignoring the damaged cans) to 1547-7264(17859)ppm, peaking at 3010-3020± metres. These gases are still wet, but are less so below 3080± metres where they drop from (61)65-86(94)% to (42)54-75% C_{2+}. At approximately the same depth the C_5-C_7 hydrocarbons decrease from 1694-8798(17068)ppm to (194)424-1613 ppm. The data suggest shows within Zone D^3 but these are apparently fairly weak except at 2740-2790± metres and at 3010-3040± metres.

Zone E (3260-3455± metres) is richer than Zone D^3 (i.e. C_1-C_4 : (3237)7626-23147 ppm; C_5-C_7: 1516-3306(8453)ppm). Its gases tend to be wet rather than very wet (55-80% C_{2+}) although their butane ratios are low. Shows are indicated at 3319-3328± metres and below 3440± metres but otherwise, there is no apparent correlation between richness and wetness and no definite shows.

Zone F is subdivided into Zones F^1 (3455-3510± metres) and F^2 (3510-3913± metres).

Zone F^1 is rich and wet, being most interesting above 3475± metres. Thus the gases and the gasolines decrease with depth from 64515 to 15721 ppm and from 78471 ppm to 34651 ppm respectively. The gases are very wet at 76-86% C_{2+}. There is a strong show, apparently of oil, above 3475± metres.

In Zone F^2 the gases are less abundant (1881-9103(14831)ppm) and drier (39-71 (83)% C_{2+}) and tend to become drier with increasing depth. However the heavier C_5-C_7 hydrocarbons are suprisingly abundant (6396-15284(28557)ppm), particularly above 3565± metres, but it is believed that this is due to the fact that they are entrained in the mud. There is no definitive evidence of shows in this zone.

To summarise:

- hydrocarbons which are probably wet gas or condensate in type have diffused into the interval 1880-1940± metres.

- there are shows, probably of oil, throughout the interval 1940-2350± metres (Zone D^1) with the best shows at 1940-1950± metres, 2130-2160 (2210)± metres and 2280-2310± metres and a strong show in the limestones at 2140-2150± metres.

- good shows of oil throughout Zone D^2 (2350-2650± metres) and especially in the sands above 2600± metres.

- fairly weak shows within the interval 2650-3260± metres (Zone D^3) but good at 2740-2790± metres and (condensate?) 3010-3040± metres.

- show at 3319-3328± metres and also at 3440-3455± metres at the base of Zone E.

- strong shows of oil in the sand above 3475± metres in Zone F^1.

The heavy (C_{15+}) hydrocarbon data discussed below confirm these conclusions but also indicate that the shows within the interval 2950-3661 metres generally involve a similar oil which is light or medium to light in gravity and indeed, resembles the DST 1 crude. A different, medium gravity, crude oil is present at 3319-3328± metres.

SOURCE ROCK EVALUATION

Each of the parameters relevant to the geochemical evaluation of these sediments will be considered in turn and then combined to form the "Conclusions".

In the absence of well logs, the zonation discussed above will be employed.

Detailed analyses were only authorised for the interval 2950-3661 metres.

A. 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 percent 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 of the hydrocarbon product (oil, gas) and the response of the organic matter to thermal maturation. Richness and oiliness decrease in the order: amorphous-algal-herbaceous-woody. Wood has a primary (but not exclusive) potential for gas whilst inertinitic (oxidised, mineral charcoal) material has only a limited hydrocarbon potential.

The siltstones above 1340± metres in Zone B contain only 0.53-0.61% organic carbon, but the underlying shaly mudstones are of above-average richness at 1.68-2.05% organic carbon.

In contrast, the shales and shaly mudstones of Zone C have values of 0.25-0.83% organic carbon and seldom exceed 0.6%. Clearly, these sediments are of below-average richness, but the character of their organic matter was not investigated.

The shaly mudstones of Zone D are slightly improved at (0.35)0.49-0.84(0.97)%, commonly lying within the approximate limits of 0.6-0.75% organic carbon. This thick interval is relatively uniform in organic richness. The organic matter in the sediments below 2950± metres is dominantly inertinitic in type and indeed, the inertinitic and woody fractions together constitute almost all of the total. The greyish red shale at the base of this zone is very lean.

Zone E is significantly richer. These shales and siltstones generally contain 1.41-2.76% organic carbon although the shales from 3370-3430± metres are

somewhat depleted at 0.85-1.22% organic carbon. However, this improvement in richness relative to Zone D is only weakly reflected in the character of the organic matter which is now inertinitic and woody in type with minor to significant proportions of herbaceous debris but only minor algal material and essentially no amorphous kerogen.

The greyish red shales and siltstones within Zone F are extremely lean (0.09-0.13%) but the more abundant medium dark grey shales generally have good values of 1.11-2.21(2.78)% organic carbon, but are leaner (0.68-0.87%) at 3475-3550± metres. Their organic matter is again, woody and inertinitic in type, with significant proportions of herbaceous debris.

B. LEVEL OF THERMAL MATURATION

Thermal maturity was evaluated with the spore colouration and vitrinite reflectance techniques. The vitrinite data were supplied by Saga.

Spore colouration determinations were performed on selected samples between 2950 metres and 3661 metres. A thermal index of 2- applies at the top of this interval whilst an index of 2 is achieved at a depth of 3380± metres.

Minor and significant hydrocarbon generation are initiated in amorphous, herbaceous ± algal organic matter at thermal indices of 2- and of 2 respectively, but wood only becomes marginally mature (minor generation) at an index of 2. Hence in this well, due to the character of the organic matter, only very limited hydrocarbon generation can be anticipated within the analysed interval.

Caved and reworked organic matter was evident in most of the analysed samples.

A suite of vitrinite reflectance measurements, made upon core and sidewall core samples, was supplied by the client for this study. Sporadic reflectance values above 3080± metres vary between 0.31% and 1.35% Ro and show little evidence of a trend with depth. The readings below 3080± metres may be divided into an immature population at 0.43-0.46% Ro (due to readings on mis identified organic matter?), a cluster of points at 0.52-0.55% Ro, believed to represent the fresh woody organic matter, and a third, more mature, population at 0.58-1.39% Ro which is attributed to reworked kerogen. Maturity between 3250± metres and 3580± metres appears from the foregoing to be well defined at 0.52-0.55% Ro but the upper part of the trend cannot be determined with

confidence since it is dependant upon a single reading of 0.48% Ro at 2415± metres. Although the readings of 0.63-0.67% Ro are described as "good quality" there is no discernable trend through them and they may therefore represent reworked woody debris.

Vitrinite reflectance of 0.45% Ro and 0.53% Ro normally correlate with maturation indices of 2- and 2, respectively. There is, thus, a good agreement between the two maturation methods below 3250 metres, where the vitrinite data are sufficiently numerous to afford a comparison.

Pyrolysis Tmax determinations from 2950-3661 metres do not show a good trend but instead change at the base of Zone D^3 from the general range of 430-434 (440)°C to 443-447°C. In the view of the character of the organic matter, the dominance of reworked material and also the presence of caving, little confidence can be placed in this technique, although the data could be interpreted to give qualitative support to the spore colouration results.

C. SOURCE RICHNESS

Preliminary evaluations of source richness based upon the organic carbon contents suggest a good rating for Zone B (below 1340± metres) but probably poor ratings for Zones C and D. Zone E and the medium dark grey shales in Zone F are good.

Upon extraction, selected samples from the interval 2950-3652 metres yielded 52-536 ppm C_{15+} hydrocarbons. However it is evident that most of the richer samples have relatively high hydrocarbon to total extract ratios which suggest the presence of non-indigenous hydrocarbons. This is confirmed by the paraffin-naphthene chromatograms and hence, in these samples, which will be discussed below, the measured hydrocarbon abundances do not reflect true richness but instead, are too optimistic.

Allowing for this the analysed samples from Zone D^3 yielded 52-101(134)ppm C_{15+} hydrocarbons and hence, are poor source rocks. In Zone E even the samples which yielded 129-143 ppm hydrocarbons contain some non-indigenous material and hence these are probably also poor (at best poor to fair) source rocks. The data for Zone F cannot be used due to the presence of oil.

The pyrolysis technique evaluates the ultimate source richness achieved under optimum maturity conditions. Zone D^3 gave values of 208-634 ppm pyrolysate

(P2) and hence is a very poor source interval. Zone E is much more variable, yielding 678-2878(5627)ppm pyrolysate. It too is generally rated as poor but the siltstone from 3319-3328 metres is apparently a potentially good to very good source rock. This however, is due to the presence of non-indigenous material after the removal of which, its yield drops from 5627 ppm down to 1183 ppm, thus indicating a poor source rating. Zone F is also poor.

Chromatograms of the pyrolysate (P2) fraction define whether a potential source rock will, when mature, yield oil, condensate or gas. Oil-prone sediments are characterised by a well-defined series of normal alkene-alkane doublets which extend out to the heavy ends. If the doublets are restricted to the light ends then a potential for condensate is indicated whilst the doublets are (essentially) absent in gas-prone sediments. A few of these samples have single peaks which are due to the presence of non-pyrolysate species but, making allowance for this, all of the analysed samples are very similar and have a potential only for gas.

D. SHOWS OF MIGRATED HYDROCARBONS

The light hydrocarbon (C_1-C_7) data were discussed in detail above.

Extraction of selected samples from 2950-3652 metres resulted in the identification of some samples with higher than average C_{15+} hydrocarbon abudances and high proportions of hydrocarbons in the total extract. Examination of the paraffin-naphthene chromatograms of these samples indicated the presence of crude oil.

Thus the medium light grey mudstone from 2950-2960± metres in Zone D^3 contains crude oil, although the abundance of the C_{15+} hydrocarbons (204 ppm) indicates that only a weak show is involved. No other shows were detected in Zone D^3 but there are shows at 3319-3328± metres and at 3445-3454± metres in Zone E with very weak shows elsewhere in this zone. There is a show in Zone F^1 and shows down to the base of the analysed interval in Zone F^2. Source-indigenous hydrocarbons are of course, also present and tend to complicate the picture, but most of these shows apparently involve similar light, or medium to light, oils which probably belong to the same family. An exception is provided by the sample from 3319-3328± metres which contains a medium gravity and apparently not very mature, crude oil.

It is suspected, on the basis of the light hydrocarbon data (see discussion

above) that the oils recovered from Zone F^2 may represent material which was transferred to this interval via the mud system.

With the exception of that from 3319-3328± metres, the oils detected in this study resemble that produced in DST 1. The resemblance is particularly close in the case of the show at the base of Zone E (i.e. 3445-3454± metres) which is presumably representative of the strong show in the underlying sand.

These conclusions are integrated into those presented at the end of the discussion of shows based upon the more complete light hydrocarbon data set (see above).

E. CONCLUSIONS

Six (6) major zones are recognised between 1000 metres and 3913 metres (TD) in 34/4-5. Detailed analyses were authorised only for the interval between 2950 metres and 3661 metres. Outside these limits the conclusions are based only upon the data generated by the screening analyses.

Above 1280± metres (Zone A) the samples consist of sand with variable proportions of basalt.

In Zone B (1280-1510± metres) the siltstones above 1350± metres contain 0.53-0.61% organic carbon but the underlying shaly mudstones are significantly richer at 1.68-2.05% organic carbon. These sediments are immature but their source potential was not investigated.

Throughout Zone C (1510-1940± metres) the shales and shaly mudstones contain only 0.25-0.83(generally less than 0.6)% organic carbon. They constitute immature, poor and uninteresting source rocks.

The mudstones of Zone D (1940-3260± metres) range from (0.35)0.49% up to 0.84(0.97)% organic carbon but normally lie within the limits of 0.6-0.75%. Below 2950± metres their organic matter was found to be of poor quality, being dominantly inertinitic with very significant proportions of woody debris. Minor hydrocarbon generation would be anticipated if their organic matter was of better quality but, is this well, these sediments are effectively immature. Even in mature, they would only be poor source rocks for gas.

In contrast the shales, silty shales and siltstones of Zone E (3260-3455± metres)

are generally enhanced at 1.41-2.76% organic carbon, although the shales from 3370-3430± metres are leaner at 0.85-1.22%. Unfortunately, this improvement is not reflected in the quality of the organic matter which is inertinitic and woody (with significant herbaceous) in type. As a result, these are potentially poor source rocks for gas within which only minor hydrocarbon generation has occurred.

The shale and siltstone interbeds within Zone F (3455-3913± metres) are generally medium dark grey in colour but are occasionally greyish red. The latter are extremely lean but the medium dark grey sediments contain 1.11-2.21(2.78)% organic carbon, dropping to 0.68-0.87% at 3475-3550± metres. Their organic matter (above 3661 metres) is dominantly woody and inertinitic in type but significant proportions of herbaceous debris are also presnet. These are potentially poor source rocks for gas and only minor hydrocarbon generation has occurred on structure, at least down to 3661 metres.

No rich or oil-prone source rocks were detected in this study. If they did exist, significant hydrocarbon would be anticipated below 3380± metres.

Nevertheless, although there are no good source rocks within the drilled section, it does contain shows of migrated hydrocarbons. Thus there are:

- shows (probably of oil) at 1940-2350± metres (Zone D^1) with diffusion (of wet gas and condensate) into the overlying sediments up to 1880± metres. The best shows are at 1940-1950± metres, 2130-2160(2210)± metres and 2280-2310± metres. There is a strong show in the limestone at 2140-2150± metres.
- good shows of oil throughout Zone D^2 (2350-2650± metres) and especially in the sands above 2600± metres.
- good shows at 2740-2790± metres and 3010-3040± metres. The latter may be of condensate.
- show of oil at 3319-3328± metres.
- strong show at (3440)3455-3510± metres and especially in the sand at 3455-3475± metres.

The detailed analyses indicate that most of the shows within the interval 2950-3661 metres involve a similar light, or medium to light, oil which resembles that produced in DST 1. A different medium gravity oil is present at 3319-3328± metres.

CRUDE OIL SAMPLE, DST 1

A suite of analyses was run upon this oil. The sample was received in a screw-up can and had lost its associated gases and therefore the gas-oil ratio, C_1-C_4 compostion and carbon isotopic compostion of the methane could not be determined.

This is a light to medium gravity (37.3° API) crude of which 28.4% distils below 210°C. It has low contents of sulphur (0.22%), the asphaltanes, nickel (11 ppm) and vanadium ((less than 0.5 ppm).

Capillary chromatograms of the whole oil and of the C_{15+} total alkanes, branched-cyclic alkanes and aromatics are reproduced in the report. They indicate a mature crude which has not suffered any signficant alteration within the reservoir. This latter conclusion is supported by the gasoline range compostion of the oil which indicates good proportions of n-hexane, n-heptane and of the aromatics (benzene and toluene). The pentanes and particularly the butanes are depleted, but this is believed to be a sampling problem and hence, not an indication of alteration.

The mass fragmentograms of the 218, 259, 231 (triaromatic steranes) and the phenanthrenes (3) fragment ions are included in addition to these which were specified. Together with the tabulated molecular ion ratios they suggest an oil whch is mature but not highly mature and which was derived from a parent source rock at a depth equivalent to a tentative temperature of approximately 95°C.

Carbon isotope ratios of the DST-1 saturated and aromatic hydrocarbons, and of the asphaltenes, are $-29.63^{o}/oo$, $-28.81^{o}/oo$ and $-28.59^{o}/oo$, respectively. These values fall within the range normally associated with a mixed marine and continental type of source organic matter.

OIL TO SOURCE CORRELATION

Insufficient hydrocarbon material was recovered from the analysed sediments for all of the specified analyses and hence the branched-cyclic chromatogram was omitted and, except in the case of the sample from 3319-3328 metres, carbon isotope determinations was performed only only the asphaltenes.

These sediments are from the interval 3247-3373(3418)metres. They tend to exhibit gross similarities in their aromatic chromatograms and in their mass fragmentograms but do not resemble the DST 1 crude oil. Indeed, they appear to have the waxy organic facies (see Source Rock Evaluation) whilst the molecular ion ratios suggest that they are also too immature to have sourced the oil.

Interestingly the sample from 3319-3328 metres, for which the presence of a good oil show is interpreted (see above), tends to have mass fragmentogram characteristics which are intermediate between those of the other sediments and those of the DST 1 crude oil. As most of its hydrocarbons are believed to be out of place, this observation also supports the hypothesis that the oil at 3319-3328 metres is not the same as that produced in DST 1.

Carbon isotope ratios of the saturated and aromatic hydrocarbons, and of the asphaltenes, from the show at 3319-3328± metres do, nonetheless, correlate closely with the corresponding data from the DST-1 crude. It would appear, therefore, that although two distinct source units are involved (see above) they both contain the same, mixed marine and continental type of organic matter

In summary therefore:-

a) the DST 1 crude oil was not sourced from these sediments
b) the show at 3319-3328± metres does not correlate with the DST oil.

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-050	1010-1020m	A 50% Sand, unconsolidated, fine-medium grained, subrounded, fairly well sorted, clear, white	N9	
		B 50% Basalt, blocky, hard, greyish black Minor shell fragments and other igneous	N2	
842-052	1030-1040m	A 50% Sand, as 842-050A	N9	
		B 50% Basalt, as 842-050B Minor shell fragments	N2	
842-054	1050-1060m	A 45% Sand, as 842-050A	N9	
		B 45% Basalt, as 842-050B	N2	
		C 10% Shell fragments Minor other igneous		
842-056	1070-1080m	A 55% Basalt, as 842-050B	N2	
		B 45% Sand, as 842-050A Minor shell fragments	N9	
842-058	1090-1100m	A 55% Sand, as 842-050A	N9	
		B 45% Basalt, as 842-050B Minor shell fragments	N2	
842-060	1110-1120m	A 55% LCM - cement		
		B 30% Sand, as 842-050A	N9	
		C 15% Basalt, as 842-050B	N2	
842-062	1130-1140m	A 50% Sand, as 842-050A	N9	
		B 40% LCM - cement		
		C 10% Basalt, as 842-050B	N2	
842-064	1150-1160m	A 45% LCM - cement		
		B 35% Basalt, as 842-050B	N2	
		C 20% Sand, as 842-050A	N9	
842-066	1170-1180m	A 55% Sand, unconsolidated, fine-medium grained, subrounded, well sorted, clear, white	N9	
		B 30% LCM - cement and metal		
		C 15% Basalt, blocky, hard, greyish black Minor shell fragments	N2	
842-068	1190-1200m	A 60% Sand, as 842-066A	N9	
		B 30% LCM - cement		
		C 10% Basalt, as 842-066C Minor shell fragments	N2	
842-070	1210-1220m	A 80% Sand, as 842-066A	N9	
		B 20% Basalt, as 842-066C Minor shell fragments and LCM - cement	N2	
842-072	1230-1240m	A 75% Sand, as 842-066A	N9	
		B 25% Basalt, as 842-066C Minor shell fragments	N2	
842-074	1250-1260m	A 80% Sand, as 842-066A	N9	
		B 20% Basalt, as 842-066C Minor shell fragments and cement	N2	

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomitic, Fluorescence, foraminifera, fossiliferous Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-076	1270-1280m	A 85% Sand, unconsolidated, fine-medium grained, subrounded, well sorted, clear, white	N9	
		B 15% Basalt, blocky, hard, greyish black Minor shell fragments	N2	
842-078	1290-1300m	A 98% Siltstone, blocky, soft, non-calc., minor to sig. cavings, medium olive grey Minor sand	5Y5/1	0.53
842-080	1310-1320m	A 90% Siltstone, as 842-078A, sig. cavings B 10% Sand, as 842-076A	5Y5/1 N9	0.61
842-082	1330-1340m	A 65% Siltstone, as 842-078A, sig. cavings B 35% Glauconite, blocky, soft, dark greenish grey Minor sand	5Y5/1 5GY4/1	0.54,0.56
842-084	1350-1360m	A 98% Silty mudstone, blocky, soft to mod. hard, v. sl. calc., sig. cavings, very light brownish grey Minor glauconite and other mudstone	5YR7/1	2.04
842-086	1370-1380m	A 98% Shaly mudstone, subfissile to blocky, soft to mod. hard, sl. silty, v. sl. calc., sig. cavings, very light olive grey to very light brownish grey Minor other mudstone	5Y7/1-5YR7/1	1.68
842-088	1390-1400m	A 98% Shaly mudstone, as 842-086A, sig. to abundant cavings Minor other mudstone	5Y7/1-5YR7/1	1.72
842-090	1410-1420m	A 98% Shaly mudstone, as 842-086A, sig. to abundant cavings	5Y7/1-5YR7/1	1.68
842-092	1430-1440m	A 98% Shaly mudstone, blocky to subfissile, soft, sl. silty, non-calc., abundant cavings, yellowish grey to pinkish grey	5Y8/1-5YR8/1	2.06,2.03
842-094	1450-1460m	A 98% Shaly mudstone, as 842-092A, abundant to dominant cavings Minor other caved mudstone	5Y8/1-5YR8/1	1.90
842-096	1470-1480m	A 98% Shaly mudstone, as 842-092A, abundant to dominant cavings Minor other caved mudstone	5Y8/1-5YR8/1	1.82
842-098	1490-1500m	A 98% Shaly mudstone, as 842-092A, abundant cavings Minor shale and caved mudstone	5Y8/1-5YR8/1	1.71
842-100	1510-1520m	A 50% Shale, subfissile, mod. hard, non-calc., minor to sig. cavings, greenish grey	5GY6/1	0.34
		B 40% Shaly mudstone, subfissile to blocky, soft to mod. hard, non-calc., minor cavings, medium olive grey	5Y5/1	0.83

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Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-100	1510-1520m	C 10% Shaly mudstone, blocky to subfissile, soft, sl. silty, non-calc., dominant cavings, yellowish grey to pinkish grey	5Y8/1-5YR8/1	
842-102	1530-1540m	A 85% Shaly mudstone, subfissile to blocky, soft to mod. hard, non-calc., sig. cavings, medium olive grey	5Y5/1	0.67,0.67
		B 15% Shale, subfissile, mod. hard, non-calc., abundant cavings, greenish grey	5GY6/1	0.33
		Minor caved mudstone		
842-104	1550-1560m	A 90% Shale, platy to subfissile, mod. hard, non-calc., sig. cavings, medium olive grey to olive grey	5Y5/1-5Y4/1	0.48
		B 10% Mudstone, blocky, sl. silty, non-calc., caved, yellowish grey	5Y8/1	
		Minor other mudstone		
842-106	1570-1580m	A 90% Shale, as 842-104A, sig. to abundant cavings	5Y5/1-5Y4/1	0.46
		B 10% Mudstone, as 842-104B, caved	5Y8/1	
842-108	1590-1600m	A 98% Shale, as 842-104A, sig. cavings	5Y5/1-5Y4/1	0.39
		Minor mudstone		
842-110	1610-1620m	A 98% Shale, as 842-104A, sig. cavings	5Y5/1-5Y4/1	0.46,0.46
		Minor mudstone		
842-112	1630-1640m	A 98% Shale, subfissile to blocky, mod. hard, non-calc., sig. cavings, medium olive grey to medium dark greenish grey	5Y5/1-5GY5/1	0.47
		Minor limestone and caved mudstone		
842-114	1650-1660m	A 98% Shale, as 842-112A, sig. cavings	5Y5/1-5GY5/1	0.44
842-116	1670-1680m	A 98% Shale, as 842-112A, abundant cavings	5Y5/1-5GY5/1	0.27
842-118	1680-1690m	A 98% Shale, as 842-112A, abundant cavings	5Y5/1-5GY5/1	0.26
		Minor caved mudstone		
842-120	1700-1710m	A 98% Shale, as 842-112A, abundant cavings	5Y5/1-5GY5/1	0.25
842-122	1720-1730m	A 98% Shale, subfissile to platy, mod. hard, non-calc., sig. cavings, medium olive grey to medium dark greenish grey	5Y5/1-5GY5/1	0.36,0.37
842-124	1740-1750m	A 98% Shale, as 842-122A, minor to sig. cavings	5Y5/1-5GY5/1	0.54
842-126	1760-1770m	A 98% Shale, as 842-122A, minor to sig. cavings	5Y5/1-5GY5/1	0.75

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Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-128	1780-1790m	A 98% Shale, subfissile to platy, mod. hard, non-calc., minor to sig. cavings, medium olive grey to medium dark greenish grey	5Y5/1-5GY5/1	0.77
842-130	1800-1810m	A 98% Shale, platy to subfissile, mod. hard, non-calc., sig. cavings, medium olive grey to medium dark greenish grey Minor limestone	5Y5/1-5GY5/1	0.49
842-132	1820-1830m	A 90% Shale, as 842-130A, sig. cavings	5Y5/1-5GY5/1	0.45,0.44
		B 10% Glauconite, blocky, soft, dark greenish grey	5GY4/1	
842-134	1840-1850m	A 85% Shale, as 842-130A, sig. cavings	5Y5/1-5GY5/1	0.71
		B 15% Shaly mudstone, platy, mod. hard, non-calc., sig. cavings, light grey	N7	0.31
842-136	1860-1870m	A 50% Shaly mudstone, as 842-134B, minor cavings	N7	0.28
		B 50% Shale, as 842-130A, dominant cavings Minor other mudstone	5Y5/1-5GY5/1	0.57
842-138	1880-1890m	A 70% Shaly mudstone, as 842-134B, minor to sig. cavings	N7	0.30,0.30
		B 30% Shale, as 842-130A, dominant cavings Minor other caved mudstone	5Y5/1-5GY5/1	0.83
842-140	1900-1910m	A 55% Shaly mudstone, as 842-134B, minor cavings	N7	0.29
		B 45% Shale, platy to subfissile, mod. hard, non-calc., sig. cavings, medium olive grey Minor caved mudstone	5Y5/1	0.29
842-142	1920-1930m	A 70% Shale, as 842-140B, minor cavings	5Y5/1	0.42,0.43
		B 30% Shaly mudstone, as 842-134B, sig. cavings Minor other mudstone	N7	0.28
842-144	1940-1950m	A 85% Shale, as 842-140B, sig. to abundant cavings	5Y5/1	0.80
		B 15% Shaly mudstone, as 842-134B, sig. cavings Minor other mudstone and pyrites	N7	0.34
842-146	1960-1970m	A 75% Shale, as 842-140B, abundant cavings	5Y5/1	0.60
		B 25% Shaly mudstone, as 842-134B, sig. cavings Minor other mudstone - mostly caved and pyrites	N7	0.38,0.39

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Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-148	1980-1990m	A 85% Shale, subfissile to platy, mod. hard, non-calc., abundant cavings, medium olive grey	5Y5/1	0.78
		B 15% Shaly mudstone, blocky to subfissile, mod. hard, non-calc., sig. cavings, light grey Minor pyrites and other caved mudstone	N7	0.35
842-150	2000-2010m	A 90% Shale, as 842-148A, abundant cavings	5Y5/1	0.35
		B 10% Shaly mudstone, as 842-148B, sig. cavings Minor pyrites and other caved mudstone	N7	0.32
842-152	2020-2030m	A 55% LCM - cement		
		B 45% Shaly mudstone, blocky, soft, sl. calc.?, sig. cavings, light grey	N7	0.71,0.70
842-154	2040-2050m	A 75% Shaly mudstone, as 842-152B, sig. cavings	N7	0.73
		B 25% LCM - cement		
842-156	2060-2070m	A 98% Shaly mudstone, blocky to subfissile, soft to mod. hard, calc., sig. cavings, light grey	N7	0.71
842-158	2080-2090m	A 95% Shaly mudstone, as 842-156A, abundant cavings	N7	0.65
		B 5% Glauconite, blocky, soft, dark greenish grey	5GY4/1	
842-160	2100-2110m	A 98% Shaly mudstone, as 842-156A, minor cavings	N7	0.73
842-162	2120-2130m	A 98% Shaly mudstone, as 842-156A, minor cavings Minor limestone	N7	0.75
842-164	2140-2150m	A 55% Shaly mudstone, as 842-156A, sig. cavings	N7	0.73
		B 45% Limestone, blocky, soft, oil stained! dull yellow F., milky cut, very pale yellowish brown Minor red mudstone	10YR7/2	1.74
842-166	2160-2170m	A 98% Shaly mudstone, platy to blocky, mod. hard, non-calc., minor to sig. cavings, medium light grey to light grey Minor red mudstone and limestone	N6-7	0.66
842-168	2180-2190m	A 98% Shaly mudstone, as 842-166A, sig. to abundant cavings Minor other mudstone and limestone	N6-7	0.62
842-170	2200-2210m	A 98% Shaly mudstone, as 842-166A, sig. cavings Minor pyrites and other mudstone	N6-7	0.55

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TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-172	2220-2230m	A 98% Shale, platy to subfissile, mod. hard, non-calc., grades from fine shaly mudstone, abundant cavings, medium light grey to light grey Minor other mudstone - caved	N6-7	0.60,0.60
842-174	2240-2250m	A 98% Shale, as 842-172A, abundant cavings Minor caved mudstone	N6-7	0.58
842-176	2260-2270m	A 98% Shale, as 842-172A, abundant cavings Minor caved mudstone	N6-7	0.53
842-178	2280-2290m	A 98% Shaly mudstone, platy to blocky, mod. hard, non-calc., abundant cavings, medium light grey Minor limestone and other caved mudstone	N6	0.55
842-180	2300-2310m	A 98% Shale, platy, mod. hard, non-calc., grades from shaly mudstone, sig. to abundant cavings, medium light grey to light grey	N6-7	0.55
842-182	2320-2330m	A 98% Shaly mudstone, as 842-178A, abundant cavings Minor red mudstone	N6	0.50,0.52
842-184	2340-2350m	A 98% Shaly mudstone, platy to blocky, mod. hard, non-calc., abundant cavings, medium light grey Minor caved red mudstone	N6	0.54
842-186	2360-2370m	A 98% Shaly mudstone, as 842-184A, abundant cavings Minor caved red mudstone	N6	0.55
842-188	2380-2390m	A 98% Shaly mudstone, as 842-184A, abundant cavings Minor caved red mudstone	N6	0.55
842-190	2400-2410m	A 98% Shaly mudstone, as 842-184A, abundant cavings Minor limestone and other mudstone	N6	0.59
842-192	2420-2430m	A 98% Shaly mudstone, as 842-184A, dominant cavings Minor dolomite? and other mudstone	N6	0.57,0.57
842-194	2440-2450m	A 85% Mudstone, blocky, soft, non-calc., sl. silty, minor cavings, medium grey Minor sandstone	N5	0.94
842-196	2460-2470m	A 98% Mudstone, as 842-194A, minor to sig. cavings Minor sandstone and caved shaly mudstone	N5	0.97

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TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-198	2480-2490m	A 75% Mudstone,blocky, soft, non-calc., sl. silty, minor cavings, medium grey	N5	0.84
		B 15% Shaly mudstone, platy to subfissile, soft, to mod. hard, non-calc., minor to sig. cavings, light grey	N7	0.60,0.60
		C 10% Sandstone, blocky, v. fine grained, non-calc., matrix, sl. glauconitic, pale milky cut, pinkish grey	5YR8/1	
842-200	2500-2510m	A 90% Shaly mudstone, as 842-198B, sig. to abundant cavings	N7	0.59
		B 10% Sandstone, as 842-198C, pale milky cut	5YR8/1	
		Minor other mudstone		
842-202	2520-2530m	A 80% Shaly mudstone, as 842-198B, sig. cavings	N7	0.61
		B 20% Sandstone, as 842-198C, pale milky cut	5YR8/1	
		Minor other mudstone		
842-204	2540-2550m	A 80% Shaly mudstone, as 842-198B, sig. to abundant cavings	N7	0.60
		B 20% Sandstone, as 842-198C, pale milky cut	5YR8/1	
842-206	2560-2570m	A 80% Shaly, mudstone, as 842-198B, sig. to abundant cavings	N7	0.64
		B 20% Sandstone, as 842-198C, pale milky cut	5YR8/1	
842-208	2530-2590m	A 90% Shaly mudstone, subfissile, soft to mod. hard, non-calc., abundant cavings	N6	0.67,0.66
		B 10% Sandstone, blocky, v. fine grained v. sl. calc., matrix, sl.glauconitic, white to pinkish grey	N9-5YR8/1	
842-210	2600-2610m	A 75% Shaly mudstone, as 842-208A, sig. cavings	N6	0.66
		B 25% Sandstone, as 842-208B, pale milky cut	N9-5YR8/1	
		Minor pyrites		
842-212	2620-2630m	A 98% Shaly mudstone, subfissile, soft to mod. hard, non-calc., medium light grey to light grey, abundant cavings	N6-N7	0.61
		Minor sandstone and other mudstone		
842-214	2640-2650m	A 98% Shaly mudstone, as 842-212A, dominant cavings	N6-N7	0.67
		Minor dolomitic pyrites, sandstone and mudstone		
842-216	2660-2670m	A 75% Shaly mudstone, as 842-212A dominant cavings	N6-N7	0.19
		B 25% Dolomite, blocky, hard, microcrystalline, yellowish orange brown	10YR7/2	

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Lost Circulation Material, moderately, occasionally, slightly, very

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ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-218	2680-2690m	A 60% Mudstone, blocky, rounded, soft non-calc., medium dark grey	N4	0.68,0.67
		B 40% Shaly mudstone, subfissile, soft to mod. hard, non-calc., medium light grey to light grey, abundant cavings Minor dolomite	N6-N7	0.59
842-220	2700-2710m	A 85% Shaly mudstone, as 842-218B abundant cavings	N6-N7	0.64
		B 10% Dolomite, blocky, hard, microcrystalline, yellowish orange brown	10YR7/2	0.27
		C 5% Sand, unconsolidated, fine grained, sub-angular, clear, white Minor glauconite, pyrites, sandstone and shell fragments	N9	
842-222	2720-2730m	A 75% Shaly mudstone, subfissile, soft to mod. hard, non-calc., abundant cavings, medium light grey to light grey	N6-N7	0.66
		B 25% Dolomite, blocky, hard, microcrystalline, yellowish orange brown Minor sand and pyrites	10YR7/2	0.43
842-224	2740-2750m	A 98% Mudstone, blocky, shaly in part, soft to mod. hard, non-calc., dominant cavings, medium light grey to light grey Minor dolomite, glauconite and other (caved) mudstone	N6-N7	0.66,0.66
842-226	2760-2770m	A 90% Mudstone, as 842-224A, dominant cavings	N6-N7	0.67
		B 10% Dolomite, as 842-222B, minor cavings	10YR7/2	0.62
842-228	2780-2790m	A 95% Mudstone, as 842-224A, dominant cavings	N6-N7	0.72
		B 5% Sand, unconsolidated, fine grained, subrounded, clear, white Minor dolomite and siltstone	N9	
842-230	2800-2810m	A 75% Mudstone, as 842-224A, dominant cavings	N6-N7	0.76
		B 15% Siltstone, blocky, soft, non-calc., minor cavings		0.54
		C 10% Sand, as 842-228B	N9	
842-232	2820-2830m	A 75% Mudstone, blocky, soft, sl. silty non-calc., sig. cavings, medium light grey	N6	0.74,0.75
		B 25% Sand, as 842-228B	N9	
842-234	2840-2850m	A 90% Mudstone, as 842-232A, abundant cavings	N6	0.71
		B 10% Sand, as 842-228B	N9	
842-236	2870-2880m	A 90% Mudstone, as 842-232A, abundant cavings	N6	0.67
		B 10% Sand, as 842-228B Minor glauconite and pyrites	N9	

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842-238	2890-2900m	A 90% Mudstone, blocky, soft, sl. silty non-calc., abundant cavings, medium light grey	N6	0.74,0.75
		B 10% Sand, unconsolidated, fine grained, subrounded, clear, white Minor glauconite	N9	
842-240	2910-2920m	A 98% Mudstone, as 842-238A, dominant cavings Minor sand	N6	0.62
842-242	2930-2940m	A 60% Mudstone, as 842-238A, dominant cavings	N6	0.82,0.84
		B 40% Mudstone, blocky, soft, sl. calc., minor cavings Minor sand	10YR7/2 10YR8/2	0.97
842-244	2950-2960m	A 95% Mudstone, as 842-238A, dominant cavings	N6	0.62
		B 5% Glauconite, blocky, soft, very light greenish grey	5G9/1	
842-246	2970-2980m	A 40% Mudstone, as 842-238A, dominant cavings	N6	0.72
		B 25% Dolomite, blocky, hard, pale milky cut, pale yellowish brown	10YR6/2	1.18
		C 25% Lignite, blocky, greyish black	5YR2/1	
		D 10% Dolomitic limestone, blocky, hard,	N8-N9	0.28
842-248	2990-3000m	A 90% Mudstone, as 842-238A, abundant cavings	N6	0.66
		B 10% Dolomite, as 842-246B, pale cut Minor lignite and other dolomite	10YR6/2	
842-250	3010-3020m	A 70% Mudstone, blocky, soft, to mod. hard, non calc., abundant cavings, light olive grey	5Y6/1	0.64,0.65
		B 30% Shale, platy, mod. hard, non-calc., sig. cavings, medium grey Minor lignite and dolomite	N5	0.77
842-252	3030-3040m	A 85% Mudstone, as 842-250A, abundant cavings	5Y6/1	0.65
		B 15% Shale, as 842-250B, sig. cavings	N5	0.77
842-254	3049-3058m	A 80% Mudstone, as 842-250A, sig. to abundant cavings	5Y6/1	0.64,0.64
		B 20% Shale, as 842-250B, sig. cavings Minor other mudstone	N5	0.75
842-256	3067-3076m	A 60% Mudstone, as 842-250A, sig. to abundant cavings	5Y6/1	0.58
		B 30% Shale, as 842-250B, sig. cavings	N5	0.55
		C 10% Lignite, Minor other mudstone		
842-258	3085-3094m	A 55% Shale, platy to thinly fissile, mod. hard, non-calc., sig. cavings, medium dark grey to medium grey	N4-N5	0.49

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GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-258	3085-3094m	B 35% Mudstone, blocky, soft to mod. hard non-calc., abundant cavings, light olive grey	5Y6/1	0.63,0.63
		C 10% Lignite, blocky, greyish black	5YR2/1	
		Minor other mudstone		
842-260	3103-3112m	A 55% Mudstone, blocky, soft to mod. hard, non-calc., abundant cavings, medium light grey to light olive grey	N6-5Y6/1	0.65
		B 45% Shale, platy to thinly fissile, mod. hard, non-calc., sig. cavings, medium dark grey to medium grey	N4-N5	0.49
		Minor other mudstone		
842-262	3121-3130m	A 70% Shale, as 842-260B, abundant cavings	N4-N5	0.62
		B 30% Mudstone, as 842-260A	N6-5Y6/1	0.62
842-264	3139-3148m	A 85% Shale, as 842-260B, abundant cavings	N4-N5	0.75
		B 15% Mudstone, as 842-260A, abundant to dominant cavings	N6-5Y6/1	0.56
842-266	3157-3166m	A 98% Shale, as 842-260B, abundant cavings	N4-N5	0.74
		Minor dolomite and caved mudstone		
842-268	3175-3184m	A 98% Shale, as 842-260B, abundant cavings	N4-N5	0.74
		Minor mudstone		
842-270	3193-3202m	A 60% LCM - cement		
		B 40% Shale, platy to thinly fissile, mod. hard, non-calc., sig. to abundant cavings, medium dark grey	N4	0.66
842-272	3211-3220m	A 50% LCM - cement		
		B 50% Shale, as 842-270B	N4	0.74
842-274	3229-3238	A 60% Shale, as 842-270B, sig. cavings	N4	0.64
		B 40% LCM - cement and lignite		
842-276	3247-3256m	A 55% Shale, platy, mod. hard, non-calc., sig. cavings, medium dark grey	N4	0.64,0.64
		B 45% Shale, thinly fissile to platy, mod. hard, non-calc., greyish red	5R4/2	0.13
		Minor mudstone		
		Minor LCM		
842-278	3265-3274m	A 80% Shale, as 842-276A sig. cavings	N4	1.41
		B 15% Shale, as 842-276B, sig. cavings	5R4/2	0.13
		C 5% Pyrites		
		Minor sand		
		Minor LCM		
842-280	3283-3292m	A 98% Silty shale, subfissile, soft to mod. hard, non-calc., sig. cavings, medium dark grey to brownish grey	N4-5YR4/1	2.25,2.29
		Minor other shale		
		Minor LCM		
842-282	3301-3310m	A 95% Silty shale, as 842-280A, minor to sig. cavings	N4-5YR4/1	2.76

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomitic, Fluorescence, foraminifera, fossiliferous
Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-282	3301-3310m	B 5% Shale, thinly fissile, mod. hard, non-calc., sig. cavings, greyish red	5R4/2	0.18
842-284	3319-3328m	A 60% Siltstone, blocky, soft, non-calc. minor cavings, brownish grey	5YR4/1	2.53
		B 40% Silty shale, subfissile, soft to mod. hard, non-calc., sig. cavings medium dark grey to brownish grey	N4-5YR4/1	2.06
842-286	3337-3346m	A 75% Shale, subfissile, mod. hard, non-calc., sig. cavings, darkgrey	N3	1.92,1.97
		B 15% Siltstone, as 842-284A, minor	5YR4/1	2.05
		C 10% Sand, unconsolidated, fine grained, subangular, fairly well sorted, white	N9	
842-288	3355-3364m	A 75% Shale, as 842-286A, sig. cavings	N3	1.71
		B 15% Siltstone, as 842-284A, minor cavings	5YR4/1	1.49
		C 10% LCM as cement Minor sand		
842-290	3373-3382m	A 65% Shale, platy to subfissile, mod. hard non-calc., sig. cavings, medium dark grey	N4	1.18
		B 20% LCM - cement and metal		
		C 15% Silty shale, blocky to subfissile, soft to mod. hard, non-calc., minor cavings, brownish grey Minor other shale	5YR4/1	1.92,1.89
842-292	3391-3400	A 60% Shale, as 842-290A, sig. to abundant cavings	N4	0.85
		B 25% LCM - cement and metal		
		C 15% Silty shale, as 842-290C, minor cavings	5YR4/1	1.78
842-294	3409-3418m	A 60% Shale, as 842-290A, sig. cavings	N4	0.95
		B 25% LCM - cement		
		C 15% Silty shale, as 842-290C, minor cavings	5YR4/1	1.42
842-296	3427-3436m	A 95% LCM - cement, lignite and paint		
		B 5% Shale, platy, soft, non-calc., sl. silty in part, minor cavings, medium dark grey	N4	1.22
842-298	3445-3454m	A 75% Siltstone, blocky to subfissile, soft, non-calc., minor cavings, medium dark grey to brownish grey	N4-5YR4/1	1/47,1.50
		B 15% Shale, platy, mod. hard, non-calc., sig. cavings, medium dark grey	N4	0.77
		C 10% Sand, unconsolidated, fine grained subangular, fairly well sorted, clear white Minor other shale Minor LCM	N9	
842-300	3962-3472m	A 80% Sand, as 842-298C	N9	
		B 15% Shale, as 842-298B	N4	1.51

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomitic, Fluorescence, foraminifera, fossiliferous
Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-300	3962-3472m	C 5% Siltstone, blocky to subfissile, soft, non-calc., sig. cavings, medium dark grey to brownish grey Minor other shale	N4-5YR4/1	1.47,1.50
842-302	3481-3490m	A 40% Shale, platy, mod. hard, non-calc., sig. cavings, medium dark grey	N4	0.87
		B 25% Sand, unconsolidated, fine grained subangular, fairly well sorted, clear white	N9	
		C 15% Siltstone, blocky, soft, non-calc., minor cavings, brownish grey	5YR4/1	1.88
		D 10% Shale, subfissile, mod. hard, non calc., sig. cavings, greyish red	5R4/2	0.11
		E 10% LCM - cement, lignite and metal		
842-304	3499-3508m	A 50% Shale, as 842-302A, sig. cavings	N4	0.68,0.68
		B 25% LCM - cement and lignite		
		C 15% Siltstone, as 842-302C,sig. cavings	5YR4/1	
		D 10% Sand, as 842-302B	N9	
		Minor other shale		
842-306	3517-3526m	A 65% Shale, as 842-302A, sig. cavings	N4	0.72
		B 15% Siltstone, as 842-302C	5YR4/1	1.78
		C 10% Shale, subfissile, mod. hard, non-calc., minor cavings, greyish red	5R4/2	0.12
		D 10% LCM - cement and paint		
		Minor sand		
842-308	3535-3544m	A 35% Shale, as 842-302A, sig. cavings	N4	0.70,0.70
		B 30% Siltstone, as 842-302C, sig. cavings	5YR4/1	1.74
		C 15% Shale, as 842-306C, minor cavings	5R4/2	0.13
		D 10% Sand, unconsolidated, fine grained, subangular, white	N9	
		E 10% LCM - lignite and fibre		
842-310	3553-3562m	A 90% Sand, unconsolidated, fine grained, subangular, fairly well sorted, clear, white	N9	
		B 10% Shale, subfissile, mod. hard, non-calc., minor to sig. cavings, medium dark grey	N4	1.35
		Minor siltstone and other shale		
842-312	3571-3580m	A 60% Sand, as 842-310A	N9	
		B 40% Shale, subfissile, mod. hard, non-calc., satin lustre, minor cavings, medium dark grey to medium grey	N4-N5	2.12
		Minor siltstone and red shale		
842-314	3589-3598m	A 75% Sand, as 842-310A	N9	
		B 15% Shale, subfissile, mod. hard, sl. silty in part,non-calc., medium dark grey	N4	1.87,1.86
		C 10% LCM - lignite		
842-316	3607-3616m	A 45% Sand, as 842-310A	N9	
		B 35% Shale, as 842-314B, sig. cavings	N4	2.21

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomitic, Fluorescence, foraminifera, fossiliferous
Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-316	3607-3616m	C 20% Siltstone, blocky, soft, non-calc. minor cavings, brownish grey Minor red shale LCM - lignite and fibre	5YR4/1	1.68
842-318	3625-3634m	A 50% Shale, subfissile, mod. hard, sl. silty in part,non-calc., sig. cavings medium dark grey	N4	2.12
		B 35% Sand, unconsolidated, fine grained, subangular, fairly well sorted, clear, white	N9	
		C 10% Siltstone, as 842-316C, sig. cavings	5YR4/1	1.51
		D 5% Shale, subfissile, mod. hard, sl. calc., sig. cavings, greyish red Minor LCM	5R4/2	0.12,0.12
842-320	3643-3652m	A 45% Shale, as 842-318A, sig. cavings	N4	1.78
		B 25% Shaly mudstone, blocky to subfissile mod. hard, non-calc., minor cavings, light olive grey	5Y6/1	0.13
		C 15% Sand, as 842-318B	N9	
		D 15% Shaly mudstone, blocky, soft to mod. hard, sl. calc., minor cavings, greyish red Minor caved siltstone	5R4/2	0.12
842-322	3661-3670m	A 98% Sandstone, blocky, mod. hard, v. fine grained, well sorted, sl. cal., matrix v. pale milky cut, pinkish grey Minor shale and mudstone	5YR8/1	
842-324	3679-3688m	A 98% Sandstone, as 842-322A, v. pale milky cut Minor shale and pyrite	5YR8/1	
842-326	3697-3706m	A 98% Sandstone, unconsolidated, in part, blocky, fine grained, well sorted, sl. calc., matrix, pinkish grey to yellowish grey Minor shale	5YR8/1-5Y8/1	
842-328	3715-3724m	A 98% Sandstone, as 842-326A Minor sandstone	5YR8/1-5Y8/1	
842-330	3733-3742m	A 60% Siltstone, blocky, mod. hard, sl. calc., grades to sandstone, greyish red	5R4/2	0.09
		B 40% Sandstone, as 842-326A Minor caved shale LCM - lignite	5YR8/1-5Y8/1	
842-332	3751-3760m	A 60% Sandstone, blocky, fine grained, angular to subangular, fairly well sorted, non-calc., matrix, pinkish brownish grey	5YR7/1	

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomitic, Fluorescence, foraminifera, fossiliferous
Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-332	3751-3760m	B 35% Sandstone, blocky, fine grained, angular to subangular, fairly well sorted, sl. calc., matrix, greyish red	5R4/2	
		C 5% Shale, platy to subfissile, soft to mod. hard, non-calc., minor cavings, medium grey	N5	1.27,1.21
842-334	3769-3778m	A 50% Sandstone, blocky, fine grained, angular to subangular, fairly well sorted, non-calc., matrix, pinkish brownish grey	5YR7/1	
		B 30% Sandstone, as 842-332B	5R4/2	
		C 20% Shale, subfissile to blocky, soft to mod. hard, silty in part, non-calc., minor to sig. cavings, medium dark grey to olive grey	N4-5Y4/1	1.11
		Minor other shale		
842-336	3787-3796m	A 70% Sandstone, as 842-334A	5YR7/1	
		B 15% Sandstone, as 842-332B	5R4/2	
		C 15% Shale, as 842-334C, minor to sig. cavings	N4-5Y4/1	1.11
		Minor other shale		
842-338	3805-3814m	A 65% Sandstone, blocky, fine grained, angular, fairly well sorted, v. sl. calc., matrix, pinkish grey to medium brownish grey	5YR8/1-5YR7/1	
		B 20% Shale, subfissile, soft to mod. hard, non-calc., sig. cavings, medium dark grey	N4	1.45
		C 15% Shale, subfissile, soft to mod. hard non-calc., minor to sig. cavings, medium grey	N5	1.54
		Minor red sandstone		
842-340	3823-3832m	A 45% Sandstone, blocky, v. fine grained subangular, well sorted, non-calc., matrix, pinkish grey	5YR8/1	
		B 45% Sandstone, blocky, v. fine grained, subangular, well sorted, non-calc., matrix, greyish red	5R4/2	
		C 10% Shale, blocky, to subfissile, mod. hard, non-calc., grades to siltstone, sig. cavings, medium dark grey	N4	1.54,1.55
		Minor other shale		
842-342	3841-3850m	A 80% Sandstone, as 842-340A, unconsolidated	5YR8/1	
		B 15% Sandstone, as 842-340B	5R4/2	
		C 5% Shale, as 842-340C, sig. cavings	N4	2.78
		Minor other shale		
842-344	3859-3868	A 80% Sandstone, as 842-340A, mostly unconsolidated	5YR8/1	
		B 10% Sandstone, as 842-340B	5R4/2	

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomitic, Fluorescence, foraminifera, fossiliferous Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
842-344	3859-3868m	C 10% Shale, blocky to subfissile, mod. hard, non calc., grades to siltstone, sig. to abundant cavings, medium dark grey Minor other shale	N4	1.30
842-346	3877-3886m	A 95% Sandstone, blocky, v. fine grained, mostly unconsolidated, subangular, well sorted, non-calc., matrix	5YR8/1	
		B 5% Shale, as 842-344C, sig. to abundant cavings Minor other shale and sandstone	N4	1.34
842-348	3895-3904m	A 95% Sandstone, as 842-346A	5YR8/1	
		B 5% Shale, as 842-344C, sig. cavings Minor other shale and sandstone	N4	1.59

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomitic, Fluorescence, foraminifera, fossiliferous
Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 2A

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 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	$\frac{iC_4}{nC_4}$
842-001	520-530	1492	4	2	1	2	1502	9	0.6	1	0.39
842-002	530-540	2670	6	3	1	3	2684	14	0.5	2	0.47
842-003	540-550	1119	2	0	0	0	1123	3	0.3	4	0.49
842-004	550-560	2494	4	1	0	0	2498	5	0.2	0	0.41
842-005	560-570	585	2	0	0	0	587	2	0.4	0	1.06
842-006	570-580	1865	4	2	1	0	1872	7	0.4	0	1.40
842-007	580-590	3238	239	40	8	8	3533	295	8.4	40	1.03
842-008	590-600	1722	32	6	2	1	1763	41	2.3	16	1.07
842-009	600-610	3130	26	7	2	3	3168	38	1.2	9	0.88
842-010	610-620	2385	13	3	1	1	2403	18	0.7	9	0.91
842-011	620-630	3032	10	2	1	1	3045	13	0.4	8	0.90
842-012	630-640	1865	8	2	0	1	1876	11	0.6	14	0.73
842-013	640-650	2424	7	1	0	0	2433	9	0.4	2	0.81
842-014	650-660	2986	4	1	0	0	2991	6	0.2	4	0.49
842-015	660-670	2863	12	3	2	3	2883	20	0.7	1	0.60
842-016	670-680	1058	2	1	0	1	1061	3	0.3	2	0.65
842-017	680-690	1938	7	1	0	0	1945	7	0.4	0	0.00
842-018	690-700	2468	7	1	0	0	2476	8	0.3	0	0.00
842-019	700-710	2259	7	1	0	0	2267	8	0.3	0	0.00
842-020	710-720	3149	9	1	0	0	3159	10	0.3	0	0.00
842-021	720-730	2187	8	1	0	0	2196	9	0.4	0	0.00
842-022	730-740	2123	9	1	0	0	2133	10	0.5	0	0.00
842-023	740-750	1386	3	1	0	0	1390	4	0.3	0	0.00
842-024	750-760	1253	3	1	0	0	1257	4	0.3	0	0.00
842-025	760-770	2395	8	1	0	0	2404	9	0.4	0	0.00
842-026	770-780	2487	8	1	0	0	2496	10	0.4	0	0.00
842-027	780-790	1865	5	1	0	0	1871	6	0.3	0	0.00
842-028	790-800	2561	6	1	0	0	2568	7	0.3	0	0.00
842-029	800-810	3577	7	1	0	0	3585	8	0.2	0	0.00
842-030	810-820	6595	9	2	0	0	6606	11	0.2	2	0.00

TABLE 2A
CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 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	$\frac{iC_4}{nC_4}$
842-031	820-830	8636	11	3	0	0	8649	14	0.2	0	0.00
842-032	830-840	3786	8	1	0	0	3795	9	0.2	0	0.00
842-033	840-850	4391	12	5	2	4	4414	23	0.5	1	0.54
842-034	850-860	1587	10	2	1	1	1600	13	0.8	0	0.97
842-035	860-870	4333	7	2	0	0	4343	9	0.2	0	0.00
842-036	870-880	5403	8	3	0	0	5414	11	0.2	0	0.00
842-037	880-890	1306	5	1	0	0	1312	6	0.5	0	0.85
842-038	890-900	783	2	1	0	0	786	2	0.3	0	0.00
842-039	900-910	708	4	1	0	0	714	6	0.8	0	1.31
842-040	910-920	1898	8	2	0	0	1908	10	0.5	0	1.18
842-041	920-930	795	6	1	0	0	802	7	0.9	0	1.44
842-042	930-940	2037	7	1	0	0	2046	9	0.4	0	0.00
842-043	940-950	3304	5	1	0	0	3311	7	0.2	0	0.00
842-044	950-960	2451	8	1	0	0	2461	10	0.4	0	1.15
842-045	960-970	2860	8	2	1	1	2871	11	0.4	1	1.01
842-046	970-980	1597	6	1	0	0	1605	8	0.5	0	1.55
842-047	980-990	2256	7	2	1	0	2266	10	0.4	0	1.45
842-048	990-1000	2534	7	1	0	0	2543	9	0.4	0	0.00
842-049	1000-1010	2656	10	3	1	2	2671	16	0.6	2	0.76
842-050	1010-1020	1653	7	1	1	1	1663	10	0.6	11	1.29
842-051	1020-1030	1801	5	1	0	0	1807	7	0.4	7	2.00
842-052	1030-1040	1892	7	1	1	0	1902	10	0.5	10	1.52
842-053	1040-1050	1032	6	1	1	0	1040	8	0.8	8	1.63
842-054	1050-1060	1567	10	2	1	1	1581	14	0.9	10	1.68
842-055	1060-1070	1548	9	1	1	0	1560	12	0.8	5	3.29
842-056	1070-1080	2236	8	2	1	0	2247	11	0.5	3	1.92
842-057	1080-1090	1540	8	1	1	0	1550	10	0.7	2	2.87
842-058	1090-1100	3338	93	3	0	6	3441	103	3.0	28	0.00
842-059	1100-1110	1718	13	2	1	1	1734	17	1.0	4	1.19
842-060	1110-1120	3359	10	2	0	0	3371	12	0.4	16	0.00

TABLE 2A

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 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	$\frac{iC_4}{nC_4}$
842-061	1120-1130	918	4	3	0	3	927	9	1.0	1	0.00
842-062	1130-1140	1213	4	2	0	0	1220	6	0.5	0	0.00
842-063	1140-1150	1190	2	2	3	0	1196	6	0.5	17	0.00
842-064	1150-1160	1688	3	1	2	0	1694	6	0.3	0	0.00
842-065	1160-1170	1856	15	2	3	0	1876	21	1.1	0	0.00
842-066	1170-1180	1967	2	0	2	0	1971	4	0.2	0	0.00
842-067	1180-1190	1455	1	1	2	0	1459	4	0.3	0	0.00
842-068	1190-1200	2165	0	0	0	0	2165	0	0.0	0	0.00
842-069	1200-1210	1304	1	1	4	0	1310	6	0.5	0	0.00
842-070	1210-1220	1993	0	0	4	0	1996	4	0.2	0	0.00
842-071	1220-1230	1463	0	0	2	0	1465	2	0.2	0	0.00
842-072	1230-1240	2482	3	0	1	0	2486	4	0.2	0	0.00
842-073	1240-1250	3791	6	0	0	0	3797	6	0.2	0	0.00
842-074	1250-1260	3074	7	0	0	0	3081	7	0.2	0	0.00
842-075	1260-1270	2391	14	7	0	0	2412	22	0.9	0	1.00
842-076	1270-1280	2936	7	2	2	0	2945	10	0.3	0	0.00
842-077	1280-1290	4334	9	0	3	2	4347	13	0.3	0	1.54
842-078	1290-1300	3444	11	11	0	0	3466	22	0.6	0	0.00
842-079	1300-1310	5410	12	0	3	0	5426	15	0.3	0	0.00
842-080	1310-1320	10389	15	0	0	0	10403	15	0.1	0	0.00
842-081	1320-1330	8775	20	1	0	0	8795	21	0.2	0	0.00
842-082	1330-1340	9119	14	0	1	0	9134	15	0.2	0	0.00
842-083	1340-1350	1299	3	0	0	0	1301	3	0.2	0	0.00
842-084	1350-1360	10567	51	2	0	0	10620	53	0.5	0	0.00
842-085	1360-1370	8506	35	2	0	0	8543	37	0.4	0	0.00
842-086	1370-1380	4516	34	1	0	0	4552	36	0.8	0	0.00
842-087	1380-1390	5668	55	2	0	0	5726	57	1.0	0	0.00
842-088	1390-1400	7498	51	2	0	0	7551	54	0.7	0	0.00
842-089	1400-1410	5486	54	2	0	0	5542	56	1.0	0	0.00
842-090	1410-1420	9570	56	2	0	0	9628	58	0.6	0	0.00

TABLE 2A
CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 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	$\frac{iC_4}{nC_4}$
842-091	1420-1430	10519	51	3	0	0	10573	54	0.5	0	0.00
842-092	1430-1440	7697	54	2	0	0	7753	56	0.7	0	0.00
842-093	1440-1450	13292	48	3	0	0	13343	51	0.4	0	0.00
842-094	1450-1460	8168	57	5	0	0	8230	62	0.8	0	0.00
842-095	1460-1470	8166	57	2	0	0	8225	60	0.7	0	0.00
842-096	1470-1480	6185	69	3	0	0	6257	71	1.1	0	0.00
842-097	1480-1490	13085	31	4	0	2	13123	37	0.3	0	0.00
842-098	1490-1500	12654	25	0	0	0	12678	25	0.2	0	0.00
842-099	1500-1510	9887	16	0	0	0	9903	16	0.2	0	0.00
842-100	1510-1520	3917	11	0	2	0	3931	13	0.3	0	0.00
842-101	1520-1530	5790	15	0	0	0	5805	15	0.3	0	0.00
842-102	1530-1540	8505	18	0	0	0	8523	18	0.2	0	0.00
842-103	1540-1550	1825	6	0	1	0	1833	8	0.4	0	0.00
842-104	1550-1560	6068	13	0	0	0	6081	13	0.2	0	0.00
842-105	1560-1570	6277	103	85	21	26	6512	235	3.6	9	0.80
842-106	1570-1580	8663	60	50	14	18	8805	142	1.6	6	0.76
842-107	1580-1590	8591	23	13	4	10	8642	50	0.6	0	0.43
842-108	1590-1600	4141	17	14	5	8	4186	44	1.1	1	0.61
842-109	1600-1610	4583	14	7	3	4	4611	28	0.6	4	0.75
842-110	1610-1620	3881	15	7	3	4	3910	29	0.8	5	0.60
842-111	1620-1630	3497	13	3	0	1	3514	16	0.5	1	0.00
842-112	1630-1640	3973	12	2	3	0	3989	17	0.4	0	0.00
842-113	1640-1650	5514	25	2	0	0	5542	27	0.5	0	0.00
842-114	1650-1660	2832	10	1	0	0	2843	11	0.4	1	0.00
842-115	1660-1670	6307	30	2	0	0	6339	32	0.5	0	0.00
842-116	1670-1680	5399	40	2	0	0	5441	42	0.8	1	0.00
842-117	1680-1690	7609	33	2	3	3	7649	40	0.5	0	1.09
842-118	1680-1690	6068	62	3	0	0	6132	65	1.1	0	0.00
842-119	1690-1700	13941	87	4	0	0	14033	91	0.7	0	0.00
842-120	1700-1710	6606	43	3	0	0	6652	46	0.7	0	0.00

TABLE 2A
CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 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	$\frac{iC_4}{nC_4}$
842-121	1710-1720	7834	83	3	0	0	7919	86	1.1	0	0.00
842-122	1720-1730	8142	78	4	0	0	8224	81	1.0	0	0.00
842-123	1730-1740	6876	80	4	0	0	6960	84	1.2	0	0.00
842-124	1740-1750	5093	74	7	0	0	5174	81	1.6	0	0.00
842-125	1750-1760	7877	135	11	1	0	8024	147	1.8	0	0.00
842-126	1760-1770	7772	216	25	2	0	8015	243	3.0	5	0.00
842-127	1770-1780	8273	255	33	2	0	8562	289	3.4	1	0.00
842-128	1780-1790	4792	232	31	2	0	5057	265	5.2	3	0.00
842-129	1790-1800	10482	313	54	2	0	10852	370	3.4	0	0.00
842-130	1800-1810	8197	305	68	7	3	8580	382	4.5	15	2.54
842-131	1810-1820	6594	269	59	14	12	6948	354	5.1	5	1.14
842-132	1820-1830	6968	403	108	26	29	7534	566	7.5	24	0.92
842-133	1830-1840	11289	395	115	22	26	11847	558	4.7	24	0.82
842-134	1840-1850	4240	193	70	11	18	4531	292	6.4	15	0.64
842-135	1850-1860	6545	287	117	21	43	7014	468	6.7	92	0.48
842-136	1860-1870	8807	345	144	26	66	9389	582	6.2	185	0.39
842-137	1870-1880	6101	277	118	19	54	6569	468	7.1	125	0.36
842-138	1880-1890	7322	476	449	147	401	8794	1473	16.7	1459	0.37
842-139	1890-1900	3132	290	152	48	142	3764	632	16.8	570	0.34
842-140	1900-1910	4395	221	130	35	94	4875	480	9.9	316	0.37
842-141	1910-1920	6863	418	287	75	211	7854	991	12.6	637	0.36
842-142	1920-1930	4314	296	251	80	236	5177	862	16.7	702	0.34
842-143	1930-1940	10818	1050	869	259	679	13676	2858	20.9	2127	0.38
842-144	1940-1950	6075	3622	4631	3697	7008	25033	18958	75.7	13796	0.53
842-145	1950-1960	4515	1097	1669	541	1432	9253	4739	51.2	3050	0.38
842-146	1960-1970	3422	1379	1766	836	2224	9628	6206	64.5	4317	0.38
842-147	1970-1980	6658	2252	4037	1436	4009	18392	11734	63.8	8106	0.36
842-148	1980-1990	4912	2257	2909	1425	3982	15486	10573	68.3	7225	0.36
842-149	1990-2000	2078	1005	1258	746	1885	6971	4893	70.2	3374	0.40
842-150	2000-2010	6568	903	933	281	805	9491	2923	30.8	2411	0.35

TABLE 2A
CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 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	$\frac{iC_4}{nC_4}$
842-151	2010-2020	5513	1109	1245	370	1058	9295	3782	40.7	2647	0.35
842-152	2020-2030	5474	2240	4907	1263	3753	17637	12163	69.0	6031	0.34
842-153	2030-2040	5067	1924	4448	1270	3818	16528	11461	69.3	6478	0.33
842-154	2040-2050	5154	1351	2126	534	1580	10746	5592	52.0	2894	0.34
842-155	2050-2060	2250	1229	1416	774	1945	7614	5364	70.4	2591	0.40
842-156	2060-2070	3278	1797	2300	980	2740	11095	7817	70.5	4161	0.36
842-157	2070-2080	3222	1646	1909	596	1686	9060	5838	64.4	2251	0.35
842-158	2080-2090	3055	1622	1939	580	1757	8953	5898	65.9	2835	0.33
842-159	2090-2100	4108	1718	2133	504	1494	9957	5848	58.7	2240	0.34
842-160	2100-2110	3674	1276	1796	432	1261	8438	4764	56.5	2186	0.34
842-161	2110-2120	6933	2002	2196	431	1295	12858	5925	46.1	2258	0.33
842-162	2120-2130	3324	1551	1809	363	1043	8089	4765	58.9	1464	0.35
842-163	2130-2140	5309	3381	4438	1771	4915	19813	14504	73.2	4790	0.36
842-164	2140-2150	4714	3611	4910	4709	7615	25558	20845	81.6	16405	0.62
842-165	2150-2160	1430	958	1247	1209	1891	6735	5305	78.8	1655	0.64
842-166	2160-2170	4337	2470	3365	1459	4532	16162	11825	73.2	7685	0.32
842-167	2170-2180	1543	958	1192	813	1773	6279	4736	75.4	3348	0.46
842-168	2180-2190	6065	3020	4334	1453	4396	19268	13203	68.5	7143	0.33
842-170	2200-2210	5419	2510	3899	1390	3962	17180	11761	68.5	6410	0.35
842-172	2220-2230	2799	1737	1987	1223	2828	10574	7775	73.5	4382	0.43
842-174	2240-2250	4245	1837	2638	662	2006	11388	7142	62.7	3196	0.33
842-176	2260-2270	3405	1800	2161	623	1812	9801	6396	65.3	2960	0.34
842-178	2280-2290	1660	1045	1226	853	1777	6561	4901	74.7	3492	0.48
842-180	2300-2310	4039	2356	2867	1251	3736	14250	10210	71.7	7908	0.33
842-182	2320-2330	2515	1483	1658	937	2279	8871	6357	71.7	3581	0.41
842-184	2340-2350	2302	1391	1613	932	2336	8573	6271	73.2	4465	0.40
842-186	2360-2370	4913	3133	3902	2092	5696	19736	14823	75.1	11177	0.37
842-188	2380-2390	6051	3816	3829	2801	6171	22668	16618	73.3	12666	0.45
842-190	2400-2410	757	451	565	568	907	3249	2492	76.7	1721	0.63
842-192	2420-2430	4100	2618	3269	1452	4345	15785	11685	74.0	8128	0.33

TABLE 2A

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 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	$\frac{iC_4}{nC_4}$
842-194	2440-2450	4767	3308	4060	2237	5810	20182	15415	76.4	11512	0.39
842-196	2460-2470	3310	2230	2697	1840	4225	14302	10992	76.9	8683	0.44
842-198	2480-2490	3314	2267	2793	2353	4331	15058	11744	78.0	8707	0.54
842-200	2500-2510	3560	2422	2921	1733	4429	15065	11505	76.4	8166	0.39
842-202	2520-2530	4218	2710	2947	1859	4177	15911	11693	73.5	6270	0.45
842-204	2540-2550	3856	2650	3411	1467	4571	15954	12099	75.8	7882	0.32
842-206	2560-2570	4244	2810	3734	1629	4804	17220	12977	75.4	8158	0.34
842-208	2580-2590	2141	3611	3632	1474	4296	15153	13013	85.9	7053	0.34
842-210	2600-2610	2353	1463	2474	833	2213	9335	6983	74.8	3382	0.38
842-212	2620-2630	38	28	69	28	64	226	188	83.1	680	0.43
842-214	2640-2650	2681	2102	2514	2459	3698	13454	10773	80.1	4701	0.66
842-216	2660-2670	2890	1543	3096	758	2047	10334	7444	72.0	2803	0.37
842-218	2680-2690	886	500	630	350	703	3069	2183	71.1	591	0.50
842-220	2700-2710	1096	517	916	229	551	3308	2212	66.9	678	0.41
842-222	2720-2730	619	234	497	137	327	1814	1195	65.9	416	0.42
842-224	2740-2750	3599	2766	3555	1263	3225	14407	10809	75.0	3294	0.39
842-226	2760-2770	1059	784	955	550	1183	4531	3472	76.6	1211	0.47
842-228	2780-2790	3381	1976	2858	2035	3213	13463	10082	74.9	5663	0.63
842-230	2800-2810	3277	1199	2242	553	1531	8802	5525	62.8	2670	0.36
842-232	2820-2830	2967	1234	3184	944	2718	11047	8080	73.1	5028	0.35
842-234	2840-2850	3544	998	1778	443	1215	7978	4434	55.6	2007	0.36
842-236	2870-2880	2918	1236	2265	547	1374	8340	5422	65.0	1685	0.40
842-238	2890-2900	1413	697	1380	347	933	4770	3357	70.4	1606	0.37
842-240	2910-2920	1432	832	1686	356	1026	5331	3899	73.1	1765	0.35
842-242	2930-2940	27	15	61	44	146	292	265	90.8	989	0.30
842-244	2950-2960	23	14	44	19	35	136	113	83.2	245	0.55
842-246	2970-2980	13	7	12	4	11	47	34	71.7	50	0.39
842-248	2990-3000	927	454	946	240	714	3282	2355	71.7	1412	0.34
842-250	3010-3020	3270	2829	5183	1195	3498	15974	12704	79.5	6380	0.34
842-252	3030-3040	319	640	2106	627	1923	5615	5296	94.3	901	0.33

TABLE 2A

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 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	$\frac{iC_4}{nC_4}$
842-254	3049-3058	1501	958	1765	423	1080	5727	4226	73.8	1906	0.39
842-256	3067-3076	208	179	541	171	521	1621	1413	87.2	1212	0.33
842-258	3085-3094	819	387	746	182	447	2582	1763	68.3	742	0.41
842-260	3103-3112	2358	752	1185	305	840	5441	3083	56.7	1554	0.36
842-262	3121-3130	874	722	799	129	345	2870	1996	69.5	692	0.37
842-264	3139-3148	30	18	27	5	13	92	62	67.7	85	0.39
842-266	3157-3166	301	223	401	72	181	1178	877	74.4	385	0.40
842-268	3175-3184	454	369	544	86	195	1648	1194	72.5	388	0.44
842-270	3193-3202	117	104	137	31	61	449	332	74.0	138	0.50
842-272	3211-3220	770	329	269	42	72	1482	712	48.1	154	0.58
842-274	3229-3238	567	307	194	21	33	1123	555	49.5	33	0.63
842-276	3247-3256	2637	1125	413	39	75	4289	1652	38.5	89	0.51
842-278	3265-3274	4296	2578	2075	330	616	9895	5599	56.6	1517	0.54
842-280	3283-3292	7172	3841	2057	195	439	13703	6531	47.7	507	0.44
842-282	3301-3310	7609	4788	3367	269	1022	17055	9446	55.4	849	0.26
842-284	3319-3328	2747	2127	2301	460	558	8192	5445	66.5	463	0.83
842-286	3337-3346	3009	1967	1838	254	713	7781	4772	61.3	883	0.36
842-288	3355-3364	1491	1017	1428	188	795	4920	3428	69.7	1102	0.24
842-290	3373-3382	1696	1205	972	217	279	4369	2672	61.2	248	0.78
842-292	3391-3400	2511	1583	1001	119	319	5533	3022	54.6	549	0.37
842-294	3409-3418	339	214	159	23	65	798	460	57.6	144	0.35
842-296	3427-3436	346	180	242	44	136	948	602	63.5	525	0.33
842-298	3445-3454	381	191	207	36	104	919	538	58.5	444	0.35
842-300	3463-3472	10074	7134	8541	6303	12850	44901	34828	77.6	42423	0.49
842-302	3481-3490	2493	1719	2754	941	4002	11909	9416	79.1	15414	0.24
842-304	3499-3508	3007	1503	1927	685	3688	10809	7803	72.2	19593	0.19
842-306	3517-3526	1814	712	924	338	1774	5563	3748	67.4	13207	0.19
842-308	3535-3544	1243	615	681	175	1016	3730	2487	66.7	18699	0.17
842-310	3553-3562	929	458	582	135	555	2660	1730	65.1	8511	0.24
842-312	3571-3580	718	333	289	34	149	1524	806	52.9	1721	0.23

TABLE 2A

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 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	$\frac{iC_4}{nC_4}$
842-314	3589-3598	3971	1836	1582	188	780	8356	4385	52.5	6712	0.24
842-316	3607-3616	113	144	190	36	164	647	534	82.6	4401	0.22
842-318	3625-3634	34	11	8	1	5	59	25	42.2	126	0.24
842-320	3643-3652	2285	1269	1107	151	536	5348	3063	57.3	2116	0.28
842-322	3661-3670	1368	593	641	237	510	3348	1981	59.2	2180	0.47
842-324	3679-3688	1134	487	487	168	365	2641	1507	57.1	2061	0.46
842-326	3697-3706	524	259	259	73	187	1302	778	59.8	2780	0.39
842-328	3715-3724	504	143	113	26	64	850	346	40.7	700	0.41
842-330	3733-3742	462	171	156	23	82	895	432	48.3	1235	0.28
842-332	3751-3760	995	551	474	95	279	2393	1398	58.4	8378	0.34
842-334	3769-3778	2691	1136	857	158	579	5420	2729	50.4	2666	0.27
842-336	3787-3796	2644	971	1241	373	1472	6701	4057	60.5	6453	0.25
842-338	3805-3814	3028	1023	772	146	536	5504	2476	45.0	5216	0.27
842-340	3823-3832	2737	784	542	111	401	4576	1839	40.2	3975	0.28
842-342	3841-3850	1770	438	352	80	338	2978	1208	40.6	3753	0.24
842-344	3859-3868	1329	361	275	46	191	2202	873	39.7	2536	0.24
842-346	3877-3886	1819	613	518	93	374	3416	1597	46.8	5711	0.25
842-348	3895-3904	913	295	252	40	144	1644	731	44.5	2304	0.28

TABLE 2B

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS IN CUTTING 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	$\frac{iC_4}{nC_4}$
842-001	520-530	509	11	5	1	6	533	24	4.5	48	0.22
842-002	530-540	228	6	3	2	3	242	13	5.6	20	0.46
842-003	540-550	379	10	3	2	4	399	20	5.0	9	0.59
842-004	550-560	278	9	3	0	0	290	12	4.2	0	0.00
842-005	560-570	3119	22	9	4	7	3161	42	1.3	13	0.58
842-006	570-580	1244	15	5	0	1	1264	20	1.6	13	0.70
842-007	580-590	5035	177	52	12	16	5292	257	4.9	130	0.73
842-008	590-600	2264	122	44	10	16	2457	193	7.9	113	0.63
842-009	600-610	3472	31	13	3	6	3526	54	1.5	47	0.49
842-010	610-620	1304	28	15	5	9	1361	57	4.2	56	0.55
842-011	620-630	2911	22	9	3	5	2950	39	1.3	37	0.60
842-012	630-640	1452	16	10	2	2	1483	30	2.1	3	0.93
842-013	640-650	1534	21	8	1	3	1567	33	2.1	9	0.30
842-014	650-660	769	12	6	1	2	791	21	2.7	15	0.63
842-015	660-670	1434	16	6	1	3	1460	26	1.7	13	0.19
842-016	670-680	688	11	4	0	2	705	17	2.5	9	0.00
842-017	680-690	793	16	5	0	1	815	22	2.8	0	0.24
842-018	690-700	647	10	3	0	0	661	14	2.1	0	0.00
842-019	700-710	2746	10	3	0	3	2761	15	0.6	0	0.00
842-020	710-720	1160	9	3	0	0	1171	12	1.0	2	0.00
842-021	720-730	1557	10	4	0	0	1571	14	0.9	0	0.00
842-022	730-740	985	10	3	0	0	998	13	1.3	0	0.00
842-023	740-750	1474	5	1	0	0	1480	7	0.4	1	0.00
842-024	750-760	370	3	0	0	0	373	3	0.9	0	0.00
842-025	760-770	2799	9	2	0	0	2810	11	0.4	0	0.00
842-026	770-780	1059	9	3	0	0	1070	11	1.0	0	0.00
842-027	780-790	1847	9	3	0	0	1858	12	0.6	3	0.00
842-028	790-800	846	11	4	0	0	861	15	1.7	0	0.00
842-029	800-810	1223	9	2	0	0	1235	12	0.9	6	0.00
842-030	810-820	572	12	5	2	0	590	19	3.1	0	0.00

TABLE 2B

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS IN CUTTING 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	$\frac{iC_4}{nC_4}$
842-031	820-830	1141	9	5	0	0	1155	14	1.2	0	0.00
842-032	830-840	967	10	3	0	0	980	13	1.3	0	0.00
842-033	840-850	1575	22	13	1	1	1612	37	2.3	3	0.68
842-034	850-860	1127	8	5	1	1	1141	14	1.2	3	0.82
842-035	860-870	404	6	2	0	0	412	9	2.1	0	0.00
842-036	870-880	452	10	3	0	0	465	13	2.8	4	0.00
842-037	880-890	1659	11	3	0	0	1673	14	0.8	12	0.00
842-038	890-900	323	7	2	0	0	333	10	3.0	0	0.00
842-039	900-910	1881	9	2	0	0	1893	12	0.6	0	0.00
842-040	910-920	934	10	3	0	0	947	13	1.4	0	0.00
842-041	920-930	2300	5	1	0	0	2306	7	0.3	4	0.00
842-042	930-940	541	8	3	0	0	552	11	2.0	0	0.00
842-043	940-950	317	11	4	0	3	335	18	5.4	0	0.00
842-044	950-960	1583	26	10	2	4	1626	42	2.6	15	0.64
842-045	960-970	1840	9	3	0	0	1852	12	0.6	2	0.00
842-046	970-980	1009	8	4	0	0	1021	12	1.2	0	0.00
842-047	980-990	1502	7	2	1	1	1512	11	0.7	0	0.67
842-048	990-1000	514	5	1	0	0	520	6	1.1	2	0.00
842-049	1000-1010	2294	12	3	0	0	2309	15	0.7	68	0.00
842-050	1010-1020	1086	12	3	0	0	1101	15	1.3	77	0.00
842-051	1020-1030	1759	15	4	0	0	1779	19	1.1	16	0.00
842-052	1030-1040	837	9	3	0	0	848	11	1.3	34	0.00
842-053	1040-1050	4302	19	5	0	0	4326	24	0.6	77	0.00
842-054	1050-1060	1537	9	3	0	0	1549	12	0.8	26	0.00
842-055	1060-1070	2784	15	4	0	0	2803	20	0.7	18	0.00
842-056	1070-1080	885	20	6	0	2	913	28	3.1	10	0.00
842-057	1080-1090	1468	23	6	4	0	1500	32	2.1	44	0.00
842-058	1090-1100	598	22	5	0	0	624	26	4.2	11	0.00
842-059	1100-1110	663	17	4	0	0	685	22	3.2	10	0.00
842-060	1110-1120	196	4	1	0	0	201	5	2.5	8	0.00

TABLE 2B

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS IN CUTTING 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	$\frac{iC_4}{nC_4}$
842-061	1120-1130	151	3	1	0	0	155	4	2.9	7	0.00
842-062	1130-1140	175	3	1	0	0	179	4	2.1	0	0.00
842-063	1140-1150	202	3	1	0	0	205	4	1.8	0	0.00
842-064	1150-1160	193	3	1	0	0	196	3	1.8	0	0.00
842-065	1160-1170	213	4	1	0	0	218	4	2.0	0	0.00
842-066	1170-1180	240	4	1	0	0	245	5	2.0	0	0.00
842-067	1180-1190	133	3	1	0	0	138	4	3.1	0	0.00
842-068	1190-1200	185	5	1	0	0	191	6	3.1	0	0.00
842-069	1200-1210	137	5	0	0	0	141	5	3.3	0	0.00
842-070	1210-1220	130	5	2	0	0	137	7	5.1	0	0.00
842-071	1220-1230	121	3	1	0	0	125	4	3.4	0	0.00
842-072	1230-1240	158	4	0	1	0	163	6	3.4	0	0.00
842-073	1240-1250	253	4	0	0	0	258	5	1.9	9	0.00
842-074	1250-1260	121	3	2	0	0	126	5	4.0	0	0.00
842-075	1260-1270	215	5	2	0	4	227	12	5.2	0	0.00
842-076	1270-1280	158	5	2	0	0	164	7	4.1	0	0.00
842-077	1280-1290	167	6	2	0	0	175	8	4.7	0	0.00
842-078	1290-1300	133	7	2	0	0	141	8	5.9	0	0.00
842-079	1300-1310	488	9	2	0	0	499	11	2.2	0	0.00
842-080	1310-1320	205	4	1	0	0	209	5	2.3	0	0.00
842-081	1320-1330	667	6	0	0	0	674	6	0.9	0	0.00
842-082	1330-1340	445	5	1	0	0	452	7	1.5	0	0.00
842-083	1340-1350	587	6	1	0	0	594	7	1.2	0	0.00
842-084	1350-1360	1425	9	2	0	0	1436	11	0.7	0	0.00
842-085	1360-1370	2475	10	2	0	0	2487	12	0.5	0	0.00
842-086	1370-1380	1835	9	2	0	0	1846	11	0.6	0	0.00
842-087	1380-1390	1855	7	0	0	0	1862	7	0.4	0	0.00
842-088	1390-1400	1745	12	4	0	0	1760	16	0.9	0	0.00
842-089	1400-1410	3310	12	2	0	0	3323	14	0.4	0	0.00
842-090	1410-1420	1381	7	2	0	0	1390	9	0.6	0	0.00

TABLE 2B

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS IN CUTTING 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	$\frac{iC_4}{nC_4}$
842-091	1420-1430	2648	9	2	0	0	2659	11	0.4	0	0.00
842-092	1430-1440	2529	9	2	0	0	2540	11	0.4	0	0.00
842-093	1440-1450	2042	12	3	0	0	2057	15	0.7	0	0.00
842-094	1450-1460	2728	10	2	0	0	2740	12	0.4	0	0.00
842-095	1460-1470	6185	16	3	1	0	6205	20	0.3	0	0.00
842-096	1470-1480	3428	9	0	1	0	3438	10	0.3	0	0.00
842-097	1480-1490	700	24	11	6	0	741	41	5.5	0	0.00
842-098	1490-1500	500	10	3	0	0	513	13	2.6	0	0.00
842-099	1500-1510	146	5	2	0	0	153	7	4.4	0	0.00
842-100	1510-1520	99	4	1	0	0	103	5	4.6	0	0.00
842-101	1520-1530	290	4	1	0	0	296	6	1.9	0	0.00
842-102	1530-1540	193	4	1	0	0	197	5	2.3	0	0.00
842-103	1540-1550	74	4	1	0	0	79	5	6.2	0	0.00
842-104	1550-1560	119	4	1	0	0	124	5	4.2	0	0.00
842-105	1560-1570	400	42	53	15	22	531	131	24.7	7	0.70
842-106	1570-1580	165	12	17	5	9	208	43	20.6	6	0.60
842-107	1580-1590	196	11	14	5	10	235	39	16.6	6	0.47
842-108	1590-1600	222	9	9	4	6	250	28	11.3	4	0.69
842-109	1600-1610	204	7	9	3	5	229	24	10.6	6	0.53
842-110	1610-1620	129	6	3	0	2	140	11	7.8	2	0.00
842-111	1620-1630	284	4	1	1	1	292	8	2.7	0	0.73
842-112	1630-1640	328	4	1	0	0	334	6	1.7	0	0.00
842-113	1640-1650	477	4	1	0	0	482	5	1.1	6	0.00
842-114	1650-1660	202	4	1	0	1	209	6	3.0	0	0.00
842-115	1660-1670	771	7	1	0	0	779	8	1.0	0	0.00
842-116	1670-1680	974	8	1	0	0	984	9	1.0	0	0.00
842-117	1680-1690	468	4	1	0	0	472	5	1.0	0	0.00
842-118	1680-1690	1061	7	2	0	0	1070	9	0.9	4	0.00
842-119	1690-1700	81	5	2	0	0	87	7	7.8	0	0.00
842-120	1700-1710	67	5	2	0	0	74	7	9.3	0	0.00

TABLE 2B

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS IN CUTTING 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	$\frac{iC_4}{nC_4}$
842-121	1710-1720	384	10	2	0	0	396	12	3.0	0	0.00
842-122	1720-1730	278	8	2	0	0	288	10	3.5	0	0.00
842-123	1730-1740	144	7	2	0	0	153	9	6.0	0	0.00
842-124	1740-1750	103	7	2	0	0	112	9	7.9	0	0.00
842-125	1750-1760	337	13	3	0	0	353	16	4.5	0	0.00
842-126	1760-1770	313	20	5	0	0	338	25	7.5	0	0.00
842-127	1770-1780	410	25	9	0	0	444	34	7.7	0	0.00
842-128	1780-1790	239	22	8	0	0	269	30	11.2	0	0.00
842-129	1790-1800	191	19	12	3	3	229	38	16.6	7	1.00
842-130	1800-1810	185	22	16	4	4	231	45	19.6	14	1.11
842-131	1810-1820	301	26	12	5	6	349	48	13.9	3	0.93
842-132	1820-1830	169	44	32	12	17	275	105	38.4	25	0.69
842-133	1830-1840	278	28	22	9	17	354	76	21.5	23	0.54
842-134	1840-1850	138	20	14	6	14	192	54	28.1	42	0.42
842-135	1850-1860	189	16	8	3	3	219	29	13.5	38	0.77
842-136	1860-1870	196	26	14	4	15	256	60	23.4	113	0.27
842-137	1870-1880	140	18	11	2	9	180	40	22.2	93	0.28
842-138	1880-1890	120	21	14	4	19	179	59	32.9	712	0.24
842-139	1890-1900	203	40	14	3	19	279	77	27.4	576	0.17
842-140	1900-1910	92	25	13	6	24	159	67	42.0	431	0.23
842-141	1910-1920	167	25	17	4	19	232	66	28.3	385	0.24
842-142	1920-1930	143	43	20	5	26	236	94	39.7	687	0.19
842-143	1930-1940	696	210	416	119	301	1741	1045	60.0	1247	0.39
842-144	1940-1950	854	398	1356	683	2183	5473	4619	84.4	11731	0.31
842-145	1950-1960	1426	181	355	160	493	2615	1189	45.5	4785	0.32
842-146	1960-1970	746	120	251	126	427	1669	923	55.3	4913	0.30
842-147	1970-1980	931	195	435	181	574	2317	1386	59.8	4937	0.31
842-148	1980-1990	519	154	286	116	450	1524	1005	66.0	5379	0.26
842-149	1990-2000	1287	326	683	315	1160	3771	2484	65.9	8711	0.27
842-150	2000-2010	1657	163	251	119	410	2600	943	36.3	4147	0.29

TABLE 2B
CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS IN CUTTING 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	$\frac{iC_4}{nC_4}$
842-151	2010-2020	2372	264	436	163	567	3802	1430	37.6	3295	0.29
842-152	2020-2030	249	107	358	177	647	1537	1289	83.8	6540	0.27
842-153	2030-2040	414	153	419	211	791	1988	1574	79.2	8208	0.27
842-154	2040-2050	332	117	227	90	348	1114	783	70.3	4151	0.26
842-155	2050-2060	1749	509	968	316	1090	4631	2883	62.2	5836	0.29
842-156	2060-2070	728	301	698	264	1020	3011	2284	75.8	5520	0.26
842-157	2070-2080	1097	328	605	219	817	3066	1969	64.2	8559	0.27
842-158	2080-2090	662	191	327	107	424	1711	1050	61.3	3822	0.25
842-159	2090-2100	1218	369	712	247	927	3473	2255	64.9	5010	0.27
842-160	2100-2110	236	87	173	57	249	802	566	70.6	2445	0.23
842-161	2110-2120	540	187	312	90	356	1485	945	63.6	2341	0.25
842-162	2120-2130	296	125	233	69	292	1014	718	70.9	3141	0.24
842-163	2130-2140	1012	786	3290	1522	5389	11999	10987	91.6	24808	0.28
842-164	2140-2150	855	1303	7825	4890	13920	28793	27938	97.0	48753	0.35
842-165	2150-2160	732	506	1477	562	2214	5490	4758	86.7	17755	0.25
842-166	2160-2170	411	224	627	263	1007	2533	2121	83.8	9779	0.26
842-167	2170-2180	566	321	892	424	1700	3902	3336	85.5	11422	0.25
842-168	2180-2190	891	422	1253	653	2443	5662	4771	84.3	12367	0.27
842-170	2200-2210	770	342	780	361	1360	3614	2843	78.7	8687	0.27
842-172	2220-2230	868	453	947	349	1405	4022	3154	78.4	9431	0.25
842-174	2240-2250	498	218	431	141	550	1839	1341	72.9	4494	0.26
842-176	2260-2270	308	153	332	144	577	1515	1206	79.6	6731	0.25
842-178	2280-2290	1654	851	1847	708	2646	7705	6052	78.5	19237	0.27
842-180	2300-2310	769	363	922	464	1767	4284	3515	82.0	19023	0.26
842-182	2320-2330	2109	868	1618	553	2069	7218	5109	70.8	14291	0.27
842-184	2340-2350	829	377	757	291	1127	3379	2551	75.5	12138	0.26
842-186	2360-2370	617	352	942	429	1805	4145	3528	85.1	20427	0.24
842-188	2380-2390	987	583	1461	547	2210	5788	4802	83.0	16753	0.25
842-190	2400-2410	2181	1209	3012	1183	4601	12186	10005	82.1	23624	0.26
842-192	2420-2430	624	433	1248	535	2206	5047	4423	87.6	17967	0.24

TABLE 2B

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS IN CUTTING 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	$\frac{iC_4}{nC_4}$
842-194	2440-2450	1066	819	2502	1021	4349	9757	8691	89.1	25490	0.23
842-196	2460-2470	1401	1134	3237	1293	5560	12626	11224	88.9	30775	0.23
842-198	2480-2490	1561	1316	3876	1502	6335	14591	13030	89.3	36287	0.24
842-200	2500-2510	958	882	2471	937	4179	9428	8470	89.8	27299	0.22
842-202	2520-2530	1322	1535	4874	1679	6618	16028	14705	91.7	28236	0.25
842-204	2540-2550	475	501	1591	630	3045	6243	5768	92.4	24841	0.21
842-206	2560-2570	626	525	1213	372	1957	4693	4067	86.7	15716	0.19
842-208	2580-2590	342	350	1007	358	1748	3805	3463	91.0	12964	0.20
842-210	2600-2610	400	400	1523	591	2417	5330	4930	92.5	9680	0.24
842-212	2620-2630	632	798	2291	656	2596	6974	6341	90.9	9580	0.25
842-214	2640-2650	475	749	2067	607	2511	6409	5935	92.6	12040	0.24
842-216	2660-2670	278	215	646	207	860	2205	1927	87.4	5015	0.24
842-218	2680-2690	528	268	625	159	617	2196	1669	76.0	1862	0.26
842-220	2700-2710	158	104	294	99	434	1089	930	85.5	1685	0.23
842-222	2720-2730	223	117	280	77	313	1010	787	77.9	1611	0.25
842-224	2740-2750	502	456	1744	632	2367	5702	5199	91.2	8600	0.27
842-226	2760-2770	629	687	1492	363	1688	4859	4230	87.1	5997	0.21
842-228	2780-2790	324	331	1221	491	1880	4247	3923	92.4	11423	0.26
842-230	2800-2810	261	146	418	131	533	1489	1228	82.5	3639	0.25
842-232	2820-2830	80	61	257	113	576	1088	1008	92.6	3770	0.20
842-234	2840-2850	240	128	443	189	812	1811	1572	86.8	5531	0.23
842-236	2870-2880	285	225	691	224	877	2302	2017	87.6	4181	0.26
842-238	2890-2900	166	139	374	113	547	1339	1173	87.6	2769	0.21
842-240	2910-2920	46	50	220	51	263	631	584	92.6	838	0.19
842-242	2930-2940	55	30	94	85	383	647	592	91.5	1710	0.22
842-244	2950-2960	107	63	166	63	251	649	543	83.6	861	0.25
842-246	2970-2980	55	37	102	55	209	457	402	87.9	1644	0.26
842-248	2990-3000	51	30	85	29	151	346	295	85.3	1110	0.19
842-250	3010-3020	206	250	544	175	710	1885	1679	89.1	4132	0.25
842-252	3030-3040	99	65	313	169	743	1388	1290	92.9	4672	0.23

TABLE 2B

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS IN CUTTING 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	$\frac{iC_4}{nC_4}$
842-254	3049-3058	114	74	186	63	306	742	628	84.7	2646	0.20
842-256	3067-3076	54	12	48	19	103	237	182	77.0	1289	0.19
842-258	3085-3094	125	73	174	56	246	674	549	81.5	1788	0.23
842-260	3103-3112	277	219	471	179	677	1823	1546	84.8	3107	0.26
842-262	3121-3130	65	108	274	42	203	692	627	90.6	921	0.21
842-264	3139-3148	93	66	124	18	71	372	279	75.0	532	0.25
842-266	3157-3166	96	49	116	20	86	368	272	73.8	914	0.23
842-268	3175-3184	52	36	103	15	57	263	211	80.1	178	0.26
842-270	3193-3202	50	21	66	15	68	220	170	77.2	292	0.22
842-272	3211-3220	229	141	221	39	99	730	501	68.6	270	0.39
842-274	3229-3238	158	108	133	18	53	469	311	66.3	161	0.34
842-276	3247-3256	938	477	302	39	113	1869	931	49.8	380	0.34
842-278	3265-3274	998	2067	3304	331	1492	8191	7193	87.8	2990	0.22
842-280	3283-3292	2119	2388	1681	137	560	6885	4766	69.2	1009	0.24
842-282	3301-3310	857	2107	2083	187	859	6093	5236	85.9	883	0.22
842-284	3319-3328	761	1682	2908	346	1631	7329	6568	89.6	1688	0.21
842-286	3337-3346	354	570	998	157	763	2843	2489	87.5	2000	0.21
842-288	3355-3364	1643	989	1473	355	1528	5987	4344	72.6	5297	0.23
842-290	3373-3382	1547	1553	1485	204	759	5548	4001	72.1	2086	0.27
842-292	3391-3400	462	573	609	85	364	2093	1630	77.9	1606	0.23
842-294	3409-3418	721	1020	1465	261	1093	4559	3839	84.2	2659	0.24
842-296	3427-3436	368	318	703	183	716	2289	1921	83.9	2782	0.26
842-298	3445-3454	2027	2416	3515	666	2524	11148	9121	81.8	8008	0.26
842-300	3463-3472	2121	1240	4808	2139	9306	19614	17493	89.2	36048	0.23
842-302	3481-3490	564	654	2174	1159	5877	10428	9864	94.6	37488	0.20
842-304	3499-3508	741	311	736	474	2650	4911	4170	84.9	15058	0.18
842-306	3517-3526	425	175	337	151	972	2061	1636	79.4	13136	0.16
842-308	3535-3544	347	202	389	134	717	1790	1443	80.6	9858	0.19
842-310	3553-3562	193	73	114	38	205	623	430	69.0	11303	0.19
842-312	3571-3580	760	558	809	133	605	2866	2106	73.5	6441	0.22

TABLE 2B

CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS IN CUTTING 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	$\frac{iC_4}{nC_4}$
842-314	3589-3598	1838	1170	1749	378	1340	6475	4636	71.6	8572	0.28
842-316	3607-3616	531	726	1010	174	678	3119	2588	83.0	2526	0.26
842-318	3625-3634	761	518	653	123	528	2583	1822	70.5	3458	0.23
842-320	3643-3652	298	220	337	66	318	1238	941	76.0	4280	0.21
842-322	3661-3670	590	162	312	255	650	1968	1379	70.0	10234	0.39
842-324	3679-3688	571	179	317	196	540	1803	1232	68.4	8472	0.36
842-326	3697-3706	464	136	209	96	292	1198	733	61.2	7558	0.33
842-328	3715-3724	635	82	111	46	156	1031	396	38.4	7232	0.30
842-330	3733-3742	568	134	208	46	214	1170	602	51.5	9116	0.22
842-332	3751-3760	543	148	116	22	83	912	369	40.4	3008	0.26
842-334	3769-3778	858	595	878	220	1048	3600	2742	76.2	10451	0.21
842-336	3787-3796	549	597	567	108	580	2401	1852	77.1	6472	0.19
842-338	3805-3814	670	477	682	157	729	2715	2045	75.3	8771	0.22
842-340	3823-3832	591	239	400	109	519	1857	1266	68.2	8086	0.21
842-342	3841-3850	608	250	210	31	171	1271	663	52.1	6402	0.18
842-344	3859-3868	701	228	372	87	403	1791	1090	60.9	9587	0.22
842-346	3877-3886	537	126	161	39	182	1043	507	48.6	7410	0.21
842-348	3895-3904	592	78	98	20	95	883	291	33.0	4343	0.21

TABLE 2 C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS (2A + 2B)

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	$\frac{iC_4}{nC_4}$
842-001	520-530	2002	15	7	2	9	2035	33	1.6	49	0.26
842-002	530-540	2898	12	6	3	7	2925	27	0.9	22	0.47
842-003	540-550	1499	12	4	3	5	1522	23	1.5	13	0.58
842-004	550-560	2771	13	3	0	0	2788	17	0.6	0	0.41
842-005	560-570	3703	23	10	4	7	3748	45	1.2	13	0.58
842-006	570-580	3109	19	6	1	1	3136	27	0.9	14	0.95
842-007	580-590	8272	417	92	20	24	8824	552	6.3	170	0.83
842-008	590-600	3985	154	50	12	18	4219	234	5.5	129	0.67
842-009	600-610	6603	58	20	5	9	6695	92	1.4	56	0.60
842-010	610-620	3689	41	18	6	10	3764	75	2.0	65	0.59
842-011	620-630	5943	32	11	4	6	5995	52	0.9	46	0.64
842-012	630-640	3317	24	12	3	3	3359	42	1.2	17	0.89
842-013	640-650	3958	27	10	1	3	4000	41	1.0	10	0.36
842-014	650-660	3755	17	7	1	2	3782	27	0.7	19	0.63
842-015	660-670	4297	29	9	2	5	4343	46	1.1	14	0.40
842-016	670-680	1746	13	5	0	3	1767	21	1.2	11	0.13
842-017	680-690	2731	23	6	0	1	2760	30	1.1	0	0.24
842-018	690-700	3115	18	4	0	0	3136	22	0.7	0	0.00
842-019	700-710	5005	17	3	0	3	5028	23	0.5	0	0.00
842-020	710-720	4309	18	3	0	0	4331	22	0.5	2	0.00
842-021	720-730	3744	19	4	0	0	3767	23	0.6	0	0.00
842-022	730-740	3108	19	4	0	0	3131	23	0.7	0	0.00
842-023	740-750	2860	9	2	0	0	2871	11	0.4	1	0.00
842-024	750-760	1623	7	1	0	0	1630	7	0.4	0	0.00
842-025	760-770	5194	17	3	0	0	5214	20	0.4	0	0.00
842-026	770-780	3545	17	4	0	0	3566	21	0.6	0	0.00
842-027	780-790	3712	14	3	0	0	3729	18	0.5	3	0.00
842-028	790-800	3407	17	5	0	0	3429	22	0.6	0	0.00
842-029	800-810	4801	16	4	0	0	4820	20	0.4	6	0.00
842-030	810-820	7167	21	7	2	0	7197	30	0.4	2	0.00

TABLE 2C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS (2A + 2B)

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	$\frac{iC_4}{nC_4}$
842-031	820-830	9777	20	8	0	0	9804	27	0.3	0	0.00
842-032	830-840	4753	18	4	0	0	4775	22	0.5	0	0.00
842-033	840-850	5966	34	18	3	5	6026	60	1.0	3	0.57
842-034	850-860	2714	17	7	1	2	2741	27	1.0	3	0.87
842-035	860-870	4737	13	4	0	0	4755	18	0.4	0	0.00
842-036	870-880	5855	18	6	0	0	5879	24	0.4	4	0.00
842-037	880-890	2965	16	4	0	0	2985	21	0.7	12	0.85
842-038	890-900	1106	9	3	0	0	1118	12	1.1	0	0.00
842-039	900-910	2589	14	3	0	0	2606	17	0.7	0	1.31
842-040	910-920	2832	18	5	0	0	2855	24	0.8	0	1.18
842-041	920-930	3095	11	2	0	0	3108	14	0.4	4	1.44
842-042	930-940	2579	15	4	0	0	2598	20	0.8	0	0.00
842-043	940-950	3621	17	6	0	3	3646	25	0.7	0	0.00
842-044	950-960	4035	33	12	3	4	4087	52	1.3	15	0.70
842-045	960-970	4701	17	4	1	1	4724	23	0.5	3	1.01
842-046	970-980	2606	14	5	0	0	2626	20	0.8	0	1.55
842-047	980-990	3758	13	4	1	1	3778	20	0.5	0	0.86
842-048	990-1000	3048	12	3	0	0	3063	15	0.5	2	0.00
842-049	1000-1010	4949	22	6	1	2	4980	31	0.6	70	0.76
842-050	1010-1020	2739	19	5	1	1	2763	25	0.9	88	1.29
842-051	1020-1030	3560	20	6	0	0	3586	26	0.7	23	2.00
842-052	1030-1040	2729	16	4	1	0	2750	21	0.8	43	1.52
842-053	1040-1050	5335	25	6	1	0	5367	32	0.6	85	1.63
842-054	1050-1060	3104	20	4	1	1	3130	26	0.8	36	1.68
842-055	1060-1070	4332	24	6	1	0	4363	32	0.7	24	5.03
842-056	1070-1080	3121	28	8	1	2	3160	39	1.2	13	0.36
842-057	1080-1090	3007	30	7	4	0	3050	42	1.4	46	*.**
842-058	1090-1100	3936	115	8	0	6	4065	129	3.2	39	0.00
842-059	1100-1110	2381	30	7	1	1	2420	39	1.6	14	0.92
842-060	1110-1120	3555	14	3	0	0	3573	18	0.5	24	0.00

TABLE 2 C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS (2A + 2B)

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	$\frac{iC_4}{nC_4}$
842-061	1120-1130	1068	7	4	0	3	1082	13	1.2	8	0.00
842-062	1130-1140	1389	7	3	0	0	1399	10	0.7	0	0.00
842-063	1140-1150	1391	4	3	3	0	1401	10	0.7	17	0.00
842-064	1150-1160	1881	6	1	2	0	1890	9	0.5	0	0.00
842-065	1160-1170	2069	19	3	3	0	2094	25	1.2	0	0.00
842-066	1170-1180	2207	6	1	2	0	2216	9	0.4	0	0.00
842-067	1180-1190	1588	5	1	2	0	1596	8	0.5	0	0.00
842-068	1190-1200	2351	5	1	0	0	2357	6	0.3	0	0.00
842-069	1200-1210	1441	6	1	4	0	1452	11	0.7	0	0.00
842-070	1210-1220	2122	5	2	4	0	2133	11	0.5	0	0.00
842-071	1220-1230	1584	3	1	2	0	1591	6	0.4	0	0.00
842-072	1230-1240	2639	8	0	2	0	2649	10	0.4	0	0.00
842-073	1240-1250	4044	10	0	0	0	4054	11	0.3	9	0.00
842-074	1250-1260	3195	11	2	0	0	3207	12	0.4	0	0.00
842-075	1260-1270	2606	19	9	0	5	2640	34	1.3	0	0.09
842-076	1270-1280	3093	11	4	2	0	3110	17	0.5	0	0.00
842-077	1280-1290	4501	15	2	3	2	4522	21	0.5	0	1.68
842-078	1290-1300	3577	17	13	0	0	3607	30	0.8	0	0.00
842-079	1300-1310	5898	21	2	3	0	5925	26	0.4	0	0.00
842-080	1310-1320	10593	19	1	0	0	10613	20	0.2	0	0.00
842-081	1320-1330	9442	26	1	0	0	9469	27	0.3	0	0.00
842-082	1330-1340	9564	19	1	1	0	9586	22	0.2	0	0.00
842-083	1340-1350	1886	8	1	0	0	1895	9	0.5	0	0.00
842-084	1350-1360	11992	60	4	0	0	12056	64	0.5	0	0.00
842-085	1360-1370	10980	45	3	0	0	11029	49	0.4	0	0.00
842-086	1370-1380	6351	43	3	0	0	6397	46	0.7	0	0.00
842-087	1380-1390	7524	62	2	0	0	7588	64	0.8	0	0.00
842-088	1390-1400	9242	63	6	0	0	9311	69	0.7	0	0.00
842-089	1400-1410	8796	66	4	0	0	8865	69	0.8	0	0.00
842-090	1410-1420	10951	63	4	0	0	11018	66	0.6	0	0.00

TABLE 2C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS (2A + 2B)

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	$\frac{iC_4}{nC_4}$
842-091	1420-1430	13167	60	4	0	0	13232	65	0.5	0	0.00
842-092	1430-1440	10226	62	4	0	0	10293	67	0.6	0	0.00
842-093	1440-1450	15334	60	6	0	0	15400	65	0.4	0	0.00
842-094	1450-1460	10897	67	7	0	0	10971	74	0.7	0	0.00
842-095	1460-1470	14350	74	5	1	0	14430	80	0.6	0	0.00
842-096	1470-1480	9613	78	3	1	0	9694	82	0.8	0	0.00
842-097	1480-1490	13785	55	15	6	2	13863	78	0.6	0	2.77
842-098	1490-1500	13154	35	3	0	0	13192	38	0.3	0	0.00
842-099	1500-1510	10033	21	2	0	0	10056	23	0.2	0	0.00
842-100	1510-1520	4016	15	1	2	0	4034	18	0.4	0	0.00
842-101	1520-1530	6081	19	1	0	0	6101	20	0.3	0	0.00
842-102	1530-1540	8697	22	1	0	0	8720	23	0.3	0	0.00
842-103	1540-1550	1899	10	1	1	0	1911	12	0.6	0	0.00
842-104	1550-1560	6188	17	1	0	0	6206	18	0.3	0	0.00
842-105	1560-1570	6677	144	138	36	48	7043	366	5.2	16	0.76
842-106	1570-1580	8829	72	67	19	27	9013	185	2.0	11	0.71
842-107	1580-1590	8787	34	27	9	20	8876	89	1.0	6	0.45
842-108	1590-1600	4363	26	23	9	14	4435	72	1.6	5	0.65
842-109	1600-1610	4787	21	16	6	10	4840	53	1.1	10	0.62
842-110	1610-1620	4010	21	10	3	6	4050	40	1.0	6	0.44
842-111	1620-1630	3781	17	4	1	2	3805	24	0.6	1	0.44
842-112	1630-1640	4301	16	3	3	0	4323	22	0.5	0	0.00
842-113	1640-1650	5991	30	3	0	0	6024	32	0.5	6	0.00
842-114	1650-1660	3035	14	2	0	1	3052	17	0.6	1	0.00
842-115	1660-1670	7078	37	3	0	0	7118	40	0.6	0	0.00
842-116	1670-1680	6373	48	3	0	0	6425	51	0.8	1	0.00
842-117	1680-1690	8077	37	3	3	3	8121	45	0.6	0	1.09
842-118	1680-1690	7129	69	5	0	0	7203	74	1.0	4	0.00
842-119	1690-1700	14022	92	6	0	0	14120	98	0.7	0	0.00
842-120	1700-1710	6673	49	5	0	0	6726	53	0.8	0	0.00

TABLE 2C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS (2A + 2B)

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	$\frac{iC_4}{nC_4}$
842-121	1710-1720	8218	93	5	0	0	8315	98	1.2	0	0.00
842-122	1720-1730	8420	86	5	0	0	8512	91	1.1	0	0.00
842-123	1730-1740	7020	87	6	0	0	7113	93	1.3	0	0.00
842-124	1740-1750	5196	81	9	0	0	5286	90	1.7	0	0.00
842-125	1750-1760	8214	148	14	1	0	8377	163	1.9	0	0.00
842-126	1760-1770	8085	236	31	2	0	8353	268	3.2	5	0.00
842-127	1770-1780	8682	280	42	2	0	9006	323	3.6	1	0.00
842-128	1780-1790	5031	254	39	2	0	5326	295	5.5	3	0.00
842-129	1790-1800	10674	332	67	6	3	11082	408	3.7	7	1.70
842-130	1800-1810	8383	327	83	11	7	8810	428	4.9	29	1.70
842-131	1810-1820	6895	295	71	19	18	7297	402	5.5	7	1.07
842-132	1820-1830	7138	447	140	38	46	7808	671	8.6	49	0.83
842-133	1830-1840	11567	423	137	31	43	12201	634	5.2	47	0.71
842-134	1840-1850	4377	213	83	17	32	4723	346	7.3	57	0.54
842-135	1850-1860	6735	303	125	23	46	7232	498	6.9	130	0.51
842-136	1860-1870	9003	371	159	30	82	9645	642	6.7	298	0.37
842-137	1870-1880	6241	295	129	22	63	6749	508	7.5	218	0.35
842-138	1880-1890	7442	497	463	152	419	8973	1532	17.1	2172	0.36
842-139	1890-1900	3334	330	166	51	161	4043	708	17.5	1146	0.32
842-140	1900-1910	4487	246	143	40	118	5034	547	10.9	746	0.34
842-141	1910-1920	7029	443	305	80	230	8086	1057	13.1	1021	0.35
842-142	1920-1930	4457	339	270	85	263	5413	956	17.7	1388	0.32
842-143	1930-1940	11514	1260	1285	378	980	15417	3903	25.3	3375	0.39
842-144	1940-1950	6929	4019	5987	4380	9191	30506	23577	77.3	25527	0.48
842-145	1950-1960	5940	1278	2024	701	1925	11868	5928	49.9	7836	0.36
842-146	1960-1970	4168	1499	2017	962	2651	11297	7129	63.1	9230	0.36
842-147	1970-1980	7589	2447	4472	1617	4584	20709	13119	63.4	13043	0.35
842-148	1980-1990	5431	2411	3195	1540	4432	17009	11578	68.1	12604	0.35
842-149	1990-2000	3365	1331	1941	1061	3045	10742	7377	68.7	12085	0.35
842-150	2000-2010	8225	1066	1184	400	1216	12092	3866	32.0	6557	0.33

TABLE 2C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS (2A + 2B)

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	$\frac{iC_4}{nC_4}$
842-151	2010-2020	7885	1373	1681	533	1625	13097	5212	39.8	5942	0.33
842-152	2020-2030	5722	2347	5265	1439	4400	19174	13452	70.2	12571	0.33
842-153	2030-2040	5481	2077	4868	1481	4609	18516	13035	70.4	14687	0.32
842-154	2040-2050	5486	1468	2354	624	1928	11860	6374	53.7	7045	0.32
842-155	2050-2060	3999	1738	2384	1090	3035	12245	8247	67.3	8427	0.36
842-156	2060-2070	4005	2098	2998	1245	3760	14106	10101	71.6	9682	0.33
842-157	2070-2080	4319	1975	2514	815	2503	12126	7807	64.4	10810	0.33
842-158	2080-2090	3716	1814	2266	687	2181	10664	6948	65.2	6657	0.31
842-159	2090-2100	5326	2087	2845	751	2421	13430	8104	60.3	7250	0.31
842-160	2100-2110	3910	1363	1968	489	1509	9240	5330	57.7	4631	0.32
842-161	2110-2120	7473	2189	2509	520	1651	14342	6869	47.9	4599	0.32
842-162	2120-2130	3620	1676	2042	432	1334	9103	5484	60.2	4604	0.32
842-163	2130-2140	6321	4166	7728	3293	10304	31812	25492	80.1	29597	0.32
842-164	2140-2150	5569	4914	12735	9598	21535	54351	48783	89.8	65159	0.45
842-165	2150-2160	2162	1464	2723	1771	4105	12225	10063	82.3	19409	0.43
842-166	2160-2170	4748	2693	3992	1722	5539	18695	13947	74.6	17465	0.31
842-167	2170-2180	2109	1279	2084	1236	3473	10180	8072	79.3	14769	0.36
842-168	2180-2190	6955	3442	5587	2106	6839	24930	17974	72.1	19509	0.31
842-170	2200-2210	6189	2852	4678	1751	5323	20794	14604	70.2	15097	0.33
842-172	2220-2230	3667	2190	2934	1572	4233	14596	10929	74.9	13812	0.37
842-174	2240-2250	4743	2055	3070	803	2555	13226	8483	64.1	7690	0.31
842-176	2260-2270	3714	1954	2493	767	2389	11316	7602	67.2	9691	0.32
842-178	2280-2290	3313	1896	3073	1560	4422	14266	10952	76.8	22729	0.35
842-180	2300-2310	4809	2719	3789	1715	5503	18534	13725	74.1	26931	0.31
842-182	2320-2330	4624	2351	3275	1491	4349	16089	11465	71.3	17871	0.34
842-184	2340-2350	3130	1768	2369	1222	3463	11952	8822	73.8	16603	0.35
842-186	2360-2370	5530	3485	4845	2521	7501	23882	18351	76.8	31603	0.34
842-188	2380-2390	7037	4399	5290	3349	8381	28457	21419	75.3	29419	0.40
842-190	2400-2410	2938	1660	3577	1752	5508	15435	12497	81.0	25344	0.32
842-192	2420-2430	4724	3052	4517	1988	6551	20832	16108	77.3	26096	0.30

TABLE 2C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS (2A + 2B)

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	$\frac{iC_4}{nC_4}$
842-194	2440-2450	5833	4127	6562	3259	10159	29939	24106	80.5	37001	0.32
842-196	2460-2470	4711	3364	5934	3133	9786	26927	22216	82.5	39458	0.32
842-198	2480-2490	4875	3583	6669	3856	10666	29649	24774	83.6	44994	0.36
842-200	2500-2510	4518	3304	5392	2671	8608	24493	19975	81.6	35465	0.31
842-202	2520-2530	5540	4245	7820	3538	10795	31939	26399	82.7	34505	0.33
842-204	2540-2550	4331	3151	5002	2097	7616	22198	17867	80.5	32723	0.28
842-206	2560-2570	4869	3336	4947	2001	6761	21914	17044	77.8	23874	0.30
842-208	2580-2590	2483	3961	4639	1832	6044	18959	16476	86.9	20017	0.30
842-210	2600-2610	2753	1862	3997	1423	4630	14665	11913	81.2	13062	0.31
842-212	2620-2630	671	826	2360	684	2660	7200	6529	90.7	10260	0.26
842-214	2640-2650	3156	2851	4582	3066	6209	19863	16708	84.1	16741	0.49
842-216	2660-2670	3168	1758	3742	965	2907	12539	9371	74.7	7819	0.33
842-218	2680-2690	1414	768	1255	509	1320	5266	3852	73.1	2453	0.39
842-220	2700-2710	1255	621	1210	327	984	4397	3142	71.5	2363	0.33
842-222	2720-2730	842	351	777	214	640	2824	1982	70.2	2027	0.33
842-224	2740-2750	4101	3222	5298	1895	5592	20109	16008	79.6	11894	0.34
842-226	2760-2770	1688	1471	2447	913	2871	9390	7702	82.0	7208	0.32
842-228	2780-2790	3705	2307	4079	2526	5093	17710	14005	79.1	17086	0.50
842-230	2800-2810	3538	1345	2660	683	2064	10291	6753	65.6	6309	0.33
842-232	2820-2830	3047	1295	3441	1057	3295	12135	9088	74.9	8798	0.32
842-234	2840-2850	3783	1126	2220	632	2027	9789	6006	61.3	7539	0.31
842-236	2870-2880	3203	1461	2957	771	2251	10642	7439	69.9	5866	0.34
842-238	2890-2900	1579	835	1755	460	1480	6109	4530	74.2	4375	0.31
842-240	2910-2920	1478	882	1906	407	1289	5962	4484	75.2	2603	0.32
842-242	2930-2940	82	44	155	128	529	938	857	91.3	2699	0.24
842-244	2950-2960	130	77	210	83	286	786	656	83.5	1105	0.29
842-246	2970-2980	69	43	113	59	220	504	435	86.4	1694	0.27
842-248	2990-3000	978	485	1032	269	865	3628	2650	73.0	2522	0.31
842-250	3010-3020	3476	3079	5726	1370	4208	17859	14383	80.5	10512	0.33
842-252	3030-3040	418	705	2418	796	2666	7003	6585	94.0	5573	0.30

TABLE 2C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS (2A + 2B)

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	$\frac{iC_4}{nC_4}$
842-254	3049-3058	1615	1032	1951	486	1385	6469	4854	75.0	4551	0.35
842-256	3067-3076	262	191	589	190	624	1857	1595	85.9	2501	0.30
842-258	3085-3094	944	461	920	238	693	3256	2312	71.0	2530	0.34
842-260	3103-3112	2635	971	1656	485	1517	7264	4629	63.7	4662	0.32
842-262	3121-3130	939	831	1073	171	548	3561	2622	73.6	1613	0.31
842-264	3139-3148	123	83	150	23	84	463	341	73.6	617	0.27
842-266	3157-3166	397	272	518	92	268	1547	1149	74.3	1299	0.34
842-268	3175-3184	506	405	647	101	252	1911	1405	73.5	566	0.40
842-270	3193-3202	167	124	203	46	129	669	502	75.1	430	0.36
842-272	3211-3220	999	470	491	81	171	2212	1213	54.8	424	0.47
842-274	3229-3238	725	415	326	39	86	1592	867	54.4	194	0.46
842-276	3247-3256	3575	1602	715	77	188	6158	2583	41.9	469	0.41
842-278	3265-3274	5294	4645	5378	661	2108	18086	12792	70.7	4507	0.31
842-280	3283-3292	9291	6229	3738	332	999	20588	11297	54.9	1516	0.33
842-282	3301-3310	8466	6895	5450	456	1881	23147	14682	63.4	1733	0.24
842-284	3319-3328	3508	3809	5209	806	2188	15521	12013	77.4	2151	0.37
842-286	3337-3346	3363	2538	2835	412	1477	10624	7261	68.3	2883	0.28
842-288	3355-3364	3134	2006	2901	543	2323	10907	7773	71.3	6398	0.23
842-290	3373-3382	3244	2758	2457	421	1037	9917	6673	67.3	2334	0.41
842-292	3391-3400	2973	2156	1610	204	683	7626	4653	61.0	2155	0.30
842-294	3409-3418	1059	1233	1623	284	1158	5358	4298	80.2	2804	0.25
842-296	3427-3436	714	498	945	227	852	3237	2523	77.9	3306	0.27
842-298	3445-3454	2409	2607	3722	702	2628	12067	9659	80.0	8453	0.27
842-300	3463-3472	12195	8374	13350	8442	22156	64515	52321	81.1	78471	0.38
842-302	3481-3490	3057	2373	4928	2100	9879	22337	19280	86.3	52902	0.21
842-304	3499-3508	3748	1814	2662	1159	6337	15721	11973	76.2	34651	0.18
842-306	3517-3526	2239	887	1262	489	2747	7624	5385	70.6	26343	0.18
842-308	3535-3544	1590	817	1071	309	1733	5520	3930	71.2	28557	0.18
842-310	3553-3562	1122	531	695	173	761	3282	2160	65.8	19815	0.23
842-312	3571-3580	1478	891	1098	168	755	4390	2912	66.3	8163	0.22

TABLE 2C

TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C_1 - C_7 HYDROCARBONS (2A + 2B)

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	$\frac{iC_4}{nC_4}$
842-314	3589-3598	5809	3006	3330	566	2120	14831	9022	60.8	15284	0.27
842-316	3607-3616	644	870	1200	210	843	3766	3123	82.9	6927	0.25
842-318	3625-3634	795	528	661	125	533	2642	1847	69.9	3584	0.23
842-320	3643-3652	2582	1489	1444	217	853	6586	4004	60.8	6396	0.25
842-322	3661-3670	1957	755	952	493	1160	5317	3360	63.2	12414	0.42
842-324	3679-3688	1705	666	804	364	905	4444	2739	61.6	10533	0.40
842-326	3697-3706	988	396	468	169	479	2500	1512	60.5	10338	0.35
842-328	3715-3724	1140	225	224	72	220	1881	741	39.4	7931	0.33
842-330	3733-3742	1030	306	364	69	296	2065	1035	50.1	10351	0.23
842-332	3751-3760	1538	699	590	117	362	3305	1767	53.5	11386	0.32
842-334	3769-3778	3549	1731	1735	378	1627	9020	5471	60.7	13117	0.23
842-336	3787-3796	3193	1568	1808	482	2052	9103	5910	64.9	12925	0.23
842-338	3805-3814	3698	1500	1453	303	1265	8219	4521	55.0	13987	0.24
842-340	3823-3832	3328	1023	942	220	920	6433	3105	48.3	12061	0.24
842-342	3841-3850	2378	688	562	111	509	4249	1871	44.0	10155	0.22
842-344	3859-3868	2030	589	647	133	595	3993	1964	49.2	12123	0.22
842-346	3877-3886	2355	739	678	131	556	4459	2104	47.2	13121	0.24
842-348	3895-3904	1505	373	350	60	239	2527	1022	40.4	6647	0.25

TABLE 3

DETAILED GASOLINE (C4-C7) ANALYSIS

GEOCHEM SAMPLE NUMBER	350
DEPTH	DST 1 CRUDE OIL
isobutane	0.31
n-butane	2.39
isopentane	3.22
n-pentane	7.04
2,2-dimethylB	0.09
cyclopentane(CP)	0.87
2,3-dimethylB	0.02
2-methylP	4.73
3-methylP	3.04
n-hexane	10.74
methylCP(MCP)	5.62
2,2-dimethylP	0.42
2,4-dimethylP	0.07
2,2,3-trimethylB	0.01
benzene	2.23
cyclohexane(CH)	8.75
2,3-dimethylP	0.00
1,1-dimethylCP	0.00
2-methylH	4.26
2,3-dimethylP	0.87
3-methylH	4.18
1,c,3-dimethylCP	1.54
1,t,3-dimethylCP	1.12
1,t,2-dimethylCP	3.59
3-ethylP	0.00
n-heptane	13.00
methylCH(MCH)	16.31
1,c,2-dimethylCP	0.00
toluene	5.58
ABUNDANCE	
nC7/C7nap x100	57.63
MCP/Bz	2.52
MH/DMCP	1.35
nC6/MCP	1.91
%n-PARAFFINS	33.17
%iso-PARAFFINS	21.23
% NAPHTHENES	37.79
% AROMATICS	7.81

TABLE 4
KEROGEN TYPE AND MATURATION

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC MATTER DESCRIPTION					THERMAL MATURATION	
		TYPES 40%; 10-40%; 10%	REMARKS	RE-WORKED (%)	PARTICLE SIZE	PRESERV-ATION	INDEX	1 – 10 SCALE
842-244A	2950-2960m	I;W;Am-H-Al		95	F-M	F-G	2-	
842-250B	3010-3020m	I;W;H-Am-Al	H at 2- and 2- to 2	95	F-M	F-G	2-	
842-258A	3085-3094m	I-W;H;Am-Al	H at 2- to 2 and 2 possible material at 1+ to 2-	65	F-M	F-G	2-/2-(?)	
842-262A	3121-3130m	I;W;Am-H-Al	H at 2 caving	90	F-M	F-G	2- to 2/2(?)	
842-268A	3175-3184m	I;W;H-Al	H at 2- through 2	90	F-M	F-G	2- to 2	
842-274A	3229-3238m	I-W;-;Am-Al-H	H at 2	80	F-C	F	2- to 2	
842-276A	3247-3256m	I;W;H-Al	caving H at 2	90	F-M	F-G	2- to 2	
842-280A	3283-3292m	W-I;H;Al-Am	significant H at 2 caving	70	M-C	G	2- to 2	
842-284A	3319-3328m	W-I;H;Al	material at 2 significant	70	F-M	F-G	2- to 2	
842-288A	3355-3364m	I-W;H;Al	good H at 2 significant caving	75	F-M/C	G	2- to 2/2	
842-292A	3391-3400m	I-W;-;H-Al	significant caving	85	M	F-G	2- to 2/2(?)	
842-294A	3409-3418m	I-W;H;Al	significant caving H at 2	75	F-M	G	2(?)	
842-298A	3445-3454m	W-I;H;Al-Am	significant caving	60	F-C	F-G	2	
842-302A	3481-3490m	I-W;-;H-Al	frequent disseminated Am-like contamination caving	80	F-M	F	2	
842-312B	3571-3580m	W-I;H;Al	significant caving	65	F-M	F	2	
842-320A	3643-3652m	W-I;H;Al	significant caving	70	F-M/C	F	2	

Algal, Amorphous, Herbaceous, Inertinite, Resin, Wood

postscript = coarse, cuticle, cysts, degraded, fine, other,. structured, spore-pollen, thick-walled, unstructured

Dominant, Major, Significant, Minor

TABLE 5

VITRINITE REFLECTANCE DATA

GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	AVERAGE REFLECTIVITY Ro (%), (NUMBER OF PARTICLES)			REMARKS
			1	2	3	
	2090m SWC		0.73			
	2145m SWC		1.35			
	2166m SWC		NO DETERMINATIONS POSSIBLE			
	2374.5 SWC		0.61			
	2415m SWC		0.48			
	2568m SWC		0.31			
	2510.2 SWC		0.36			
	2574m SWC		NO DETERMINATIONS POSSIBLE			
	3085m SWC		0.44	0.64		
	3098m SWC		0.67			
	3104m SWC		NO DETERMINATIONS POSSIBLE			
	3192m SWC		NO DETERMINATIONS POSSIBLE			
	3225m SWC		1.39			
	3250m SWC		0.57	0.68		
	3265m SWC		0.52	0.69		
	3285m SWC		0.79			
	3303m SWC		0.53			
	3310m SWC		NO DETERMINATIONS POSSIBLE			
	3340m SWC		0.61			
	3365m SWC		0.61			
	3375m SWC		0.61			
	3380m SWC		0.66			
	3423m CORE		0.52			
	3428.5m CORE		0.71			
	3438.5m CORE		0.58			
	3473m CORE		0.56			
	3483m CORE		0.46			
	3488.5m CORE		0.45	0.65		
	3493m CORE		0.54			
	3501m CORE		0.43	0.69		
	3515.5 CORE		0.59			
	3525.6m CORE		0.56			
	3536.5m CORE		0.58			
	3565m CORE		0.67			good quality data
	3567m CORE		0.55			good quality data
	3571.5 CORE		0.61			good quality data
	3574.2m CORE		0.63			good quality data

CT—ditch cuttings; **CO**—core; **WR**—whole rock; **KC**—kerogen concentrate. Colours — spore fluorescence. *Reworked

TABLE 5

VITRINITE REFLECTANCE DATA

GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	AVERAGE REFLECTIVITY Ro (%), (NUMBER OF PARTICLES)			REMARKS
			1	2	3	
	3578.5m CORE		0.55			
	3591.6m CORE		0.63			good quality data

CT—ditch cuttings; **CO**—core; **WR**—whole rock; **KC**—kerogen concentrate. Colours — spore fluorescence. *Reworked

TABLE 6

MOLECULAR MATURATION PARAMETERS

		STERANES M/Z 217 (259)			TERPANES M/Z 191				
GEOCHEM SAMPLE NO.	DEPTH	$\frac{C_{29}\ 20S\ (\alpha\alpha)}{C_{29}\ 20R\ (\alpha\alpha)}$	$\frac{C_{29}\ 20R\ (\beta\beta)}{C_{29}\ 20R\ (\alpha\alpha)}$	$\frac{C_{27}\ (20S)\ \text{Diasteranes}}{C_{27}\ (20R)\ \text{Diasteranes}}$	$\frac{Tm}{Ts}$	$\frac{C_{30}\ \text{Moretane}}{C_{30}\ \text{Hopane}}$	$\frac{C_{29}\ \text{normoretane}}{C_{29}\ \text{norhopane} + C_{29}\ \text{normoretane}}$	$\frac{\text{Bisnorhopane } (C_{28})}{Tm + \text{Bisnorhopane} + C_{29}\ \text{norhopane}}$	$\frac{C_{31}\ (20S)}{C_{31}\ (20S) + C_{31}\ (20R)}$ x 10
842-280	3283-3292m	0.80	0.78	1.49	4.89	0.27	0.17	0.05	59%
842-284	3319-3328m	0.95	1.32	1.41	2.85	0.10	0.10	0.35	60%
842-288	3355-3364m	0.85	0.93	1.29	6.42	0.25	0.17	0.09	59%
842-294	3409-3418m	1.02	1.02	1.38	4.29	0.19	0.16	0.05	59%
842-350	OIL	1.31	1.69	1.37	0.77	0.07	0.11	0.57	60%

TABLE 7a

CONCENTRATION (PPM) OF EXTRACTED C_{15+} MATERIAL IN ROCK

GEOCHEM SAMPLE NUMBER	DEPTH	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS			
			Paraffin - Naphthenes	Aromatics	TOTAL	Precipitd. Asphaltenes	Eluted NSO's	Non-eluted NSO's	Sulphur
842-244A	2950-2960	411	115	89	204	138	45	8	16
842-250B	3010-3020	432	56	30	86	297	30	18	0
842-258A	3085-3094	682	74	60	134	447	89	2	9
842-262A	3121-3130	400	58	43	101	259	21	19	0
842-268A	3175-3184	288	55	44	99	146	24	7	12
842-274A	3229-3238	361	59	34	94	227	30	3	7
842-276A	3247-3256	296	19	33	52	179	58	6	0
842-280A	3283-3292	545	44	99	143	345	49	4	5
842-284	3319-3328	891	326	144	471	253	156	7	4
842-288A	3355-3364	1138	160	122	282	742	62	26	26
842-292A	3391-3400	440	80	49	129	247	32	32	0
842-294A	3409-3418	403	73	70	142	188	40	27	5
842-298A	3445-3454	1014	320	207	527	298	128	49	12
842-302A	3481-3490	722	292	76	368	271	62	15	6
842-312B	3571-3580	1006	228	145	373	537	43	28	25
842-320A	3643-3652	1211	310	226	536	480	104	57	34

TABLE 7b

COMPOSITION (NORMALISED %) OF C_{15+} MATERIAL EXTRACTED FROM ROCK

GEOCHEM SAMPLE NUMBER	DEPTH	HYDROCARBONS		NON HYDROCARBONS			
		Paraffin – Naphthenes	Aromatics	Preciptd. Asphaltenes	Eluted NSO's	Non eluted NSO's	Sulphur
842-244A	2950-2960	27.91	21.63	33.59	11.04	1.99	3.83
842-250B	3010-3020	12.89	7.00	68.91	7.00	4.20	0.00
842-258A	3085-3094	10.82	8.85	65.57	13.11	0.33	1.31
842-262A	3121-3130	14.53	10.73	64.71	5.19	4.84	0.00
842-268A	3175-3184	19.21	15.28	50.66	8.30	2.40	4.15
842-274A	3229-3238	16.46	9.47	62.96	8.23	0.82	2.06
842-276A	3247-3256	6.57	11.11	60.61	19.70	2.02	0.00
842-280A	3283-3292	8.01	18.13	63.29	9.01	0.67	0.89
842-284	3319-3328	36.65	16.18	28.45	17.53	0.80	0.40
842-288A	3355-3364	14.05	10.76	65.19	5.44	2.28	2.28
842-292A	3391-3400	18.27	11.07	56.09	7.20	7.38	0.00
842-294A	3409-3418	18.06	17.28	46.60	10.03	6.79	1.23
842-298A	3445-3454	31.57	20.42	29.41	12.61	4.81	1.18
842-302A	3481-3490	40.46	10.53	37.50	8.55	2.14	0.82
842-312B	3571-3580	22.66	14.44	53.32	4.32	2.74	2.53
842-320A	3643-3652	25.60	18.62	39.63	8.62	4.68	2.84

TABLE 8

SIGNIFICANT RATIOS (%) OF C_{15+} FRACTIONS AND ORGANIC CARBON

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC CARBON (wt. %)	HYDROCARBONS / TOTAL EXTRACT	HYDROCARBONS / ORG. CARBON	TOTAL EXTRACT / ORG. CARBON	P-NAPHTHENES / AROMATICS
842-244A	2950-2960	0.62	49.54	3.28	6.63	1.29
842-250B	3010-3020	0.69	19.89	1.24	6.26	1.84
842-258A	3085-3094	0.53	19.67	2.53	12.87	1.22
842-262A	3121-3130	0.70	25.26	1.44	5.71	1.35
842-268A	3175-3184	0.76	34.50	1.31	3.79	1.26
842-274A	3229-3238	0.67	25.93	1.40	5.39	1.74
842-276A	3247-3256	0.92	17.68	0.57	3.22	0.59
842-280A	3283-3292	1.97	26.14	0.72	2.77	0.44
842-284	3319-3328	1.07	52.83	4.40	8.32	2.27
842-288A	3355-3364	1.73	24.81	1.63	6.58	1.31
842-292A	3391-3400	0.97	29.34	1.33	4.53	1.65
842-294A	3409-3418	1.26	35.34	1.13	3.20	1.04
842-298A	3445-3454	1.47	51.99	3.59	6.90	1.55
842-302A	3481-3490	1.25	50.99	2.95	5.78	3.84
842-312B	3571-3580	1.85	37.09	2.02	5.44	1.57
842-320A	3643-3652	1.75	44.22	3.06	6.92	1.37

TABLE 9
PYROLYSIS RESULTS

GEOCHEM SAMPLE NUMBER	DEPTH	WT. % ORGANIC CARBON (OC)	WT. PPM		RATIOS		Tmax (°C) Pyrolysate
			Thermal Bitumen (P1)	Pyrolysate (P2)	$\frac{P1}{P1+P2}$	$\frac{P2}{OC}$	
842-244A	2950-2960	0.62	296	634	0.32	0.10	424
842-250B	3010-3020	0.77	242	360	0.40	0.05	434
842-258A	3085-3094	0.49	111	208	0.35	0.04	550
842-262A	3121-3130	0.74	14	266	0.05	0.04	440
842-268A	3175-3184	0.74	196	276	0.42	0.04	431
842-274A	3229-3238	0.64	169	312	0.35	0.05	433
842-276A	3247-3256	0.63	162	381	0.30	0.06	430
842-280A	3283-3292	2.25	654	2878	0.19	0.13	445
842-284A	3319-3328	2.53	1028	5627	0.15	0.22	447
842-288A	3355-3364	1.71	470	1954	0.19	0.11	445
842-292A	3391-3400	0.85	265	678	0.28	0.08	444
842-294A	3409-3418	0.95	263	809	0.25	0.09	443
842-298A	3445-3454	1.47	502	1538	0.25	0.10	447
842-302A	3481-3490	0.87	256	252	0.50	0.03	443
842-312B	3571-3580	2.12	530	2146	0.20	0.10	452
842-320A	3643-3652	1.78	416	1140	0.27	0.06	445

Thermal Bitumen (Peak 1) evolved up to 340°C. Pyrolysate (Peak 2) evolved 340 – 550°C.

TABLE 10

COMPOSITION (NORMALISED %) OF C_{15+} PARAFFIN – NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-244A	-250B	-258A	-262A	-268A	-274A	-276A
DEPTH	2950-2960m	3010-3020m	3085-3094m	3121-3130m	3175-3184m	3229-3238m	3247-3256m
SAMPLE TYPE							
nC_{15}	10.31	8.51	4.22	12.15	13.07	5.74	1.01
nC_{16}	10.75	15.62	9.58	20.19	16.37	15.00	4.33
nC_{17}	11.10	17.15	14.03	15.46	12.94	17.21	9.87
nC_{18}	9.16	14.92	13.45	12.93	12.31	17.35	11.88
nC_{19}	7.93	10.04	10.95	7.57	7.99	11.32	12.08
nC_{20}	6.78	8.09	9.92	6.15	6.60	7.79	11.08
nC_{21}	6.34	5.58	6.61	4.57	5.08	5.15	9.67
nC_{22}	6.17	4.60	6.27	4.57	4.44	4.71	9.67
nC_{23}	5.37	3.77	5.36	4.10	4.31	3.97	10.07
nC_{24}	5.20	3.07	4.79	3.00	3.43	3.38	7.96
nC_{25}	4.58	2.65	4.22	2.68	3.30	2.65	6.04
nC_{26}	3.61	1.67	2.85	1.89	2.54	1.76	2.92
nC_{27}	3.17	1.39	2.85	1.74	2.54	1.32	1.71
nC_{28}	2.73	0.70	1.48	0.63	1.52	0.74	0.50
nC_{29}	2.29	0.56	1.25	0.63	1.40	0.59	0.40
nC_{30}	1.32	0.28	0.91	0.32	0.63	0.29	0.20
nC_{31}	0.97	0.42	0.46	0.32	0.51	0.29	0.20
nC_{32}	0.62	0.28	0.23	0.32	0.38	0.29	0.10
nC_{33}	0.53	0.28	0.23	0.32	0.25	0.15	0.10
nC_{34}	0.62	0.28	0.23	0.32	0.25	0.15	0.10
nC_{35}	0.44	0.14	0.11	0.16	0.13	0.15	0.10
PARAFFIN	41.39	30.14	27.21	34.66	35.30	31.98	29.92
ISOPRENOID	5.98	5.13	4.93	4.81	4.53	5.32	3.77
NAPHTHENE	52.63	64.73	67.86	60.52	60.17	62.70	66.32
CPI INDEX A	1.00	1.05	1.02	1.07	1.09	0.99	1.09
CPI INDEX B	1.09	1.30	1.24	1.31	1.24	1.18	1.48
PRISTANE/PHYTANE	1.52	2.21	1.27	2.26	1.66	1.63	1.91
PRISTANE/nC_{17}	0.79	0.68	0.72	0.62	0.62	0.60	0.84

TABLE 10

COMPOSITION (NORMALISED %) OF C_{15+} PARAFFIN – NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-280A	-284	-288A	-292A	-296A	-298A	-302A
DEPTH	3283-3292m	3319-3328m	3355-3364m	3391-3400m	3427-3436m	3445-3454m	3481-3490m
SAMPLE TYPE							
nC_{15}	1.97	5.63	5.61	11.76	4.12	10.75	5.87
nC_{16}	6.23	6.95	10.66	13.18	8.62	10.75	12.13
nC_{17}	10.17	7.90	11.13	11.05	9.71	10.84	12.61
nC_{18}	10.75	7.90	11.79	12.17	10.18	9.57	11.93
nC_{19}	9.35	8.03	10.38	8.42	9.25	8.81	9.72
nC_{20}	8.53	7.46	8.79	7.20	8.47	7.96	8.28
nC_{21}	7.47	7.59	7.67	6.09	7.46	7.20	7.22
nC_{22}	6.73	6.70	6.36	5.17	6.45	5.93	6.16
nC_{23}	6.89	5.94	5.89	4.77	6.45	5.59	5.97
nC_{24}	5.91	5.12	4.86	4.26	5.36	4.57	4.52
nC_{25}	6.15	4.74	4.40	4.06	5.28	3.64	4.14
nC_{26}	5.09	4.24	3.27	2.94	3.96	2.96	3.08
nC_{27}	5.25	4.05	3.09	2.94	3.96	2.71	2.79
nC_{28}	3.20	3.29	1.78	1.93	3.11	1.95	1.44
nC_{29}	2.95	3.35	1.50	1.72	2.87	1.86	1.44
nC_{30}	1.23	2.78	1.22	0.81	1.55	1.44	0.87
nC_{31}	0.74	2.40	0.56	0.61	1.40	1.10	0.58
nC_{32}	0.41	2.02	0.37	0.30	0.54	0.76	0.48
nC_{33}	0.33	1.58	0.28	0.30	0.62	0.68	0.29
nC_{34}	0.33	1.39	0.28	0.20	0.39	0.59	0.29
nC_{35}	0.33	0.95	0.09	0.10	0.23	0.34	0.19
PARAFFIN	47.64	46.12	42.52	47.73	54.14	43.85	49.43
ISOPRENOID	6.33	6.27	7.00	7.16	5.72	6.09	6.47
NAPHTHENE	46.03	47.61	50.48	45.11	40.13	50.06	44.10
CPI INDEX A	1.11	1.05	1.10	1.08	1.09	1.07	1.12
CPI INDEX B	1.25	1.06	1.15	1.25	1.22	1.08	1.21
PRISTANE/PHYTANE	2.31	1.62	1.63	2.08	1.89	1.69	2.09
PRISTANE/nC_{17}	0.91	1.06	0.92				

TABLE 10

COMPOSITION (NORMALISED %) OF C_{15+} PARAFFIN – NAPHTHENE HYDROCARBONS

GEOCHEM SAMPLE NUMBER	-312B	-320A	-350
DEPTH	3571-3580m	3643-3652m	DST 1 OIL
SAMPLE TYPE			
nC_{15}	10.57	16.71	15.68
nC_{16}	10.73	14.57	13.24
nC_{17}	9.75	11.31	12.43
nC_{18}	8.93	9.05	10.22
nC_{19}	8.03	7.16	8.59
nC_{20}	7.78	6.41	7.55
nC_{21}	6.96	5.40	6.39
nC_{22}	5.57	4.90	5.69
nC_{23}	5.81	4.52	4.76
nC_{24}	4.42	3.89	4.07
nC_{25}	4.67	3.52	3.02
nC_{26}	3.44	2.64	2.44
nC_{27}	3.52	2.89	1.74
nC_{28}	2.54	1.88	1.28
nC_{29}	2.38	1.88	0.93
nC_{30}	1.47	1.01	0.70
nC_{31}	1.23	0.88	0.46
nC_{32}	0.74	0.50	0.23
nC_{33}	0.66	0.50	0.23
nC_{34}	0.49	0.25	0.23
nC_{35}	0.33	0.13	0.12
PARAFFIN	51.61	54.26	47.91
ISOPRENOID	5.71	5.59	6.07
NAPHTHENE	42.69	40.15	46.02
CPI INDEX A	1.15	1.07	0.99
CPI INDEX B	1.22	1.25	1.03
PRISTANE/PHYTANE	2.14	2.28	1.66
PRISTANE/nC_{17}	0.77	0.63	0.64

TABLE 11

CARBON ISOTOPES (PDB °/oo)

GEOCHEM SAMPLE NUMBER	DEPTH	PARAFFIN-NAPHTHENE	AROMATICS	ASPHALTENES
842-280	3283-3292m	-	-	-26.73
842-284	3319-3328m	-29.17	-28.49	-28.31
842-288	3355-3364m	-	-	-26.85
842-294	3409-3418m	-	-	-27.25
842-350	DST-1 OIL	-29.63	-28.81	-28.59

TABLE 12

OIL COMPOSITION, 34/4-5, DST 1

GRAVITY (°API)	37.35
SULPHUR (WT. %)	0.22
Ni (ppm)	11.0
V (ppm)	<0.5
% B.P. < 210°C	28.4

FIGURE 1 **RATING** WELL 34/4-5

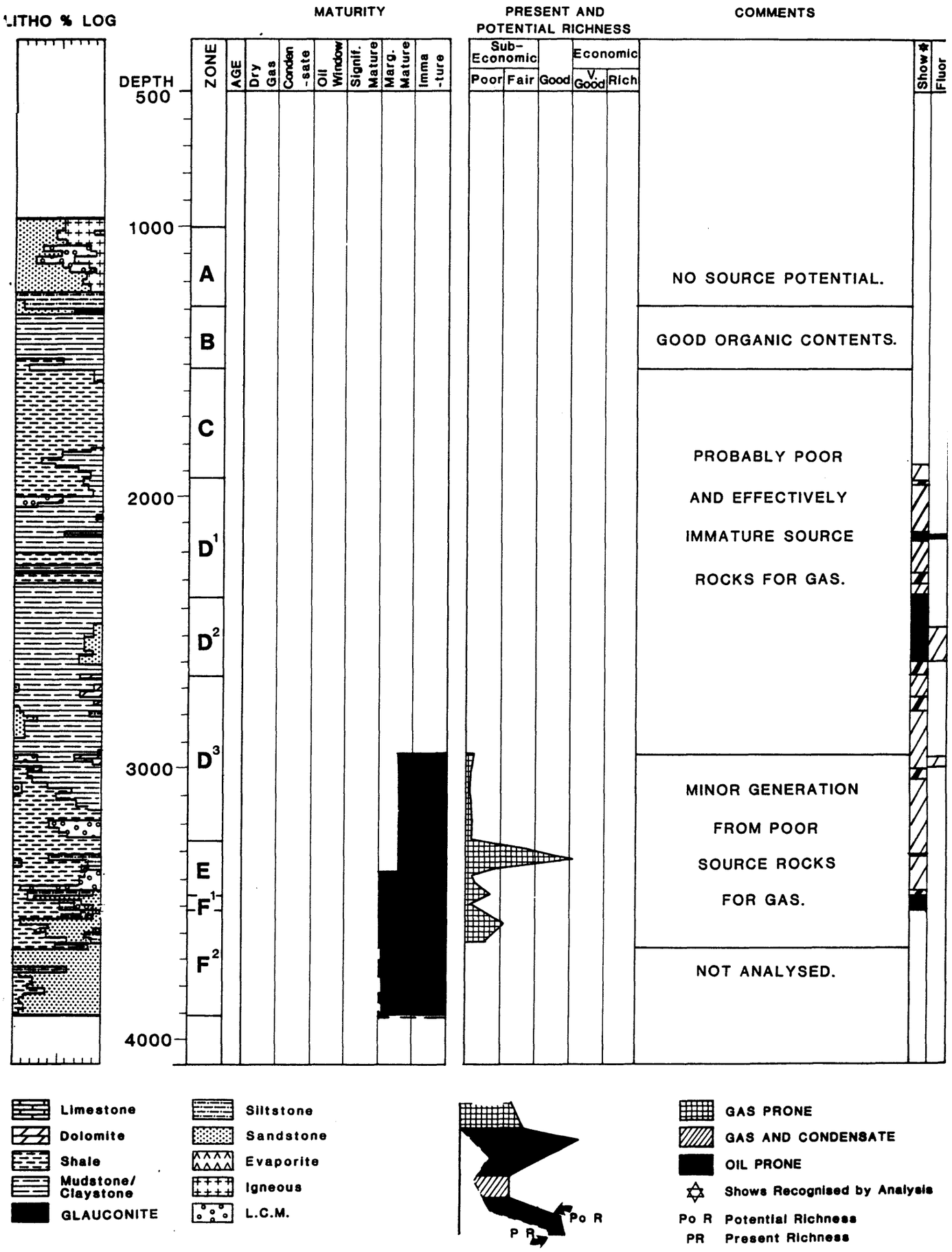
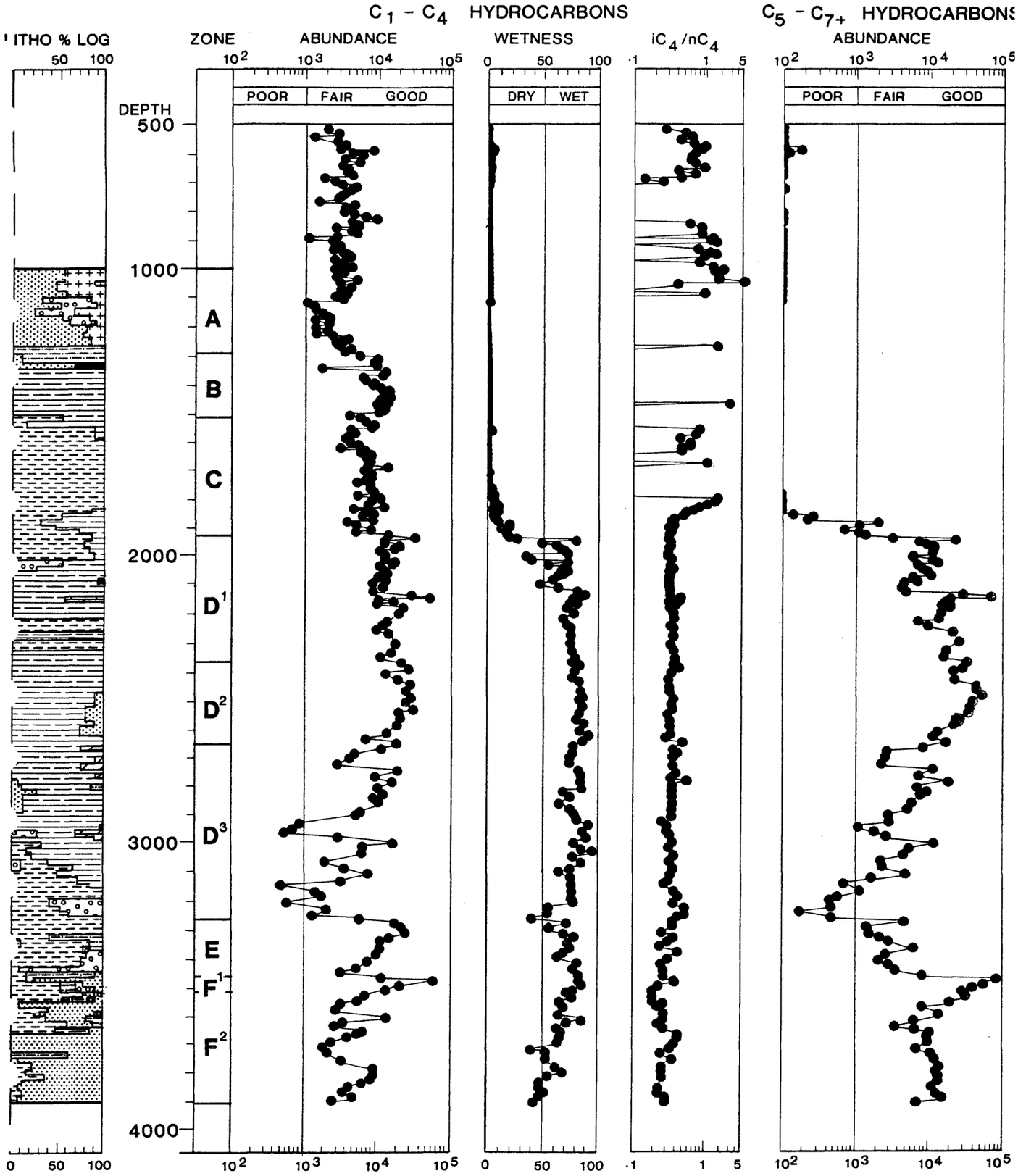


FIGURE 2

$C_1 - C_7$ HYDROCARBONS

WELL 34/4-5



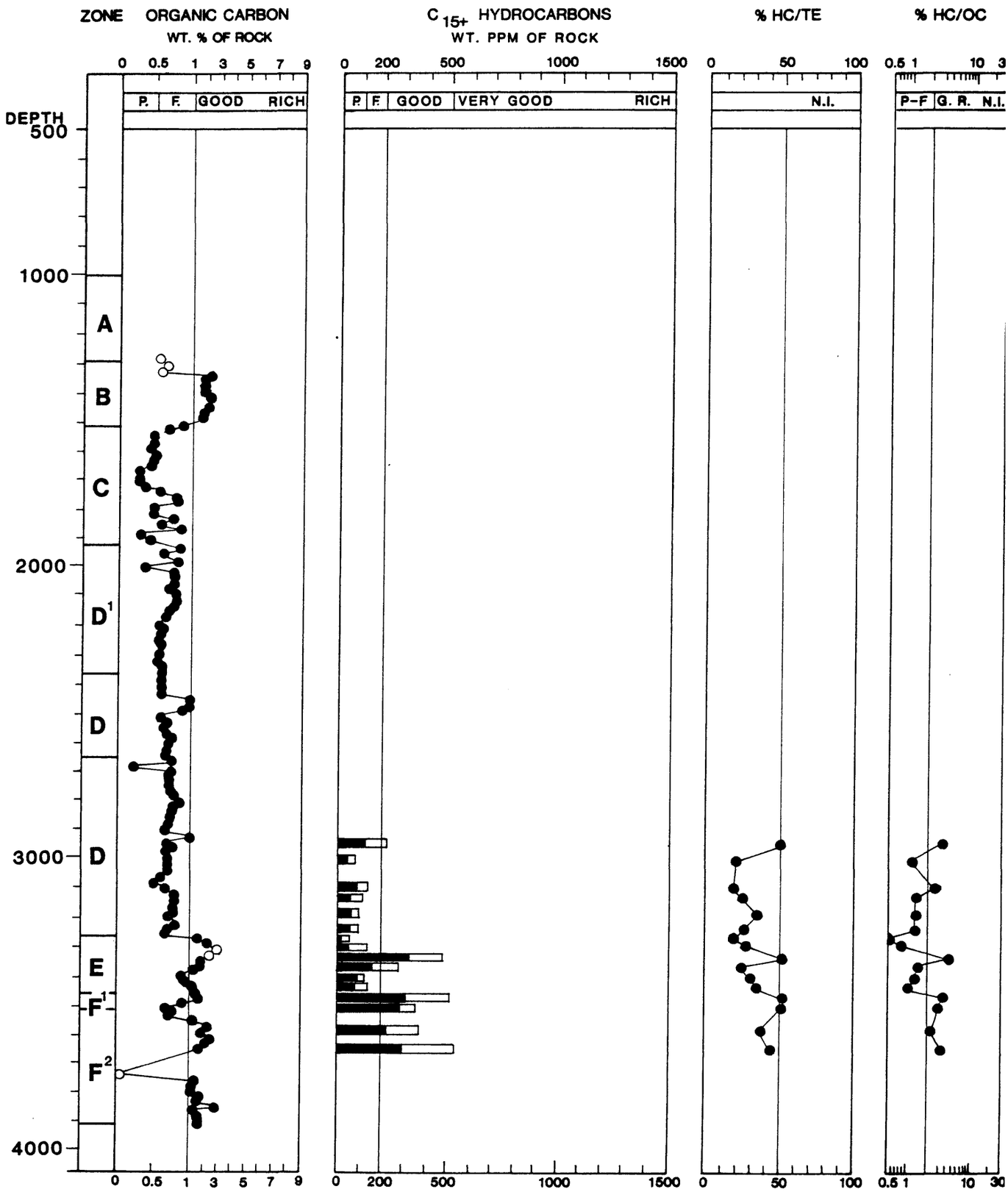
Limestone
Dolomite
Shale
Mudstone/ Claystone
GLAUCONITE
Siltstone
Sandstone
Evaporite
Igneous
L.C.M.

iC_4 - ISOBUTANE
nC_4 - NORMAL BUTANE
ABUNDANCE - VOLUME PPM OF ROCK
WETNESS - % C_2-C_4 IN C_1-C_4

FIGURE 3

RICHNESS

WELL 34/4-5



● SHALE / MUDSTONE

○ OTHER LITHOLOGIES

P - N - PARAFFIN - NAPHTHENES

AROM - AROMATICS

HC - C_{15+} HYDROCARBONS

OC - ORGANIC CARBON

TE - TOTAL C_{15+} EXTRACT

P - POOR

F - FAIR

G - GOOD

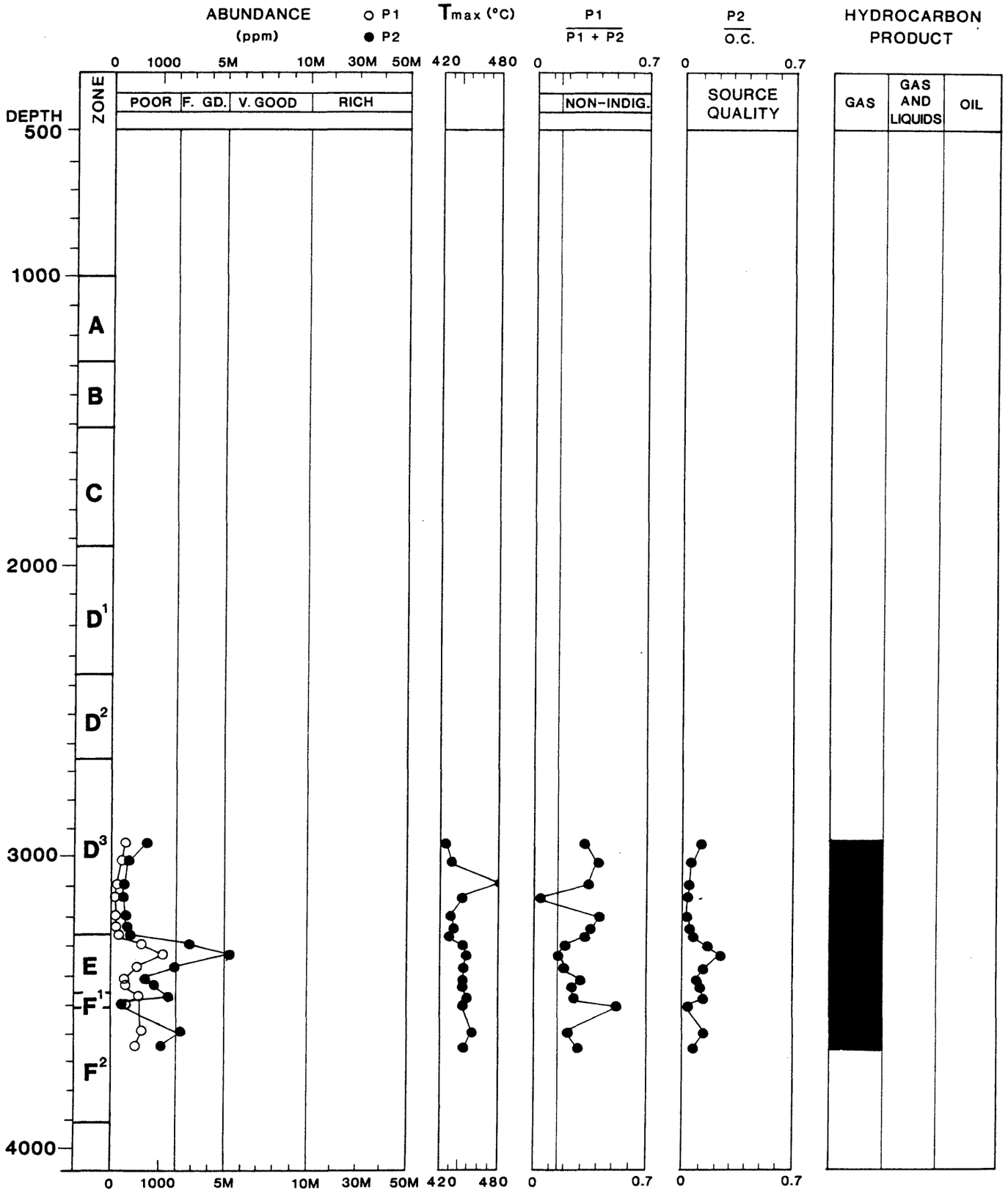
R - RICH

N.I. - NON-INDIGENOUS HYDROCARBONS

FIGURE 4

PYROLYSIS

WELL 34/4-5



M - 1000

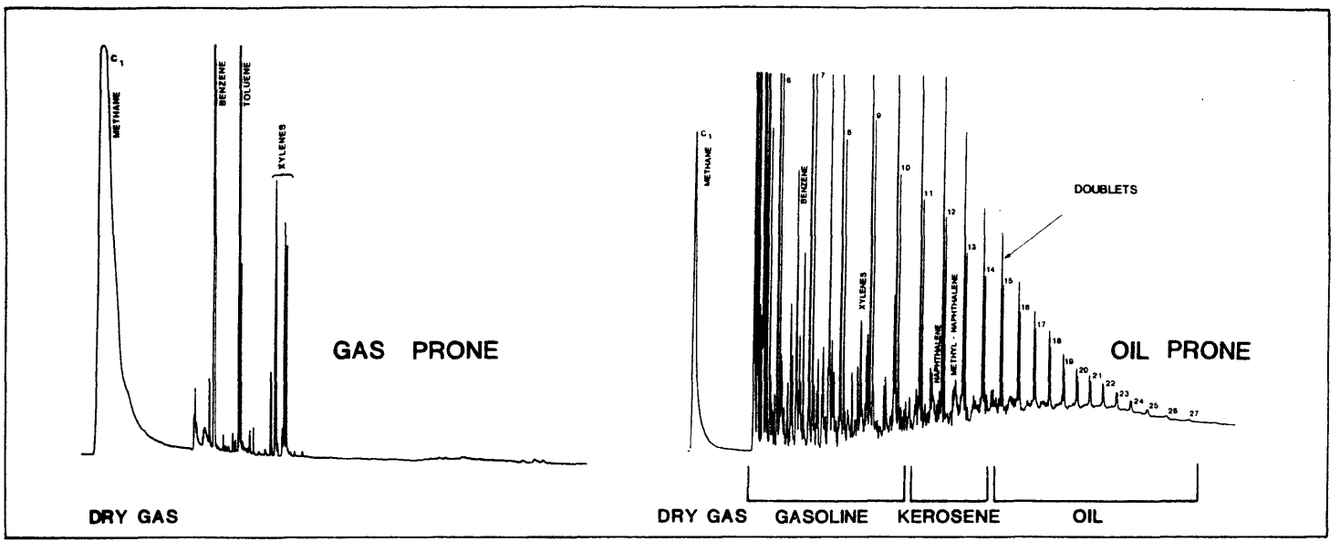
P1 — THERMAL BITUMEN

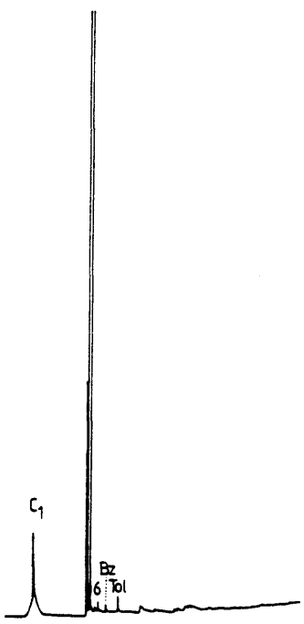
P2 — PYROLYSATE

O.C. — ORGANIC CARBON

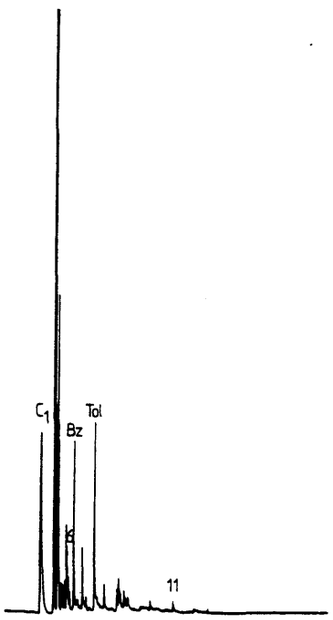
NON-INDIG. — NON-INDIGENOUS HYDROCARBONS (SHOWS OR CONTAMINATION)

FIGURE 5a **PYROLYSIS GC** WELL 34/4-5

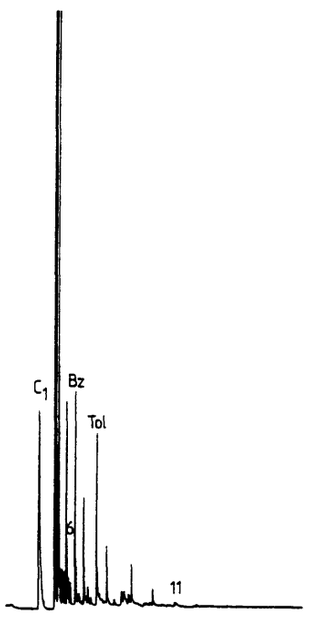




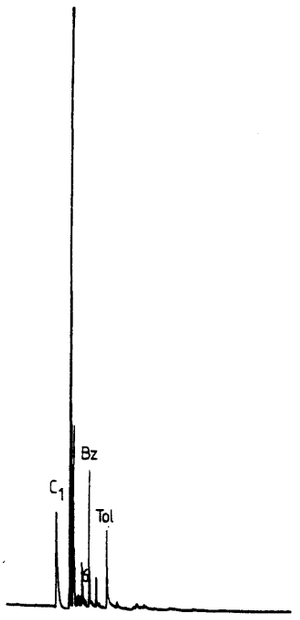
2950-2960m A



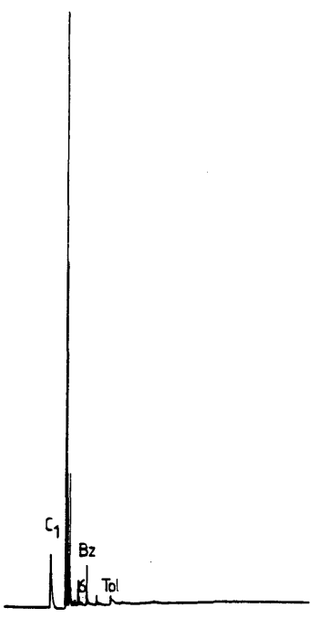
3010-3020m B



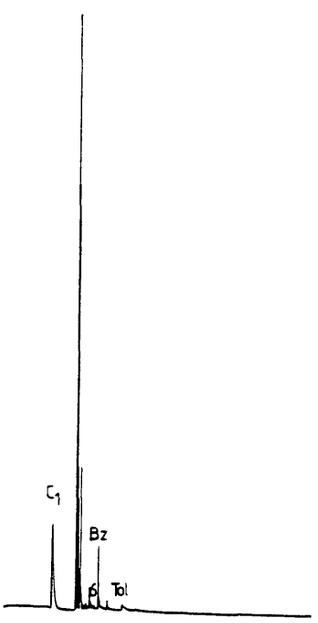
3085-3094m A



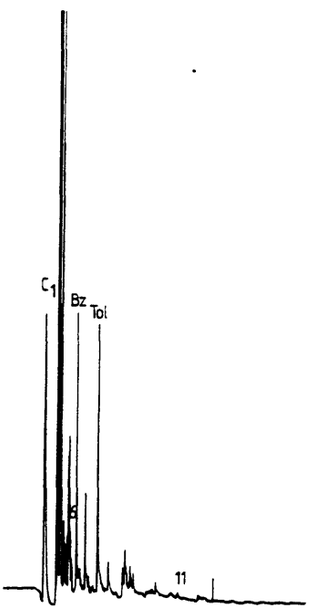
3121-3130m A



3175-3184m A



3229-3238m A

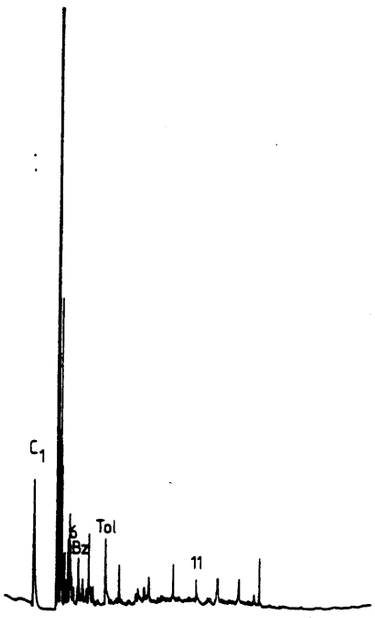


3247-3256m A

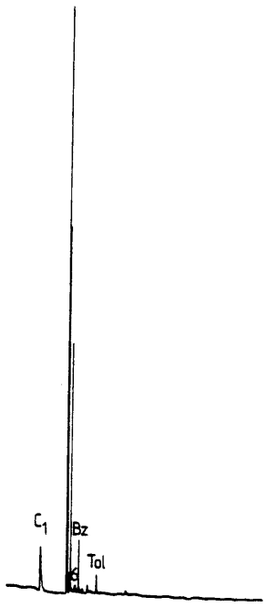
FIGURE 5b

PYROLYSIS GC

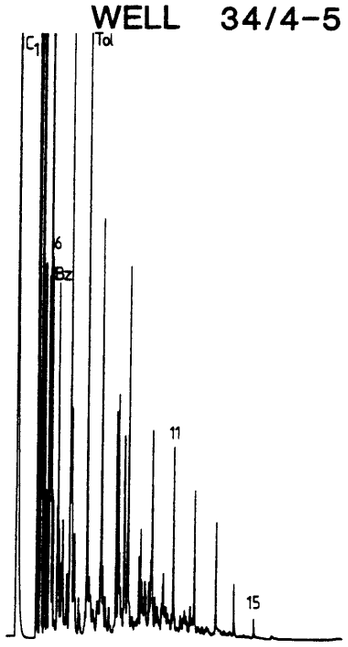
WELL 34/4-5



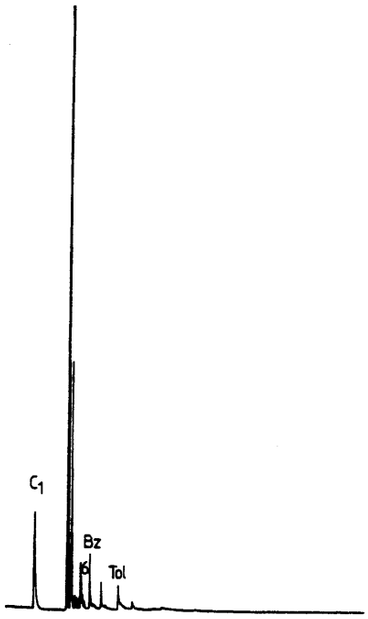
3283-3292m A



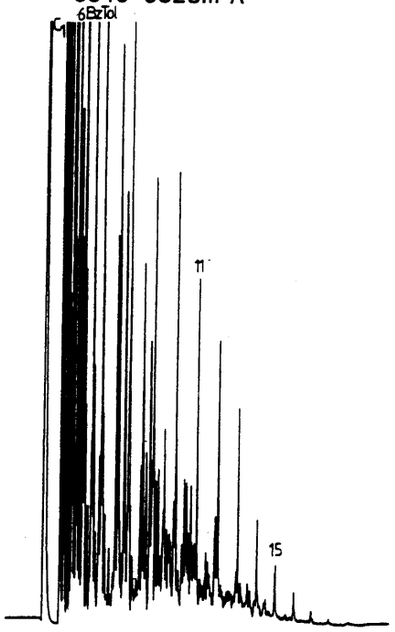
3319-3328m A



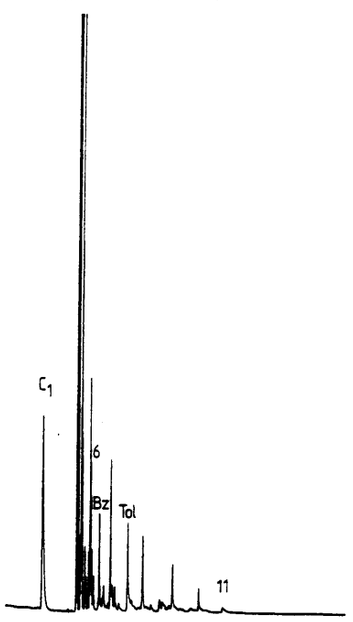
3355-3364m A



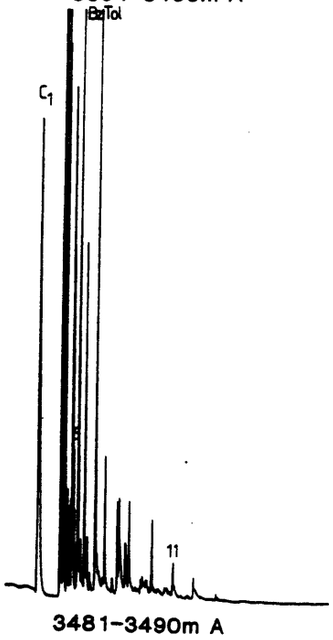
3391-3400m A



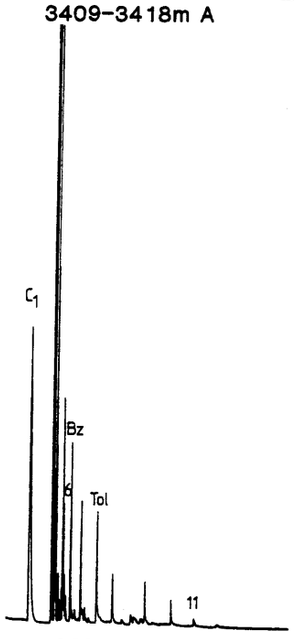
3409-3418m A



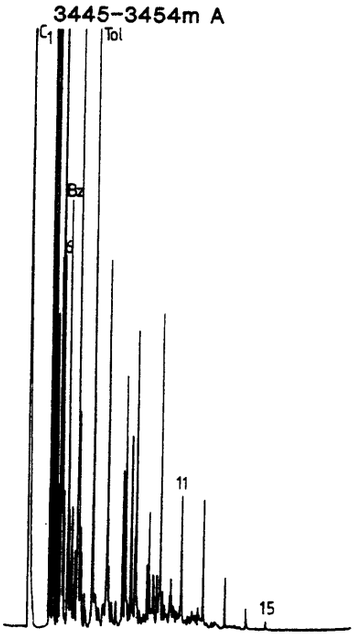
3445-3454m A



3481-3490m A

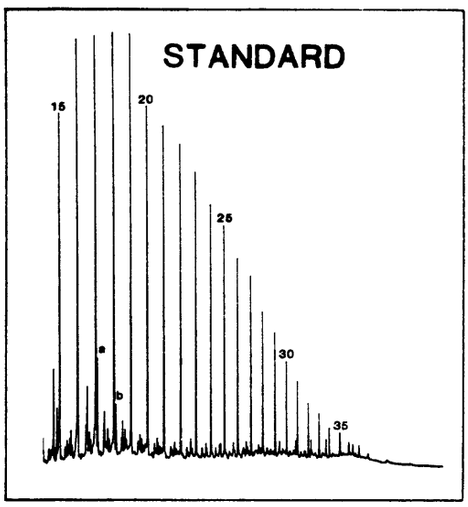


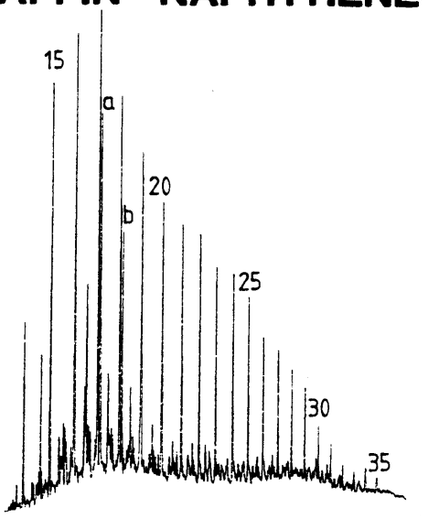
3571-3580m B



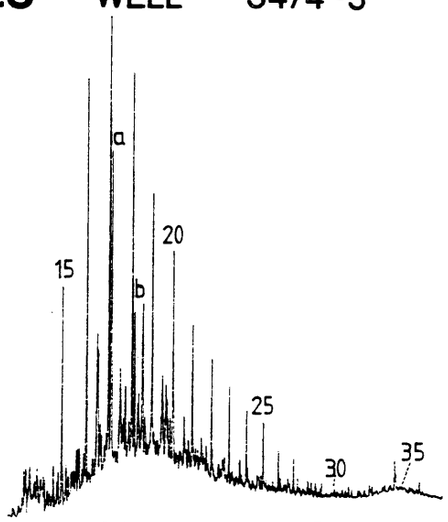
3643-3652m A

FIGURE 6a C_{15+} PARAFFIN-NAPHTHENES WELL 34/4-5

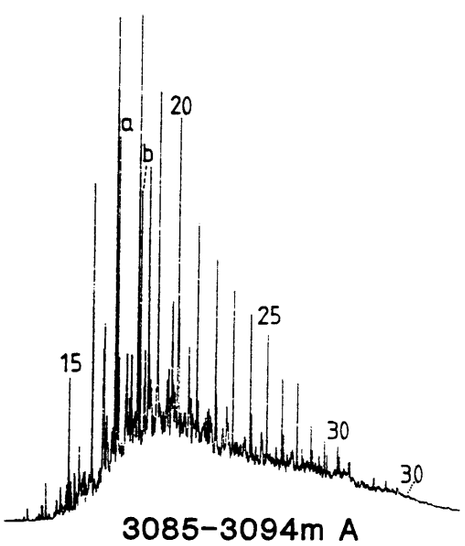




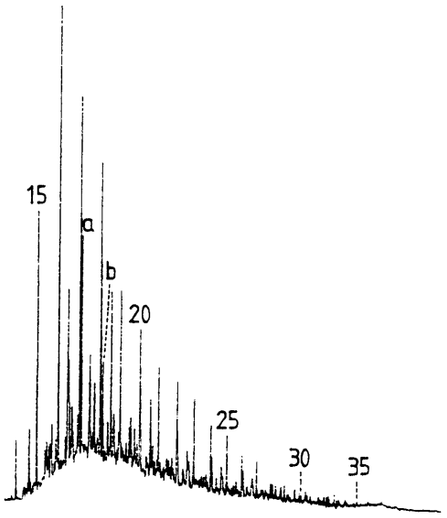
2950-2960m A



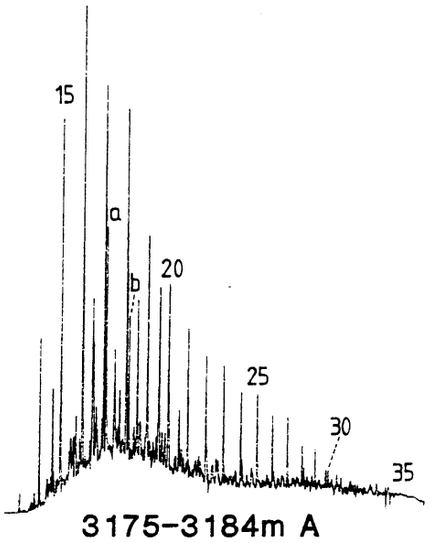
3010-3020m B



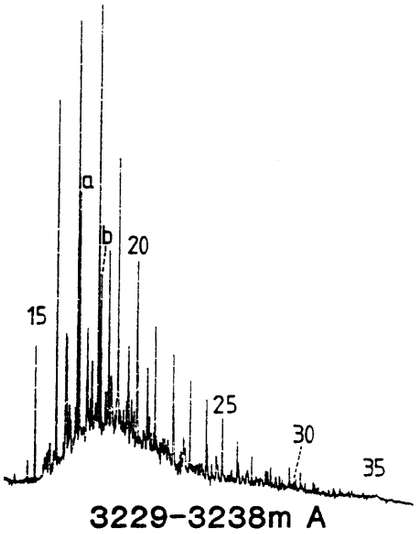
3085-3094m A



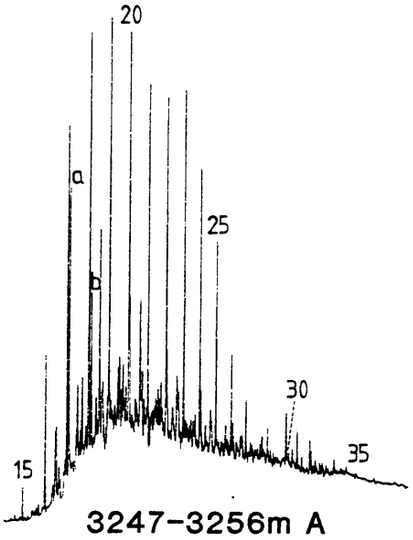
3121-3130m A



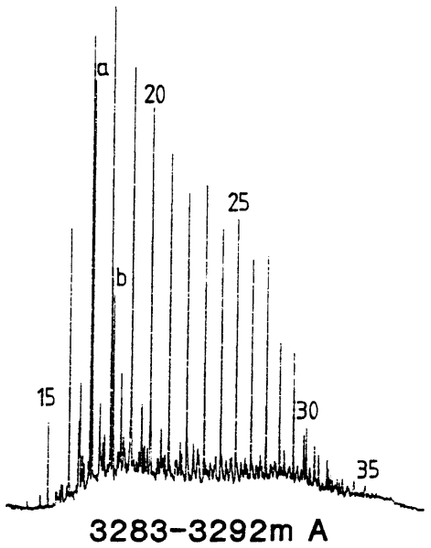
3175-3184m A



3229-3238m A



3247-3256m A

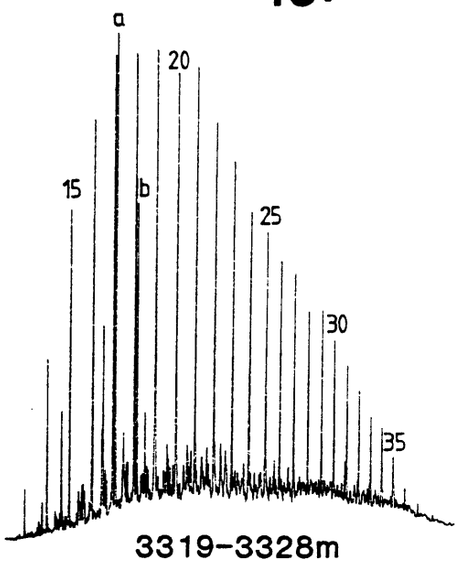


3283-3292m A

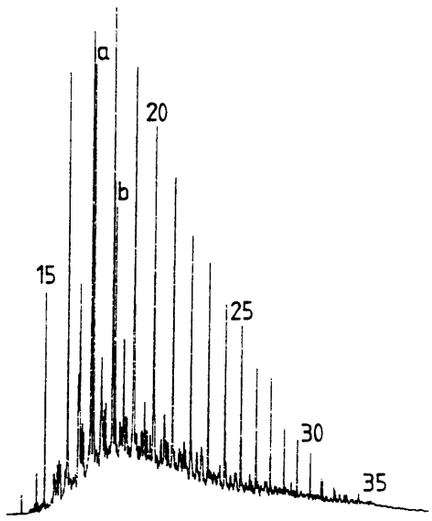
a - PRISTANE
b - PHYTANE

CARBON NUMBERS OF NORMAL PARAFFINS INDICATED (20 - nC_{20})

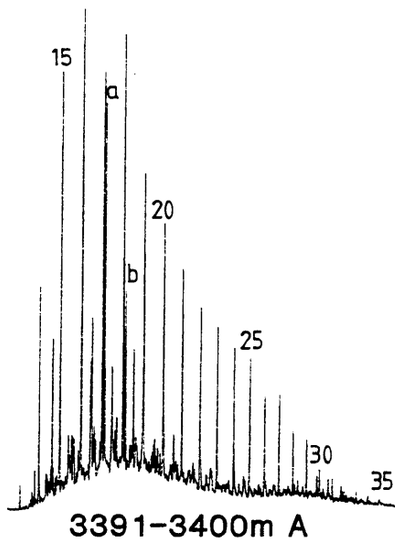
FIGURE 6b C_{15+} PARAFFIN - NAPHTHENES WELL 34/4-5



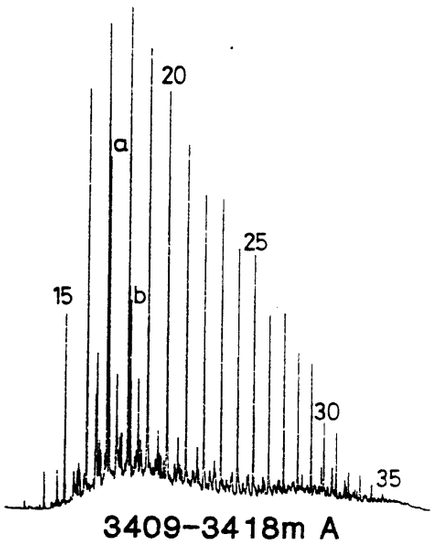
3319-3328m



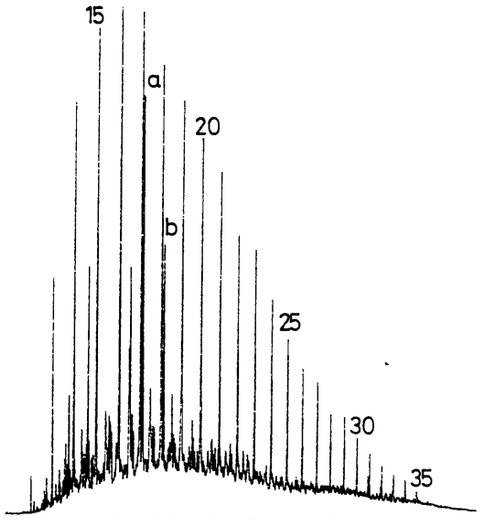
3355-3364m A



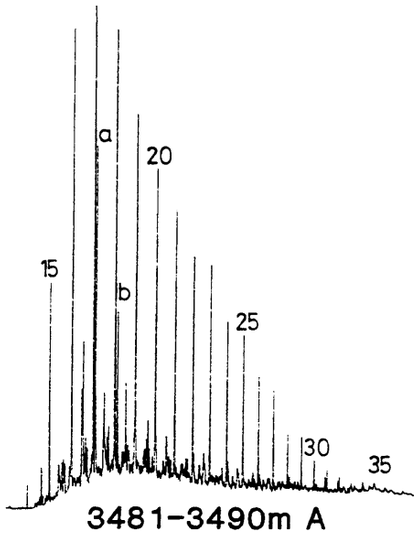
3391-3400m A



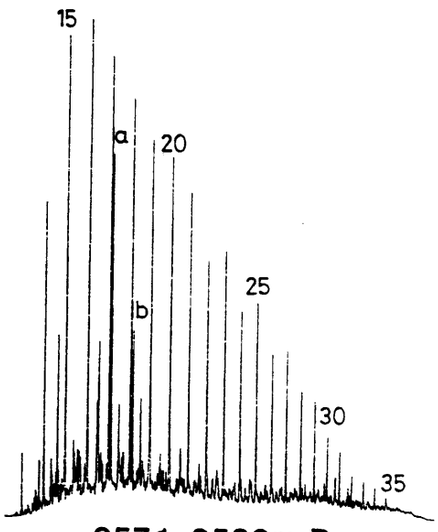
3409-3418m A



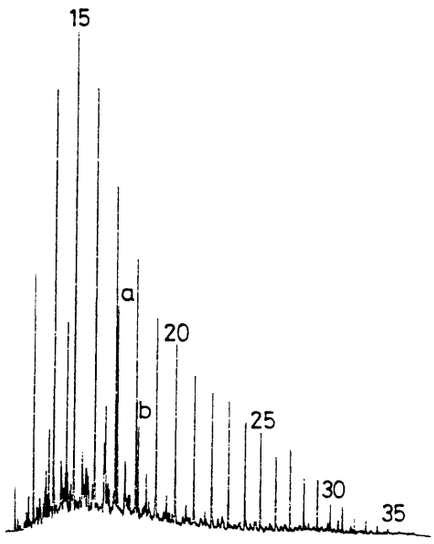
3445-3454m A



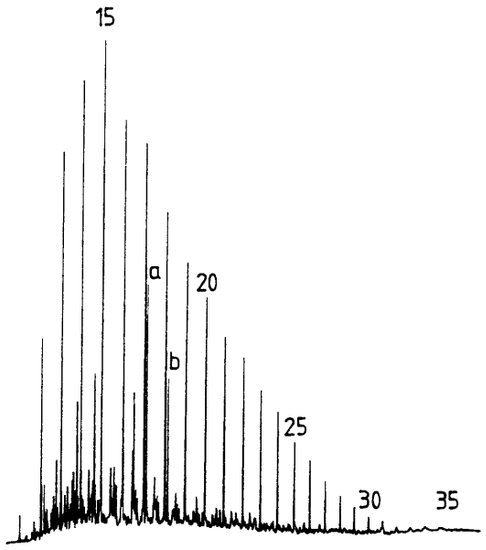
3481-3490m A



3571-3580m B



3643-3652m A

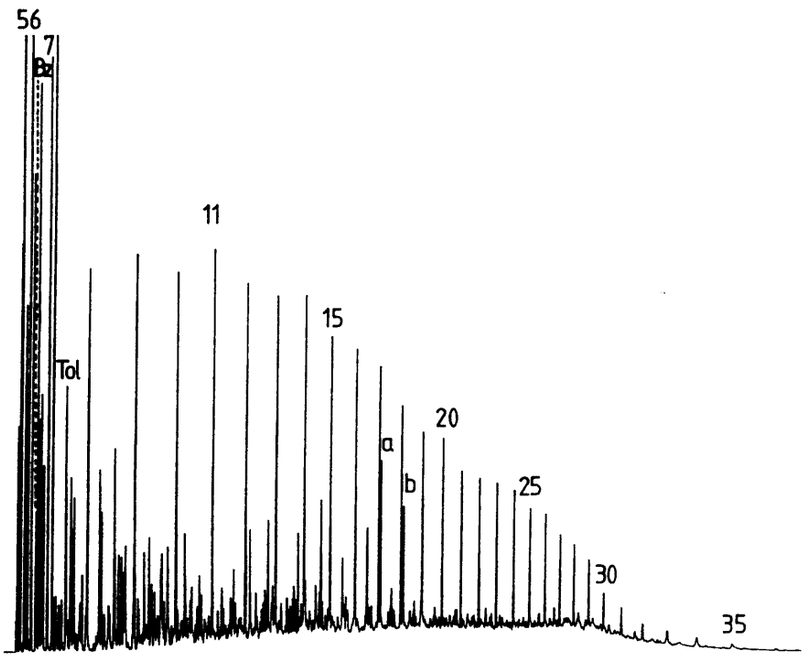


DST-1
OIL SAMPLE

a - PRISTANE
b - PHYTANE

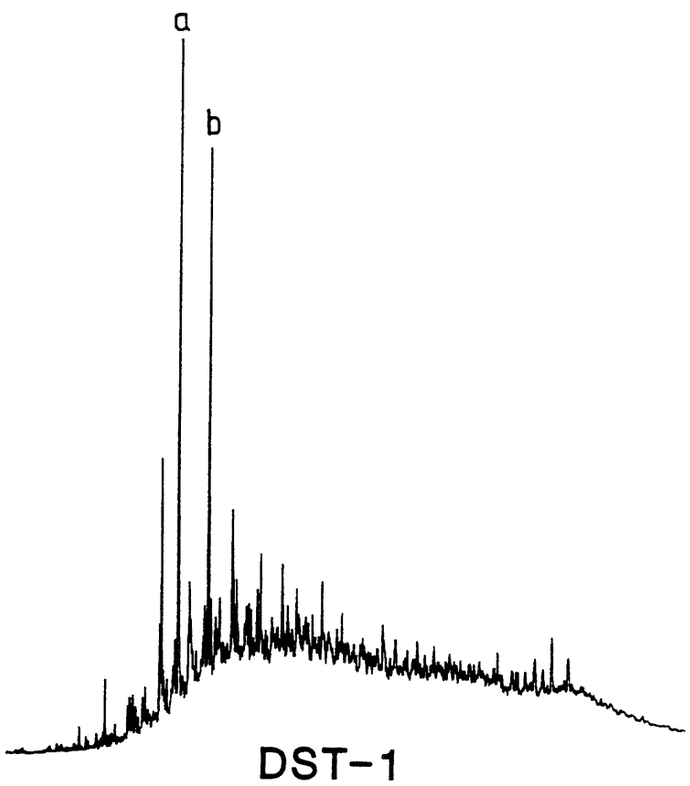
CARBON NUMBERS OF NORMAL PARAFFINS INDICATED (20 - nC_{20})

FIGURE 7 **WHOLE OIL** WELL 34/4-5



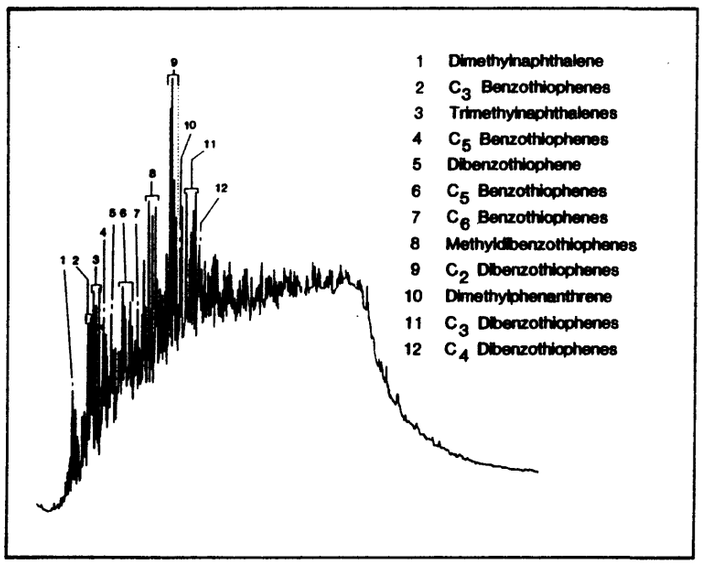
DST-1
OIL SAMPLE

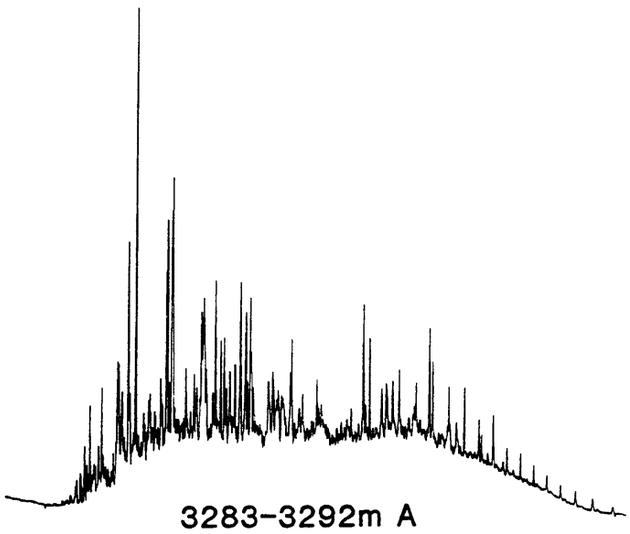
FIGURE 8 **BRANCHED CYCLICS** WELL 34/4-5



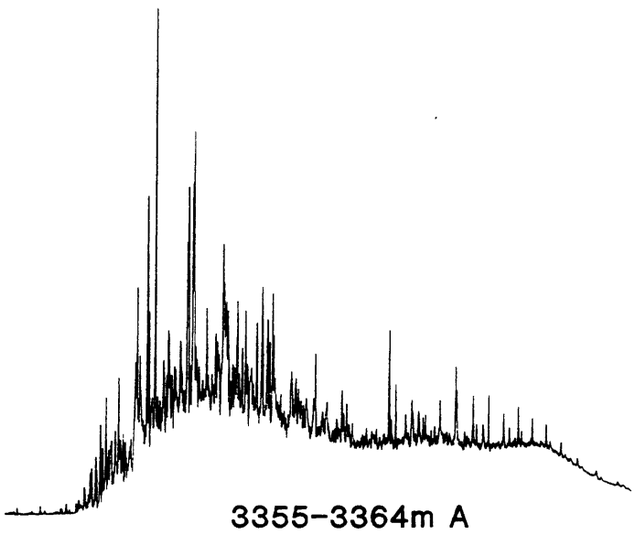
DST-1
OIL SAMPLE

FIGURE 9 **AROMATIC CHROMATOGRAMS** WELL 34/4-5

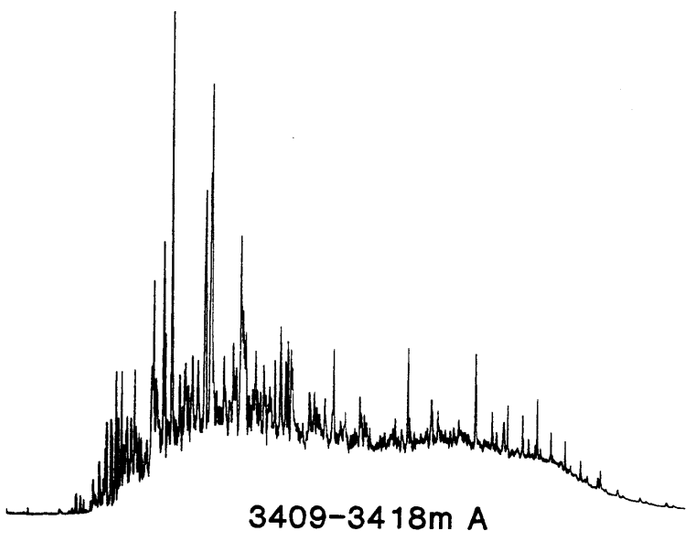




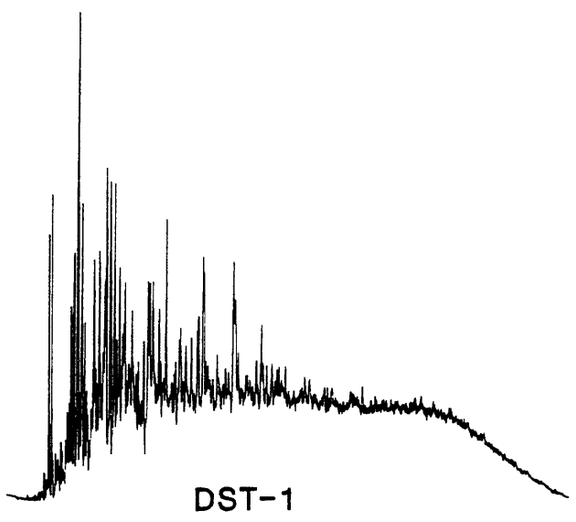
3283-3292m A



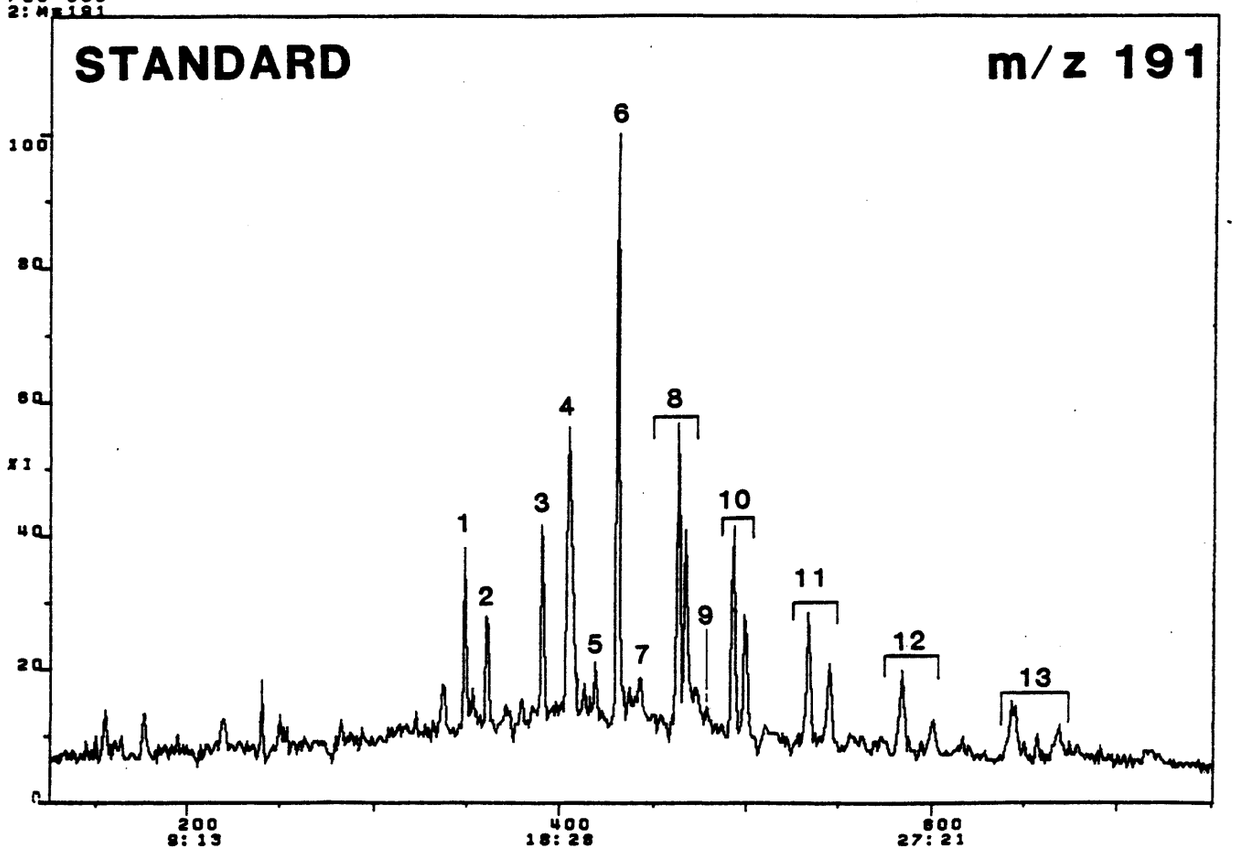
3355-3364m A



3409-3418m A



DST-1
OIL SAMPLE



LIST OF IDENTIFIED TRITERPANES

1		17αH TRISNORHOPANE (C_{27})
2		17αH TRISNORHOPANE (C_{27})
3		BISNORHOPANE (C_{28})
4		17αH NORHOPANE (C_{29})
5		NORMORETANE (C_{29})
6		17αH HOPANE (C_{30})
7		17αH MORETANE (C_{30})
8	(22S) (22R)	17αH HOMOHOPANES (C_{31})
9		GAMMACERANE
10	(22S) (22R)	BISHOMOHOPANE (C_{32})
11	(22S) (22R)	TRISHOMOHOPANES (C_{33})
12	(22S) (22R)	TETRAHOPANES (C_{34})
13	(22S) (22R)	HOPANES (C_{35})

FIGURE 10a

MASS FRAGMENTOGRAMS

WELL 34/4-5

TRITERPANES m/z 191

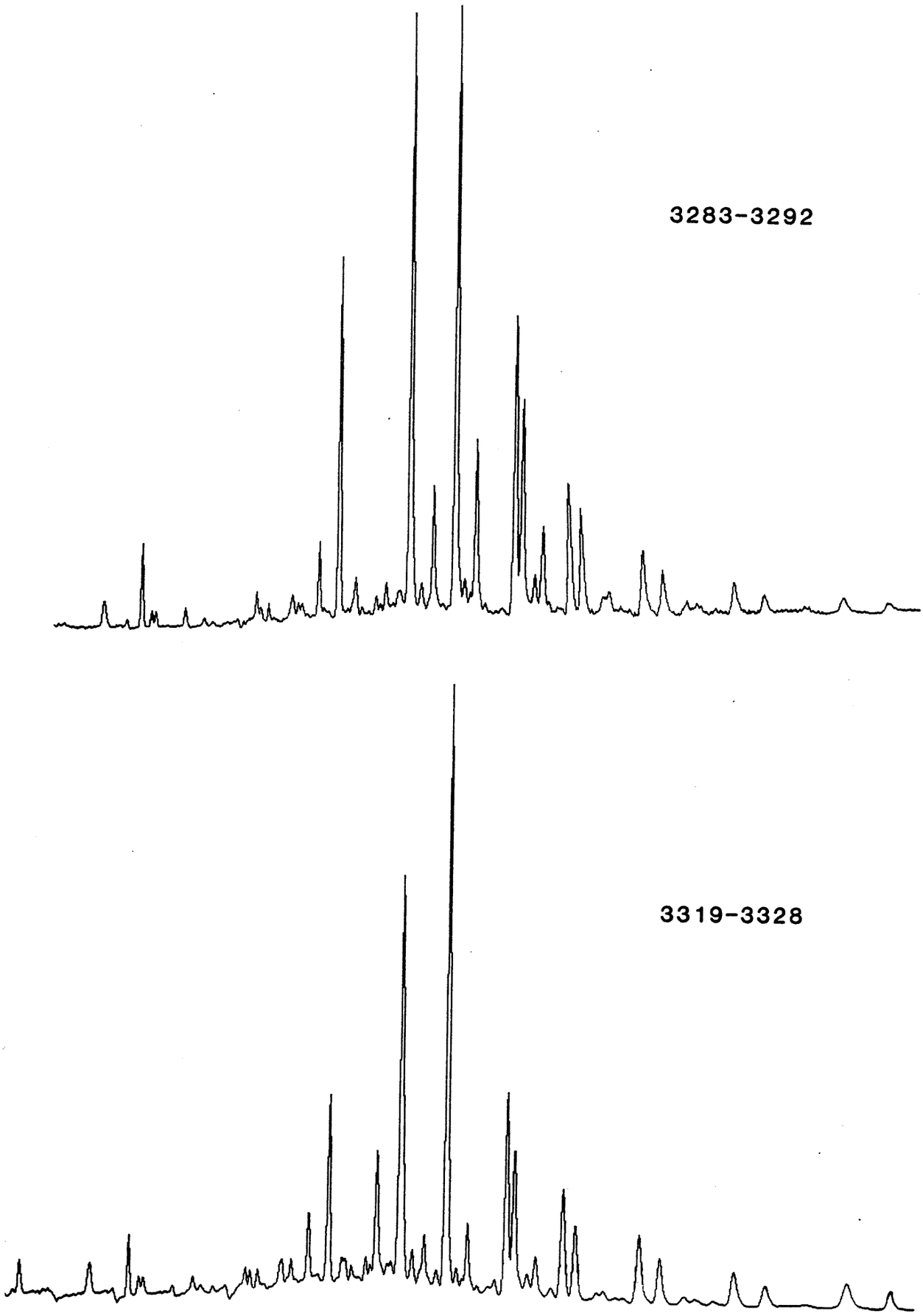


FIGURE 10b **MASS FRAGMENTOGRAMS** WELL 34/4-5

TRITERPANES m/z 191

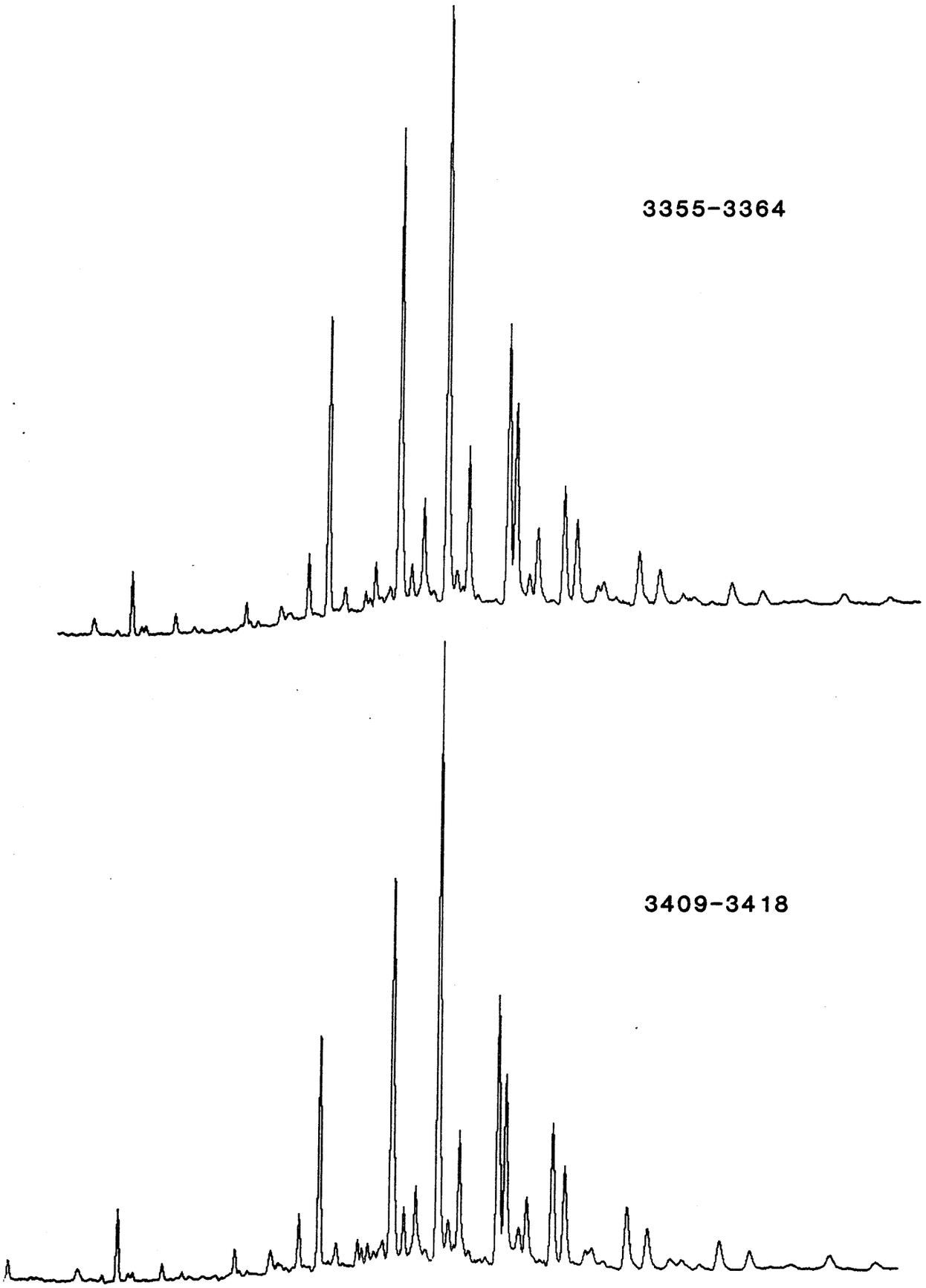
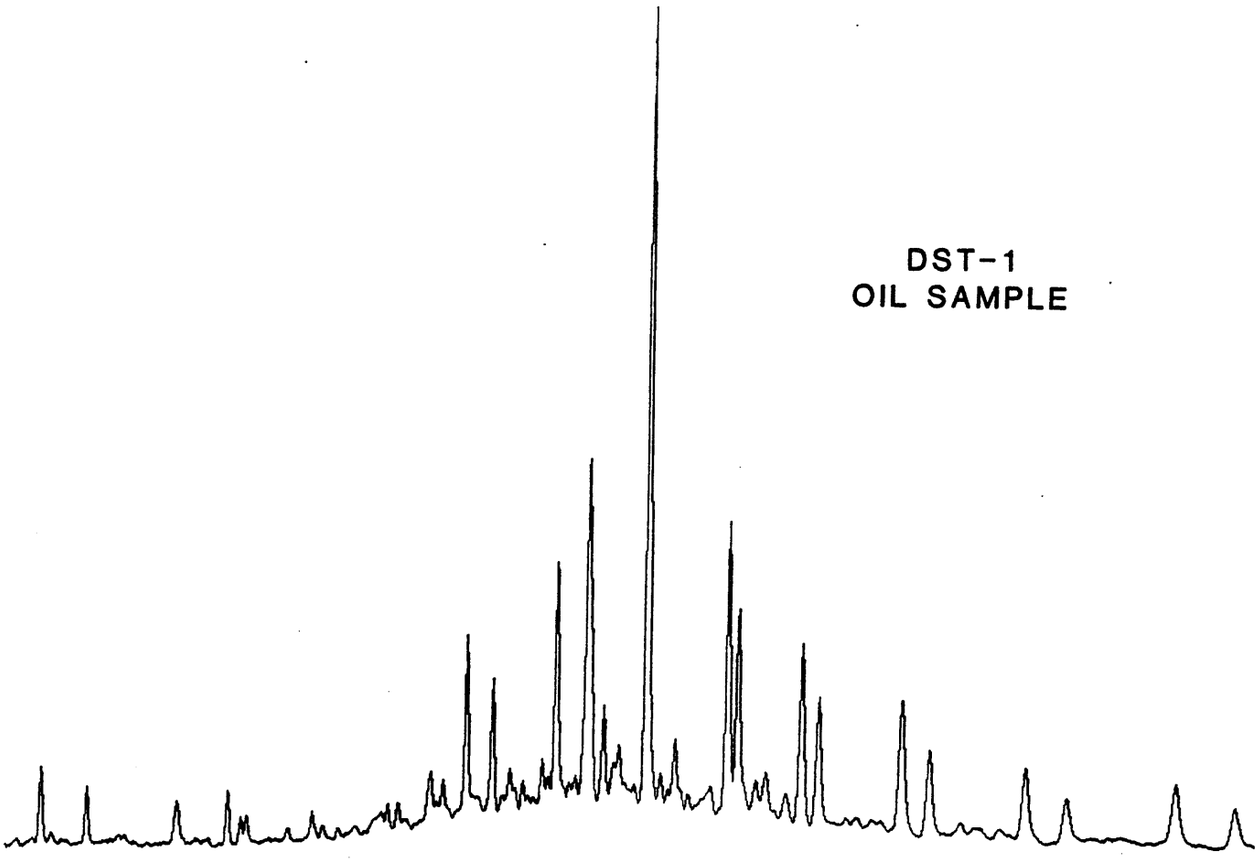
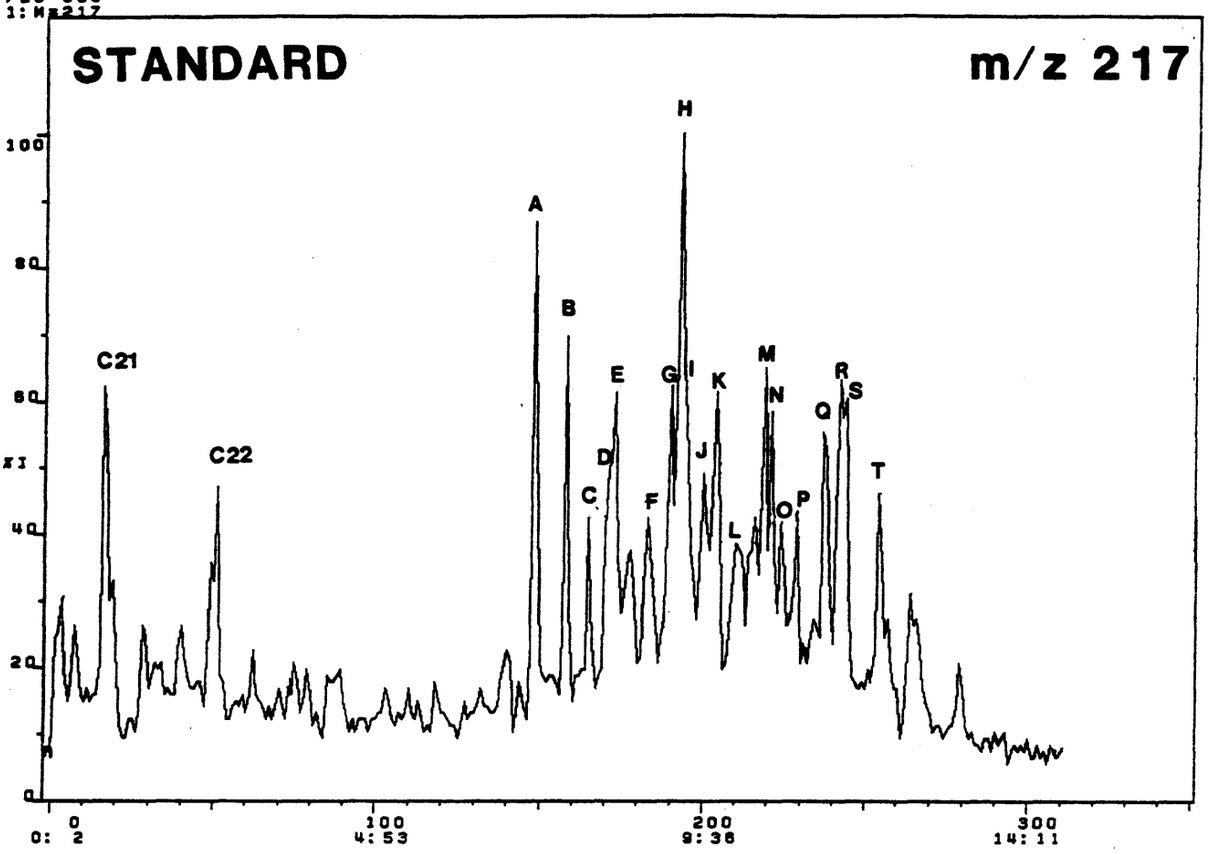


FIGURE 10c **MASS FRAGMENTOGRAMS** WELL 34/4-5

TRITERPANES m/z 191





LIST OF IDENTIFIED STERANES

A C_{27} DIACHOLESTANE (20S)
B C_{27} DIACHOLESTANE (20R)
C C_{27} DIACHOLESTANE (20S)
D C_{27} DIACHOLESTANE (20R)
E C_{28} METHYL DIACHOLESTANE (20S)
F C_{28} METHYL DIACHOLESTANE (20R)
G C_{28} METHYL DIACHOLESTANE (20S)
H C_{29} ETHYL DIACHOLESTANE (20S)
I C_{27} CHOLESTANE (20S) & C_{28} METHYL DIACHOLESTANE (20R)
J C_{27} CHOLESTANE (20R)
K C_{29} ETHYL DIACHOLESTANE (20R)
L C_{29} ETHYL DIACHOLESTANE (20S)
M C_{28} METHYL CHOLESTANE (20S)
N C_{29} ETHYL DIACHOLESTANE (20R)
O C_{28} METHYL CHOLESTANE (20S)
P C_{28} METHYL CHOLESTANE (20R)
Q C_{29} ETHYL CHOLESTANE (20S) [$\alpha\alpha$]
R C_{29} ETHYL CHOLESTANE (20R) [$\beta\beta$]
S C_{29} ETHYL CHOLESTANE (20S) [$\beta\beta$]
T C_{29} ETHYL CHOLESTANE (20R) [$\alpha\alpha$]

FIGURE 10d MASS FRAGMENTOGRAMS WELL 34/4-5

STERANES m/z 217

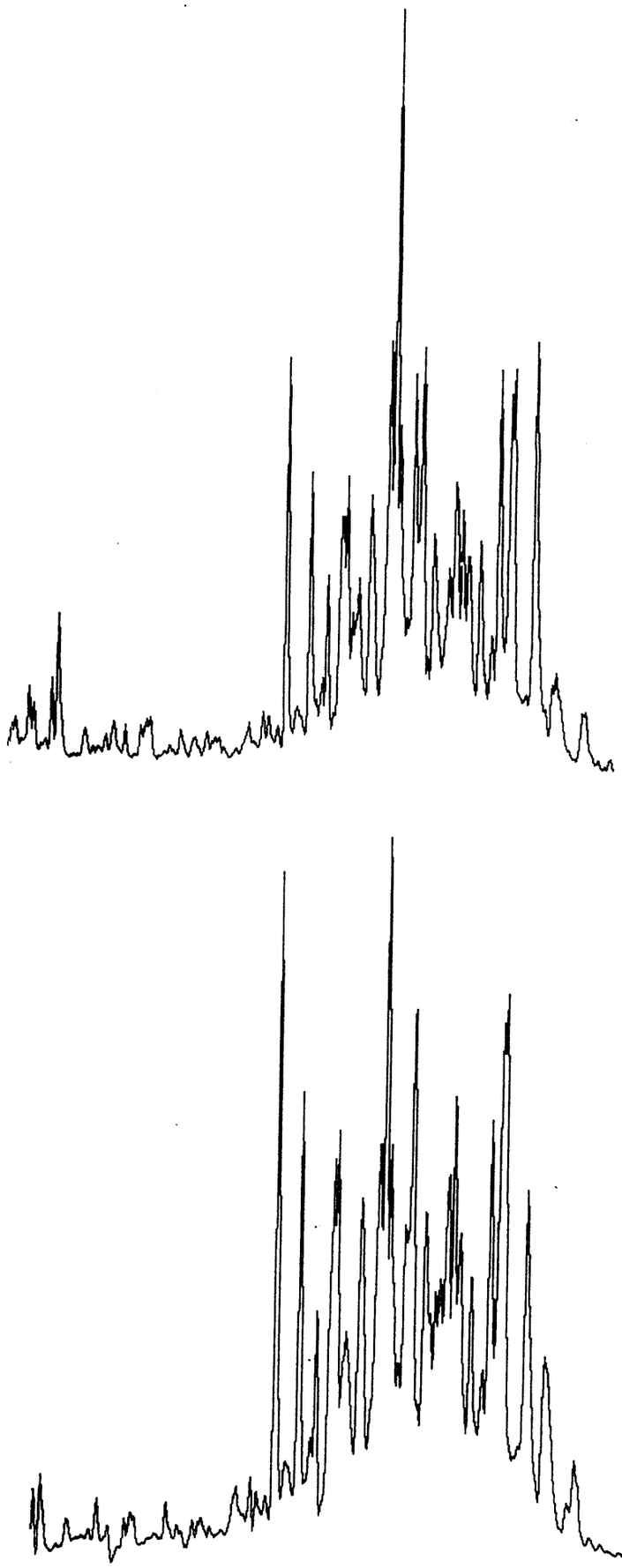


FIGURE 10e MASS FRAGMENTOGRAMS WELL 34/4-5

STERANES m/z 217

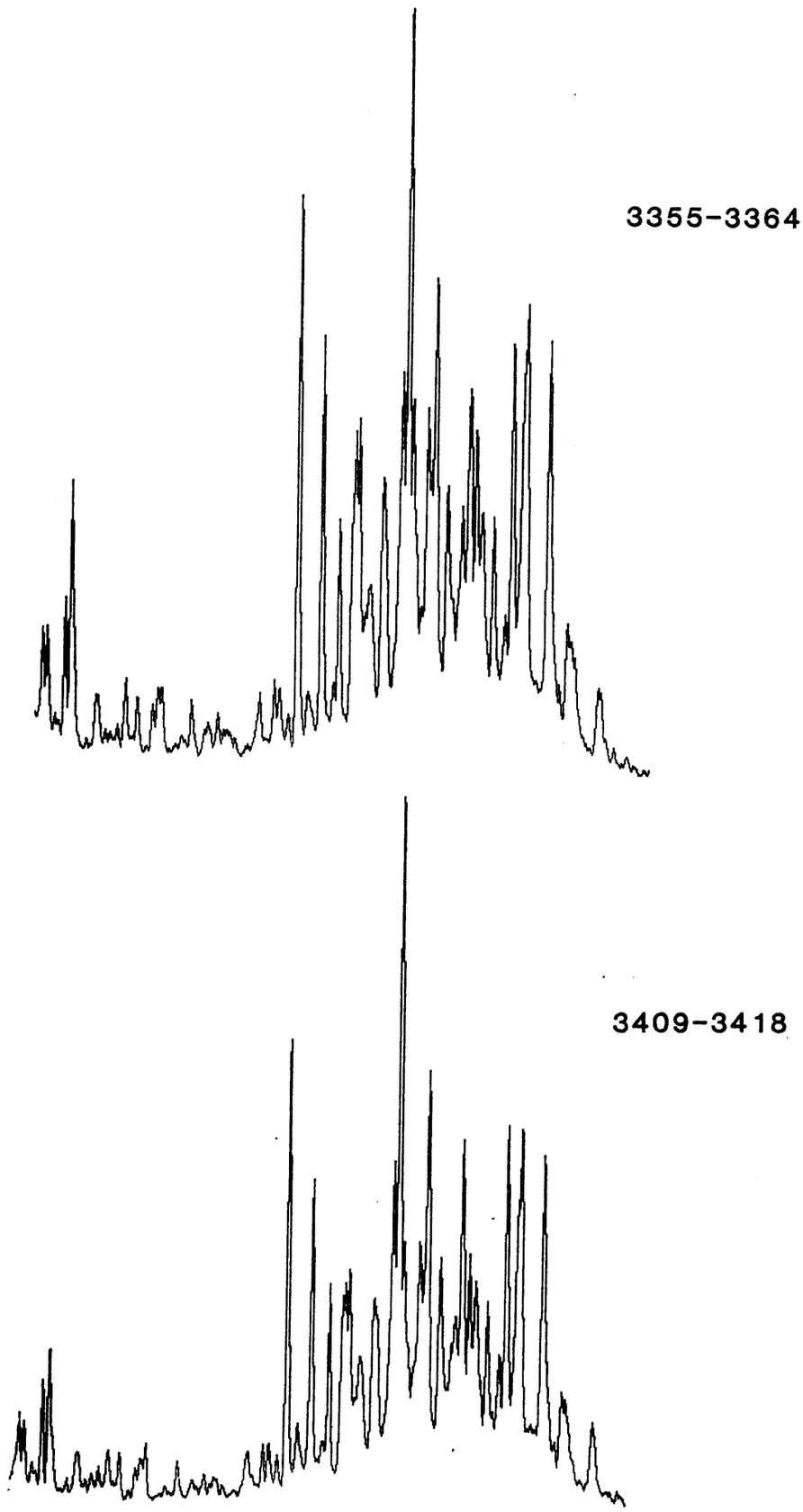


FIGURE 10f MASS FRAGMENTOGRAMS WELL 34/4-5

STERANES m/z 217

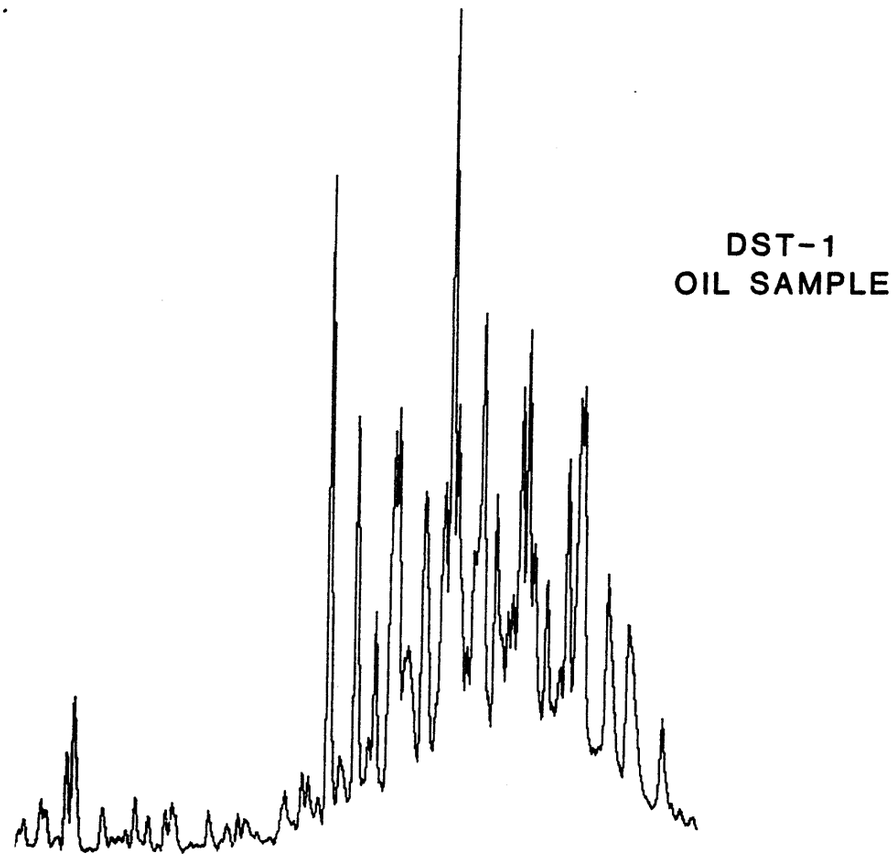
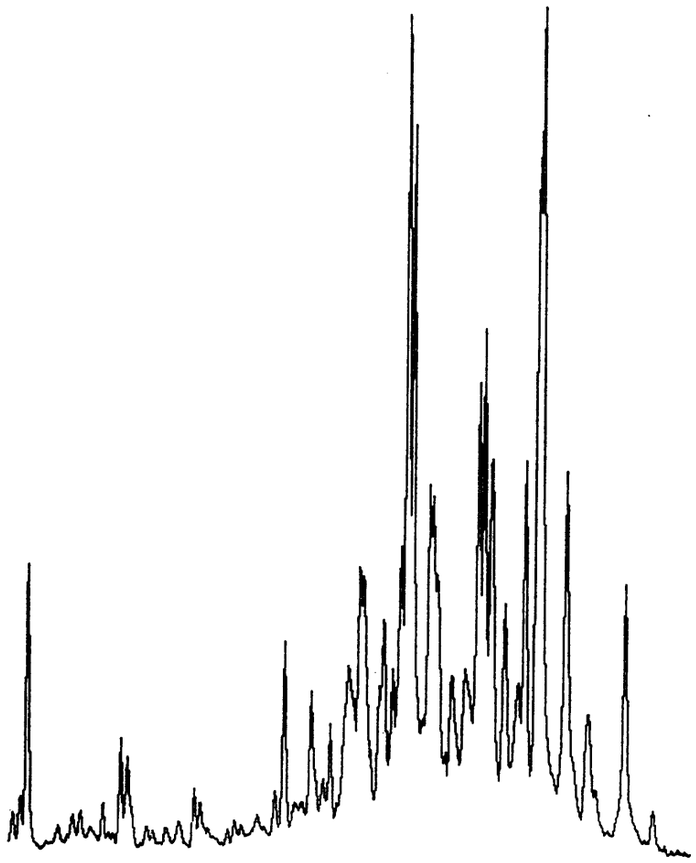
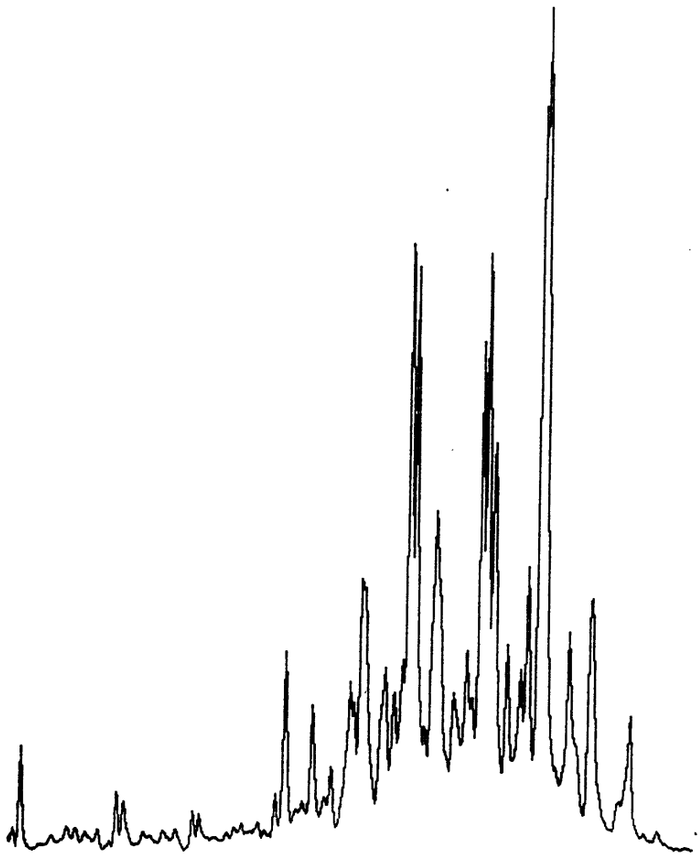


FIGURE 10g MASS FRAGMENTOGRAMS WELL 34/4-5

STERANES m/z 218



3283-3292



3319-3328

FIGURE 10h MASS FRAGMENTOGRAMS WELL 34/4-5

STERANES m/z 218

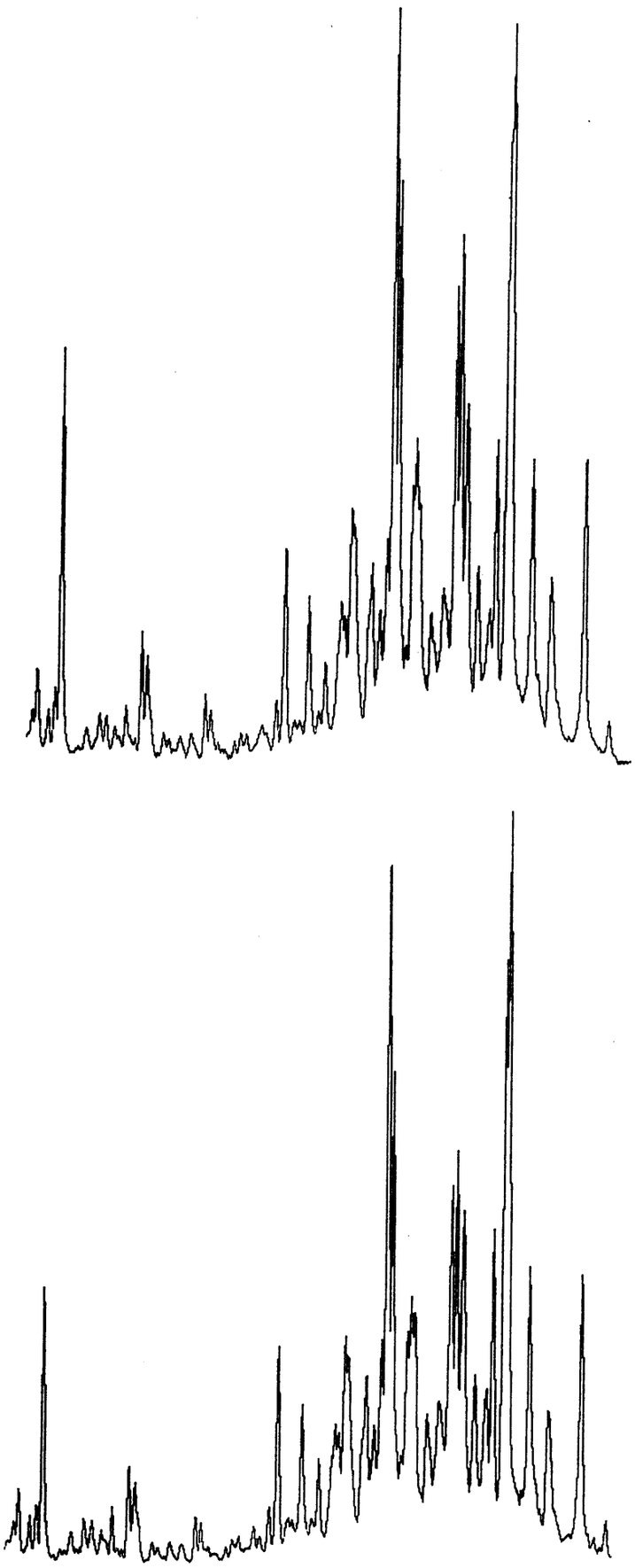
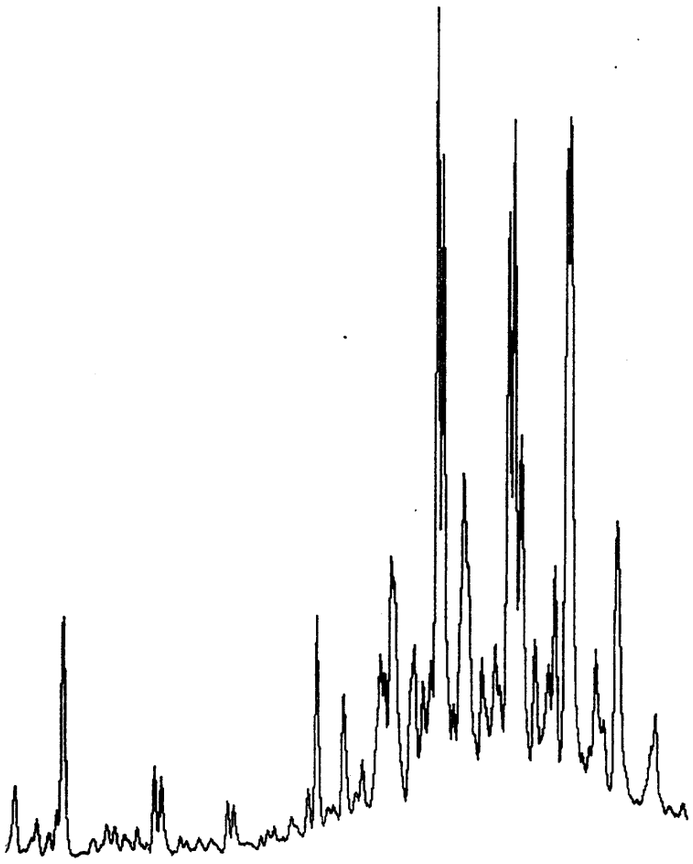


FIGURE 10i MASS FRAGMENTOGRAMS WELL 34/4-5

STERANES m/z 218



DST-1
OIL SAMPLE

FIGURE 10j

MASS FRAGMENTOGRAMS

WELL 34/4-5

REARRANGED STERANES m/z 259

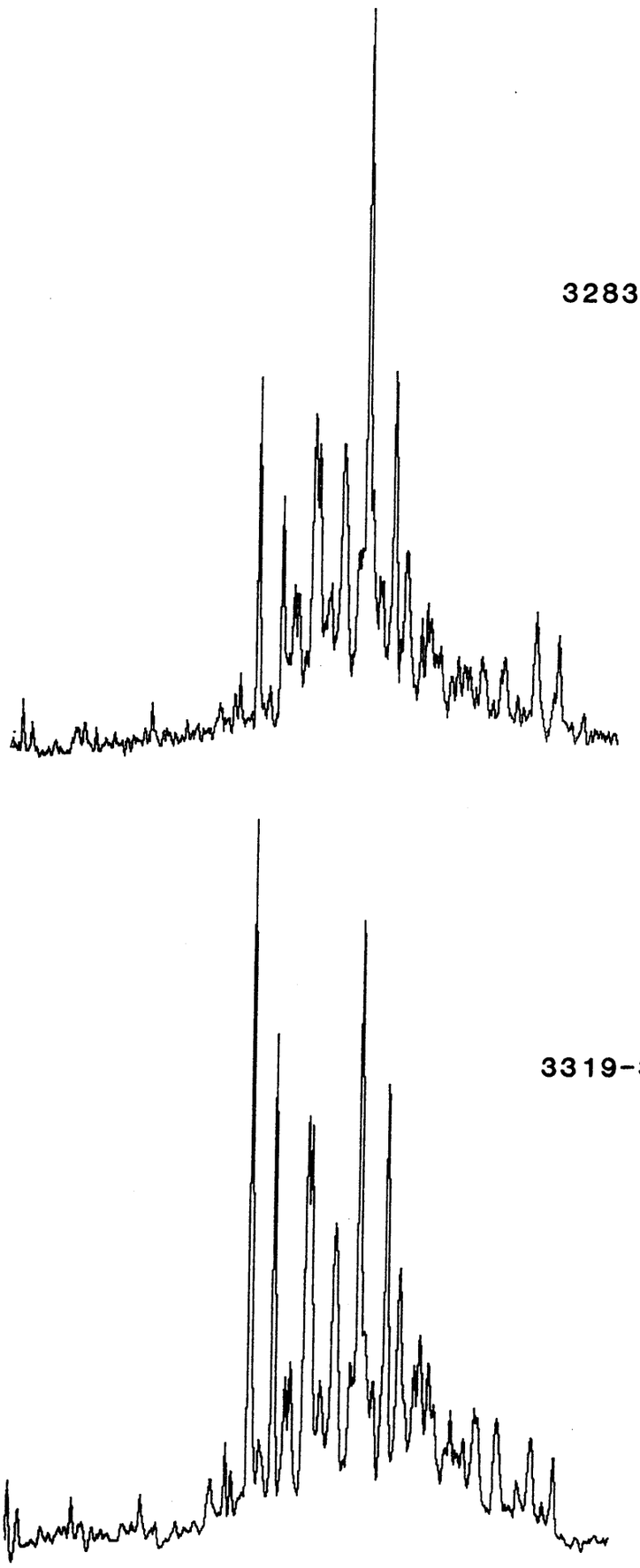


FIGURE 10k

MASS FRAGMENTOGRAMS

WELL 34/4-5

REARRANGED STERANES m/z 259

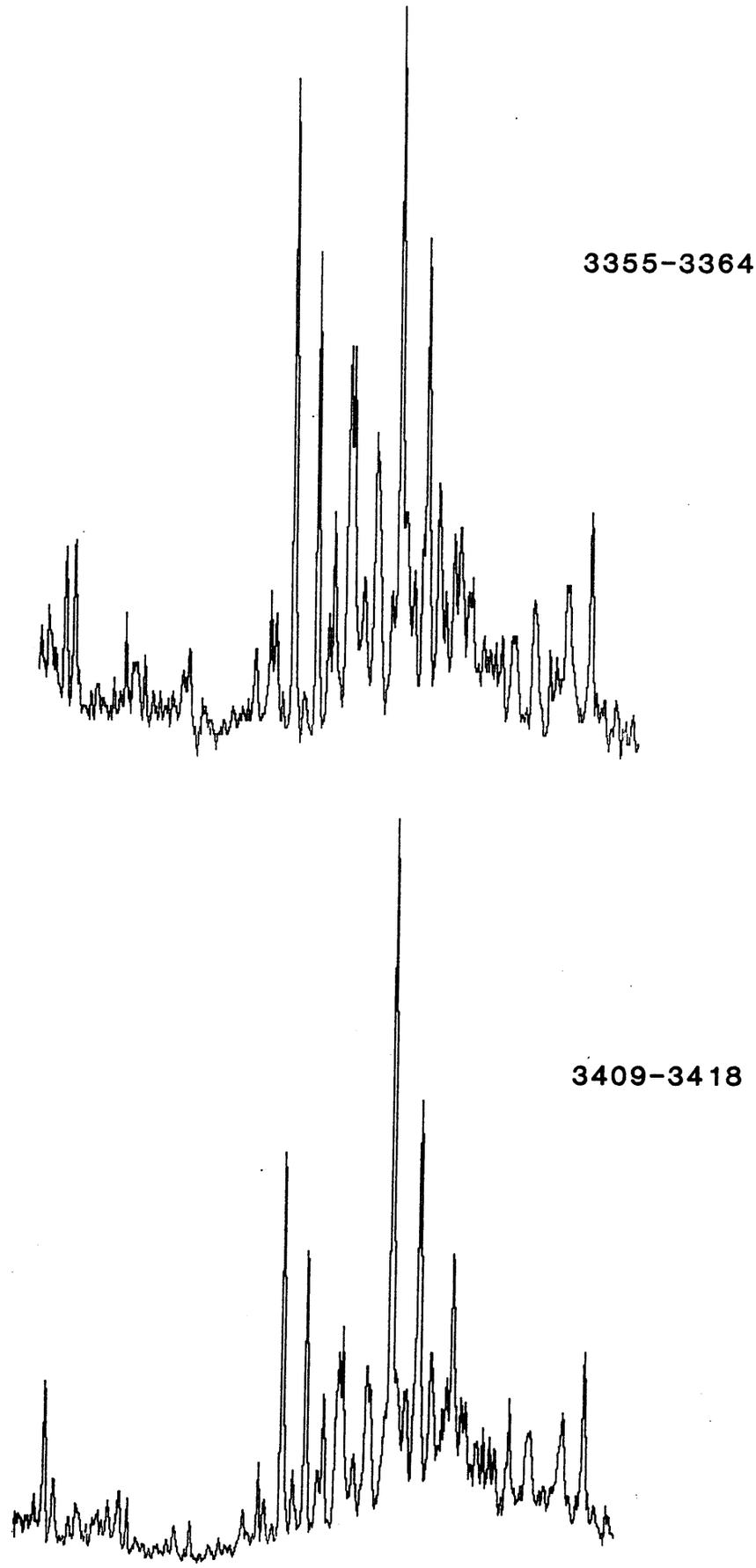


FIGURE 101 MASS FRAGMENTOGRAMS WELL 34/4-5

REARRANGED STERANES m/z 259

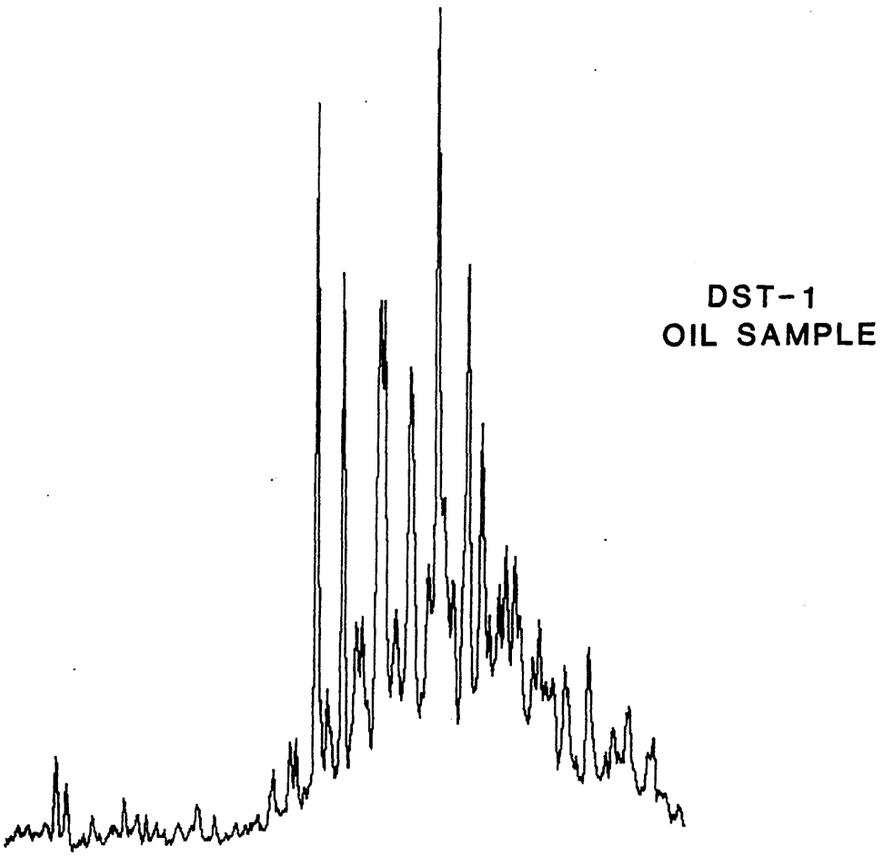


FIGURE 10m MASS FRAGMENTOGRAMS WELL 34/4-5

MONOAROMATIC STERANES m/z 239

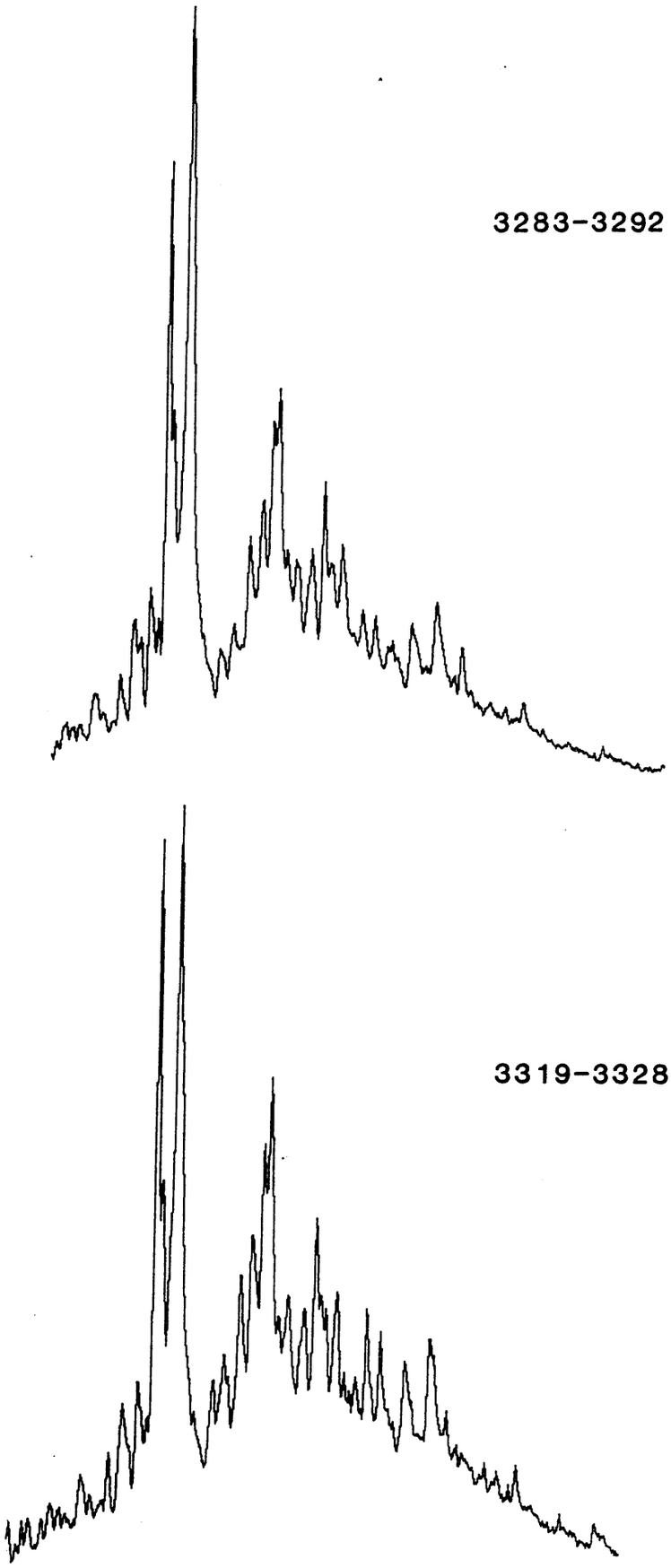


FIGURE 10n MASS FRAGMENTOGRAMS WELL 34/4-5

MONOAROMATIC STERANES m/z 239

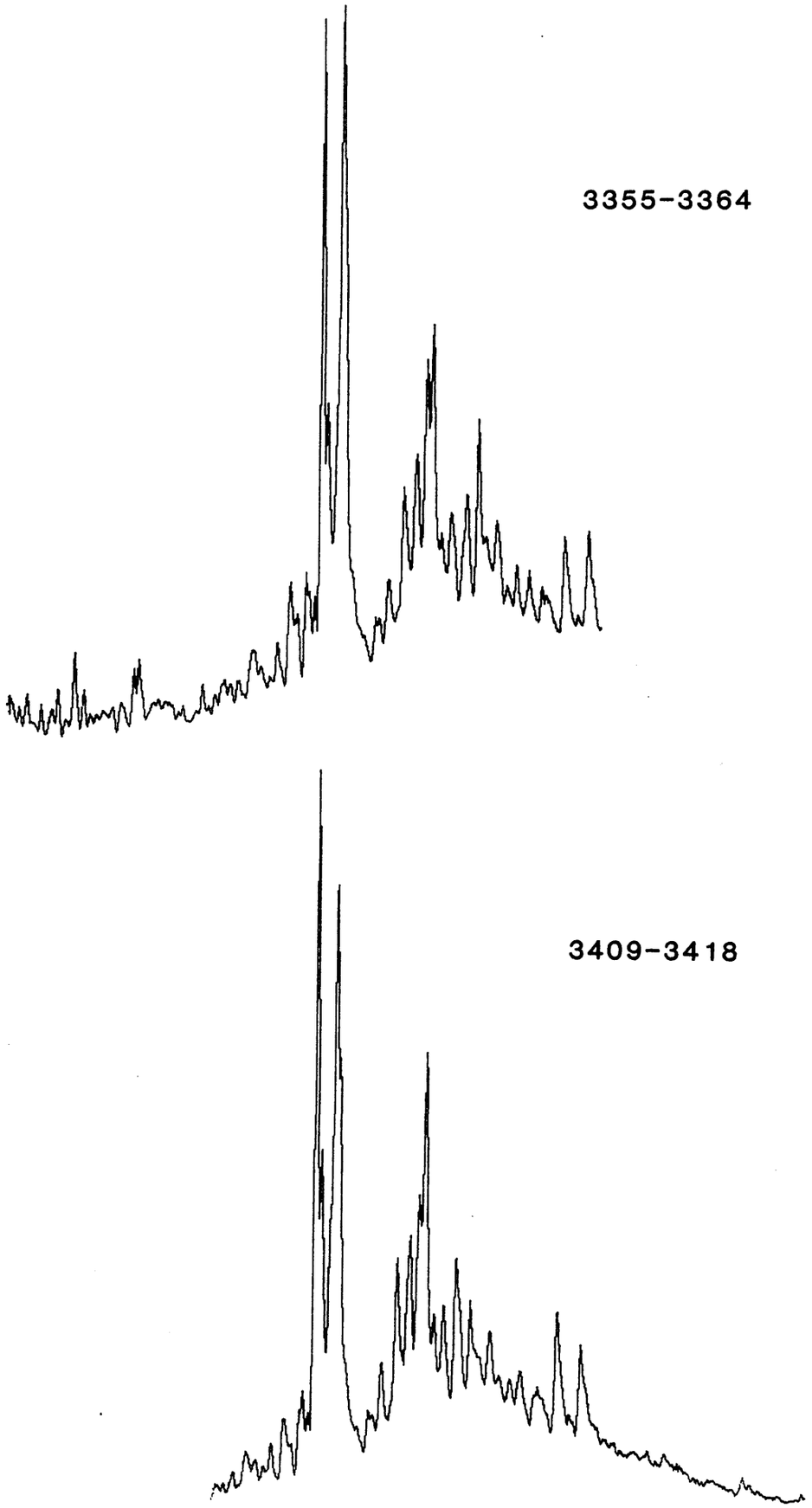


FIGURE 10o MASS FRAGMENTOGRAMS WELL 34/4-5

MONOAROMATIC STERANES m/z 239

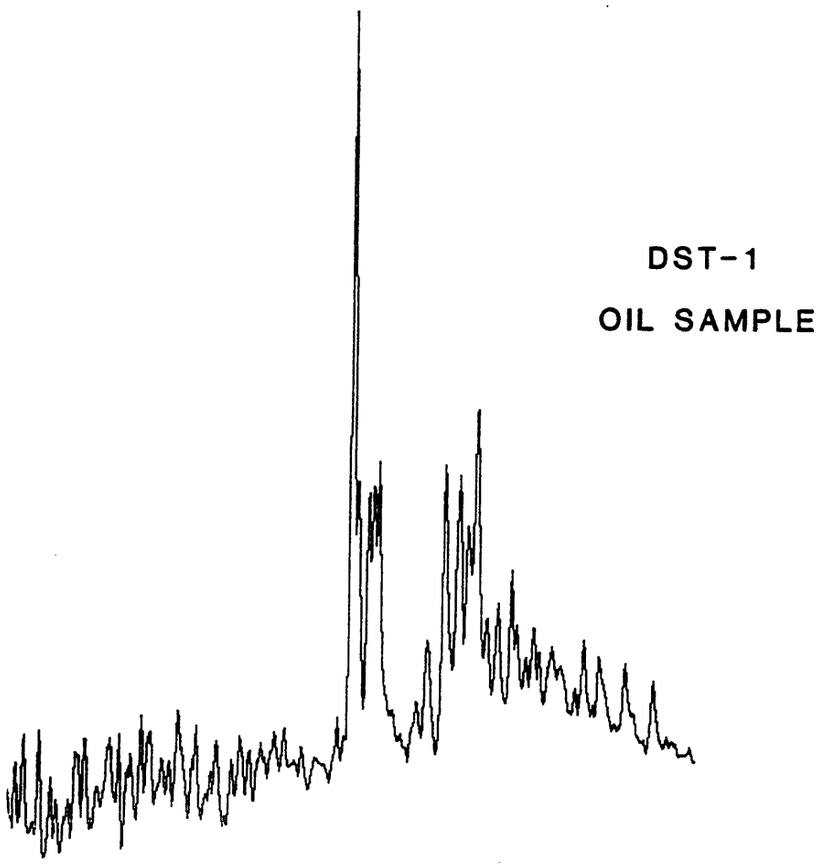
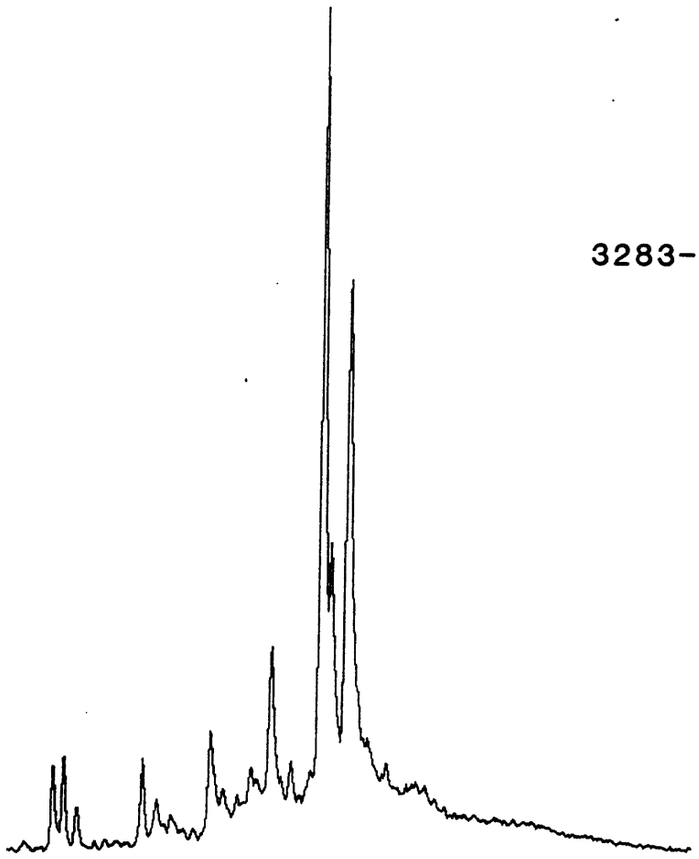


FIGURE 10p

MASS FRAGMENTOGRAMS

WELL 34/4-5

MONOAROMATIC STERANES m/z 253



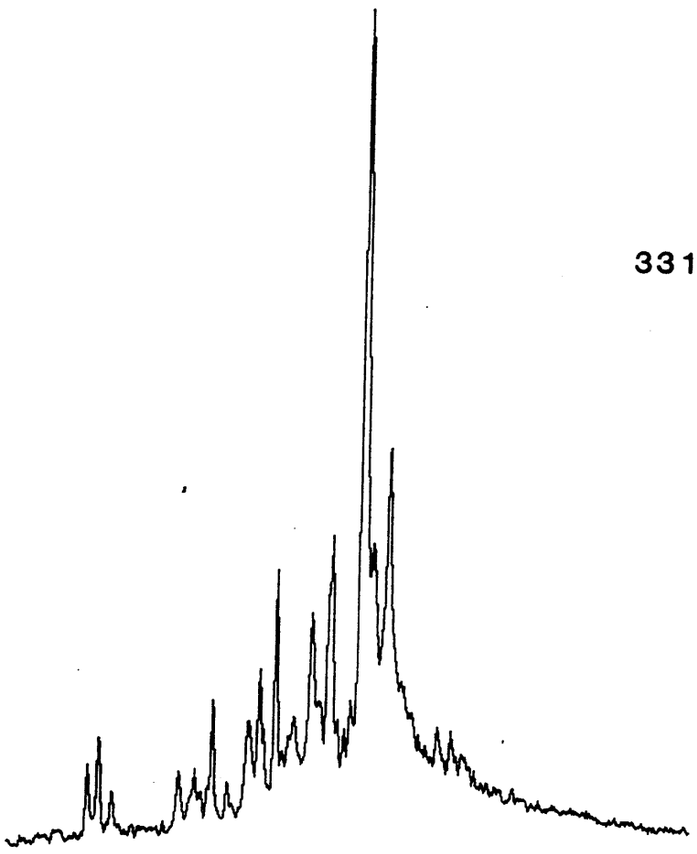


FIGURE 10q

MASS FRAGMENTOGRAMS

WELL 34/4-5

MONOAROMATIC STERANES m/z 253

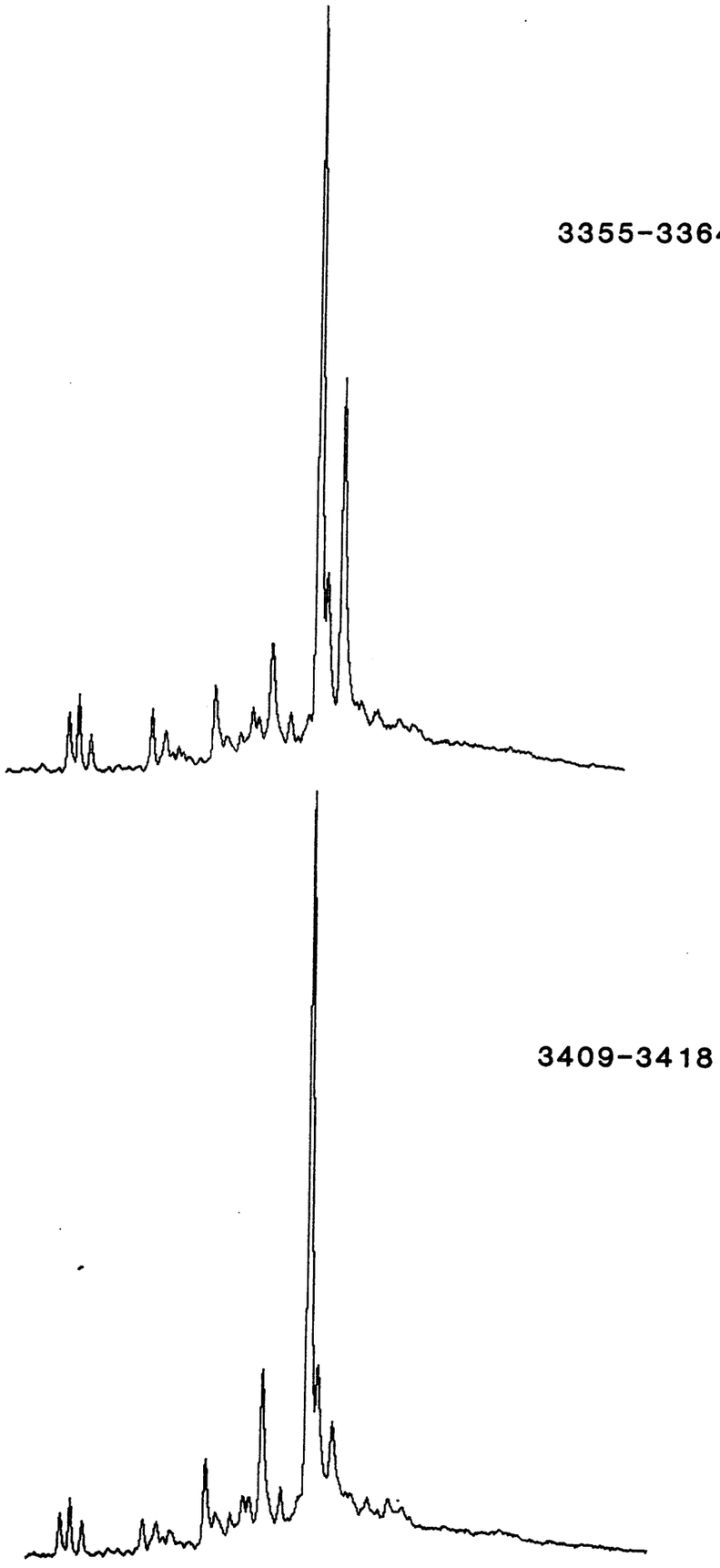


FIGURE 10r

MASS FRAGMENTOGRAMS

WELL 34/4-5

MONOAROMATIC STERANES m/z 253

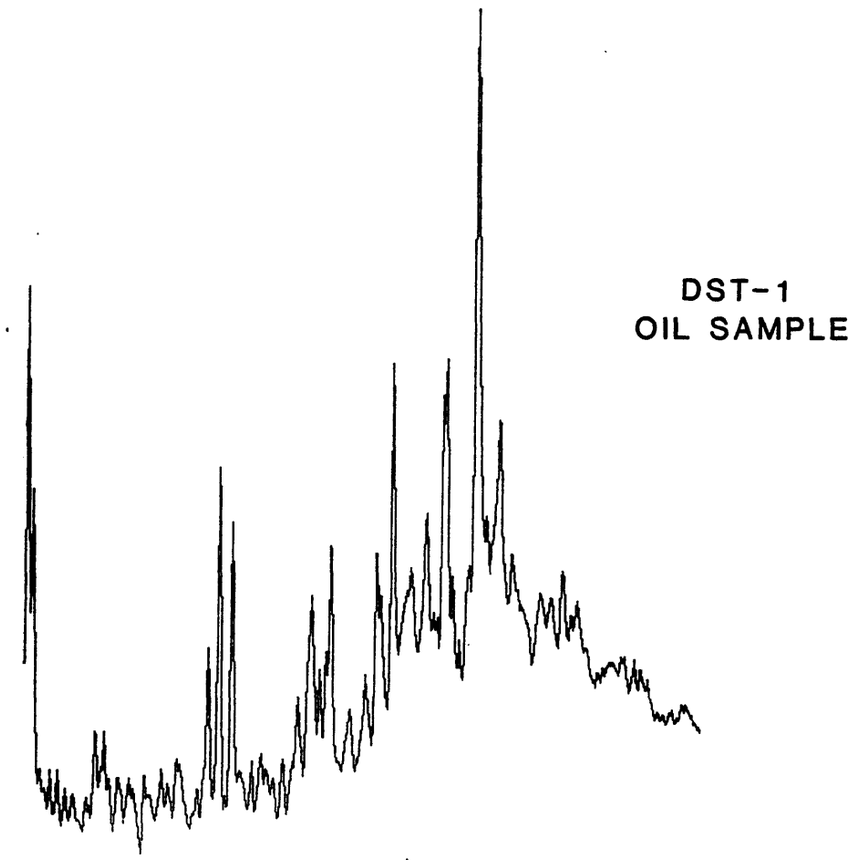


FIGURE 10s

MASS FRAGMENTOGRAMS

WELL 34/4-5

TRIAROMATIC STERANES m/z 231

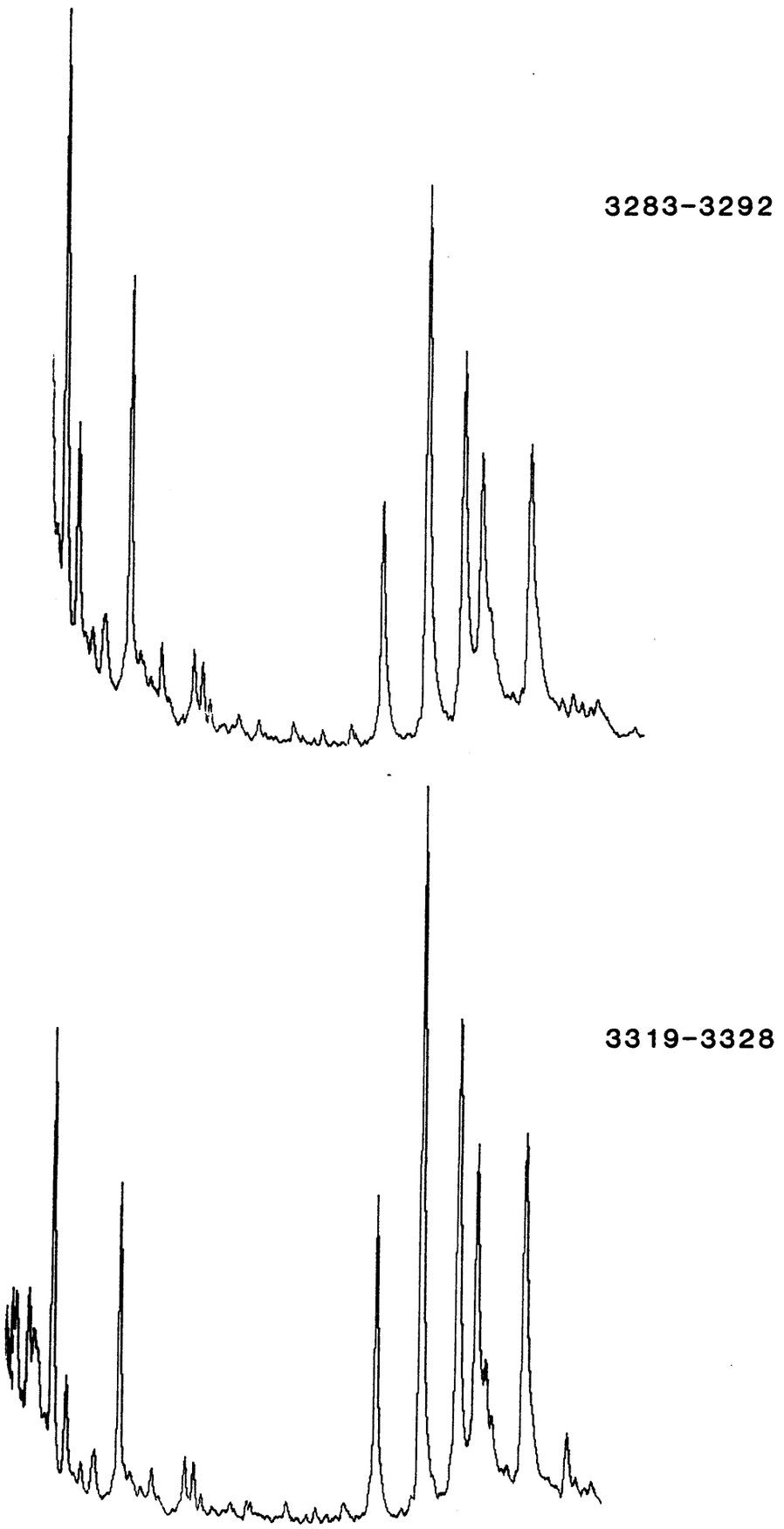


FIGURE 10t **MASS FRAGMENTOGRAMS** WELL 34/4-5

TRIAROMATIC STERANES m/z 231

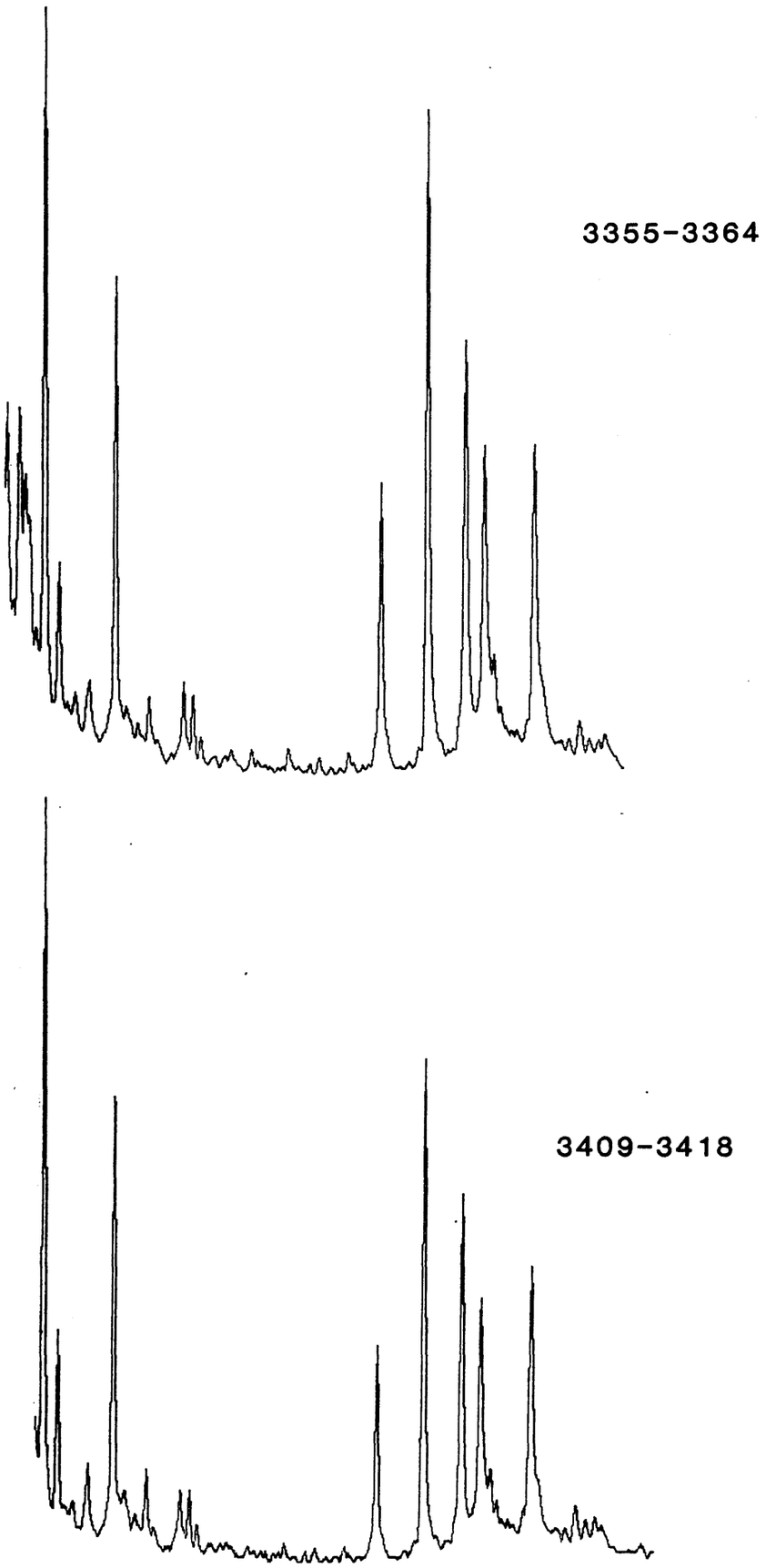


FIGURE 10u

MASS FRAGMENTOGRAMS

WELL 34/4-5

TRIAROMATIC STERANES m/z 231

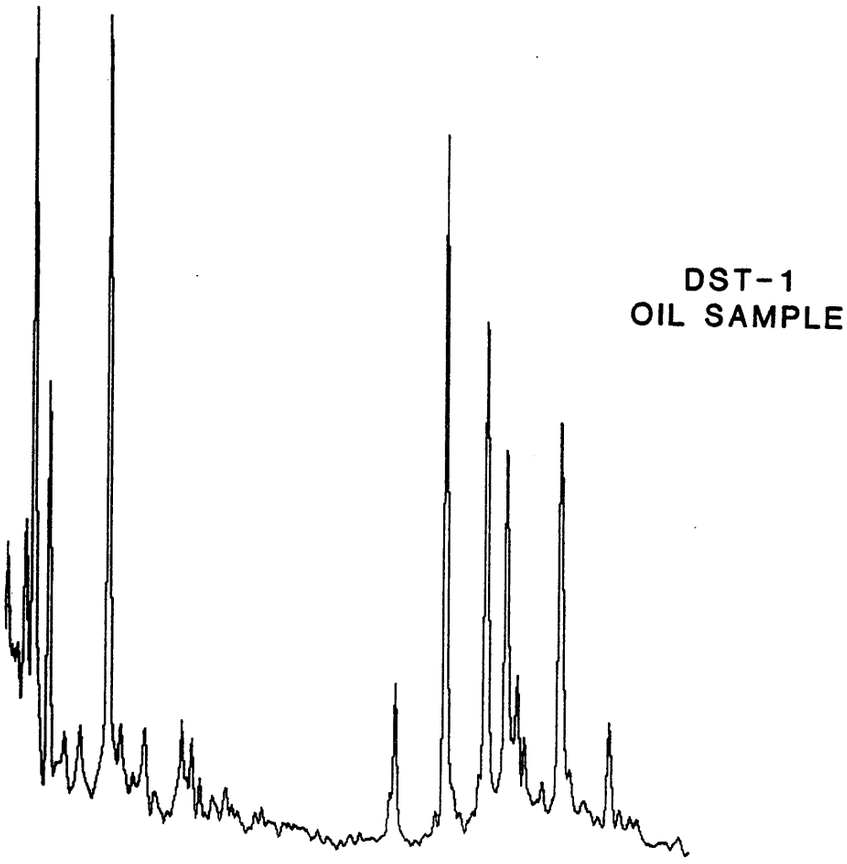
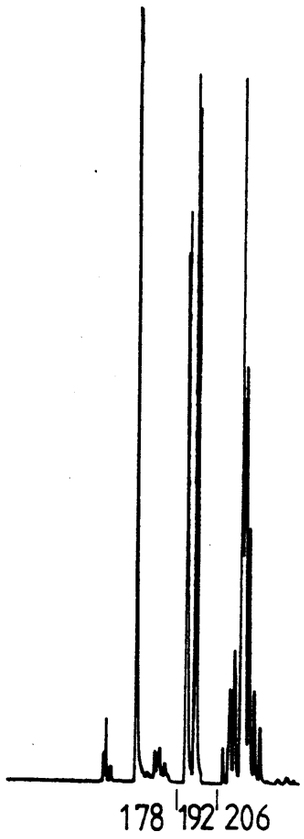


FIGURE 10v **MASS FRAGMENTOGRAMS** WELL 34/4-5

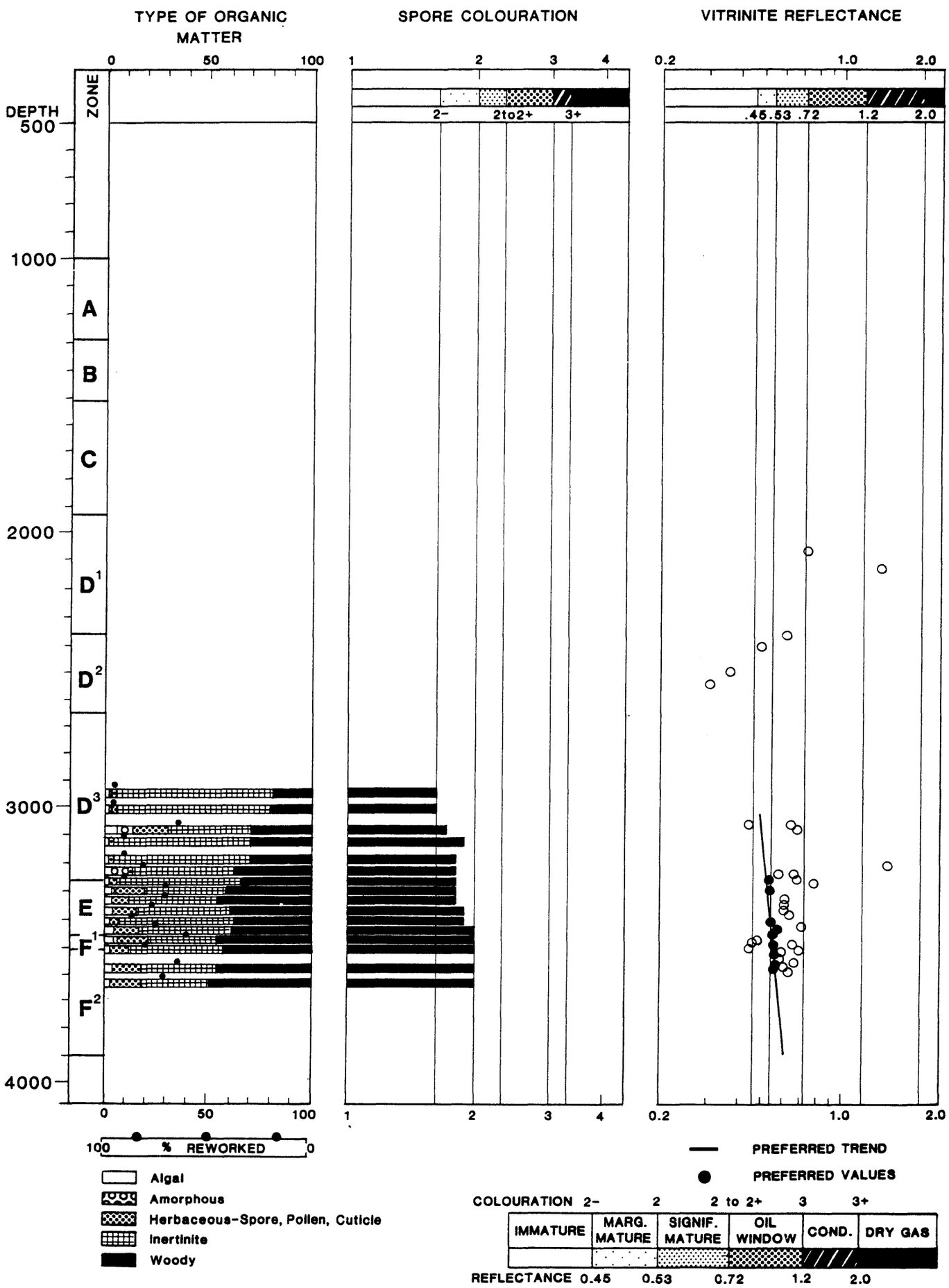
PHENANTHRENES



DST-1

OIL SAMPLE

FIGURE 11 ORGANIC FACIES & MATURITY WELL 34/4-5



BRIEF DESCRIPTION OF THE ANALYSES PERFORMED BY GEOCHEM

"Screen Analyses" are described in sections A, C and D, "Sample Preparation" in section B, "Follow-up Analyses" in sections E through K and "Correlation Studies" in section L. The analyses can be run on either core or cuttings material with the proviso that samples must be canned for the C_1-C_7 analysis and should be canned (or at least wet) for the C_4-C_7 analysis. The other analyses can be run on both canned and bagged samples.

A) C_1-C_7 LIGHT HYDROCARBON ANALYSIS

The abundance and composition of the C_1-C_7 hydrocarbons in sediments reflects their source richness, maturity and the character of the hydrocarbons they can yield. Most importantly, it is extremely sensitive to the presence of migrated hydrocarbons and is an excellent method for their detection. As it provides the information on most of the critical parameters and is also economical, this analysis is excellent for screening samples to decide which of them merit further analysis.

During the time which elapses betwwen the collection of the sample at the wellsite and its analysis in the laboratory, a fraction of the total gas passes from the rock to the air space at the top of the can. For this reason, both the air space and the cuttings are analysed.

The analysis involves the gas chromatographic separation of the individual C_1-C_4 gaseous hydrocarbons (methane, ethane, propane, isobutane and normal butane) and a partial resolution of the C_5-C_7 gasoline-range hydrocarbons (for their complete resolution see Section E). The ppm abundance of the five gases and of the total C_5-C_7 hydrocarbons are calculated from their electronically integrated peak areas (not from peak height) by comparison with a standard.

In the report, the following data are tabulated: the abundance and composition of the air space gas, of the cuttings gas and of the combined air space and cuttings gases. The combined results are also presented graphically.

B) SAMPLE WASHING AND HAND PICKING

All of the analyses described in subsequent sections are run on washed and hand picked samples.

Cuttings are washed to remove the drilling mud, care being taken not to remove soft clays and fine sand during the washing procedure. Using the C_1-C_7 hydrocarbon data profile of the well, or the organic carbon profile (if this analysis is used for screening), electric logs (if supplied) and the appearance of the cuttings under the binocular microscope, samples are selected to represent the lithological and geochemical zones penetrated by the well. These samples are then carefully hand picked and the lithology of the uncaved material is described. It is these samples which are submitted for further analysis.

Sample material remaining after analysis is retained for six months. Unless instructions are received to the contrary, Geochem Laboratories may then destroy the samples.

Our reports incorporate a gross lithological description of all the samples which have been analysed and litho percentage logs. As screen analyses are recommended at narrow intervals, a complete lithological profile is obtained.

C) ORGANIC CARBON ANALYSIS

The organic carbon content of a rock is a measure of its total organic richness. Combined with the visual kerogen, C_1-C_7, C_4-C_7, pyrolysis and C_{15+} analyses, the organic carbon content is used to evaluate the potential (not necessarily actual) hydrocarbon source richness of the sediment. This analysis is an integral part of a total evaluation and it can also be used as an economical screen analysis for dry samples (when the C_1-C_7 analysis cannot be used).

Hand picked samples are dried, crushed and then acidised to remove the inorganic calcium and magnesium carbonates. The actual analysis involves combustion in a Leco carbon analyser. Blanks, standards and duplicates are run routinely for purposes of quality control at no extra cost to the client.

The data are tabulated and presented diagramatically in our reports in a manner which facilitates comparison with the gross lithology (see Section B) of the samples.

D) MINI-PYROLYSIS

An ideal screen analysis which provides a definitive measure of potential source richness upon those samples whose organic carbon contents suggest fair or good source potential. This is described in detail in section K.

E) DETAILED C_4-C_7 HYDROCARBON ANALYSIS

The abundance and composition of the C_4-C_7 gasoline-range hydrocarbons in sediments reflects their source quality, level of thermal maturation and organic facies. In addition, the data also reveal the presence of migrated hydrocarbons and can be used for crude oil-parent source rock correlation studies.

This powerful analysis, performed upon hand picked lithologies, is employed as a follow-up to confirm the potential of samples which have been selected using the initial screen analysis. It is used in conjunction with the organic carbon, visual kerogen and C_{15+} analyses.

The individual normal paraffins, isoparaffins, naphthenes and aromatics with between four and seven carbon atoms in the molecule (but also including toluene) are resolved by capillary gas chromatography and their peak areas electronically integrated.

Normalised compositions, selected ratios and the ppm abundance of the total gasoline-range fraction are tabulated in the report and also presented graphically.

F) KEROGEN TYPE AND MATURATION

Kerogen is the insoluble organic matter in rocks. Visual examination of the kerogen gives a direct measure of thermal maturity and of the composition of the organic matter (organic facies) and indicates the source quality of the sediment - which is confirmed using the organic carbon, light hydrocarbon, pyrolysis and C_{15+} analyses.

The type of hydrocarbon (oil or gas) generated by a source rock is a function of the types and level of thermal maturation of the organic matter which are present. Both of these parameters are measured directly by this method.

Kerogen is separated from the inorganic rock matrix by acid digestion and flotation methods which avoid oxidation of the organic matter. It is then mounted on a glass slide and examined at high and low magnifications with a Leitz microscope. Chemical methods measure the total kerogen population but, with this technique, individual particles can be selected for examination and spurious material identified. This is particularly valuable in reworked, contaminated and turbodrilled sediments.

The following data are generated: the types of organic matter present and their relative abundances, an estimate of the proportion of reworked material, preservation state, the thermal maturity of the non-reworked organic matter using the spore colouration technique.

Our maturation scale has been developed to digitise small but recognisable changes in organic matter colouration resulting from increasing maturity and to place particular emphasis upon the immature to mature transition. In the absence of a universal colouration scale, the most significant points on our scale have been calibrated against equivalent vitrinite reflectance values. The following maturation stages are recognised at the low end of the scale:-

a) immature; thermal index less than 2- (0.45% Ro)
b) marginally mature; indices between 2- and 2. Minor hydrocarbon generation from amorphous and herbaceous ($\pm$ algal) organic matter
c) mature; indices between 2 (0.53% Ro) and 2 to 2+ (0.72% Ro), significant generation from amorphous, algal and herbaceous organic matter but wood only marginally mature
d) oil window; indices of 2 to 2+ (0.72% Ro) through to 3 (1.2% Ro). Peak hydrocarbon generation.

The condensate zone starts at a thermal index of 3 whilst indices of 3+ (2.0% Ro) and higher indicate the eometamorphic dry gas stage.

A total of fourteen types of organic matter are sought based upon the major categories of algal, amorphous, herbaceous (spore, pollen, cuticle), wood, inertinite and resin. This detail is essential for a proper understanding of hydrocarbon source potential as the different sub-groups within each category have different properties.

Upon completion of the study, the kerogen slides are sent to the client.

G) VITRINITE REFLECTANCE

Vitrinite reflectance is an alternative/confirmatory method for evaluating thermal maturation which is used in conjection with the visual kerogen analysis. The reflectivity of vitrinite macerals increases in response to thermal alteration and is used to define maturation levels and, by projection, to predict maturity at depth or the thicknesses of section removed by erosion.

Measurements are made upon kerogen separations in conjunction with polished whole rock samples. In general, this analysis is performed upon the same samples as the visual kerogen analysis, thus facilitating a direct comparison of the two sets of results.

If possible, forty to fifty measurements are taken per sample - unless the sediments are organically lean, vitrinite is sparse or only a single uniform population is present. The data are plotted in a histogram which distinguishes the indigenous vitrinite from possible reworked or caved material. Averages are calculated for each population. Comments upon exinite fluorescence and upon the character of the phytoclasts are noted on the histograms. The reports contain the tabulated data, histograms and the reflectivities plotted against depth.

The vitrinite and visual kerogen techniques provide mutually complementary information upon maturity, organic matter type and diagenesis.

H) C_{15+} EXTRACTION, DEASPHALTENING AND CHROMATOGRAPHIC SEPARATION

Sections "A" and "E" dealt with analyses covering the light end of the hydrocarbon spectrum. This section is concerned with the solvent extractable organic material in the rock with more than fourteen carbon atoms in the molecule (i.e. the heavy end). The amount and composition of this extract indicates source richness and type, the level of thermal maturation and the possible presence of migrated hydrocarbons.

These results are integrated with those derived from the pyrolysis, visual kerogen, organic carbon and light hydrocarbon analyses.

The techniques involved in this analysis employ pure solvents and have been designed to give reproducible results. Hand picked samples are ground and then solvent extracted in a soxhlet apparatus, or by blending, with dichloromethane (the solvent system can be adapted to client's specifications). After asphaltene precipitation, the total extract is separated by column chromatography or high pressure liquid chromatography into the following fractions: paraffin-naphthene hydrocarbons, aromatic hydrocarbons, eluted NSO's (nitrogen-, sulphur-, and oxygen- containing non-hydrocarbons) and non-eluted NSO's. Note that the non-hydrocarbons are split into three fractions and not reported as a gross value. These fractions can be submitted for further analyses (carbon isotopes, gas chromatography, high mass spectroscopy) including correlation studies.

For convenience and thoroughness, the data are reported in three formats: the weights of the fractions, ppm abundances and normalised percentage compositions. The data are also presented diagramatically.

J) GC ANALYSIS OF C_{15+} PARAFFIN-NAPHTHENE HYDROCARBONS

The gas chromatographic configurations of the heavy C_{15+} paraffin-naphthene hydrocarbons reflect source type, the degree of thermal maturation and the presence and character of migrated hydrocarbons or contamination.

Not only is this analysis an integral part of any source rock study but it also provides a fingerprint for correlation purposes and helps to define the geochemical/palynological environmental character of the source rocks from which crude oils were derived.

The paraffin-naphthene hydrocarbons obtained by column chromatography are separated by high resolution capillary chromatography. Excellent resolution of the individual normal paraffins, isoprenoids and significant individual isoparaffins and naphthenes is achieved. Runs are normally terminated at nC_{35}. A powerful in-house microprocessor system is being introduced to correct for the change in response factor with chain length.

The normal paraffin carbon preference indices (C.P.I.) indicate if odd (values in excess of 1) or even (values less than 1) normal paraffins are dominant. Strong odd preferences (± strong pristane peaks) are characteristic of immature land plant organic matter whilst even preferences (± strong phytane peaks) suggest a reducing environment of deposition. With increasing maturity, values approach 1.0 and oils are typically close to 1.0. The indices are calculated using the following formulae:

$$C.P.I_A = \frac{\frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{20} + C_{22} + C_{24} + C_{26}} + \frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{22} + C_{24} + C_{26} + C_{28}}}{2}$$

$$C.P.I_B = \frac{\frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{24} + C_{26} + C_{28} + C_{30}} + \frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{26} + C_{28} + C_{30} + C_{32}}}{2}$$

Chromatograms are reproduced in the report for use as visual fingerprints and in addition, the following data are tabulated: normalised normal paraffin distributions; proportions of paraffins, isoprenoids and naphthenes in the total paraffin-naphthene fraction; C.P.I_A and C.P.I_B; pristane to phytane ratio; pristane to nC_{17} ratio.

K) PYROLYSIS

The process of thermal maturation can be simulated in the laboratory by pyrolysis, which involves heating the sample under specified conditions and measuring the oil-like material which is freed/generated from the rock. With this analysis, the potential richness of immature sediments can be determined and, by coupling the pyrolysis unit to a gas chromatograph, the liberated material can be characterised. These results are correlated with those obtained from the organic carbon, kerogen and C_{15+} analyses.

Small amounts of powdered sample are heated in helium to release the thermal bitumen (up to 340°C) and pyrolysate (340-550°C). The thermal bitumen correlates with the solvent extractable material (see above) whilst the pyrolysate fraction does not exist in a "free" state but is generated from the kerogen, thus simulating maturation in the subsurface. Abundances (weight ppm of rock) are measured with a flame ionisation detector against a standard. Thermal bitumen includes source indigenous, contaminant and migrated hydrocarbons but the pyrolysate abundance is a measure of ultimate source richness. The capillary gas chromatogram of the pyrolysate is used to evaluate the character of the parent organic matter and whether it is oil or gas prone. Peak temperature(s) of pyrolysate evolution is recorded. Carbon dioxide can be measured if requested but is normally ignored as the separation of the organic and inorganic species has been found to be artificial and unreliable.

Pyrolysate yields provide a definitive measure of potential source richness which avoids the ambiguities of the organic carbon data and the problem of contamination. This analysis is also used to evaluate the quality and character of the organic matter and the degree to which it has realised its ultimate hydrocarbon potential. Geochem does not employ the pyrolysis technique to evaluate maturation, preferring the kerogen and vitrinite reflectance analyses which avoid the problem of reworking and hence, are more reliable.

Capillary chromatograms produced for the pyrolysate hydrocarbons range from C_1 (methane) out towards C_{35} but exhibit considerable variations. They are used to define whether a source rock will yield oil, condensate or gas. With this new technique, it is now possible to complete the evaluation of a source rock.

The data are tabulated and presented graphically. MINI-PYROLYSIS includes ppm thermal bitumen and ppm pyrolsate. PYROLYSIS also provides the above together with the temperature of peak pyrolysate evolution. The capillary chromatograms of the pyrolysate obtained by PYROLYSIS-GC are reproduced in the report. The Mini-Pyrolysis analysis is recommended as a screening technique.

L) CORRELATION STUDY ANALYSES

Oil to oil and oil to parent source rock correlation studies require high resolution analytical techniques. This requirement is satisfied by some of the analyses discussed above but others have been selected specifically for correlation work. Many of these analyses also provide information upon the character of the environment of deposition of the parent source rocks.

- detailed C_4-C_7 hydrocarbon (gasoline range) analysis. See Section E. Although these hydrocarbons can be affected by migrational/alteration processes, they commonly provide a very useful correlation parameter.
- capillary gas chromatography of the C_{15+} paraffin-naphthenes. See section J. The branched±normal paraffin distributions are used to "fingerprint" the samples.
- capillary chromatograms of whole oils and of the C_{8+} fraction of source rocks.
- capillary gas chromatography of C_{15+} aromatic hydrocarbons. Separate chromatograms of the hydrocarbons and of the sulphur-bearing species are reproduced.
- high pressure liquid chromatograms.
- mass spectrometric carbon isotope analyses of crude oil and rock extract fractions and of kerogen separations. A powerful tool for comparing hydrocarbons and correlating hydrocarbons to organic matter. With this technique the problem of source rock contamination can be avoided. The data are recorded on x-y or Galimov plots.
- mass fragmentograms (mass chromatograms) of fragment ions characteristic of selected hydrocarbon groups such as the steranes and terpanes. The fragmentograms provide a convenient and simple means of presenting detailed mass spectrometric data and are used as a sophisticated fingerprinting technique. This provides the ultimate resolution for correlating hydrocarbons and facilitates the examination of hydrocarbon classes.
- vanadium and nickel contents.

Suites of (rather than single) analyses are employed in correlation studies, the actual selection depending upon the complexity of the problem. See also section N.

M) ANALYSES FOR SPECIAL CASES

M-1) ELEMENTAL KEROGEN ANALYSIS

This analysis evaluates source quality, whether the sediments are oil or gas prone, the character of the organic matter and its level of thermal maturation. It is the chemical equivalent of the visual kerogen analysis. The pyrolysis analysis is generally preferred to this technique, both methods providing similar information.

M-2) SULPHUR ANALYSIS

The abundance of sulphur in source rocks and crude oils.

M-3) CARBONATE CONTENT

The mineral carbonate content of sediments is determined by acid treatment. These data are particularly useful when used in conjunction with organic carbon contents as a screening technique.

M-4) NORMAL PARAFFIN ANALYSIS

Following the removal of the branched paraffins and naphthenes from the total paraffin-naphthene fraction, a chromatogram of the normal paraffins is obtained. The resulting less complicated chromatogram facilitates the examination of normal paraffin distributions.

M-5) SOLID BITUMEN EVALUATION

Residual solid bitumen after crude oil is generated by three prime processes: the action of waters, gas deasphalting, thermal alteration. Thus it provides a means of determing the reservoir history of a crude and of evaluating whether adjacent traps will or will not be prospective for oil. In carbonate sections, where organic matter is sometimes sparse, this technique is also used to evaluate thermal maturation levels.

The analysis involves the determination of the solubility (in CS_2) of the solid bitumen and of the atomic hydrogen to carbon ratio of the insoluble fraction.

N) CRUDE OIL ANALYSIS

N-1) API GRAVITY

This can be performed upon large (hydrometer) and small (SG bottle, pycnometer) samples and even upon stains extracted from sediments (refractive index).

N-2) SULPHUR CONTENTS (ASTM E30-47)

N-3) POUR POINT (ASTM D97-66, IP15/67)

N-4) VISCOSITY (ASTM D445-72, IP71/75)

N-5) FRACTIONAL DISTILLATION

Graph of cumulative distillation yield against temperature. Five percent cuts taken for further analysis. Mass spectrometric studies of these fractions provide a detailed picture of the distribution of paraffins and of the various naphthene and aromatic groups within a crude, which is useful both for correlation and for refinery evaluation purposes.